DEPARTMENT OF ENVIRONMENTAL PROTECTION
Solid Waste Program Attn: Geraldine Travers
17 State House Station
Augusta, Maine 04333-0017
Telephone: (207) 287-7688

FOR DEP USE ONLY			
ATS ID:	Seq:	DEP ID:	Received by DEP:
Bureau: **S**	Type of Application: **WD**	Activity: **N**	Fees Paid:
Project Analyst:			Check No.:

APPLICATION FOR A NEW LANDFILL OR LANDFILL EXPANSION

This form shall be used to request approval for the establishment of a new landfill or landfill expansion, pursuant to 38 MRSA, Section 1301 et seq., and Chapter 401, sections 1-6 of Maine's Solid Waste Management Regulations.

Company and Address Information

Company Name: State of Maine, acting through the Department of Bureau of Administrative and Financial Services, Bureau of General Services, Juniper Ridge Landfill

Telephone: 207-624-7345

Applicant's Last Name: _____ First Name: _____

Contact Person: Lane Gould

Telephone: 207-624-7345

Applicant Name: State of Maine Bureau of General Services

Telephone: 207-624-7345

Mailing Address: 77 State House Station

Street Address: _____

Town: Augusta State: ME Zip: 04333

Agent/Consultant Name: NEWSME Landfill Operations, LLC

Telephone: 207-394-4376

Mailing Address: 2828 Bennoch Road

Street Address: _____

Town: Alton State: ME Zip: 04468

Billing Information

Name: NEWSME Landfill Operations, LLC

Mailing Address: 358 Emerson Mill Road

Street Address: _____

Town: Hampden State: ME Zip: 04444

Site/Activity Information

Solid Waste Facility License Application to expand existing Juniper Ridge Landfill solid waste boundary in Old Town by approximately 57 acres on BGS- owned land.

Project Description: Landfill - New

911 address: _____ GPS Location: UTM Northing: 4981477N UTM Easting: 19052142E

Directions: 0.1 mile west of Interstate 95 Exit 199 off Route 16.

PLEASE SEE PAGE 2 - SIGNATURE REQUIRED

SIGNATURE OF APPLICANT

By signing this application, the applicant certifies that he or she has: (1) published the public notice form once in a newspaper circulated in the area where the project is located, (2) sent a copy of the public notice form to the owners of property abutting the land upon which the project is located, (3) sent a copy of the public notice form to the chief municipal officer and chair of the municipal planning board of the municipality in which the project is located (4) filed a complete copy of this application in the municipal office of the municipality in which the project is located, (5) reviewed the instructions contained in this application form, and (6) reviewed the appropriate state laws that relate to the proposed project.

I certify under penalty of law that I have personally examined the information submitted in this document and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the information is true, accurate, and complete. I, the property owner or lessee, authorize the Department to enter the property that is the subject of this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

DATE: 11/18/2025

NAME: _____
(Applicant)

TITLE: Landfill Manager
(If other than applicant, attach letter of agent authorization.)

PLEASE CALL GERALDINE TRAVERS AT 207-287-7865 TO DETERMINE FEE FOR A NEW SECURE LANDFILL OR LANDFILL EXPANSION APPLICATION.

REQUIRED INFORMATION FOR APPLICATION FOR A NEW LANDFILL OR LANDFILL EXPANSION

Landfill applications must include all information necessary to address the requirements of Chapter 400 and Chapter 401. The application must include all pertinent data and calculations.

1. **Description**. Provide a brief description of the proposed landfill, including the types of waste to be handled and the municipalities to be served.

2. **Schedule**.

   a. Proposed date of start of construction: Spring 2027

   b. Proposed date of start of operation: Summer/Fall 2028

   c. Anticipated lifetime of facility use: 10 to 12 years

3. **Topographic Map**. Submit the most recent full size U.S.G.S. topographic map (7.5 minute series if available) showing the location of the proposed facility site, the waste handling area, the solid waste boundary and the property boundary. The map must include all surrounding areas within one mile of the proposed waste handling area.

4. **Title, Right, or Interest.** State the number of acres included in the facility site (see Chapter 400 for the definition of "facility site") . Attach copies of deeds, leases, contracts or agreements that establish the applicant's title, right or interest for the proposed site.

5. **Abutters**. Attach a copy of the municipal tax map with the proposed site and names of abutting property owners clearly marked. Also, include a list of the names and addresses of all the owners of property abutting the proposed facility site.

6. **Notice of intent to file.** Provide a copy of the completed "Notice of Intent to File" and evidence of compliance with the public notice requirements delineated in items 8, 9 and 10 of the instructions.

7. **Financial ability**. Submit evidence that affirmatively demonstrates the financial ability of the applicant to develop the project in a manner consistent with the State environmental standards and laws. Refer to Chapter 400, section 4.B for standards and submission requirements.

8. **Technical ability**. Include evidence that affirmatively demonstrates that the applicant has the technical ability to design, construct, operate, maintain and close the facility. If the proposed project will be managed by other than the applicant, state the persons or businesses that will be responsible for management and operation of the facility. This information should include the applicant's or operator's prior experience and/or appropriate training related to the nature of the proposed facility, and a description of the personnel who will be employed to design, construct, operate, maintain and close the facility.

9. **Disclosure statement**. Include the criminal or civil record of the owner, operator, or anyone having a legal interest in the applicant or the facility, as described in Chapter 400, Section 12(A) of the Maine Solid Waste Management Regulations.

10. **Other authorizations**. Identify all environmental or land use licenses, permits, or authorizations which are or may be required by any governmental agency. Indicate those now held with an asterisk(*); indicate when the remaining licenses and permits will be obtained.

Building permit: N/A	Waste discharge license: N/A	NRPA license: 1. NRPA Tier II Wetland Application 2. U.S. Army Corps Federal Wetland Permit 3. U.S. Army Corps Water Quality Certification
Plumbing permit: N/A	Highway entrance license: N/A	
Air emissions license: Part 70 Air Emissions LIcense	Other (describe): 1. City of Old Town - Solid Waste Licensing Ordinance (Fall 2027/Winter 2028) 2. U.S. Fish and Wildlife Service - Depredation Permit	

11. **Site and Surroundings Map.** Submit a site and surroundings map, or series of maps, that meets the requirements of Chapter 401, section 2.A(1).

12. **Prohibitive and Restrictive Siting Criteria.** Submit information sufficient to demonstrate that the siting of the landfill facility meets the prohibitive and restrictive siting criteria in Chapter 401, section 1.C(2) and 1.C(3).

13. **Aerial Photographs.** Submit aerial photographs in conformance with the requirements in Chapter 401, section 2.A(2).

14. **Site Assessment Report.** Submit a site assessment report in conformance with the requirements of Chapter 401, section 2.C.

15. **Engineering Design and Report.** Submit an engineering design and report sufficient to meet the standards and requirements of Chapter 401, sections 2.D and 2.F, and section 2.E if applicable.

16. **Contaminant Transport Analysis.** Submit a contaminant transport analysis conducted and reported in conformance with the requirements of Chapter 401, section 2.G.

17. **Plan View and Profile Drawings.** Include plan view and profile drawings prepared to meet the requirements of Chapter 401, section 2.H.

18. **Quality Assurance Plan.** Submit a quality assurance plan that meets the requirements of Chapter 401, section 2.I.

19. **Construction Contract Bid Documents.** Submit construction contract bid documents n accordance with the requirements of Chapter 401, section 2.J.

20. **Water Quality Report and Proposed Monitoring Plan.** Submit a site characterization water quality report and a proposed water quality monitoring program prepared in accordance with the requirements of Chapter 401, section 2.K and Chapter 405.

21. **Traffic Movement**. Submit information in compliance with the submission requirements of Chapter 400, section 4.D(2) to demonstrate that the facility will meet the standards of Chapter 400, Section 4.D(1).

22. **Fitting Harmoniously into the Natural Environment.** Submit evidence to affirmatively demonstrate that the proposed facility will meet the standards in Chapter 400, section 4.E(1) and that the facility will fit harmoniously into the natural environment. This must include the information required in Chapter 400, section 4.E(2).

23. **Existing Uses and Scenic Character.** Describe the existing use of the site. Also, provide information sufficient to meet the submission requirements of Chapter 400, section 4.F(2) and to demonstrate that the standards of Chapter 400, section 4.F(1) will be met by the proposed facility.

24. **Air Quality.** Provide information sufficient to meet the submission requirements of Chapter 400, section 4.G(2), and to demonstrate that the standards of Chapter 400, section 4.G(1) will be met by the proposed facility.

25. **Surface Water Quality.** Provide information sufficient to meet the submission requirements of Chapter 400, section 4.H(2), and to demonstrate that the standards of Chapter 400, section 4.H(1) will be met by the proposed facility.

26. Other Natural Resources. Provide information sufficient to meet the submission requirements of Chapter 400, section 4.I and to demonstrate that the standards of Chapter 400, section 4.I(1) will be met by the proposed facility.

27. Adequate Provisions for Utilities. Provide information sufficient to meet the submission requirements of Chapter 400, section 4.L(2), and to demonstrate that the standards of Chapter 400, section 4.L(1) will be met by the proposed facility.

28. Recycling & Source Reduction. Submit information to demonstrate that the volume of waste and the risks related to its handling and disposal have been reduced to the maximum practical extent by recycling and source reduction prior to being landfilled. This includes submitting information sufficient to meet the requirements of Chapter 400, section 6.B.

29. Operations manual. Submit an operations manual, suitable for use by the facility, which includes at a minimum all information that would enable supervisory and operating personnel and persons evaluating the operation of the facility to determine what sequence of operation, plans, diagrams, policies, procedures, and legal requirements are to be followed for orderly and successful operation on a daily and yearly basis. The operations manual must address all the requirements specified in Chapter 401, section 4 and must include a Hazardous and Special Waste Exclusion Plan in conformance with the requirements of Chapter 400, section 9. Variances from operational requirements may be requested pursuant to Chapter 400, Section 13 of the Solid Waste Management Regulations.

30. If a variance or variances are being requested as part of this application, specify the nature of the variance and the justification for why it should be granted. Refer to Chapter 400, Section 13 of the Solid Waste Management Rules for the standards and submissions required in this variance application. Variances are not allowed to the performance standards and prohibitive siting criteria contained in Chapter 401, section 1.C.

31. Host Community Agreement. If the proposed landfill is a commercial disposal facility, please submit information demonstrating that you have met the host community agreement requirements of Chapter 400, section 7.A.

32. Liability Insurance. Submit proof of liability insurance for sudden and accidental occurrences as required in Chapter 400, section 10. (Applicants who are public entities are exempt from this requirement.)

33. Financial Assurance. Submit all information and documentation necessary to demonstrate that the owner or operator of the proposed landfill is providing sufficient financial assurance in conformance with the requirements of Chapter 400, section 11.

END

UPS CampusShip: View/Print Label

1. **Ensure there are no other shipping or tracking labels attached to your package.** Select the Print button on the print dialog box that appears. Note: If your browser does not support this function select Print from the File menu to print the label.

2. **Fold the printed label at the solid line below.** Place the label in a UPS Shipping Pouch. If you do not have a pouch, affix the folded label using clear plastic shipping tape over the entire label.

3. **GETTING YOUR SHIPMENT TO UPS**
   Customers with a Daily Pickup
   Your driver will pickup your shipment(s) as usual.

   Customers without a Daily Pickup
   Schedule a same day or future day Pickup to have a UPS driver pickup all your CampusShip packages.
   Hand the package to any UPS driver in your area.
   Take your package to any location of The UPS Store®, UPS Drop Box, UPS Customer Center, Staples® or Authorized Shipping Outlet near you. Items sent via UPS Return Services(SM) (including via Ground) are also accepted at Drop Boxes. To find the location nearest you, please visit the Resources area of CampusShip and select UPS Locations.

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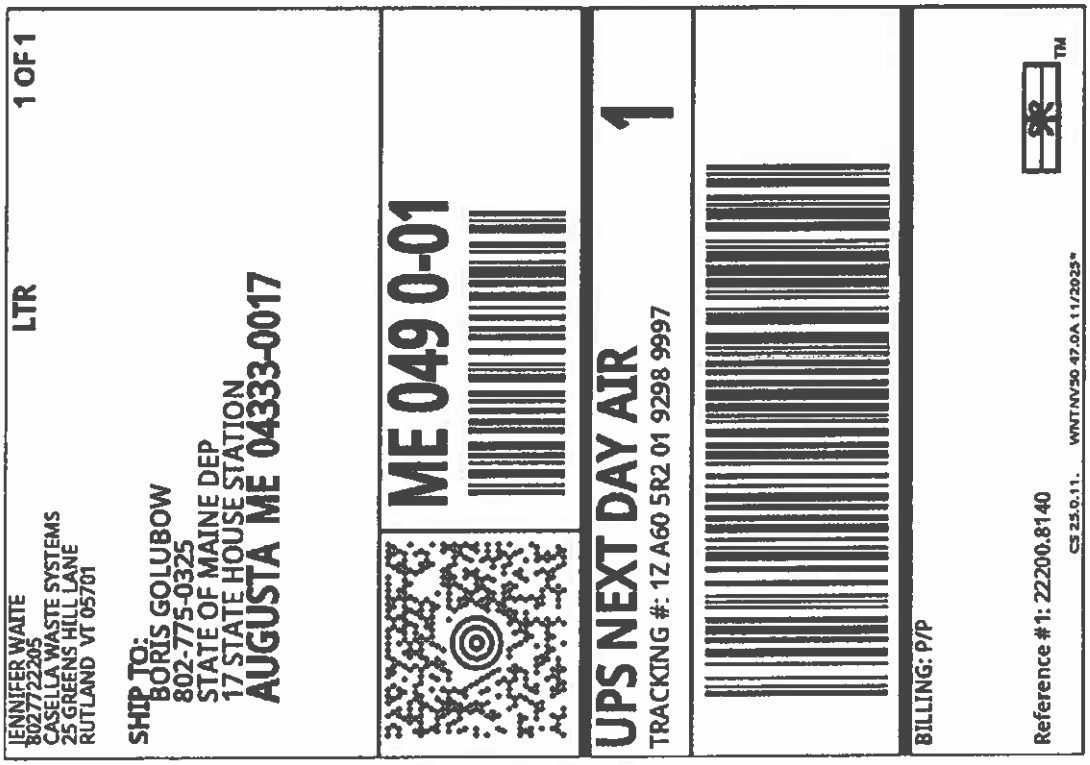


Casella Waste System, Inc.

TREASURER, STATE OF MAINE

9389028

11/20/2025

Date	Invoice	Memo	Orig. Amt	Amt. Due	Amount
11/20/2025	Bill #CKR 11/18/25 MAINE TREASU	PROCESSING & LICENSE FEE	31,652.00		31,652.00
				PAGE 1 OF 1	31,652.00

Send all statements to ap.statements@casella.com

THE FACE OF THIS CHECK HAS A SECURITY VOID BACKGROUND PATTERN AND MICROPRINT BORDERS - DO NOT CASH IF THE WORK VOID IS VISIBLE

casella

Casella Waste System, Inc.
P.O Box 866
Rutland, Vermont 05702

Bank of America

52-153 / 112

9389028

DATE: 11/20/2025

****$31,652.00****

PAY Thirty-One Thousand Six Hundred Fifty-Two and 00/100 DOLLARS

TO THE ORDER OF
TREASURER, STATE OF MAINE
DEPT. OF ENVIRONMENTAL PROTECTION, NRSC
155 STATE HOUSE STATION
AUGUSTA ME 04333-0155
UNITED STATES

Authorized Signature

[redacted]

Casella Waste System, Inc. 9389079

TREASURER, STATE OF MAINE 11/20/2025

Date	Invoice	Memo	Orig. Amt	Amt. Due	Amount
11/20/2025	Bill #CKR 11/18/25 STATE OF ME	OLD TOWN INTERVENOR GRANT	50,000.00		50,000.00

Send all statements to ap.statements@casella.com

PAGE 1 OF 1 50,000.00

THE FACE OF THIS CHECK HAS A SECURITY VOID BACKGROUND PATTERN AND MICROPRINT BORDERS - DO NOT CASH IF THE WORK VOID IS VISIBLE

casella

Casella Waste System, Inc.
P.O Box 866
Rutland, Vermont 05702

Bank of America 52-153 / 112

9389079

DATE: 11/20/2025

$50,000.00

PAY Fifty Thousand and 00/100 DOLLARS

TO THE ORDER OF
TREASURER, STATE OF MAINE
DEPT. OF ENVIRONMENTAL PROTECTION, NRSC
155 STATE HOUSE STATION
AUGUSTA ME 04333-0155
UNITED STATES

Authorized Signature

[redacted]

Casella Waste System, Inc.

TREASURER, STATE OF MAINE

9388991

11/20/2025

Date	Invoice	Memo	Orig. Amt	Amt. Due	Amount
11/20/2025	Bill #CKR 11/18/25 STATE OF MAI	NRPA APPLICATION FEE	7,449.22		7,449.22
				PAGE 1 OF 1	7,449.22

Send all statements to ap.statements@casella.com

THE FACE OF THIS CHECK HAS A SECURITY VOID BACKGROUND PATTERN AND MICROPRINT BORDERS - DO NOT CASH IF THE WORK VOID IS VISIBLE

casella

Casella Waste System, Inc.
P.O Box 866
Rutland, Vermont 05702

Bank of America

52-153 / 112

9388991

DATE: 11/20/2025

$7,449.22

PAY Seven Thousand Four Hundred Forty-Nine and 22/100 DOLLARS

TO THE ORDER OF
TREASURER, STATE OF MAINE
DEPT. OF ENVIRONMENTAL PROTECTION, NRSC
155 STATE HOUSE STATION
AUGUSTA ME 04333-0155
UNITED STATES

Authorized Signature

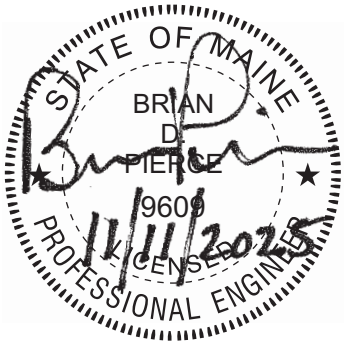
[redacted]

PHASE II EXPANSION APPLICATION
JUNIPER RIDGE LANDFILL
VOLUME I – MAINE SOLID WASTE MANAGEMENT RULES
CHAPTER 400 – GENERAL LICENSING CRITERIA
CHAPTER 401 – GENERAL LICENSING REQUIREMENTS
CHAPTER 2 – RULES CONCERNING THE PROCESSING OF APPLICATIONS

REPORT AND APPENDICES A - S

Submitted by

STATE OF MAINE BUREAU OF GENERAL SERVICES
as Owner
and
NEWSME LANDFILL OPERATIONS, LLC
as Operator



November 2025

4 Blanchard Road
P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 sme-engineers.com

SME
SEVEE & MAHER
ENGINEERS

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PHASE II EXPANSION APPLICATION
JUNIPER RIDGE LANDFILL
VOLUME I
MAINE SOLID WASTE MANAGEMENT REGULATIONS

1.0 INTRODUCTION

The Maine Bureau of General Services (BGS), as the owner of the Juniper Ridge Landfill (JRL) in Old Town, Maine, and NEWSME Landfill Operations, LLC (NEWSME), as operator of the JRL (collectively, the Applicants), have prepared this Application for a second expansion of the JRL to provide an additional 11.9 million cubic yards (MCY) of disposal capacity (Phase II Expansion) to meet the State of Maine's short- and long-term solid waste disposal needs. This Application has been prepared pursuant to the Maine Solid Waste Management Act, Title 38, M.R.S. §§ 1301 through 1310-AA, the Maine Department of Environmental Protection (MEDEP) Rules Concerning the Processing of Applications, 06-096 CMR 2, and the Maine Solid Waste Management Rules (Rules), 06-096-CMR Chapter 400, which was last revised February 9, 2021, and Chapters 401 and 405, which were last revised April 12, 2015. This Application consists of five separately bound volumes, as described Section 1.2 of this document.

1.1 Overview

The BGS owns and NEWSME operates the JRL, which is located on a 780-acre parcel in Old Town, Maine (see Figure 1-1). The JRL was initially approved in MEDEP Board Order No. S-20700-7A-A-N and was constructed in 1996 for use by James River Corporation's papermill in Old Town, Maine. The State of Maine purchased the JRL in 2004 and contracted with NEWSME, a wholly owned subsidiary of Casella Waste Systems, Inc. (CWS), to operate the JRL under an Operating Services Agreement (OSA) that was entered into between the State of Maine and CWS on February 5, 2004, and amended on July 24, 2006, November 2, 2006, and December 21, 2015. A copy of the OSA, as amended, is included in Appendix A-21.

On April 9, 2004, the MEDEP approved an amendment application (Department Order S-020700-WD-N-A) for a vertical increase in the final elevation of the original footprint and approved disposal of additional waste streams. The license was subsequently affirmed by the MEDEP Board on October 21, 2004. On June 1, 2017, the MEDEP issued Board Order No. S-020700-WD-BI-N and L-19015-TG-D-N approving the Phase I Expansion (approximately 54 acres), described initially as Cells 11 through 16. A copy of this Order is attached in Appendix A-1.

Since 2004, the JRL has been an integral part of the State of Maine's overall solid waste management program, providing environmentally sound disposal capacity for non-hazardous solid waste generated in the State consistent with the State's solid waste management hierarchy. In calendar years 2022 and 2023, the JRL accepted approximately 934,000 and 834,000 tons, respectively, of non-hazardous solid waste generated throughout the State of Maine. According to data in the Maine Materials Management Plan:

2024 State Waste Management and Recycling Plan Update and 2022 Waste Generation and Disposal Capacity Report (Materials Management Plan), which is provided in Appendix B-1, the JRL provided approximately 52 percent of the overall solid waste disposal capacity needs for the State of Maine from 2018 to 2022.

At the end of 2023, the remaining permitted capacity at the JRL was approximately 5.4 MCY, representing about five years of disposal capacity using 2023 utilization rates.[1]

The proposed Phase II Expansion, which will ultimately expand the solid waste footprint at the JRL by approximately an additional 57 acres (to approximately 179 acres in total) and, will be developed in a phased manner similar to the permitted landfill. BGS and NEWSME project that the first cell of the Phase II Expansion may need to be constructed during the 2027 construction season to ensure that the State does not run out of disposal capacity in early 2028. If construction is delayed beyond this timeframe, it is anticipated that the JRL may be filled to capacity in the first quarter of 2028. The Phase II Expansion is expected to extend the life of the JRL facility by about 10 to 12 years. The 11.9 million cubic yards of disposal capacity included in the Phase II Expansion assumes the waste is filled to an elevation of approximately 385 feet above mean sea level (ft-MSL), as permitted for the existing landfill, using 2.7 horizontal to 1 vertical (2.7:1) exterior sideslopes on the north, east, and west sides of the Phase II Expansion, and filling on the northern slope of the currently permitted expansion to fully utilize all available space. As discussed in greater detail below, BGS and NEWSME obtained a Public Benefit Determination (PBD) for the Phase II Expansion from the MEDEP on October 2, 2024, as required by 06-096 CMR 400.5 of the Rules.

The Phase II Expansion is designed with primary and secondary liners, leak detection, leachate and landfill gas collection systems, and an underdrain system under approximately 36.2 acres of the proposed Phase II Expansion footprint. The Phase II Expansion will be constructed with separate leachate collection and leak detection sumps on the north, east, and west sides of the landfill. These separate leak detection systems will facilitate the evaluation of primary liner performance of separate areas of the landfill. Development of the Phase II Expansion will also include the construction of additional site infrastructure consisting of stormwater management and erosion control structures, an additional leachate tank, leachate pump stations, force mains, landfill gas header pipes, and additional overhead electrical line. The Phase II Expansion will extend the existing landfill's primary site access road, leachate storage and transport systems, and landfill gas collection systems. Landfill gas generated by the facility will be either used in the recently completed renewable natural gas facility at the site or combusted in the landfill's flare. Leachate from the JRL, including from the Phase II Expansion, will continue to be treated off-site at the wastewater treatment plant (WWTP) at the Nine Dragons Papermill in Old Town or at other permitted wastewater treatment facilities, subject to a condition of approval in the PBD requiring design and installation of a MEDEP-approved system for the treatment of leachate for per- and polyfluoroalkyl substances (PFAS) prior to expansion operations. Figure 1-2 depicts the site development plan for the Phase II Expansion.

[1] In 2023, the capacity consumed at JRL was 975,775 cubic yards.

Figure 1-3 depicts the final grading plan for the entire landfill, including the original landfill footprint, the initial Expansion, and the Phase II Expansion.

1.2 Application Structure

The Application contains the information and exhibits to demonstrate that the Phase II Expansion is designed based on the site's characteristics and will be constructed and operated so that it will not do any of the following:

- Unreasonably adversely affect protected natural resources or rare, threatened and endangered plant and animal species;
- Unreasonably adversely affect existing uses and scenic character;
- Unreasonably adversely affect surface water quality of any waters of the State;
- Cause unreasonable sedimentation or erosion of soil or pose an unreasonable risk of discharge to a significant groundwater aquifer;
- Have an unreasonable adverse effect on existing or proposed utilities in the municipality or area;
- Unreasonably cause or increase flooding on-site or on adjacent properties;
- Unreasonably adversely affect air quality;
- Constitute a hazard to health or welfare; or
- Create a nuisance.

The Application consists of five separately bound volumes. This volume (Volume I) addresses the MEDEP's general siting and licensing requirements, as provided in the following laws and regulations:

- 06-096 CMR 2, the MEDEP Rules Concerning the Processing of Applications;
- 06-096 CMR 400, 401, and 405 of the MEDEP Solid Waste Rules;
- Title 38, M.R.S. § 1310-N of the Solid Waste Management Act; and
- Title 38, M.R.S. § 2101 of the Solid Waste Management Act.

Volume II, the Site Assessment Report, describes site investigations and the geologic and hydrogeologic setting of the site based on available published and site-specific geologic and hydrogeologic data, the time-of-travel analysis required by 06-096 CMR 401.2.C.(2) of the Rules, and associated design of the augmented liner.

Volume III, the Design Report, describes the relevant criteria considered in the design of the Phase II Expansion. The Design Report contains the plans and specifications for the landfill; describes the landfill

component design; and includes calculations relative to the composite liners, leachate collection, leak detection, underdrain, and landfill gas systems; phased development and operations; geotechnical evaluations of expansion settlement and stability; surface water and erosion control; leachate and landfill gas management; waste compatibility; and landfill construction. The Design Report also contains the contaminant transport analysis required by 06-096 CMR 401.2.G of the Rules.

Volume IV, the Operations Manual, describes the landfill operations, including the Phase II Expansion operations. Most of the policies and procedures used to operate the Phase II Expansion will be a continuation of those currently employed at the JRL, which comply with the operating requirements of 06-096 CMR 401.4.C of the Rules. The manual has been updated as necessary to address items specific to the Phase II Expansion such as cell development and temporary cover plans, the Leak Response Action Plan (LRAP), the Environmental Monitoring Plan (EMP), landfill gas operations manual, and inspection plans.

The last volume of the Application, Volume V, contains a Natural Resources Protection Act (NRPA) Tier 3 Wetland Application, filed pursuant to Title 38, M.R.S. §§ 480-A to 480-KK, and the U.S. Army Corps of Engineers (USACE) Federal Wetlands Permit Application, filed pursuant to the Clean Water Act, 33 U.S.C. §§ 1251 to 1387, for the proposed development and the unavoidable freshwater wetland impacts associated with the development of the Phase II Expansion. Volume V also contains a Natural Resources Protection Act (NRPA) Permit-by-Rule Notification Form for development of the landfill access road and detention ponds that is planned to occur between 25 feet and 75 feet of the adjacent Wetlands of Special Significance.

Table 1-1 provides a summary of the contents of this Application, referenced to the applicable sections of the Rules and where the supporting information can be found in the Application.

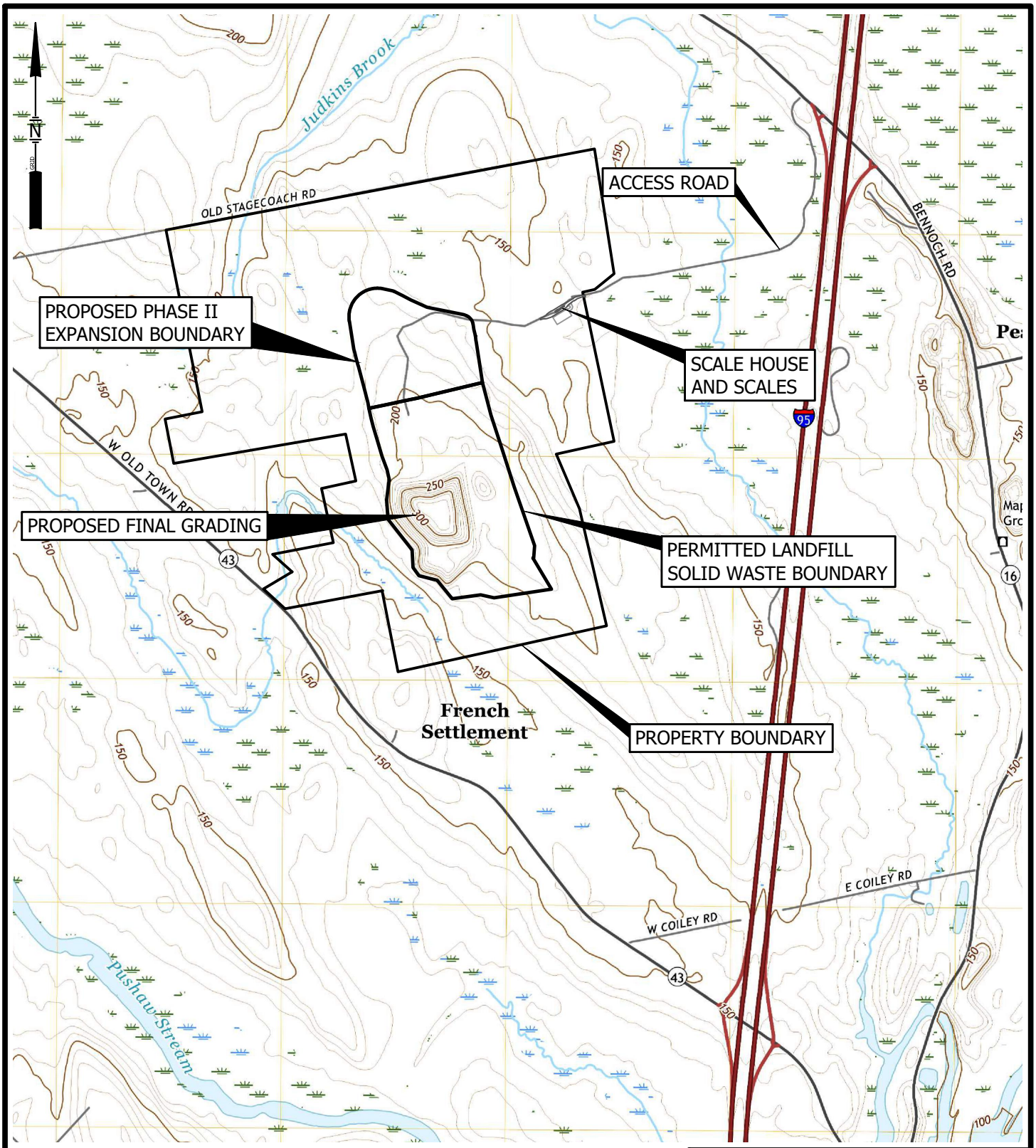
TABLE 1-1

SUMMARY OF APPLICATION CONTENTS

Law/Rule	Item	Location in Application
Chapter 400		
400.4.A	Title, Right and Interest	Volume I Section 3.1 & Appendix C
400.4.B	Financial Ability	Volume I Section 3.2 Appendix D
400.4.C	Technical Ability	Volume I Section 3.3 & Appendix E
400.4.D	Traffic Movement	Volume I Section 3.4 & Appendix F
400.4.E	Fitting the Solid Waste Facility Harmoniously into the Natural Environment	Volume I Sections 3.5 & Appendix G
400.4.F	Existing Uses and Scenic Character	Volume I Section 3.6 & Appendices G, H, & I
400.4.G	Air Quality	Volume I Section 3.7
400.4.H	Surface Water Quality	Volume I Section 3.8
400.4.I	Natural Resources	Volume I Section 3.9 & Volume V
400.4.J	Erosion Control Plan	Volume I Section 3.10 & Appendix L
400.4.K	No Discharge Significant Groundwater Aquifer	Volume I Section 3.11
400.4.L	Utilities	Volume I Section 3.12
400.4.M	Flooding, Stormwater Management	Volume I Section 3.13 & Appendix K
400.4.N	Solid Waste Management Hierarchy	Volume I Section 3.14
400.5	Public Benefit	Volume I Section 4.0
400.6	Recycling	Volume I Section 5.0
400.7.B	Host Community Agreements and Municipal Intervenor Grants	Volume I Section 6.0
400.9	Hazardous & Special Waste Handling & Exclusion Plan	Volume I Section 7 & Volume IV Section 7.16
400.10	Liability Insurance	Volume I Section 8.0 & Appendix Q
400.11	Financial Assurance for Closure and Post-Closure Funding	Volume I Section 9.0 & Appendix D-2
400.12	Criminal and Civil Disclosure Statement	Volume I Section 10.0 & Appendix R
400.13	Variances	Volume I Section 11.0
401.1.C.1 (Performance Standards)		
401.1.C.1.a	Protection Against Groundwater Contamination	Volume I Section 12.2
401.1.C.1.b	Adequate Airport Runway Setback	Volume I Section 12.3
401.1.C.1.c	Sufficient Time of Travel to Sensitive Receptors	Volume I Section 12.4 & Volume II Section 6.0
401.1.C.1.d	Protection of Sensitive Receptors from Contaminant Releases	Volume I Section 12.5 & Volume III Section 4.0
401.1.C.1.e	Ability to Monitor Facility	Volume I Section 12.6 & Volume II Section 6.0
401.1.C.2 (Prohibitive Siting Standards)		
401.1.C.2.a	1,000 Feet of Class AA or SA Waters	Volume I Section 3.6
401.1.C.2.b	Not Overlie or Within 300 Feet Significant Sand and Gravel Aquifer	Volume I Section 3.6 & Volume II Sections 2. & 5.5
401.1.C.2.c	Within 200 Feet of Holocene Fault	Volume I Section 3.6 & Volume II Section 4.2
401.1.C.2.d	Not in, on, or over Coastal Sand Dune, Coastal Wetland, or Fragile Mountain Area	Volume I Section 3.6
401.1.C.3 (Restrictive Siting Criteria)		
401.1.C.3.a	Set-Backs	Volume I Section 3.6
401.1.C.3.b	In-place Soil Hydraulic Conductivity	Volume II Section 3.3
401.1.C.3.c	Site Monitoring	Volume II Section 7.0
401.1.C.3.d	100 Year Flood Plain	Volume II Section 2.4
401.1.C.3.e	Overlie Unstable Area	Volume III Section 3.1
401.1.C.3.f	Significant Wildlife Habitat	Volume I Section 3.5
401.2 (Application Requirements)		
401.2.A.1	Site & Surrounding Map	Volume I Appendix N
401.2.A.2	Aerial Photographs	Volume I Appendix S
401.2.B.1	Geologic Investigation	Volume II Section 3.0
401.2.B.2	Ground and Surface Water Investigation	Volume II Section 3.0
401.2.B.3	Geotechnical Investigation	Volume III Section 3.1

TABLE 1-1 (cont'd)

Law/Rule	Item	Location in Application
401.2.C (Site Assessment Report)		
401.2.C.1	Maps Drawings and 06-096 CMR	Volume II
401.2.C.2	Time of Travel Calculations	Volume II Section 7.0 and Appendix V
401.2.C.3	Geotechnical Results	Volume III Section 3.1 and Appendix F
401.2 (Design Standards)		
401.2.D(1)-(3)	Liner System Requirement	Volume III Section 2.1
401.2.D(4)	Leachate Conveyance and Storage	Volume III Section 2.2
401.2.D(5)	Seismic Impact Zone	Volume III Section 2.3
401.2.D(6)	Phased Operations	Volume III Section 2.4
401.2.F(1)	Stability	Volume III Section 3.1
401.2.F(2)	Settlement	Volume III Section 3.1
401.2.F(3)	Stability and Settlement Monitoring Plan	Volume III Section 3.1
401.2.F(4)	Water Balance	Volume III Section 3.2
401.2.F(5)	Leachate Management	Volume III Section 3.3
401.2.F(6)	Gas Management	Volume III Section 3.4 & Appendix I
401.2.F(7)	Cell Development Plans	Volume III Section 3.5
401.2.F(8)	Phased Final Cover	Volume III Section 3.6
401.2.F(9)	Storage Areas	Volume III Section 3.7
401.2.F(10)	Waste Characterization/Compatibility	Volume III Section 3.8
401.2.F(11)	Surface Water Control Plan	Volume III Section 3.9 & Appendix K & L of Volume I
401.2.F(12)	Test Pad Submission	Volume III Section 3.10
401.2.F(13)	Special Construction Requirements	Volume III Section 3.11
401.2.G	Contaminant Transport Analysis	Volume III Section 4 & Appendix J
401.2.H	Plan View and Profile View Drawings	Volume III Section 5 & Appendix A
401.2.I	QA Plan	Volume III Section 6 & Appendix B
401.2.J	Bid Documents	Volume III Section 7 & Appendix C
401.2.K	Water Quality Monitoring	Volume II Section 7 & Volume IV Appendix I
401.2.L/401.4	Operations Manual	Volume IV
401.3	Landfill Construction	Volume III Section 10.0
405 (Monitoring and Waste Characterization)		
405.2.A	Standards for Groundwater Monitoring	Volume II Section 7 & Volume IV Appendix I
405.2.B	Standards for Surface Water Monitoring	Volume II Section 7 & Volume IV Appendix I
405.2.C	Types of Water Quality Monitoring Programs	Volume II Section 7 & Volume IV Appendix I
405.3	Standards for Ground and Surface Water Data Evaluation and Reporting	Volume II Section 7 & Volume IV Appendix I
405.4	Leachate, Leachate Collection, Leachate Detection and Leachate Treatment Residual	Volume II Section 7 & Volume IV Appendix I
405.5	Standards for Installation, Construction and Maintenance of Wells and Piezometers	Volume II Section 7 & Volume IV Appendix I
405.6	Solid Waste Characterization Plan	Volume IV Appendix G



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE
OLD TOWN, MAINE - 2021
GREENBUSH, MAINE - 2021

1000 0 2000 FEET

DWG: SITELOC LMN: USGS MAP CTB: SME-STD REV: 5/29/2025

FIGURE 1-1
SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
SEVEE & MAHER
ENGINEERS

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NOTE:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC, NORRIDGEWOCK, MAINE. PHOTO DATE 5/21/2024. CONTROL POINTS BASED ON SURVEY BY PLISGA & DAY LAND SURVEYORS OF BANGOR, MAINE, ON APRIL 24, 2025. VERTICAL DATUM: ASSUMED. SUBTRACT 0.34 FEET FROM ELEVATIONS LISTED TO CONVERT ELEVATIONS TO NAVD 88. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY SEVEE & MAHER ENGINEERS, INC., OF CUMBERLAND, MAINE. SEE NOTE 1 ON DWG C-100.
2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004, STANTEC CONSULTING SERVICES 2008, 2014, 2015, AND BRI ENVIRONMENTAL IN 2024.
3. BORINGS AND TEST PIT LOCATIONS FIELD SURVEYED BY SEVEE & MAHER ENGINEERS, INC. OF CUMBERLAND, MAINE.
4. BASE GRADES REPRESENT THE PREPARED SUBGRADE SURFACE BELOW THE UNDERDRAIN OR AUGMENTED LAYER. IN LOCATIONS THAT ARE NOT IDENTIFIED TO RECEIVE UNDERDRAIN OR AUGMENTED LINER, ONE FOOT OF NATIVE SOILS SHALL REMAIN IN PLACE ABOVE THE BASE GRADE. THE BASE LINER SYSTEM SHALL BE CONSTRUCTED ON THE RESULTING GRADE ABOVE THE UNDERDRAIN, AUGMENTED LINER, OR ONE FOOT OF NATIVE SOILS.
5. CELL 17 BASE GRADES REPRESENT PREPARED SUBGRADE PRIOR TO CONSTRUCTING THE LINER SYSTEM WITHIN THE LANDFILL LINER LIMITS. CELL 17 BASE GRADE SHOWN OUTSIDE THE LANDFILL REPRESENT THE PREPARED SUBGRADE PRIOR TO CONSTRUCTING THE ACCESS ROAD. CELL 17 HAS NOT BEEN CONSTRUCTED AT THE TIME THESE DRAWINGS WERE PREPARED.
6. SPECIAL FLOOD HAZARD ZONE PER FEMA PANEL 23019C1926D.

EXISTING SCALE HOUSE INFRASTRUCTURE AREA
250' SIGNIFICANT VERNAL POOL CRITICAL TERRESTRIAL HABITAT (TYP)
BEDROCK OUTCROP (TYP)
PROPERTY LINE (TYP)
END OF EXISTING LEACHATE FORCE MAIN
DETENTION POND 11R
PROPOSED SOLID WASTE LIMIT (TYP)
EXISTING OVERHEAD ELECTRIC LINE (TYP)
PERMITTED TILL BORROW PIT
PERMITTED WOOD WASTE HANDLING AREA
PROPOSED WOOD STORAGE LOT
SUBSURFACE WASTEWATER DISPOSAL FIELD
APPROXIMATE LOCATION OF PROPOSED PFAS TREATMENT PLANT
26'-WIDE PAVED ACCESS ROAD (TYP)
CELL 18 PUMP STATION
GRAVEL UTILITY ACCESS ROADS (TYP)
VERNAL POOL (TYP)
LFG KNOCKOUT STRUCTURE (TYP)
CELL 14 PUMP STATION
CELL 13 PUMP STATION
CELL 12 PUMP STATION
PRIMARY ACCESS ROAD (TYP)
DETENTION POND 10
DETENTION POND 9
WOOD STORAGE FACILITY
2 ACRE
1 ACRE
MAINTENANCE BUILDINGS
RNG TREATMENT FACILITY POND
LFG TREATMENT FACILITY
WATER SUPPLY WELL
RENEWABLE NATURAL GAS (RNG) FACILITY
LFG FLARE LOCATION
LIMIT OF BRI WETLANDS DELINEATION (TYP) SEE NOTE 2
250' SIGNIFICANT VERNAL POOL CRITICAL TERRESTRIAL HABITAT (TYP)
DETENTION POND 14
FORCE MAIN VAULT (TYP)
CATCH BASIN AND CULVERT (TYP)
CELL 11 PUMP STATION
RIPRAP DITCH (TYP)
DETENTION POND 11
RIPRAP CB INLET
LEACHATE STORAGE TANK PUMP STATION
LEACHATE STORAGE TANK 1
PROPOSED LEACHATE STORAGE TANK 2
PROPOSED LEACHATE STORAGE TANK
PROPOSED GUARDRAIL (TYP)
24" LFG HEADER (TYP)
LFG KNOCKOUT STRUCTURE (TYP)
UTILITY MANHOLE (TYP)
DETENTION POND 6
PROPOSED LANDFILL BASE GRADES (TYP) SEE NOTE 4
PROPOSED CELL LIMITS (TYP)
LIMIT OF PHASE I EXPANSION LINER (TYP)
CELL 8 PUMP STATION
EXISTING CELLS LINER LIMIT (TYP)
(2) 24" HDPE CULVERTS
PERMANENT LANDFILL ACCESS ROAD
100-YEAR FLOOD ZONE SPECIAL FLOOD HAZARD AREA (TYP) SEE NOTE 6
DETENTION POND 13
CELL 20 PUMP STATION
25-FOOT SETBACK FROM WOSS
FENCE (TYP)
8"x12" LEACHATE FORCEMAIN
PROPERTY LINE (TYP)
ELECTRICAL MANHOLE (TYP)
20'-WIDE GRAVEL ACCESS ROAD (TYP)
DEED RESTRICTION (TYP)
DETENTION POND 2
UNDERGROUND ELECTRIC (TYP)
LFG KNOCKOUT STRUCTURE AND VALVES
CELL 5 PUMP STATION
CELL 4 PUMP STATION
CELL 19 PUMP STATION
DETENTION POND 12
CELL 16 PUMP STATION
EXISTING EMH (TYP)
CELL 17 BASE GRADES (SEE NOTE 5)
EXISTING FORCEMAIN VAULT (TYP)
CELL 15 PUMP STATION
RIPRAP DITCH (TYP)
EXISTING 24" DIA LANDFILL GAS PIPE
DETENTION POND 1A
8" GRAVITY SEWER IS ABANDONED
WATER LOADING RACK
DETENTION POND 1
25-FOOT STREAM SETBACK

200 0 400 FEE

DWG: BASE LMN: SITE-DEV-FIG CTB: SME-STD-HALF.CTB JOB#: 240101 REV: 11/6/2025

FIGURE 1-2
SITE DEVELOPMENT PLAN
PHASE II EXPANSION
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SME
SEVEE & MAHER ENGINEERS

\\Server\cds\Casella\OldTownLandfill\Expansion\Phase II Expansion\Acad\Plans\BASE.dwg, B_FIG 1-2, 11/6/2025 12:04:16 PM, sjm

NOTE:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC, NORRIDGEWOCK, MAINE. PHOTO DATE 5/21/2024. CONTROL POINTS BASED ON SURVEY BY PLISGA & DAY LAND SURVEYORS OF BANGOR, MAINE, ON APRIL 24, 2025. VERTICAL DATUM: ASSUMED. SUBTRACT 0.34 FEET FROM ELEVATIONS LISTED TO CONVERT ELEVATIONS TO NAVD 88. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY SEVEE & MAHER ENGINEERS, INC., OF CUMBERLAND, MAINE. SEE NOTE 1 ON DWG C-100.
2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004, STANTEC CONSULTING SERVICES 2008, 2014, 2015, AND BRI ENVIRONMENTAL IN 2024.
3. SPECIAL FLOOD HAZARD ZONE PER FEMA PANEL 23019C1926D.

EXISTING SCALE HOUSE INFRASTRUCTURE AREA
250' SIGNIFICANT VERNAL POOL CRITICAL TERRESTRIAL HABITAT
BEDROCK OUTCROP (TYP)
PROPERTY LINE (TYP)
END OF EXISTING LEACHATE FORCE MAIN
DETENTION POND 11R
PROPOSED SOLID WASTE LIMIT (TYP)
EXISTING OVERHEAD ELECTRIC LINE (TYP)
PERMITTED TILL BORROW PIT
PERMITTED WOOD WASTE HANDLING AREA
PROPOSED WOOD STORAGE LOT
SUBSURFACE WASTEWATER DISPOSAL FIELD
APPROXIMATE LOCATION OF PROPOSED PFAS TREATMENT PLANT
RNG TREATMENT FACILITY POND
LFG TREATMENT FACILITY
MAINTENANCE BUILDINGS
DETENTION POND 9
WOOD STORAGE FACILITY
26'-WIDE PAVED ACCESS ROAD (TYP)
CELL 18 PUMP STATION
GRAVEL UTILITY ACCESS ROADS (TYP)
VERNAL POOL (TYP)
LFG KNOCKOUT STRUCTURE (TYP)
DETENTION POND 10
CELL 12 PUMP STATION
PRIMARY ACCESS ROAD (TYP)
CELL 14 PUMP STATION
CELL 13 PUMP STATION
FORCE MAIN VAULT (TYP)
CATCH BASIN AND CULVERT (TYP)
WATER SUPPLY WELL
RENEWABLE NATURAL GAS (RNG) FACILITY
LFG FLARE LOCATION
LIMIT OF BRI WETLANDS DELINEATION (TYP) SEE NOTE 2
250' SIGNIFICANT VERNAL POOL CRITICAL TERRESTRIAL HABITAT
DETENTION POND 14
CELL 11 PUMP STATION
LEACHATE STORAGE TANK PUMP STATION
LEACHATE STORAGE TANK 1
PROPOSED LEACHATE STORAGE TANK 2
PROPOSED GUARDRAIL (TYP)
RIPRAP DOWNSPOUT (TYP)
PROPOSED LEACHATE STORAGE TANK
24" LFG HEADER (TYP)
LFG KNOCKOUT STRUCTURE (TYP)
UTILITY MANHOLE (TYP)
DETENTION POND 6
100-YEAR FLOOD ZONE SPECIAL FLOOD HAZARD AREA (TYP) SEE NOTE 3
DETENTION POND 13
CELL 20 PUMP STATION
FINAL LANDFILL ACCESS ROAD (TYP)
7.5% MIN (TYP)
10H:1V (TYP)
CELL 8 PUMP STATION
EXISTING CELLS
LINER LIMIT (TYP)
(2) 24" HDPE CULVERTS
PERMANENT LANDFILL ACCESS ROAD
FINAL WASTE GRADES (TYP)
FENCE (TYP)
8"x12" LEACHATE FORCEMAIN
PROPERTY LINE (TYP)
2.7H:1V (TYP)
20'-WIDE GRAVEL ACCESS ROAD (TYP)
ELECTRICAL MANHOLE (TYP)
DEED RESTRICTION (TYP)
UNDERGROUND ELECTRIC (TYP)
DETENTION POND 2
CELL 19 PUMP STATION
CELL 16 PUMP STATION
DETENTION POND 12
EXISTING EMH (TYP)
LFG KNOCKOUT STRUCTURE AND VALVES
CELL 5 PUMP STATION
CELL 4 PUMP STATION
DETENTION POND 1A (FORMER LEACHATE POND)
EXISTING FORCEMAIN VAULT (TYP)
CELL 15 PUMP STATION
RIPRAP DITCH (TYP)
EXISTING 24" DIA LANDFILL GAS PIPE
8" GRAVITY SEWER IS ABANDONED
25-FOOT STREAM SETBACK
WATER LOADING RACK
DETENTION POND 1

200 0 400 FEET

FIGURE 1-3
FINAL GRADING PLAN
PHASE II EXPANSION
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SME
SEVEE & MAHER ENGINEERS

DWG: BASE LMN: FWG-FIG CTB: SME-STD-HALF.CTB JOB#: 240101 REV: 11/6/2025

\\Server\cds\Caselli\OldTownLandfill\Expansion\Phase II Expansion\Acad\Plans\BASE.dwg, B_FIG 1-3, 11/6/2025 12:06:23 PM, sjm

2.0 LICENSING PROCESS

This section describes the Applicants' compliance with the MEDEP's requirements for pre-application submittals, notifications, and meetings associated with this Application pursuant to the requirements of Title 38, M.R.S. §1310-S, and 06-096 CMR 2 and 400.7.

2.1 Pre-Application Requirements

2.1.1 Preliminary Information Report

A Preliminary Information Report (PIR) for the Phase II Expansion was prepared on behalf of the Applicants by Sevee & Maher Engineers, Inc. (SME). The PIR was prepared for a 70-acre expansion, which was designed to have capacity for 11.9 million cubic yards of waste. A meeting was held on August 24, 2023 prior to submission to discuss the PIR for the proposed Phase II Expansion. Representatives from the BGS, MEDEP, NEWSME, SME, and Pierce Atwood attended the meeting. The PIR was accepted for processing by the MEDEP on September 8, 2023.

On November 6, 2023, the MEDEP concluded that based upon the information contained in the PIR, the Phase II Expansion is an environmentally feasible site and was not prohibited by any of the siting criteria of 06-096 CMR 401.1.C.(2). A copy of the MEDEP's November 6, 2023 approval letter is attached in Appendix A-3.

2.1.2 Public Benefit Determination

A PBD application was submitted to the MEDEP on June 10, 2024 (SME, June 2024). The MEDEP held two public hearings on July 16, 2024 and an additional virtual public meeting on July 26, 2024 to hear public comments, as well as receiving public comments on their website. A PBD approval, S-020700-W5-CV-N, was issued on October 2, 2024 and is included in Appendix A-9. The PBD approval contained the following conditions:

- Casella shall submit a report to the Department detailing its plans and a schedule for implementing the mattress recycling program;
- Casella shall continue to expand deployment of its mobile recycling app, and include information in each landfill annual report regarding where the app has been deployed;
- Casella shall include in each landfill annual report a discussion regarding their work to encourage and assist towns to engage in all possible recycling and diversion activities;
- Casella evaluates, and submits the evaluation in each annual report, the availability and capacity of regional facilities in Maine to reduce the volume of municipal wastewater treatment plant sludge prior to landfilling at the JRL, and include recommendations to further reduce the volume of sludge prior to landfilling;

- Casella designs and installs a Department-approved system for the treatment of landfill leachate for PFAS prior to expansion operations;
- Casella pays for all applicable costs associated with a third-party odor consultant, working on behalf of the Department, to complete an odor analysis of the landfill and surrounding area, including evaluation of historical air quality sampling results, odor complaint history, field investigation, and recommended actions, to be submitted to the Department for review and approval;
- Casella conducts two additional surface scans per year during periods of low barometric pressure, if possible, of the landfill intermediate cover, using a Department-approved method to determine if there are fugitive landfill gas emissions and conduct repairs of the cover material accordingly;
- The applicant establishes a system to inform the public about significant landfill events in near real-time, such as through a website or other means as approved by the Department; and
- Casella shall submit an implementation schedule with tasks to detail how it intends to design and install a Department-approved system for the treatment of landfill leachate for PFAS prior to expansion operations if a license approval is issued for the expansion.

2.1.3 Project Overview Meetings

During 2024, BGS and NEWSME voluntarily held four pre-application project overview meetings with interested parties to discuss various aspects of the Phase II Expansion. Attendees at these meetings varied but included representatives of the MEDEP, the City of Old Town (Old Town), the Landfill Advisory Committee, the Penobscot Nation, and members of the general public. The specific discussions at the meetings included permitting requirements, siting criteria, geology, hydrogeology, landfill design, PFAS treatment, wetlands, birds, and operations of the Phase II Expansion. The dates of these meetings, locations, and topics discussed were as follows:

November 7, 2024 6 P.M.	City of Old Town	Town Hall	Project History, Overview, and Permitting Requirements
November 21, 2024 6 P.M.	Town of Alton	Town Hall	Site Visual, Noise, Traffic, and Natural Resources
December 4, 2024 6 P.M.	City of Old Town	Town Hall	Site Geology and Hydrogeology
December 17, 2024 6 P.M.	City of Old Town	Town Hall	Phase II Expansion Design, Leachate Management, and Operations

Included in Appendix A-4 are copies of the meeting notes from these meetings.

On behalf of NEWSME and BGS, SME and Stantec of Topsham, Maine met with the MEDEP and the USACE on July 2, 2024 via Teams to discuss wetland and other natural resource permitting requirements. USACE, SME, and Stantec met at the site on September 6, 2024 to review the site's proposed impacted wetlands areas. The MEDEP, SME, and Stantec met at the site on October 2, 2024 to review the significant vernal

pools and the proposed impacted wetlands areas and discuss the components of a compensation plan for unavoidable impacts.

Previously a number of meetings were held with the MEDEP, U.S.EPA, USACE, and U.S. Fish and Wildlife Service (USFWS) to review site issues relating to geology, hydrogeology, and wetlands. These meetings were held in 2007 and 2008 and addressed a larger expansion area, which included the initial expansion that was permitted in 2017 and the Phase II Expansion.

2.2 Preliminary Notice of Automatic Municipal Intervenor Status

Pursuant to the requirements of Title 38, M.R.S. § 1310-S(1-A), 06-096 CMR 400.7.B, on July 29, 2025, the municipal officers of the City of Old Town received preliminary of intent to file this Application with the MEDEP from BGS via certified mail.

Pursuant to the requirements of Title 38, M.R.S. § 1310-S(1-A), 06-096 CMR 400.7.B, on July 31, 2025, the municipal officers of the Town of Alton received preliminary of intent to file this Application with the MEDEP from BGS via certified mail.

As required by the Old Town Host Community Compensation and Facility Oversight Agreement (HCCFOA) and Resolves 2005, Chapter 74, on July 31, 2025, the municipal officers of the City of Old Town received preliminary notice of intent to file this Application with the MEDEP from NEWSME via certified mail.

Pursuant to Section 10 of Old Town's HCCFOA, on August 18, 2025, NEWSME held the Preliminary Notice Meeting at the City Hall Council Chambers in the City of Old Town to provide the City with an opportunity to ask questions and provide input about the proposed project.

Copies of the notices above are included in Appendix A-5.

2.3 Public Informational Meeting

Pursuant to 06-096 CMR 2.13.A, on September 17, 2025, BGS and NEWSME sent a Notice of the Public Informational Meeting (PIM) by certified mail to the abutting landowners, the City of Old Town and Town of Alton municipal offices, the Penobscot Nation, and the Landfill Advisory Committee. The MEDEP was notified of the meeting via email. The notice was also published in the Bangor Daily News and Kennebec Journal on September 19, 2025, and September 20, 2025. A copy of the notice, the certificates of mailing, the certified mail receipts, and a signed certification that the PIM was noticed and held in accordance with 06-096 CMR 2.13.A are contained in Appendix A-6.

On September 29, 2025, BGS and NEWSME held the PIM at the City Hall Council Chambers in the City of Old Town to provide the public with an opportunity to ask questions and provide input about the proposed

project and the opportunities for public comment during the application process. Appendix A-6 includes an attendance sheet, the project fact sheet handed out at the meeting, a narrative responsive to questions and significant issues relevant to the licensing criteria that were raised at the meeting, and the certification that the PIM was held in accordance with Chapter 2, Section 13, of the Rules concerning the processing of Applications.

2.4 Public Notice Required for Submittal of Application

On November 12, 2025, BGS and NEWSME sent a Notice of Intent to file an Application (NOI) by certified mail to the abutting landowners, the City of Old Town and Town of Alton municipal officials, the Penobscot Nation, and the Landfill Advisory Committee members. The notice was also published in the Bangor Daily News on September 18 and 20, 2025. A copy of the notice, the certificates of mailing, and certified mail receipts are contained in Appendix A-7.

2.5 Pre-Submission Meeting

On November 17, 2025, BGS and NEWSME held a pre-submission meeting with the MEDEP to review the contents of the Application for the Phase II Expansion.

2.6 Application Submittal

Copies of the Application were sent via certified courier, with return receipts requested, to City of Old Town, Town of Alton, and the Penobscot Nation. Copies of these receipts are included in Appendix A-7.

2.7 Certificate of Good Corporate Standing

Appendix A-8 includes a copy of information from the Secretary of State's CEC database, confirming the good corporate standing of NEWSME.

3.0 MEDEP REGULATION CHAPTER 400.4 - GENERAL LICENSING CRITERIA

3.1 Title, Right, and Interest

The proposed Phase II Expansion will be located on an approximately 780-acre parcel of land owned by the State of Maine located southwest of Route 16, northeast of Route 43, and west of Interstate 95 (I-95) in Old Town, Maine. The Phase II Expansion has a footprint (i.e., the solid waste boundary) of approximately 57 acres plus approximately 15 additional acres of perimeter access roadways, dikes, and detention ponds for a total developed area of approximately 72 acres. The deed for the parcel is recorded in Book 9188, Page 152 at the Penobscot County Registry of Deeds. A copy of the deed is included in Appendix C.

3.2 Financial Ability

As described in the OSA, NEWSME is responsible for all costs associated with the permitting, design, construction, operation, and closure of the JRL. NEWSME, a wholly owned subsidiary of CWS, has the financial ability to carry out these activities in a manner consistent with all applicable regulatory requirements. Ongoing activities at the JRL are financed by revenues generated from the operation of the JRL. CWS also maintains a secure credit facility administered by the Bank of America N.A., which is available to support NEWSME with operation of the JRL, if necessary. Included in Appendix D-1 is a letter from Bank of America N.A. attesting to the satisfactory relationship it has maintained with CWS since 1995 and indicating the status of CWS's current credit facility. Table 3-1 summarizes the approximate overall costs for the Phase II Expansion in 2025 dollars.

TABLE 3-1

OPINION OF PHASE II EXPANSION COSTS

Activity	Estimated Cost ($)
Design and Permitting	4,020,000
Construction	60,400,000
Operations	21,400,000
Closure	40,242,000
Post-Closure Care	15,162,000

Notes
1. Design costs including the MEDEP application permit fees.
2. Construction costs are in 2025 dollars.
3. Operations costs represent estimated yearly costs assuming a 11-year lifespan and are based on 2024 operational costs.
4. Closure costs for the entire project in 2025 dollars at a per acre closure cost of approximately $706,000 per acre.
5. Post-closure care includes costs to maintain and monitor the expansion portion of the facility for the 30-year post-closure period in 2025 dollars, based on a per-acre costs of $266,000 per acre.

The initial construction for the Phase II Expansion will be the 15.3-acre Cell 18 to be built around 2027. SME's opinion of cost for this cell construction is approximately $17,300,000 in 2025 dollars. The Bank of America N.A. letter demonstrates the ability of NEWSME and CWS to fund this project from working capital.

NEWSME maintains a surety bond as the required Financial Assurance Mechanism (FAM) for the placement of final cover on constructed landfill cells that have not yet received final cover, plus post-closure monitoring and maintenance costs for the entire developed site for a 30-year post-closure period. As part of the facility's Annual Report to the MEDEP, an opinion of cost is prepared by a third party for the post-closure costs and the remaining closure costs for the facility. NEWSME's annual financial assurance surety bond will include the initial original landfill footprint, the initial Phase I expansion area, and the Phase II Expansion area as developed. A copy of the current (2025) funding agreement for these closure and post-closure costs for the JRL is found in Appendix D-2. Yearly updates of both the opinion of cost and the funding agreement will continue annually throughout the development of the Phase II Expansion.

3.3 Technical Ability

NEWSME has management and staff available who are well qualified to operate and maintain the landfill, including the Phase II Expansion. NEWSME has managed the JRL facility since April 2004, hiring qualified consultants as necessary for design, construction, and operational guidance, consistent with state, federal, and local environmental and safety requirements. NEWSME has met its obligations under the OSA with BGS and has never been the subject of a notice of violation. NEWSME draws upon the corporate environmental and engineering expertise and experience of its parent company, CWS. CWS is a vertically integrated company, operating in at least nine states throughout the Northeast and Mid-Atlantic to provide solid waste, recycling, and resource management services to residential, commercial, municipal, and industrial customers, primarily in the areas of solid waste collection, transfer, disposal, recycling, and organics waste and reuse services. Included in Appendix E is the MEDEP's environmental review of CWS's Maine operations completed in November 7, 2024 for the Finance Authority of Maine. This review included listings of CWS's various facilities and operations and environmental licenses in Maine, and a review of site cleanup responsibilities and compliance records.

NEWSME Staff

The proper operation and maintenance of the Phase II Expansion will be the responsibility of NEWSME and its staff. Employees of NEWSME responsible for the operation of the landfill include the General Manager (GM), Environmental Compliance Manager (ECM), Facility Manager/Environmental Technician (FM/ET), Site Safety Officer, Operations Manager (OM), Lead Scale Master, Equipment Operators, Mechanics, and Laborers. A responsible NEWSME employee (i.e., a Manager) will be on-site during all operating hours. Each position has the following responsibilities for operations of the facility:

General Manager. The GM of NEWSME has the overall responsibility for supervision and management of site operations, staffing, construction, budgets, and compliance. With respect to the landfill operation, the GM's responsibilities include the following:

- Maintain liaison with the MEDEP, BGS, Old Town, Alton, and the Landfill Oversight Committee, to ensure that the landfill is being operated in accordance with state and local requirements and with the OSA;
- Address staffing and equipment needs of the facility and establish budgets for its operations; and
- Coordinate construction activities.

Environmental Compliance Manager. The ECM is responsible for the site's compliance with state, federal, and local permits and licenses, applicable federal regulations, site inspections, approving waste streams, state and federal reporting, and environmental training. The ECM also acts as the MEDEP contact for waste acceptance, inspections, permitting, and reporting.

Facility Manager/Environmental Technician. The FM/ET is responsible for the oversight and maintenance of several key environmental systems at the JRL facility, including: leachate, gas collection, gas treatment, stormwater controls, and other systems, as necessary. Additionally, the FM/ET performs various facility inspections, sampling, and data collection for reporting purposes.

Site Safety Officer. The Site Safety Officer is responsible for coordinating all safety related issues at the JRL, including safety training, addressing safety issues, and updating the Site Safety Manual.

Operations Manager. The OM is responsible for coordinating landfill operations. It is the OM's responsibility to ensure that the facility is operating properly and in compliance with current laws and regulations. The OM's responsibilities include: site maintenance, waste placement, street sweeping, mowing, erosion control, odor control, stormwater and leachate collection system maintenance, and site repairs.

Lead Scale Master. The Lead Scale Master is responsible for supervising the state-certified scales, scale personnel, and 24-hour site security.

Equipment Operators. The Equipment Operators' duties include operating necessary equipment to compact wastes placed in the landfill, apply daily cover, complete road construction, install gas collection infrastructure, and perform general site construction.

Mechanics. The Mechanics' duties include repair of landfill operating equipment and mechanical infrastructure, and the ability to operate necessary equipment to compact wastes placed in the landfill, apply daily cover, complete road construction, install gas collection infrastructure, and perform general site construction, should it be necessary.

Laborers. The Laborers' duties can vary depending on need, but include installation, maintenance, and troubleshooting of gas collection infrastructure, landfill equipment operation, various site

construction activities, landfill monitoring under the supervision of a site environmental technician, and general landfill site upkeep and cleanliness.

Local Contractors

NEWSME uses local contractors for capital projects such as construction of landfill cells, roads, stormwater structures, and placement of temporary and final landfill cover systems. Occasionally local contractors are used for operational tasks when there are not a sufficient number of NEWSME personnel or equipment to perform the necessary work.

Technical Consultants

NEWSME hired a variety of technical consultants to perform the detailed investigations and prepare the design documents for the Phase II Expansion and complete this Application. These consultants and their areas of expertise include: SME of Cumberland, Maine, with expertise in geology, hydrogeology, and landfill design; Sanborn Head & Associates (SHA) of Concord, New Hampshire, for landfill gas design; Gorrill-Palmer (GP) of South Portland, Maine, for traffic assessment; Viewshed of Yarmouth, Maine, for visual assessment; Epsilon Associates of Maynard, Massachusetts, for noise impact assessment; Biodiversity Research Institute (BRI) of Portland, Maine, for wetland and other natural resource assessments; Stantec of Topsham, Maine for a bat survey, wildlife hazard site visits, wildlife surveys, and additional wetlands consultation; and the law firm of Pierce Atwood LLP of Portland, Maine, for counsel regarding environmental law compliance. Resumes of key personnel responsible for compiling the Application are contained in Appendix E.

3.4 Traffic Movement

The current primary waste haul route to the JRL from the south is I-95 north to the Route 16 (Bennoch Road, Exit 199) interchange, then approximately 0.1 miles west on Route 16 to the JRL site access road. Additional traffic travels along Route 16 from the east or west to the site. There is no southbound exit from I-95 to Route 16. These haul routes will continue to be used for the Phase II Expansion. Based on data furnished by NEWSME, the Average Daily Truck Volume (ADTV) is approximately 178 trucks (approximately 89 in and 89 out). Based on the Traffic Assessment conducted by GP (Appendix F), approximately 79 percent of trucks use I-95 and 21 percent use Route 16. The 2024 ADTV north of Route 16 (Southgate) recorded by Maine Department of Transportation (MDOT) was 1,720 vehicles per day, thus the trucks associated with the current site represent approximately 2.2 percent of the traffic on Route 16. The JRL advises drivers to use I-95 whenever possible, which has a weight limit of 100,000 pounds. The site access roads allow for continuous uninterrupted traffic movement without posing a danger to pedestrians or other vehicles. The existing on-site traffic patterns are clearly defined. Internal site access roads are maintained by NEWSME, including plowing in the winter and dust control in the summer.

The GP Traffic Assessment evaluated the effect of the Phase II Expansion on regional and local traffic patterns to determine if the existing transportation network will adequately accommodate the future level of usage anticipated for the Phase II Expansion. The assessment was based on the following information:

- Crash history for 2021 to 2023 as provided by MDOT;
- Turning movement volumes collected by Tri-State Traffic Data on behalf of GP from 6:00 A.M. to 5:00 P.M. on Tuesday, June 18, 2024 at the Route 16 site access road entrance and Route 16 at the I-95 southbound on ramp and northbound off ramp;
- Truck counts provided by NEWSME; and
- Truck counts provided by Sargent Corporation, who was constructing a landfill closure when the turning movement volume data was collected.

The assessment concluded that the existing public road system accommodates the traffic generated by landfill-related operations and can be anticipated to do so following the construction of the Phase II Expansion. In addition, the internal access road has been designed to accommodate the internal flow and volume of traffic.

3.4.1 Estimate of Number, Weight, and Types of Vehicles

GP reviewed the weight scale records for the existing landfill for 2023 to determine the peak-hour traffic at the facility. The manual turning movement count completed on Tuesday, June 18, 2024, determined that there were 50 truck and two non-truck round trips between the A.M. peak hours of 7:00 and 8:00 and 47 truck and seven non-truck round trips during the P.M. peak hours of 3:30 to 4:30. Using this information and the slight increase in volume at the facility anticipated for the Phase II Expansion, GP determined the 2024 peak design hour vehicle trip generation to be 62 and 64 during the A.M. and P.M. peak hours, respectively (see GP Report in Appendix F for methodology). During the Phase II Expansion, and assuming the tonnage delivered to the facility is the projected 880,000 tons annually (based on an average of the 2021, 2022, and 2023 tonnages), GP forecasts that design hour trip generation would increase by a total of four vehicle round trips during each of the peak A.M. and P.M. hours. The average daily vehicle trips during the Phase II Expansion is forecasted to be 210, of which 23 would be non-trucks and 187 would be trucks. Trucks using the facility range from single- and double-axle trucks to tractor-trailer units with varying gross vehicle weights from approximately 45,000 to 100,000 pounds (lbs).

3.4.2 Haul Routes

The landfill's primary access road is located approximately 0.1 miles west of I-95 Exit 199, off Route 16. Federal law changed in 2011 to increase the allowable gross vehicle weight on I-95 from 80,000 to 100,000 pounds. Previously, vehicles weighing over 80,000 pounds were required to use state and local roadways, which have a gross vehicle weight limit of 100,000 pounds. This change has reduced the traffic on local

roadways by allowing heavier trucks to access the site from I-95 to Exit 199, then by Route 16 for the 0.1 mile to the site driveway. As described in Section 3.4, JRL truck traffic represents approximately 2.2 percent of the total traffic on Route 16. Typical haul routes to the site are shown on the figure contained in Appendix A of GP's report, included as Appendix F of this report. For the Phase II Expansion, NEWSME will continue its policy of advising trucks to use the interstate to access the facility.

The landfill's primary access road is a 30-foot-wide paved road, which enters the BGS property from Route 16. All approaches are single lane and will remain so; turning movements do not meet warrants for left or right turn lanes from Route 16.

3.4.3 Capacity Analysis

GP completed an A.M. and P.M. peak hour capacity analysis for the primary intersections including the site driveway from Route 16, and Route 16 at the I-95 Exit 199 south bound ramps (there is no north bound entrance or exit to I-95 at Exit 199) at the projected waste acceptance rates. This analysis showed the current level of service (2023) at the intersection was at an A level, or "very good with little control delay," and these levels will remain consistent for the Phase II Expansion and the projected waste acceptance rates.

3.4.4 Sight Distances

GP evaluated the sight distances available for vehicles crossing Route 16 to and from the landfill. The posted speed limit on Route 16 is 40 miles per hour, increasing to 45 mph near the southbound on-ramp to the southeast of the site access road. 45 mph was used in GP's evaluation. The minimum desired sight distance is 425 feet for passenger vehicles and increases to 640 feet for trucks. Available sight distances to both the east and the west exceed 1,000 feet. On previous site development projects at the JRL, MDOT has determined that an entrance permit is not required for the Route 16 crossing.

3.4.5 Internal Access Roads

Internal site access roads associated with the Phase II Expansion are shown in Figure 1-1. Access to the individual cells of the Phase II Expansion will be along the existing site access road. A new approximately 4,500-foot perimeter site access road will be constructed that extends the east and west access roads, and connects them at the northern end of the Phase II Expansion. The northern and eastern portions of the Phase II Expansion access roads will have more traffic than the western portion, which is a maintenance road that will not be used by haul trucks under normal circumstances. The northern and eastern portions will have a 26-foot-wide paved travelway, wider than the 24-foot-wide travelway on the existing eastern perimeter road. There will be at least a 4-foot-wide outer shoulder on each side of the access road. Proposed road construction on the east and north side of the Phase II Expansion will consist of the following (from top to bottom):

- 3 inches of hot mix asphalt;

- 6 inches of aggregate base;
- 18 inches of aggregate subbase; and
- woven geotextile.

The west portion of the expansion access road will serve mainly as a service road and have a 20-foot travelway with 4-foot shoulders. Proposed road construction on the west side of the Phase II Expansion will consist of the following (from top to bottom):

- 3 inches of Hot Mix Asphalt (if desired by NEWSME at the time of construction);
- 6 inches of Aggregate Base;
- 18 inches of Aggregate Subbase; and
- Woven Geotextile.

The new portion of the road will connect to the existing landfill service road and provide an access loop around the entire facility. The road will provide both access to the landfill for haul trucks and full perimeter access for maintenance vehicles. Site internal access roads will be maintained, including plowing in the winter and dust control in the summer.

The existing facility access road from Route 11 to the scale house has a posted speed limit of 25 miles per hour (MPH) while site access roads past the scale house have a posted speed limit of 15 MPH. This speed limit allows for uninterrupted traffic movement at the facility without posing an undue danger to pedestrians or other vehicles. Facility signage will clearly define traffic patterns required for safe waste operations.

3.5 Fitting the Solid Waste Facility Harmoniously into the Natural Environment

The Phase II Expansion has been located and designed to fit harmoniously into the natural environment. As part of the design process, NEWSME retained BRI to identify and inventory the site's wetlands, potential significant wildlife habitats, unusual natural areas, vernal pools, and rare, threatened and endangered (RTE) species on the project site, including checks of existing records at appropriate federal and state agencies for known or expected occurrences of significant wildlife habitats, RTE plants, and natural communities. Agencies contacted included:

- The Maine Department of Inland Fisheries and Wildlife (MDIF&W) addressing:
  - Endangered, threatened, and special concern species,
  - Designated essential and significant wildlife habitats, and
  - Fisheries habitat;

- The Department of Agriculture, Conservation, and Forestry addressing:
  - The Natural Areas Program's rare and unique botanical features;
- The MEDEP addressing:
  - Significant rivers and streams; and
- The USFWS addressing:
  - Fisheries habitat; and
  - Northern Long-Eared Bat habitat.

Copies of the correspondence and responses are in Appendix G. While delineating wetlands at the site, BRI also evaluated the potential presence of state or federally listed RTE species and their associated habitats within the survey area. BRI's RTE report is included in Appendix G-1; their wetland and waterbody delineation and vernal pool survey, and wetland functions and values assessment reports are contained in Volume V of this Application. During its field work, BRI did not observe any evidence of state or federally listed RTE plant or wildlife species on-site.

Stantec identified that the forested portion of the Phase II Expansion is within the range of the northern long-eared bat (*Myotis septentrionalis*) (NLEB), which was recently listed as threatened with a 4d ruling by the USFWS under the Endangered Species Act (ESA). From July 18 to 24, 2024, Stantec conducted an acoustic survey to determine the probable presence or absence of NLEB within the facility site. The acoustic bat survey followed current USFWS Guidelines and occurred during nights with suitable conditions. The survey did not detect the presence of NLEB at the site. Details of the NLEB survey are included in Stantec's report included in Appendix G-1.

During a previous review of the site, Stantec identified that the facility site falls within the mapped critical habitat for Atlantic salmon, which are protected under the final 2009 ruling issued by National Marine Fisheries Service and USFWS under the ESA. Specifically, the northeast portion of the facility site falls within the critical habitat for Atlantic salmon mapped by the National Oceanic Atmospheric Association. Stantec evaluated the 780-acre parcel for natural resources in 2008, 2014, and 2015. Although isolated forested wetlands occur within the facility site, and about 3.75 acres of these wetlands will be directly impacted by the expansion, there are no delineated or mapped streams in the 72 acres that will be developed for the Phase II Landfill Expansion or its associated berms, access road, powerlines, and stormwater detention ponds, nor is the Expansion expected to result in impacts to mapped or delineated streams. Therefore, there are no expected impacts to Atlantic salmon or their critical habitat from the Expansion.

The development of the Phase II Expansion will result in unavoidable filling of approximately 3.75 acres of freshwater wetlands due to the development of the landfill cells, perimeter berm, access road, and stormwater detention ponds.

Six wetlands that are not designated as Wetlands of Special Significance (WOSS), as defined by 06-096 CMR 310.4, will be filled by the development. These wetlands range in size from 0.03 to 0.82 acres, totaling 2.37 acres (see Figure 3-1). In addition, five non-WOSS wetlands will be partially filled by development of the access roads and stormwater ponds. The partial impacts to these wetlands range in size from 0.03 to 0.32 acres, totaling 0.86 acres.

A total of nine potential vernal pools were identified in wetland areas in the vicinity of the proposed expansion area. One is a significant vernal pool (SVP) that was previously mapped and is included in Maine Department of Inland Fisheries and Wildlife (MDIF&W) mapping. The additional eight potential vernal pools were identified during the site investigation conducted by BRI. Of the eight, six met the definition of a vernal pool as provided by the Programmatic General Permit of the USACE for Maine (Maine GP). The remaining two pools were small depressions located in upland areas which, when evaluated in the spring, did not contain egg masses or other vernal pool indicators. One of the vernal pools mapped by BRI and located outside of the Phase II Expansion landfill footprint met the criteria to be considered an SVP (see Figure 3-1). This SVP and the 250-foot critical terrestrial habitat area around the SVP will not be directly impacted by the Phase II Expansion. Because an SVP has been mapped, the entire wetland containing the SVP is considered by rule to be a WOSS. A 0.31-acre lobe of the 13.8 acres of WOSS mapped within the mapping area will be impacted by construction of the landfill and the access road. Some site development activity will occur between the 25-foot setback and the 75-setback to the WOSS.

The development impacts to the wetlands and WOSS are addressed in the project's compensation plan, which is described in Volume V of this application. The compensation plan includes the payment of an in-lieu of fee of $763,103, representing $4.31 per square foot of wetland (149,670 square feet in total) and $8.62 per square foot of WOSS (13,692 square feet in total). All other areas of the wetlands will not be impacted by the proposed development with regard to functions and values as detailed by the Functions and Values Assessment prepared by BRI contained in Volume V, Attachment 12. Volume V contains the MEDEP NRPA permit application and the USACE wetlands permit application for the wetland impacts associated with this project.

3.6 No Unreasonable Adverse Effect on Existing Uses and Scenic Character

3.6.1 Setting

The Phase II Expansion will not have an unreasonable adverse effect on the existing uses or scenic character of the surrounding areas, as it is a continuation of the existing site use. Existing land uses in the vicinity of the Phase II Expansion include landfilling, rural residences, forests, and farming. The zoning districts in the vicinity of the Phase II Expansion, as shown on the most recent Old Town zoning map dated March 2020, include landfill, rural residence and farming, and resource protection zones. The Alton zoning map dated March 17, 2020, shows a growth district in the area nearest to the landfill. The parcel of land on which the Phase II Expansion is located provides for significant buffering capacity in terms of setback

distances and vegetative cover. The setbacks and buffers from the Phase II Expansion's solid waste boundary are compared to the setbacks and buffers required by the Rules in Table 3-2.

TABLE 3-2

SETBACK AND BUFFERS FOR PHASE II EXPANSION

Setbacks to:	MEDEP Regulation	Proposed Phase II Expansion
Prohibitive Siting Criteria		
Class AA or Class SA waters	1,000 feet	>2 miles
Significant sand and gravel aquifer	300 feet	1 mile
Fault displaced in Holocene time	200 feet	None identified on 780-acre parcel. Nearest Mapped Fault approximately six miles northeast of the site.
Coastal sand dune, coastal wetland, or fragile mountain area	0 feet	>2 miles
Restrictive Siting Criteria		
Nearest public road	300 feet	3,020 feet
Property boundary	300 feet	513 feet
Nearest residence	1,000 feet	1,760 feet
Stratified sand and gravel deposit	100 feet	1,800 feet
Classified surface water body	100 feet	1,580 feet
Water supply spring or well	1,000 feet	1,760 feet
Performance Standards		
Airport	10,000 feet	15,000 feet

The Phase II Expansion will be located to the north of and adjacent to the existing JRL facility. The buffers between the Phase II Expansion's solid waste boundary and abutting properties to the north, east, and west will be managed to maintain their natural condition of mature mixed stand of hardwoods and softwoods that range in height from approximately 20 to 60 feet. Figure 3-1 shows the relative size and location of buffers that will exist around the Phase II Expansion.

3.6.2 Typical Site Activity

The Phase II Expansion will not create unreasonable levels of noise and will comply with the noise standards of 06-096 CMR 400.4.F. To control noise from routine operations, NEWSME will maintain existing buffer vegetation between the Phase II Expansion and property lines and protected locations. In addition, the proposed pump stations will be constructed in buildings that will serve as acoustical enclosures. Equipment used in construction, operation, and maintenance activities at the solid waste facility will comply with applicable local, state, and federal noise regulations, and include noise control devices in proper working condition, maintained as originally provided with the equipment by the manufacturer. In response to input obtained from neighbors during the milestone meeting process for the first Expansion that was permitted in 2017, NEWSME has voluntarily replaced original backup alarms on landfill operating equipment with broadband backup alarms that have less abrupt (beeping) sounds. Waste placement at the landfill will continue in the same manner as is currently done, so sounds generated from routine construction and operations of the Phase II Expansion will be similar to the current sound generation. The engine-powered equipment currently used at the existing landfill consists of the following:

Large Equipment typically used during construction includes:

- One 35- to 40-ton excavator,
- One 20- to 25-ton excavator,
- One mini-backhoe,
- One front-end loader,
- Three to five 40- to 45-ton off-road trucks,
- Three bulldozers,
- One to two tracked skid steers,
- Two six-wheelers,
- One telehandler,
- Several small portable generators,
- Pipe fusion equipment,
- One water truck,
- One pad-foot roller,
- One smooth drum roller, and
- Several on-road haul trucks.

Large Equipment for ongoing landfill operations typically includes:

- Two CAT 836H Compactors,
- One CAT 836G Compactor,
- Three CAT D6 Bulldozers,
- One Cat 966G Loader,
- One John Deere 744 Loader
- Two John Deere 400 Haul Trucks,
- One Water Truck, and
- Two CAT 330 Excavators.

The hourly sound levels from routine operation of the Phase II Expansion will be less than the daytime limits provided in the Rules. Nighttime limits will be met if during the one hour of nighttime operation

(6 A.M. to 7 A.M.) operation of equipment is limited to only one piece of equipment. The Rules require that the hourly sound level limits from routine operations of the solid waste facility must be less than or equal to the following:

- 75 dBA at the facility property line at the eastern and southern property lines of the site which border undeveloped land;
- 60 dBA for daytime hours (7:00 A.M. to 7:00 P.M.), and 50 dBA for nighttime hours at any protected location in an area for which the zoning, or if unzoned, the existing use or use contemplated under a comprehensive plan, is not predominantly commercial or industrial. This standard applies to the western and northern property lines where the site boundary borders residential use properties; and
- 70 dBA for daytime hours and 60 dBA for nighttime hours in an area for which the zoning, or if unzoned, the existing use or use contemplated under a comprehensive plan, is predominantly commercial or industrial.

3.6.3 Sound Level Assessment

Appendix H contains the Sound Level Assessment Report prepared by Epsilon Associates. Noise levels associated with the Phase II Expansion were modeled at a total of fourteen locations as shown on Figure 3-1 and summarized on Table 3-3. Epsilon's assessment included the landfill Renewable Natural Gas facility (RNG facility) that has been constructed at the site and was being commissioned during the sound level assessment. Sound level estimates for the proposed perfluoroalkyl and polyfluoroalkyl substances (PFAS) plant (required as a condition of the PBD) were incorporated into the site modeling. Existing site sound level conditions were measured from May 1 to May 9, 2024, and are included in Appendix H. Individual sound level measurements for each piece of landfill operating equipment were obtained by Epsilon on November 18, 2024. The exceptions are the John Deere 850J bulldozer and water truck. Sound levels of the John Deere 850J bulldozer were collected by Epsilon in 2015, and sound data for the water truck was estimated by Epsilon. Both the bulldozer and on-site water truck were not operational during the measurement program. This data was compared to manufacturers' information for the currently used equipment and was found to be comparable. It was used by Epsilon to model the noise impacts associated with the Phase II Expansion as described in Appendix H.

Epsilon assessed sound levels from routine operations with mobile sources in close proximity to the nearest (western) property boundary, which represents the greatest sound level impacts produced by the Phase II Expansion. This will occur along the closest property line to the Phase II Expansion, which is to the west of the expansion. In addition, because sound level limits and operational activities vary depending on the time of day or night, two distinct scenarios were modeled.

- Scenario 1 Daytime Operations (mobile and stationary sources) – 7 A.M. to 7 P.M.
- Scenario 2 Nighttime Operations (mobile and stationary sources) – 6 A.M. to 7 A.M.

Since the Thiopaq plant, RNG facility, and PFAS facility are anticipated to operate 24 hours per day, 7 days per week, sound sources associated with these facilities were included in both scenarios. The general modeling locations for the mobile and stationary sources are shown in Figures 7-1 and 7-2 of Epsilon's report for Scenarios 1 and 2, respectively.

Under Scenario 1, Epsilon conservatively assumed that twelve pieces of mobile landfill equipment are operating simultaneously at full power in the southwest corner of the expansion. In reality, only one or two bulldozers and one or two compactors will be used simultaneously with the other one as a backup. The three compactors and three bulldozers were assumed to be operating in the southwestern region shaded in Appendix H, Figure 7-1. The excavators, front-end loaders, water truck, and haul trucks were assumed to be operating farther to the east as depicted in the same figure. These mobile sources are modeled at 600 feet or greater from the nearest property line.

During periods when the management of solid waste is occurring in the southwestern part of the Phase II Expansion (Cell 19), the modeling locations are below the daytime noise limits.

Scenario 2 was designed to represent landfill operations during the one nighttime hour from 6:00 A.M. to 7:00 A.M., the first hour that the facility is open. Operations of more than one piece of heavy equipment will be limited only during this hour to meet the noise level requirements defined by the Rules. To model the nighttime operations of mobile sources (Scenario 2), one mobile source (compactor) operating near the western property line with a sound pressure level of 72 dBA at 50 feet was included in Scenario 2. This mobile source was approximately 700 feet from the western property line. No other mobile sources were included in this scenario.

Table 3-3 shows the predicted broadband (dBA) hourly sound levels at the 14 modeling locations for each of the two modeling scenarios. The predicted sound levels at the modeling locations range from 39 to 65 dBA for daytime (Scenario 1) and from 38 to 65 dBA for nighttime (Scenario 2). The sound levels presented in the tables do not include any contribution from existing noise sources in the area unaffiliated with the site (e.g., traffic and natural sounds).

TABLE 3-3

SOUND LEVEL MODELING RESULTS

ID	Description	Coordinates NAD83 ME State Plane East		Project Only Broadband Sound Level (dBA)	
		X (m)	Y (m)	Scenario 1 (day)	Scenario 2 (night)
1R	Bergquist Residence	281733.32	145500.84	46	43
2R	Perkins Residence	281374.59	145775.97	46	40
3R	Bertolino Residence	281159.90	146019.46	45	38
1PL	Western Property Line – Bergquist Residence	281860.78	145552.79	48	46
2PL	Western Property Line – Perkins Residence	281736.71	146032.83	51	39
3PL	Western Property Line – Bertolino Residence	281842.15	146275.08	58	45
4PL	Northern Property Line – Residential	281578.61	147290.87	45	35
5PL	Eastern Property Line	282974.61	146565.04	45	44
7PL	Southern Property Line – Residential	283034.86	145176.43	50	50
8PL	Southern Property Line – Residential	283062.99	145039.59	46	46
9PL	Southeastern Property Line – Residential	283136.33	145197.45	50	50
10PL	Eastern Property Line	282975.55	145572.68	65	65
11PL	Southeastern Property Line	282993.96	145420.59	58	58
12PL	Northeastern Property Line	282947.77	147536.58	38	37

As shown on Table 3-3, the noise standards in the Rules will be met for the Phase II Expansion for the scenarios modeled. When landfill operating hours coincide with the hours defined in the Rules as nighttime hours (i.e., between 7:00 P.M. and 7:00 A.M.) and occur along the southwestern side of the Phase II Expansion, operating equipment must be limited to equipment with a combined sound pressure level of 81 dBA or less at 50 feet. This can be achieved by limiting activity to only one piece of equipment during the first hour of site operations, and only during the placement of waste along the southwestern side of the Phase II Expansion in Cell 19.

Sound level impacts from waste management activities in the northern, eastern, and southeastern areas of the Phase II Expansion (i.e., Cells 20, 22, and 18) were also considered under both Scenarios 1 and 2. Due to the significant distances from these cells to the northern, eastern, and southeastern properties, sound level results from landfill equipment in these cells are not anticipated to be higher than the results from the southwestern-modeled scenarios. Therefore, the proposed JRL facility expansion will meet both the local and state regulations with respect to noise when work is conducted in these areas.

3.6.4 Visual Impact Assessment

The Visual Impact Assessment (VIA) completed by Viewshed is included as Appendix I. The assessment was performed using U.S. Forest Service standards and guidelines in MEDEP Chapter 315, Assessing and Mitigating Impacts to Existing Scenic and Aesthetic Uses. Both Chapter 400 and Old Town Code Chapter 24 guidance require the applicant to look at public viewing areas within a 2,000-foot radius of the landfill; no "public viewing areas" as defined in the Rules exist within this radius. During permitting for the initial expansion in 2017, a VIA was completed by SMRT Inc.[2] Based on public input at that time, potential future views from Pushaw Lake were assessed, from locations where the existing landfill is currently visible. Due to this feedback, the Visual Study Area (VSA) used by SMRT was conservatively expanded to 6-miles, covering much of the lake. Additionally, NRPA Chapter 315.7 states:

> *"The radius of the impact area to be analyzed must be based on the relative size and scope of the proposed activity given the specific location."*

In the current VIA, Viewshed expanded further, using a 7-mile radius around the site, a scope and scale of review that far exceeds what is required under the Rules.

Fieldwork was conducted by automobile, kayak, and on foot on lands, roads, and waterbodies that are public or allow for public access. Photosimulations were prepared to illustrate the anticipated changes in views from scenic resources due to potential landfill visibility. From these analyses, Viewshed concluded that the JRL "is expected to have minimal contrasts in color, form, line, and texture. The JRL is unlikely to be perceived as a significant change in how the site has been used for nearly three decades. The landfill will take on different elements of form and color contrasts as it develops, but once it has reached its final elevations and receives vegetative capping, it is likely to be relatively consistent with other elevated landscape features within the VSA when viewed from midground and background distances."

During construction and operation of the landfill, it will have a generally gray color with operating equipment in view. The landfill will gradually grow in extent as cells are developed, eventually reaching its permitted final extent and elevation. Prior to final capping, closed cells will be covered by a protective black geomembrane that dulls to a flat grayish black over a few months. The relative contrast of these two conditions varies with season, weather, lighting, and distance. In winter, closed cells with snow cover blend with other snow-covered landforms, and the lighter gray operating areas will be more pronounced but will blend in with the warmer tones of intervening leafless areas.

Scenic resources were inventoried within the 7-mile VSA using State Geographical Information Systems (GIS) databases, municipal Comprehensive Plans and documents, and online research. Potential scenic resources within the seven-mile study area included: the Orono Bog, Pushaw Lake, Pushaw Stream, Penobscot River, Stillwater River, Perch Pond (also called Mud Pond), Pickerel Pond, Holland Pond, Birch

[2] SME, 2015, Appendix H.

Stream, Hirundo Wildlife Refuge, Sunkhaze Meadows National Wildlife Refuge, Caribou Bog Wildlife Management Area, Maine Interconnected Trail System 84 (ITS 84, a snowmobile trail), the Penobscot River at two public boat launches, four dams, Routes 16 and 43, I-95, and ten structures and two historic districts listed on the National Register of Historic Places.

The landfill was found to be visible from approximately two percent of the surface of Pushaw Lake at distances of 5.2 to 6.7 miles, the Penobscot River at one location 3.7 miles from the landfill and a second location 5.1 miles from the landfill, and the Stillwater River from intermittent areas at distances of 2.3 to 3.5 miles from the landfill. From Pushaw Lake, there are expected to be minimal contrasts in scale, form, line, and color. Once the expansion reaches heights visible above tree line, it will appear grayish/brownish to dark gray/black in color. Though the form and color of the landfill will change as it develops over time, these gradual changes will remain inconspicuous to the human eye. Along the Penobscot River, visibility in the midground and background viewing distance is not expected to unreasonably interfere with the experience of boaters and paddlers on the river, who are typically focused on foreground elements. Due to the presence of mature forest vegetation along the banks of the river, visibility from the Stillwater River is expected to be highly limited or negligible from most areas.

Drivers along Route 16 and Route 43 currently have views of the existing landfill, most of which are brief and intermittent, often seen through small gaps in vegetation and structures. Arborvitae planted along a stretch of Route 43 over a decade ago mitigate views of the existing landfill and have grown to be an effective visual screen that will continue to mitigate the view for motorists travelling northbound. The landfill is not readily visible in the southbound direction on Route 43. Overall, the JRL's visibility from local roads is likely to be minimal and would not cause an unreasonable adverse visual impact to motorists.
The landfill is visible while traveling through the Alton Bog along I-95. For approximately 4,200 feet, motorists traveling southbound will have intermittent views of the JRL through pockets of roadside vegetation. Travel at the posted speed limit would allow less than ten seconds of intermittent views of the landfill.

Details related to the specific sites evaluated, their features and representative photo simulations of the Phase II Expansion are provided in Viewshed's report contained in Appendix I.

The Phase II Expansion is determined to have no unreasonable adverse effect on existing uses and scenic character, will not unreasonably interfere with views from established public viewing areas, and will not unreasonably interfere with existing scenic and aesthetic uses of a scenic resource.

3.6.5 Federal Aviation Administration

The Phase II Expansion will not present a bird hazard to aircraft, in that the closest airport is greater than 15,000 feet away. Based on concerns expressed by the Federal Aviation Administration (FAA) in an email dated October 22, 2024 (Appendix G-8), NEWSME hired Stantec to conduct a Wildlife Hazard Site Visit (WHSV) in accordance with FAA Advisory Circular (AC) 150/5200-33C. This WHSV was conducted to gain

an understanding of gull activity and potential attractants at the JRL, investigate the relationship between gull presence at the JRL and Dewitt Field/Old Town Municipal Airport, and to determine mitigation strategies to address potential hazards.

A WHSV Report was issued by Stantec on December 19, 2024 (see Appendix G-8) and indicates that increased volume of municipal solid waste (MSW) bypass received at the JRL, which may contain food waste, has become a highly attractive food source to the gulls. The increase in MSW bypass in the waste stream has increased the gulls' attraction to the JRL.

NEWSME currently holds depredation permit No. MB670894, allowing the culling of up to 200 herring gulls, 100 ring-billed gulls, and 25 great black-backed gulls annually. A copy of the depredation permit is included in Appendix G-8. In addition to depredation, the JRL employs several non-lethal strategies to deter gulls including human presence, bird roosting deterrents, equipment horns, and limiting the area of open waste by installing daily, intermediate, and final cover as needed.

Based on follow-up site observations during site visits on March 18, 2025, and May 29, 2025, Stantec issued a WHSV Summary Report on July 18, 2025 (see Appendix G-8) indicating that NEWSME should follow the actions below to minimize gull numbers at the JRL:

- Continue to limit the area of uncovered waste to the extent practical;
- Continue to limit work to one area to the extent practical;
- Continue to hold depredation permit and increase depredation to meet the quota in the permit;
- Continue to install bird roosting deterrents on landfill gas wellheads around areas of open waste;
- Install and initiate a program using non-lethal hazing devices previously purchased by NEWSME (authorization to use hazing devices on a trial basis was granted from the MEDEP on June 25, 2025); and
- Conduct seasonal site visits to monitor gull abundance and effectiveness of implementation and mitigation measures.

On June 25, 2025, NEWSME received approval from the MEDEP for a 6-month trial for the recently purchased cannon hazing device. The results of the trial will be submitted to the MEDEP for review. If given permanent approval, the cannon will be used on an as-needed basis and its operation will be included in the facility Operations Manual.

SME received a letter from the Federal Aviation Administration (FAA) dated June 28, 2025, accepting Stantec's recommendations for minimizing gull populations at JRL provided that NEWSME continues mitigation strategies indicated in the WHSV Report and maximizes depredation numbers in the USFWS permit. FAA correspondence is included in Appendix G-8.

These vector control strategies above are included in the Operations Manual located in Volume IV of this Application.

3.6.6 Preservation of Historical Sites

The project will not have an unreasonable adverse effect on the preservation of historical sites (see Appendix G-4 for correspondence with the Maine Historic Preservation Commission and Appendix G-9 for correspondence with local tribes and nations), or, given the nature of the existing use, cause an unreasonable adverse effect on existing uses of property neighboring the proposed solid waste facility.

The proposed Phase II Expansion is determined to have no unreasonable adverse effect on existing uses or scenic character in the area.

3.7 No Unreasonable Adverse Effect on Air Quality

3.7.1 Gas Emissions

Gas emissions from the existing landfill have been managed by installing an active gas collection system. The Phase II Expansion will use the same practices (i.e., active gas collection, flaring, and the installation of landfill cover) as are currently in use. The site currently has two air emission licenses under 38 M.R.S. § 344, and § 590 et seq. -- #A-921-70-F-R (issued May 24, 2021) that regulate emissions from the existing facility and #A-921-70-1-A (issued January 26, 2024) regulates emissions from Archaea Energy's Renewable Natural Gas (RNG) facility. The licenses were issued based on MEDEP findings that emissions from this source will: receive Best Practical Treatment; not violate applicable emission standards; and not violate applicable ambient air quality standards in conjunction with emissions from other sources. The emission limits established for the facility are summarized in the air emission licenses (see Appendix J). The landfill gas emissions are monitored and reported by NEWSME as required by the air emission license. Both licenses must be renewed by May 24, 2026, with a renewal application submitted at least six months prior to expiration. This renewal application will reflect the site changes associated with the Phase II Expansion.

Landfill gas (LFG) extracted from the Phase II Expansion will be combusted in the existing landfill flare (Flare #4), as shown on Figure 1-2, or in backup Flares #2 and #3, if required. LFG may be combusted in the RNG facility. Flare #4 is rated for 106.5 million British thermal units per hour (MMBtu/hr), which is equivalent to 3,550 standard cubic feet per minute (scfm) of LFG at 50 percent methane (CH_4). Flare #3 is rated for 40.5 MMBtu/hr (equivalent to 1,350 scfm at 50 percent CH_4) and Flare #2 is rated for 22.5 MMBtu/hr (equivalent to 750 scfm at 50 percent CH_4). Flares #2 and #3 are licensed as backup combustion devices and are limited to 100 hours per year of operation.

In early 2015, the JRL began to operate a Thiopaq® sulfur removal system to maintain an average concentration of 1,000 parts per million by volume (ppmv) of total reduced sulfur (mostly hydrogen sulfide) in the LFG prior to combustion to decrease emissions of sulfur dioxide as required by the JRL's air

emissions license. A backup sulfur removal system using Sulfatreat® media is installed next to the flare to be used as needed to maintain required sulfur levels if needed. Once treated, the LFG is sent to the LFG Flare system or to the RNG plant for further processing. The intent of the RNG plant is to process LFG into pipeline quality Renewable Natural Gas, which can supplement conventional fossil fuel natural gas, and can be introduced into a utility natural gas pipeline intended for public consumption.

The LFG Flare system is designed to manage any excess gas that is not sent to the RNG plant for further processing and is subject to the facility's air emissions license. The RNG Flare is intended to burn off gas that has failed to meet the required pipeline quality specifications and cannot be sold.

Included in Appendix I of Volume III of this Application is an LFG design report prepared by SHA. The report summarizes estimates for peak LFG generation and the associated LFG system design prepared by SHA for the proposed Phase II Expansion. The anticipated design flow including the Phase II expansion is approximately 170 MMBtu/hr, equivalent to 5,600 scfm. Existing Flare #4 can operate up to 120 MMBtu/hr, therefore, proposed Flare #5 will be necessary to control the projected Phase II Expansion of 170 MMBtu/hr. NEWSME is applying to increase the licensed flow of Flare #4 to 129 MMBtu/hour and to install Flare #5 when needed. Proposed Flare #4 will be located approximately 75 feet west of Flare #4, as indicated in SHA's LFG System Design Report located in Volume III Appendix I.

As part of the operation of the LFG gas collection system and in accordance with Condition 4.F of the PBD, NEWSME will perform surface scans of the landfill six times per year in general accordance with the New Source Performance Standard (NSPS) for municipal solid waste (MSW) landfills contained in 40 C.F.R § 60.763(d). Two additional surface scans per year of the landfill intermediate cover areas will be performed during periods of low barometric pressure (if possible) using MEDEP approved methods to scan for fugitive landfill gas emissions. Temporary cover areas found to have fugitive emissions will be repaired as appropriate. The results of these scans are reported to the MEDEP.

Open burning is strictly prohibited at the JRL Facility.

3.7.2 Hydrogen Sulfide Monitoring

Landfill odor is caused primarily by hydrogen sulfide (H_2S). NEWSME has identified three primary sources of odors, as well as the methods to control the off-site migration of these odors. The sources include odors associated with incoming wastes, leachate transport and storage, and landfill-related gases. The waste types with the highest potential for odor generation are front end process residue (FEPR), bypass MSW, and WWTP sludges. Leachate generated by the landfill is also a potential source of odors during its storage and transfer to tanker trucks that transport it to the WWTP. As the waste mix in the landfill begins to degrade, it has the potential to generate landfill gases such as CH_4 and H_2S. NEWSME installs active gas collection systems in each landfill cell to minimize odors and reduce off-site migration and actively monitors all landfill-related odors. These activities will continue with the Phase II Expansion. NEWSME has an active Odor Complaint Management and Response Plan that describes the current odor control

measures that will be implemented at the JRL, as well as policies and procedures to control the off-site migration of landfill-related odors and respond to odor complaints that may be received from the public. This plan is included in Appendix K of the Operations Manual (Volume IV) of this Application.

The procedures employed by NEWSME to monitor odors are described in the plan and include daily surveys around the active landfill areas and periodic surveys at surrounding residential areas. The JRL also maintains four, single point on- and off-site monitors that collect real time H_2S concentration data and identify conditions that may require abatement. The locations of the monitors are as follows:

- Approximately one-half mile northeast of the landfill on the landfill access road (Access Road Monitor);
- At 552 West Old Town Road, approximately 0.5 miles west of Detention Pond 1A, formerly the leachate pond;
- At 4 West Coiley Road, approximately 0.9 miles south of the existing landfill; and
- At Old Stagecoach Road, approximately one-half mile from the proposed Phase II Expansion.

All four of the H_2S monitors have direct communication with the landfill's electronic monitoring system through telemetry. Real-time information can be obtained at the scale house, as well as on the office computer. If any of the H_2S monitors detect a concentration of 15 ppb or greater, the scale house is alerted by telephone with an automated message reporting the condition. The scale house operators and security personnel are instructed to immediately report any such condition to the Supervisory staff so that they can follow-up by investigating on-site conditions as necessary. All of these provisions will remain in-place for the Phase II Expansion.

The existing Odor Complaint Management and Response Plan included in Volume IV, Appendix K, will continue to be followed during operations of the Phase II Expansion. NEWSME's dedicated incoming telephone line for complaints from the public related to any aspect of the JRL operations will remain active during operation of the Phase II Expansion. The complaint telephone number (207.394.4376) is listed in the plan and is included on the MEDEP's website for the landfill (https://www.maine.gov/dep/waste/juniperridge/index.html).
The following information will be gathered from any users of the complaint number:

- Name, address, and telephone number;
- The nature of complaint (e.g., odor, noise, lighting, dust);
- What time of day did the caller first experience the source of their complaint; and
- Whether the caller would be willing to allow, or has requested, a call-back or site visit.

After this information is received, NEWSME staff will immediately relay the information to the appropriate complaint response personnel. If a return call has been requested, the on-call Landfill staff will first telephone the person initiating the complaint. If a meeting has been requested, the Landfill staff will ask permission to go to the residence to evaluate site-specific information.

Regardless of whether Landfill personnel meet directly with the individual making the complaint, the Landfill personnel, upon receiving the call, will immediately gather and record the following information at the JRL site and general vicinity as relevant to the complaint and complete the Complaint Record Form contained in the Odor Complaint Management and Response Plan.

For odor complaints:

- Time of arrival at the location of the complaint (if applicable);
- Recorded wind direction and speed at the Landfill;
- H_2S level registered at the complaint address;
- Observation of unusual conditions present at the landfill prior to, or during, the time of the complaint; and
- Waste materials being accepted at time of complaint.

For all complaints:

- Actions taken to remedy the cause of the complaint;
- Resolution of the complaint;
- Time of response phone call to caller;
- Comments made in reporting back to caller;
- Comments made by caller during final exchange; and
- Recommendations as to how to resolve any observed problem.

3.7.3 Dust Control

Dust control measures that will be used in the Phase II Expansion include water spray trucks to wet secondary roads during dry weather months and a road sweeper to minimize dirt buildup on paved roadways. Additional measures such as applications of calcium chloride may be required from time to time and will be used only on internal cell access roads. The primary access roads to the Phase II Expansion (north and east roads) will be paved to reduce dust generation.

Ash received at the Phase II Expansion will be deposited on the active working area of the landfill and typically mixed with WWTP sludge each day to minimize dust. If an adequate amount of sludge is not available, other materials (such as soil or MSW bypass) will be used to completely cover the ash each day.

Ash received at the JRL has been "quenched" at the point of generation and therefore it is not prone to being windblown.

3.8 No Unreasonable Adverse Effect on Surface Water Quality

During the development and operation of the Phase II Expansion, NEWSME will not:

- Discharge any water pollutants, directly or indirectly, that affect the State classification of a surface water body as specified in 38 M.R.S. § 464;
- Discharge any pollutant without obtaining a license to do so pursuant to 38 M.R.S. § 413, degrade surface water quality by contributing to phosphorous concentrations in "water bodies most at risk from new development" as defined in 06-096 CMR 502; or
- Cause the discharge of a nonpoint source of pollution to waters of the United States that violates any area-wide or State-wide water quality management plan that has been approved and is in compliance with Section 319 of the Federal Water Pollution Control Act.

There are currently no "lakes most at risk of development" or "urban impaired streams," as defined in 06-096 CMR 502, in Old Town or Alton.

The Phase II Expansion design incorporates several features to protect the quality of surface water leaving the site. All precipitation that contacts the waste will be collected and treated as leachate. Surface water management for both the construction activities and runoff from the covered portion of the landfill was developed based on the four objectives outlined in the "Maine Erosion and Sediment Control Best Management Practices" (BMP-MEDEP, 2016) (BMPs). The BMPs incorporated in the design include temporary measures such as silt fence, temporary seeding and mulching, hay bales, and stone check dams as well as permanent measures such as riprap-lined downspouts, stormwater detention ponds, permanent seeding, mulching, culvert inlet and outlet protection, low velocity ditches, and level spreaders. (Stormwater Management and Erosion Control Plans are contained in Appendices J and K, respectively.)

NEWSME currently has a Multi-Sector General Stormwater Permit (# MER05B477) for the discharge of stormwater associated with industrial activity (Sector L, Landfills) and has a Stormwater Pollution Prevention Plan (SWPPP) in-place for the JRL. The SWPPP will be updated as each new cell of the Phase II Expansion is developed. The current site's SWPPP is included in Appendix O of Volume IV. A Maine Construction General Permit (MCGP) will also be obtained prior to performing qualifying construction activities (cell or final cover construction) associated with the Phase II Expansion. Therefore, the Phase II Expansion will not have an unreasonable impact on the quality of surface water.

3.9 No Unreasonable Adverse Effect on Other Natural Resources

The Phase II Expansion will not have an unreasonable adverse effect on other on- or off-site natural resources. The development of the Phase II Expansion will result in 3.75 acres of direct freshwater wetlands impact. The wetland filling impacts will be spread out over several different areas (see Figure 3-1). 0.31 acres of the impacted wetlands are designated as Wetlands of Special Significance, as defined by 06-096 CMR 310.4. A total of nine vernal pools were identified or had been previously mapped within and adjacent to the proposed Phase II Expansion area; two of these vernal pools meet the criteria to be considered a SVP. Neither of the SVPs nor the 250-foot critical terrestrial habitat surrounding them will be impacted by the project. The combined NRPA Tier 3 /USACE application is included in Volume V of the Application. Volume V also includes descriptions of the impacted wetlands, their functions and values, an alternatives analysis comparing options to avoid and minimize unavoidable wetland impacts, and a wetland compensation plan for the 3.75-acre unavoidable wetland impacts of $763,103 of in lieu fees.

3.10 Soil Types that are Suitable and Will Not Cause Unreasonable Erosion

The soils located within the Phase II Expansion area are suitable for the proposed development. The planned erosion control measures that will be implemented during construction and operation of the Phase II Expansion will limit unreasonable erosion of soils. A detailed description of the surficial soils within the Phase II Expansion area, including test pit and soil boring information, is contained in Volume II of this Application. The design and implementation of all erosion control measures will be conducted in accordance with the BMPs and in accordance with the Maine Construction General Permit, coverage under which will be obtained for each phase of development. A comprehensive Erosion and Sedimentation Control Plan (ESCP) has been developed in accordance with the BMPs and is attached as Appendix L of this document. The ESCP describes the project locations and watersheds, the proposed construction activities, existing and proposed drainage structures, design calculations, temporary, permanent, and standard erosion control measures to protect soils from erosional forces, and maintenance and inspections of erosion control features to ensure they are functioning as designed.

Suitable erosion control measures will be in-place prior to disturbance of soil associated with the Phase II Expansion development. To minimize erosion during construction, operations, and cover placement, temporary and permanent erosion control measures will be implemented as described in the plan. The BMPs incorporated in the design are listed in Section 3.8. All erosion control measures will be monitored on a regular basis, by the construction contractor during construction, and by NEWSME post-construction to ensure that structures have been implemented in accordance with the plan and are functioning properly. The phased development of the Phase II Expansion will ensure that the amount of disturbed area at any one time will be minimized and limited to the shortest reasonable period. Vegetative cover will be established using seed selection, seeding rates, and mulching rates based on successful site-specific application rates previously used at the site.

3.11 No Unreasonable Risk that a Discharge to a Significant Groundwater Aquifer Will Occur

Volume II of this Application contains the hydrogeologic information required by the Rules for a solid waste landfill expansion and demonstrates that no unreasonable risk of a discharge to a significant groundwater aquifer exists. The Phase II Expansion does not overlie a significant sand and gravel aquifer or pose an unreasonable threat to the quality of a significant groundwater aquifer.

"Significant groundwater aquifer" is defined by 06-096 CMR 400.1 as a "porous formation of ice-contact and glacial outwash sand and gravel supplies or fractured bedrock that contains significant recoverable quantities of water likely to provide drinking water supplies." The nearest mapped sand and gravel aquifer is located approximately one mile east of the Phase II Expansion (Maine Geological Survey (MGS) Open-File 08-07 by Tolman and Lanctot, 2008). There are no stratified sand and gravel deposits mapped by MGS within the JRL site (Borns and Thompson, 1981; Foster and Smith, 2001). Therefore, the Phase II Expansion does not overlie or fall within 300 feet of a significant sand and gravel aquifer.

A stratified sand zone within the basal till was identified to the east side of the existing Cell 11 at MW-06-01, MW-213, P-08-09, and P-08-10, greater than 1,800 feet from the proposed Phase II Expansion solid waste boundary. This sandy zone is contained within the basal till and does not appear to be a regional stratified sand and gravel deposit, based on previous investigations for the existing landfill (SME, 1991) and investigations for the previous expansion. Till layers were observed within the thicker portions of the sandy zone. The earth resistivity survey suggested a limited lateral extent to this sandy zone to the east. Furthermore, this sandy zone within the till was deposited during till deposition beneath glacial ice and not contemporaneously with the remote sand and gravel deposit one mile east of the JRL. This limited zone is not mapped by MGS as a regional stratified sand and gravel deposit. Because groundwater from the Phase II Expansion will not flow toward this zone, and because it was evaluated as part of the investigation for the previous expansion, this sandy zone was not evaluated again as part of the Phase II Expansion application.

Groundwater from bedrock beneath, directly adjacent to, or immediately downgradient of the Phase II Expansion site is not likely to be used for domestic consumption because the land surrounding and immediately downgradient of the Phase II Expansion's solid waste boundary is owned by the State, with the nearest property boundary approximately 500 feet from the proposed expansion. However, because off-site bedrock immediately adjacent to the site property boundary could be used as a water supply, the potential for the Phase II Expansion to pose an unreasonable threat to an off-site bedrock well was also evaluated.

The potential for the Phase II Expansion to pose an unreasonable threat to off-site bedrock wells was evaluated through the time of travel analysis required by 06-096 CMR 401.2.C.2, and the contaminant transport analysis required by 06-096 CMR 401.2.G. These evaluations are included in Volume II, Section 6, and Volume III, Section 4.0 of this Application, respectively. These analyses demonstrate that

the Phase II Expansion's site setting coupled with the double-composite liner with leak detection and leachate collection systems can be anticipated to protect the underlying groundwater such that the facility poses no unreasonable risk of discharge to a significant groundwater aquifer.

3.12 Adequate Provision for Utilities and No Unreasonable Adverse Effect on Existing or Proposed Utilities

The Phase II Expansion will not have any unreasonable adverse effect on existing site or municipal utilities. The existing well and sanitary wastewater disposal systems located adjacent to the facility's maintenance buildings and at the current office building will continue to be used by on-site landfill personnel. There are no additional sanitary wastewater disposal needs for expansion of the landfill. Initially, water supply needs for the Phase II Expansion (i.e., for dust control, leachate pipe cleaning) will continue to be met by the water supply sources for the existing facility. Prior to construction of Cell 20, a new water supply well will be drilled to provide water for preparation of the daily foam cover.

Leachate generated by the existing landfill and the Phase II Expansion will be treated for PFAS at the facility's MEDEP approved on-site leachate treatment plant (to be designed, constructed, and operational prior to Phase II Expansion operations). An implementation schedule for design and construction of the on-site leachate treatment plant was submitted to the MEDEP on December 27, 2024, as required by Condition 6 of the PBD. After PFAS treatment occurs, leachate generated by the existing landfill and the Phase II Expansion will continue to be treated at the ND Paper Mill WWTP in Old Town, , or other permitted wastewater treatment facilities. A copy of the current leachate disposal contract and is attached in Appendix M of this document.

The existing JRL facility has three-phase, 480-volt-power service which enters the site along the existing site access roadway. The Phase II Expansion leachate pump stations will also require three-phase, 480-volt power, which will be supplied to each pump station via on-site electrical cables, of which some will be aboveground along the site access roads and some buried along the site access roads. Additional power will be required for control systems associated with the PFAS treatment plant and will be supplied from lateral extensions from the existing power lines at the site.

3.13 Not Unreasonably Cause or Increase Flooding

The Phase II Expansion will not unreasonably cause or increase flooding on-site or on adjacent properties, nor will it create an unreasonable flood hazard. As shown on the site surroundings map in Appendix N of this document, the Phase II Expansion is not located in a 100-year floodplain. As part of the design of the Phase II Expansion, post-development flow from a 25-year, 24-hour storm event will be at or below pre-development levels. Appendix K of this document contains a Stormwater Management Plan for the Phase II Expansion, which describes the site setting, the pre- and post-construction drainage plans, and

the stormwater structures design and routing that will limit post-development runoff levels to predevelopment levels, demonstrating that this standard has been met.

3.14 Solid Waste Management Hierarchy

The State's solid waste management hierarchy, set out in 38 M.R.S. § 2101, establishes a policy to plan for and implement an integrated approach to managing solid waste, based on the following order of priority:

- Reduction of waste generated at the source, including both amount and toxicity of the waste;
- Reuse of waste;
- Recycling of waste;
- Composting of biodegradable waste;
- Waste processing that reduces the volume of waste needing land disposal; including incineration; and
- Land disposal of waste.

The MEDEP Commissioner recently concluded in the PBD that the proposed expansion of the JRL continues to promote the hierarchy, provided that CWS submits a report within six months of plans for a mattress recycling program, and if this application is granted to construct and operate the Phase II Expansion:

- Casella continues to expand deployment of its mobile recycling app, and includes information in each landfill annual report regarding where the app has been deployed;
- Each landfill annual report includes a discussion regarding Casella's work to encourage and assist towns to engage in all possible recycling and diversion activities; and
- Casella evaluates and submits the evaluation in each annual report of the availability and capacity of regional facilities in Maine to reduce the volume of municipal wastewater treatment plant sludge prior to landfilling at the JRL. The evaluation should include recommendations to further reduce the volume of sludge prior to landfilling.[3]

On March 28, 2025, CWS submitted the required report detailing schedules and plans for the mattress recycling program to the MEDEP for review and on February 18, 2025, CWS submitted an application for a solid waste processing facility license to allow for the processing, dismantling, and recycling of mattresses at their Scarborough Material Recovery Facility (MRF). A letter from the MEDEP indicating that

[3] See Appendix A-9, page 22.

CWS satisfied the mattress recycling plan conditions was issued on April 29, 2025, and is included in Appendix B-3.

This is consistent with MEDEP's conclusion in 2017 that the initial expansion at JRL also supported the hierarchy.[4] Waste management practices conducted at JRL by NEWSME, and by its parent company, CWS, will continue in the Phase II Expansion to promote the solid waste management hierarchy, as summarized below.

3.14.1 Source Reduction and Reuse

Residues, as defined in 06-096 CMR Ch. 400, are wastes generated as a result of the handling, processing, composting, incineration (ash from waste to energy [WTE] facilities and biomass and fossil fuel combustion), or recycling of solid waste, including, without limitation, FEPR, fines and other residues from CDD processing facilities, and ash from incineration facilities and non-compostable compost screenings.[5] JRL supports the solid waste hierarchy by providing necessary disposal capacity for the variety of residues generated during the operation of material processing, recycling, and WTE facilities, as well as bypass MSW that would otherwise accumulate during facility maintenance shutdowns. From 2020 to 2023, approximately 47 percent of the solid waste accepted for disposal at JRL was the residues and bypass from WTE or solid waste processing facilities. These facilities would be unable to operate without the availability of a disposal option for their residues or during shutdown periods. Additional information on CWS's source reduction and reuse efforts in Maine were described in the June 2024 PBD application.[6]

3.14.2 Recycling of Waste

JRL operations support the hierarchy's goal of reuse by using recycled material in construction and operations that "reduce the extraction of virgin natural resources, and often the energy use and other impacts related to extraction, processing, and transport of natural resources[7] and provides a beneficial use of recycled materials that decreases the use of valuable non-renewable natural resources (e.g., sand and gravel)." Processing fines are a residue of the CDD recycling process. Virgin sand, a material that is experiencing a global shortage,[8] would need to be used instead of alternative daily cover (ADC) if recycled materials were not available, thus filling valuable landfill space with a material that is not a waste. Recycled materials are also used for internal gas pipe bedding material, internal road base material, internal drainage control structures, as ADC, and for shaping and grading material at the landfill. The use of waste or waste-derived recycled materials will continue as part of operations in the Phase II Expansion.

[4] See Appendix A-1, page 100.
[5] Chapter 400, Section 1.Tt.
[6] Application for a Determination of Public Benefit, Juniper Ridge Landfill, SME June 2024, pages [3-7 to 3-13].
[7] Materials Management Plan, page 21.
[8] Demand for Frac Sand and Concrete Drives Scarcity, Investopedia, Accessed November 24, 2023. https://www.investopedia.com/investing/demand-frac-sand-and-concrete-drives-scarcity/

CWS is the largest recycler of residential, commercial, and industrial recyclables in Maine, using its two recycling facilities and its brokerage operation to contribute significantly to Maine's overall recycling and diversion rate.[9] An overview of Casella's approach to recycling is provided on its website[10] and as indicated CWS's 2024 Sustainability Report located in Appendix B-2. CWS's single-stream recycling program, Zero-Sort®, is used by many communities. Additionally, CWS collects and handles user-sorted recyclables for a number of communities and businesses in the State. CWS has worked directly with municipalities and businesses to provide solutions for recycling challenges. Further, on February 18, 2025, CWS submitted an application for a solid waste processing facility license to allow for the processing, dismantling, and recycling of mattresses at their Scarborough Material Recovery Facility (MRF), as required by Condition 3 of the PBD. Additional information on CWS's recycling efforts in Maine were described in the PBD application.[11]

3.14.3 Composting of biodegradable waste

In 2023, CWS recovered over 31,000 tons of organics through processing and beneficial reuse. CWS encourages interested customers to work with local compost, de-packaging, and digestion companies; connects customers with third parties who provide composting and anaerobic digestion services for food waste organics; and supports many municipal customers with leaf and yard debris collection for composting.

CWS works with individual customers to process and beneficially use their non-traditional solid waste streams and generate value-added agricultural products and agronomic soil amendments. In recent years, CWS managed the beneficial reuse of a major chemical manufacturer's byproduct. Additional information on CWS's composting efforts in Maine was described in the PBD application.[12]

3.14.4 Waste processing that reduces the volume of waste needing land disposal including incineration

At several transfer stations throughout Maine, CWS separates clean wood from CDD and collects land clearing debris and other clean wood waste. These materials are then sent to other facilities for further processing or used to make recycled products.

CDD fines generated during the processing of wood wastes are primarily used at the JRL as part of the landfill's ADC, but have also been used as the gas transmission layer below the intermediate cover, as internal gas piping bedding, and as internal road base material. A transfer station at the JRL collects clean wood waste which is chipped and used on-site for ADC or erosion control mix (ECM) for construction projects. If these materials were not used as part of the landfill infrastructure, they would still need to be

[9] Casella Recycling Establishment Report Form, 2023.
[10] Casella Waste Systems website, Recycle Better webpage, https://www.casella.com/services/recycling.
[11] Application for a Determination of Public Benefit, Juniper Ridge Landfill, SME, June 2024.
[12] Application for a Determination of Public Benefit, Juniper Ridge Landfill, SME, June 2024.

disposed of in a landfill and virgin soil materials would be added to the landfill as daily cover, doubling the required space for the internal infrastructure needed to operate the landfill.

CWS does not own waste incinerators, but supports the State's two operating incinerators (ecomaine and Mid-Maine Waste Action Corporation), one currently inoperative incinerator (Eagle Point Energy Center, LLC, previously owned by Penobscot Energy Recovery Company), and one waste processing facility Municipal Waste Solutions, previously Fiberight) by accepting bypass waste from all four facilities when they are closed due to planned and unplanned shutdowns. If landfill space at JRL was not reliably available for these facilities, there would be times when they could not accept waste from the towns with whom they contract because of their inability to process it during a shutdown. Additionally, the JRL provided disposal space for ash from the EPEC incinerator and has taken the site material that was stockpiled at EPEC. The ability of the State to use incinerators and processing facilities to reduce the volume of waste needing to be landfilled is dependent upon the availability of a landfilling option.

Due to the presence of PFAS in Maine's groundwater from previous land spreading of WWTP sludge, the Maine State Legislature passed a law in April 2022 that prohibited the MEDEP from issuing new licenses or granting authorization to apply or spread sludge and septage at any location in the State. The law also allowed for the "disposal or placement at a solid waste landfill of any of the materials that are prohibited from application, spreading, sale or distribution." WWTPs collect sewage from residential, commercial, and industrial streams and treat the liquids to a level where the effluent can be discharged to a waterbody. In doing so, solid materials are removed and dewatered to the extent possible. As of April 2022, these materials must be landfilled, with 90 percent of the WWTP sludge in Maine going to JRL. In the same way that JRL supports the waste reduction provided by incineration, it supports the ability of the WWTPs within Maine to meet the Clean Water Act by providing a place for the disposal of the residual sludge. Additional information on CWS's waste processing efforts in Maine was provided in the PBD application.[13]

3.14.5 Land disposal of waste

Since it began operations in 1996, JRL has consistently been constructed with liners that meet or exceed the State's landfill requirements. The landfill has an exemplary track record of meeting State permitting requirements and protecting groundwater, surface water, and other natural resources of the State. The Phase II Expansion will continue with this tradition, installing a double composite liner that exceeds State requirements, and robust leachate collection and leak detection systems. When the waste nears the final grades, the landfill will be capped with a temporary geomembrane to reduce leachate production and odor. This temporary cap will be replaced with a 3-foot-thick final cover system once an area has had an opportunity to settle and be topped with waste so that the landfill volume can be completely utilized, thereby minimizing the need for additional site development.

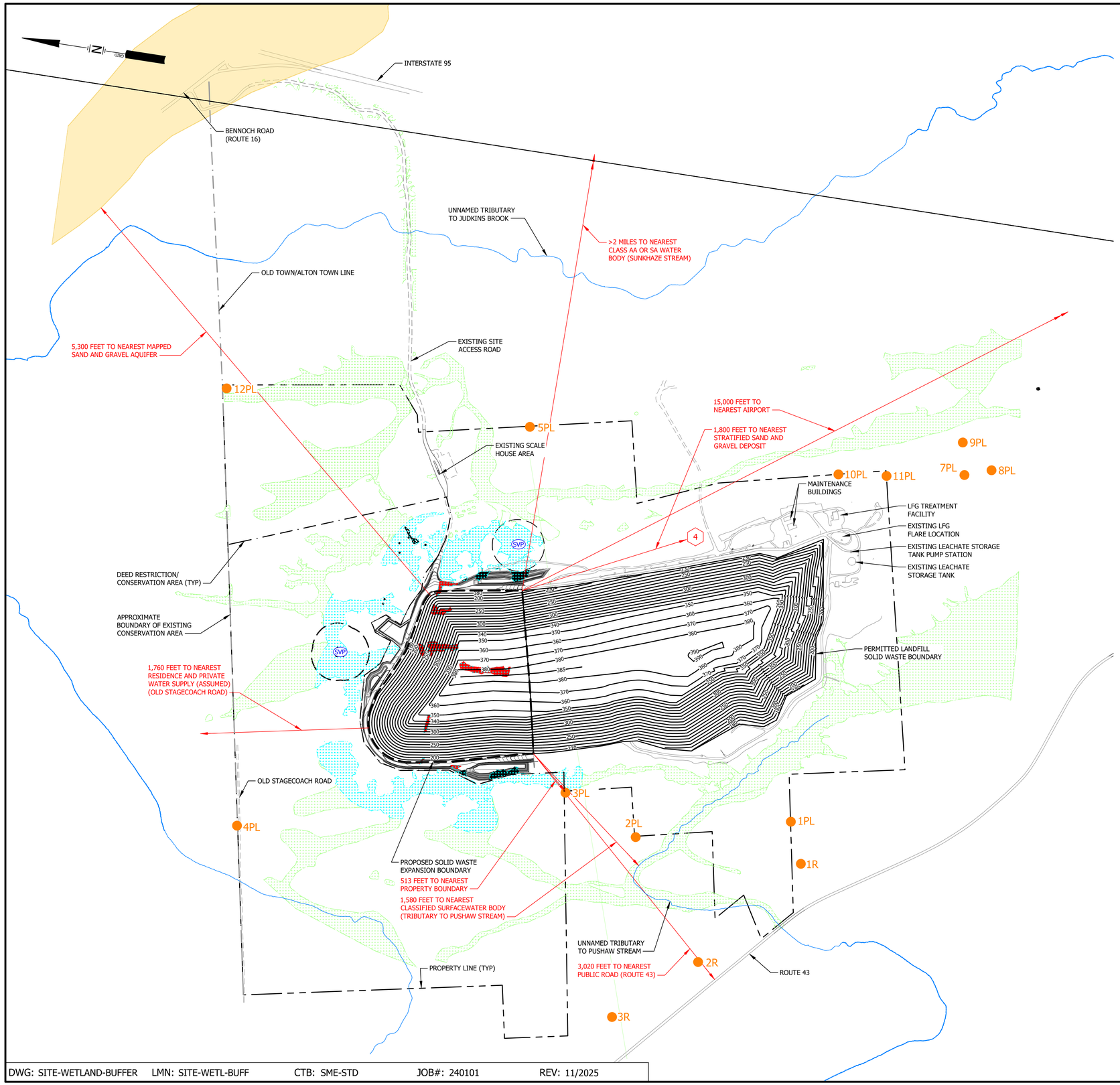
[13] Application for a Determination of Public Benefit, Juniper Ridge Landfill, SME, June 2024.

BGS and NEWSME will develop and operate the Phase II Expansion consistent with the hierarchy and continue to promote and encourage waste reduction measures and maximize the waste diversion efforts by the users of JRL to the maximum extent practicable. These efforts will be undertaken in the context of the available State recycling and reuse infrastructure, willingness or ability of waste generators to utilize this infrastructure (i.e., availability, handling logistics, transportation, and costs), and regulatory requirements for utilization projects (e.g., Chapters 418 and 419 of the Rules). In accordance with Condition 4A of the PBD, NEWSME will continue to work to deploy its mobile recycling app with willing participants and include updates in their annual report. NEWSME will include in their annual report a discussion regarding their work to encourage and assist towns to engage in all possible recycling and diversion activities, in accordance with Condition 4B of the PBD.

For many of the wastes proposed for disposal in the Phase II Expansion, there are no viable waste management techniques on the hierarchy that can effectively handle the type or volume of these materials generated in the State.[14] The decision on the waste management technique used by the generators is not within the control of either BGS or NEWSME. However, as an integrated solid waste management company, Casella provides opportunities for generators to reduce, reuse, or recycle their waste using environmentally sound material management methods. NEWSME will include in their annual report an evaluation of the availability and capacity of regional facilities in Maine to reduce the volume of WWTP sludge and include recommendations to further reduce the volume of sludge prior to landfilling in accordance with Condition 4C of the PBD.

CWS will continue to be a leader in reuse and recycling of waste as new and alternative methods become available to process wastes that have historically been landfilled or incinerated within the State. Depending on the level of reduction that can be achieved, the Phase II Expansion will be available to handle any residues or bypass that are generated by the new and alternative methods of waste management. This supports the hierarchy by providing an environmentally sound management option to handle residues and bypass, and ultimately reduces the amount of waste that is land disposed. These new waste materials would only be accepted in the Phase II Expansion after receiving any required approvals from the MEDEP.

[14] See Table 5-1 in Section 5 of this report for the State Plan's ranking of landfill disposal as the current management method for the various types proposed to be accepted in the Expansion.



NOTE:

1. THIS IS AN INFORMATIONAL FIGURE ONLY AND IS NOT INTENDED TO SERVE AS A BOUNDARY SURVEY MAP. DIMENSIONS, NORTHING AND EASTING INFORMATION PRESENTED ON THIS FIGURE ARE APPROXIMATE AND ARE BASED UPON AVAILABLE SITE INFORMATION FOR THE JUNIPER RIDGE LANDFILL. NO FIELD SURVEY HAS BEEN PERFORMED BY SEVEE AND MAHER ENGINEERS REGARDING THE INFORMATION PRESENTED ON THIS DRAWING.
2. PROPERTY LINE LOCATIONS ARE APPROXIMATE AND ARE BASED UPON A RESULT OF FIELD SURVEY PERFORMED BY HERRICK AND SALSBURY, INC. LAND SURVEYORS, ELLSWORTH, MAINE FOR TRYTON TREE FARM PROJECT, PATTEN CORPORATION-DOWNEAST, OLD TOWN, MAINE, FEBRUARY 23, 1988, REVISED APRIL 7, 1988.
3. LOT LOCATIONS ARE APPROXIMATE AND ARE BASED UPON AVAILABLE TAX MAP INFORMATION FOR THE TOWN OF ALTON AND OLD TOWN, MAINE, (2015).
4. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004, STANTEC CONSULTING SERVICES 2008, 2014, 2015, AND BRI ENVIRONMENTAL IN 2024.
5. NOISE ASSESSMENT LOCATIONS FROM SOUND LEVEL ASSESSMENT REPORT PREPARED BY EPSILON ASSOCIATED, INC., DATED APRIL 22, 2024.
6. CLASSIFIED SURFACE WATER AS SHOWN ON MAP OF CURRENT MAINE STATUTORY WATERS, DATED JULY 19, 2017 AND UPDATED DECEMBER 17, 2024.

LEGEND:

- PROPERTY LINE
- WETLAND FIELD DELINEATED BY BRI (2024) (SEE NOTE 4)
- WETLAND FIELD DELINEATED BY STANTEC/WOODLOT ALTERNATIVES (2004, 2008, 2014, AND 2015) (SEE NOTE 4)
- WETLANDS FIELD DELINEATED BY BRI (2024) WITH DIRECT FILL IMPACTS
- SVP — SIGNIFICANT VERNAL POOL LOCATED BY BRI (2024)
- NOISE ASSESSMENT LOCATION (SEE NOTE 5)
- CLASSIFIED SURFACE WATER (SEE NOTE 6)
- MAPPED SAND AND GRAVEL AQUIFER

250 0 500 1000 FEET

FIGURE 3-1
SITE WETLANDS/BUFFER PLAN
PHASE II EXPANSION
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DWG: SITE-WETLAND-BUFFER LMN: SITE-WETL-BUFF CTB: SME-STD JOB#: 240101 REV: 11/2025

\\Server\Civil\Cadd\CivilTrue\Land\FEExpansion\Phase II Expansion\Acad\Figures\FIT-WETLAND-BUFFER.dwg, FIG 3-1, 11/3/2025 9:18:13 AM, sjm

4.0 MEDEP REG. CHAPTER 400.5 - PUBLIC BENEFIT DETERMINATION

The Phase II Expansion received a PBD from the MEDEP #S-020700-W5-CV-N on October 2, 2024, for 11.9 million cubic yards of additional capacity at JRL, as proposed in this Phase II Expansion application. A copy of the Department Order is contained in Appendix A-9. The Phase II Expansion's concept and purpose is consistent with the underlying facts and circumstances that provided the basis for the MEDEP's approval of the PBD, including ownership, capacity, and waste types that will be disposed of in the Phase II Expansion. Conditions of the PBD are listed in Section 2.1.3.

5.0 MEDEP REG. CHAPTER 400.6 - RECYCLING

Pursuant to 06-096 CMR 400.6 of the Rules, NEWSME and BGS are required to demonstrate that the volume of waste and the risks related to its handling and disposal have been reduced to the maximum practical extent by recycling and source reduction prior to being landfilled. As with the hierarchy, the Commissioner recently determined in the PBD that the Phase II Expansion is consistent with the State Plan, and thus is consistent with its recycling provisions.[15]

Table 5-1 summarizes the eight major waste categories expected to be landfilled in the Phase II Expansion, the tonnages of each received at the landfill in 2023, and the percentage of overall tonnage represented by each waste category. Table 5-1 also identifies whether each material: 1) is a residue from a processing facility that has reduced the amount of material that would be landfilled; 2) is subject to recycling efforts prior to disposal; 3) has had any available reduction technologies been applied; and 4) has had all available recycling technologies applied.

[15] See Appendix A-9, page 22.

TABLE 5-1

WASTE MANAGEMENT TECHNIQUES FOR ANTICIPATED PHASE II EXPANSION WASTE STREAMS

Material Category	Waste Types Anticipated to be Accepted in the Phase II Expansion		Is Material a Residue from a Processing Facility that reduced the amount of material landfilled?	Was material subject to recycling efforts prior to landfilling or is its use in the landfill considered recycling?	Have any available reduction technologies been applied?	Have all available recycling technologies been applied?
	Tons Accepted in 2023[1]	Percent of Total Tonnage[2]				
Construction and Demolition Debris	347,016	42	Yes	Yes	Yes	Yes
MSW Bypass	266,452	32	Yes	Yes	N/A	UNK
Municipal/Industrial Wastewater Treatment Plant Sludge	66,176	8	Yes	No	Yes	No
Construction and Demolition Debris Processing Facility Fines	50,774	6	Yes	Yes	Yes	Yes
Oversized Bulky Waste	78,673	9	No	No	N/A	No
Miscellaneous Waste	20,609	2	No	No	No	No
Ash	4,663	1	Yes	Yes	Yes	Yes
TOTAL	**834,363**	**100**	**89[2]**		**81[2]**	

Notes:
[1] Average annual tonnage disposed of at JRL from 2021 to 2023 was approximately 880,000 tons.
[2] Values are the percent of total material landfilled
Abbreviations
N/A – Not Available
UNK – Unknown. Material collection is not directly contracted with the towns, so recycling information is unknown.

As shown in Table 5-1, it is anticipated that based on 2023 disposal data, 81 percent of the materials to be landfilled in the Phase II Expansion will be from facilities that included recycling as part of their waste management prior to landfilling, and 89 percent of the materials to be landfilled in the Phase II Expansion will be residuals from a processing facility that reduced the amount of material landfilled. Currently all available technologies to recycle or reduce the waste have been implemented prior to landfilling. Additional information on CWS's recycling efforts in Maine was described in the PBD application.[16]

Therefore, the materials proposed to be placed in the Phase II Expansion will have been reduced or recycled to the maximum extent practicable and in a manner that is consistent with both state recycling programs and the State Plan. JRL's consistency with the waste management hierarchy, including multiple source reduction and recycling measures, was discussed in Section 3.14.

[16] Application for a Determination of Public Benefit, Juniper Ridge Landfill, SME, June 2024.

6.0 MEDEP REG. CHAPTER 400.7 - HOST COMMUNITY AGREEMENTS AND MUNICIPAL INTERVENOR GRANTS

As required by 38 M.R.S. § 1310-S(4)(d) and 06-096 Ch.400.7.B.(2), BGS notified the municipal officers of the City of Old Town (City) on July 29, 2025, and Town of Alton on July 31, 2025, via certified mail, of their intent to file a Solid Waste Application with the MEDEP. The notice sent to both Old Town and Alton included a description of the right of the municipal officers to apply for municipal intervenor status and to receive grants not exceeding $50,000 to support direct, substantive participation in proceedings before the MEDEP and the requirement that they must request intervenor status within 60 days of the notification or be deemed to have waived the right to receive municipal Intervenor grants. This correspondence is contained in Appendix A-5.

Title 38 M.R.S. § 2170-A requires that a host community agreement be in place prior to issuance of a license for a State-owned solid waste disposal facility. Copies of NEWSME's and BGS's Host Community Compensation and Facility Oversight Agreement with Old Town, and the Community Benefits Agreement with Alton are attached in Appendix P. These agreements are in effect and will remain in effect during operation of the Phase II Expansion.

Pursuant to Section 10 of the City of Host Community Compensation and Facility Oversight Agreement, dated December 8, 2005, between the City of Old Town, BGS, and Casella; Casella is required to provide the City of Old Town with written notice at least 60 days prior to submitting any expansion application to MEDEP. SME submitted this notice on behalf of Casella, and it was received by the City on July 31, 2025. This notice is included in Appendix A-5.

7.0 MEDEP REG. CHAPTER 400.9 - HAZARDOUS AND SPECIAL WASTE HANDLING AND EXCLUSION PLAN

Only non-hazardous solid waste, as defined in 40 CFR Section 261.31 through 261.33 and permitted by the MEDEP, will be accepted within the Phase II Expansion. To ensure that only non-hazardous waste will be accepted at the facility, NEWSME will comply with all applicable federal and state laws regarding the detection and identification of special waste, biomedical waste, and hazardous waste. A Hazardous and Special Waste Handling and Exclusion Plan for the detection, identification, handling, storage, transportation, and disposal of all wastes that may be delivered to the facility is contained in Section 7.16 of the Operations Manual, Volume IV of this Application.

8.0 MEDEP REG. CHAPTER 400.10 - LIABILITY INSURANCE

Pursuant to the requirements of 06-096 Ch.400.10.(C), Appendix Q of this document contains the current certificate of insurance that NEWSME maintains for the JRL facility.

9.0 MEDEP REG. CHAPTER 400.11 - FINANCIAL ASSURANCE FOR SOLID WASTE DISPOSAL FACILITY CLOSURE AND POST-CLOSURE CARE

Although not required under the Rules for a State-owned facility,[17] NEWSME uses a surety bond as financial assurance for closure and post-closure care, as provided in the OSA and permitted under 06-096 Ch.400.11.A.(4). If needed, the bond would provide funds to cover placement of the final cover over any areas of the landfill that have been developed but have not received final cover, plus post-closure monitoring and maintenance costs for the entire developed site for a 30-year post-closure period. Estimated costs are updated on a yearly basis by an independent third party, and the opinion of cost is included in the Annual Report for the facility. A copy of the current financial assurance mechanism, in the manner of surety bonds, for the above-mentioned closure and post-closure costs for the current JRL facility is found in Appendix D-2. The yearly updates of closure and post-closure costs will continue during the development of the Phase II Expansion and will be included in the annual report.

[17] See 06-096 CMR 400.11.A(1) (stating "State…owned solid waste disposal facilities…are not subject to the requirements of this section.").

10.0 MEDEP REG. CHAPTER 400.12 - CRIMINAL OR CIVIL RECORD

NEWSME's and BGS's Civil and Criminal Disclosure Statements, pursuant to 06-096 Ch.400.12, are provided in Appendix R.

11.0 MEDEP REG. CHAPTER 400.13 - VARIANCES

Development of the Phase II Expansion will not require a variance from any of the MEDEP's criteria for siting, or operation. Three variances for design are being requested, as described below.

Variance 1

06-096 Ch.401.2.D.(1)(g)(iv): "Have a maximum compacted lift thickness of 9 inches and provide a means to ensure lift interface bonding."

A variance is requested to increase the lift thickness from 9 to 12 inches. This variance is supported by past and current site practices implemented in the construction of existing landfill Cells 7 through 16 for placing both the landfill liner's barrier soil and base soils below the liner. Construction of these barrier and base soils have demonstrated that the materials can be placed and compacted to meet the required performance criteria contained in 06-096 CMR 401.2.D.1 for base soils and the clay liner. Construction of the Phase IV of Woodland Pulp's No. 3 Landfill in Baileyville, Maine demonstrated that the same technique is effective for the alternative liner proposed for the secondary liner in Volume III of this application. As part of each of these construction projects, a test pad program was completed demonstrating the current construction techniques used to compact these soils and achieve the performance criteria (i.e., densities, moisture content, and hydraulic conductivity) required by the Rules. Given the success of these previous test pad programs, and the general similarity of soil materials available near JRL, a single test pad is proposed for the first Cell (Cell 18) of the Phase II Expansion, as described in Volume III, Section 3.10 of the Application and Section 02200 of the Project Specification included in Volume III Appendix C. The test pad meets the criteria set forth in Ch.401.F.12. Placing these soil materials in one lift of 12 inches, rather than 9 inches, will meet the purposes and intent of the Rule and has been shown by past practices at the site to equal or exceed the performance of 9-inch lifts.

Variance 2

06-096 Ch.401.2.D.(3)(e): "The maximum allowable compacted lift thickness is 9 inches."

A variance to this requirement is requested under the same justification as described above.

Variance 3

06-096 Ch.401.5.G.(4): "The minimum allowable post-consolidation slope is 5 percent. The maximum allowable post-consolidation slope is 33 percent unless otherwise approved by the Department. Slopes must be designed to promote run-off in a manner that will prevent erosion of the final cover."

A variance is requested to allow an increase in sideslopes from 3 horizontal to 1 vertical (33 percent) to 2.7 horizontal to 1 vertical (37 percent). Materials such as those that will be placed in JRL have been demonstrated to be able to hold a 2.7:1 sideslope, as waste is generally placed at this slope on an interim basis at JRL and compacts to a flatter slope prior to closure. Pine Tree Landfill was constructed to 2.5:1 sideslopes at the time of closure, with a closure cap successfully constructed beginning in

2008. A geotechnical evaluation of the closure cap proposed for Phase II, included in Volume III , shows that these slopes meet all geotechnical criteria for closure cap construction. By constructing the landfill to the steeper, 2.7:1 sideslopes, additional waste can be placed on the permitted landfill, minimizing required landfill footprint.

12.0 MEDEP RULES CHAPTER 401.1.C – PERFORMANCE STANDARDS AND SITING CRITERIA

12.1 Performance Standards

The Phase II Expansion has been sited and designed, and will be constructed, operated, and closed to meet the Performance Standards in 06-096 CMR 401.1.C:

- The Phase II Expansion will not contaminate groundwater outside the solid waste boundary;
- The Phase II Expansion is located greater than 10,000 feet from any airport runway and therefore does not pose a bird hazard to aircraft;
- Travel time to sensitive receptors from the bottom of the Phase II Expansion's liner system will be greater than six years, including offsets gained through the use of improvement allowances pursuant to 06-096 CMR 401.2.D.(2). Travel time to sensitive receptors from pump stations for the Phase II Expansion will be greater than three years;
- The Phase II Expansion will not pose an unreasonable threat to sensitive receptors; and
- The disturbance of soil material for the Phase II Expansion will not affect the ability to monitor water quality at the landfill site.

A summary of the information demonstrating facility compliance with these performance standards is set forth below.

12.2 Protection Against Groundwater Contamination

The Phase II Expansion is sited and designed to protect site groundwater quality. The facility was sited based on an extensive hydrogeologic and geologic characterization of the site completed by SME and presented in Volume II of this application. Relevant site and design features of the Phase II Expansion that protect against groundwater contamination include:

- Soils that underlie the proposed Phase II Expansion consist of dense glacial till. The average till soil thickness between the landfill base grade and bedrock will be about 22 feet with the depth ranging from approximately 1.5 feet to 65 feet;
- The site does not overlie, or lie adjacent to, a mapped significant sand and gravel aquifer. The proposed facility will not cause an unreasonable threat to a significant sand and gravel aquifer or to a significant groundwater aquifer, based on the geologic, and hydrogeologic setting of the site, the buffers between the Phase II Expansion and surrounding properties, and the proposed site design;

- The bedrock beneath the Phase II Expansion is mapped as interbedded metamorphosed quartzite, siltstone, graywacke, and phyllite of the Vassalboro Formation. No bedrock faults have been mapped within the Site as described in Volume II, Section 4.3;
- There were no Holocene Period faults observed in the vicinity of the site. The nearest mapped bedrock fault is located approximately six miles southeast of the Site, striking northeast-southwest; and
- Simulations of hypothetical failures of the leachate containment systems demonstrate the effectiveness of the design and natural setting in preventing adverse impacts on the regional groundwater and existing or potential water supplies. More importantly, the design and natural setting will preclude an adverse impact to a significant groundwater aquifer or a significant sand and gravel aquifer.

In addition to the site setting, which protects the groundwater beyond the solid waste boundary, the Phase II Expansion is designed to contain and collect leachate generated by the facility. Therefore, the proposed siting and design of the Phase II Expansion and the proposed improvements are such that the Phase II Expansion will not contaminate groundwater or surface water. Details of the Phase II Expansion design are discussed in Volume III of this Application.

12.3 Adequate Setbacks from Airport Runways

The closest public airport to the facility is the Dewitt Field Municipal Airport in Old Town, Maine. This airport is greater than 15,000 feet from the proposed solid waste boundary, well beyond the 10,000-foot setback required for turbojet aircraft. Additional measures will be taken to manage birds at the landfill based on comments from the FAA (see Section 3.6.5).

12.4 Sufficient Time of Travel to Sensitive Receptors

A complete analysis of the site groundwater travel times to site sensitive receptors is included in Volume II, Section 6.0. Site-sensitive receptors were identified based on the definition contained in 06-096 CMR 400.1 of the Rules. Based on the Phase II Expansion site setting, six site sensitive receptors were identified for the Phase II Expansion:

1. Hypothetical groundwater supply well at closest northern property boundary;
2. Hypothetical surface water discharge to an unmapped and unnamed tributary to Judkins Brook to the east;
3. Hypothetical groundwater supply well at closest eastern property boundary;
4. Hypothetical groundwater supply well at closest western property boundary;

5. Hypothetical surface water discharge to an unmapped and unnamed tributary to Pushaw Stream to the west; and
6. Hypothetical surface water discharge to an unmapped and unnamed tributary to Judkins Brook to the northwest.

The analysis evaluated the travel time for groundwater through the in-situ soils that will remain below the base of the landfill to these sensitive receptors. The time of travel to sensitive receptors from the Phase II Expansion exceeds the six-year travel time requirement in the Rules. The travel times from the Phase II Expansion's permanent leachate pump stations were also calculated, and travel time from these locations to the identified site sensitive receptors are greater than the three years required by the Rules.

12.5 No Unreasonable Threat to Sensitive Receptor from Contaminant Release from Within Solid Waste Boundary

The fate of leachate migrating from the Phase II Expansion in the unlikely event of a failure of the engineered systems controlling or containing the leachate was evaluated based on the site hydrogeologic conditions. This analysis is found in Volume III, Section 4.0 of the Application. Four hypothetical failure scenarios in the engineered systems were evaluated based on the design of the Project.

- Landfill liner systems, including the primary and secondary liner systems, were assumed to have been eliminated and leachate allowed to drain directly into the underlying soils at a rate of 296 gallons per acre per day (gpad) controlled by the hydraulic characteristics of the underlying native soils. This analysis evaluated the worst-case scenario assuming that the leak would be continuous for an indefinite period.
- Leakage through the primary liner was assumed to be at a rate of 4.6 gpad, which corresponds to ten times the leakage rate through the primary liner, assuming three design holes in the primary liner and a one-foot head on the liner system and no secondary liner system present. This leakage was assumed to flow directly into the underlying native soils. To show a reasonable worst-case potential impact, it is assumed that this leakage rate is continuous for an indefinite period.
- Leakage from leachate storage tanks and into the leachate storage tank containment area (1.3 acres in size) then draining directly into the underlying soils at a rate of 5.87 gpad. This analysis evaluated worst case scenario assuming that the leak would be continuous for an indefinite period.
- The dual-walled, leachate force main was assumed to rupture and go undetected for 30 days prior to being repaired.

The results of these analyses demonstrate that the hypothetical releases of leachate from these conservative hypothetical failure scenarios do not reach site sensitive receptors at concentrations that would exceed current regulatory standards within six years for the liner leak scenarios or within three

years for the pipeline leak scenario. Therefore, contaminant releases from the area within the solid waste boundary do not pose an unreasonable threat to identified sensitive receptors.

12.6 Ability to Monitor the Site

As discussed in Volume III, the soils disturbance within five feet of the bedrock surface will be limited to clearing and grubbing the site's uppermost vegetative and organic soil layers prior to placement of an imported soil layer. In addition, extensive site monitoring, as described in Section 7.0 of Volume II, relies on a combination of monitoring from the following:

- Three leak detection systems;
- Three underdrain systems;
- Six proposed monitoring well locations consisting of one deep and one shallow well in each location;
- Conversion of an existing bedrock well to a groundwater monitoring well and installation of an overburden well in the same location; and
- One new surface water monitoring location.

This program allows the performance of the Phase II Expansion to be monitored separately from the existing permitted portions of the JRL. The locations of the new monitoring points are discussed in the Environmental Monitoring Plan contained in Appendix I of the Operations Manual (Volume IV of this Application).

13.0 MEDEP REG. CHAPTER 401.1.D – GENERAL REQUIREMENTS

During the site investigation and licensing process, BGS and NEWSME have complied with the following general requirements:

- Monitoring wells, observation wells, piezometers, and borings have been designed, constructed, and monitored in accordance with the procedures specified in Chapter 405 (ref. Volume II, Section 7.0 and Volume IV, Appendix I of this Application);
- Wells and piezometers will be maintained in operating condition during the entire Application and review process;
- Permanent benchmarks for the site have been established for use in surveying the landfill and have been constructed to U.S. Coast and Geodetic Survey standards. Horizontal and vertical control has been established for each benchmark, are coordinated and reported according to the National Geodetic Vertical Datum standards, are shown on all applicable drawings and record drawings, and are clearly marked and labeled (ref. Volume III, Appendix A of this Application);
- Because the Phase II Expansion is less than five miles away from an airport runway, notification of the Federal Aviation Administration (FAA) is required. A copy of the FAA notification is attached in Appendix G-8; and
- Construction associated with the proposed facility site development will comply with the specific stormwater control standards contained in Sections 3.0 and 4.0, including Section 4(B) of 06-096 CMR 500 (ref. Volume I, Appendix K and L of this Application).

14.0 MEDEP REG. CHAPTER 401.2.A – GENERAL INFORMATION

A site and surroundings map is contained in Appendix N of this document. The site and surroundings map shows the Phase II Expansion facility in relation to existing surrounding natural and man-made features. The map includes the area within 2,000 feet of the perimeter of the facility site and shows the location of the proposed solid waste boundary, waste handling areas, and property boundary. The map also shows floodplain boundaries, lakes, ponds, springs, streams, surface water diversions, wells, utilities, public water supplies, watershed areas, wellhead protection areas, significant sand and gravel aquifers, federally-defined wetlands, contours, existing buildings or structures, roads, recorded rights-of-way, conservation areas, unique areas, historical sites, and local zoning.

Aerial photographs taken on May 21, 2024, which provide coverage of the area within 2,000 feet of the perimeter of the facility site, are contained in Appendix S.

REFERENCES

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Jud, Dennis V., Visual Impact Assessment, West Old Town Landfill Facility, James River Paper Company, Inc., 1991; as amended.

Maine Department of Environmental Projection (MEDEP), January 2014. Maine Materials Management Plan 2014 State Waste Management and Recyling Plan Update & 2012 Waste Generation and Disposal Capacity Report

Maine Department of Environmental Projection (MEDEP), January 2015. Maine Solid Waste Generation and Disposal Capacity Report: for Calendar Year 2013: Report to the Joint Standing Committee on Environmental and Natural Resources 127th Legislature, First Session.

APPENDIX A

MISCELLANEOUS DOCUMENTS

A-1 MEDEP CURRENT FACILITY SOLID WASTE ORDER
A-2 OPERATING SERVICES AGREEMENT
A-3 MEDEP NOVEMBER 6, 2023 LETTER "DETERMINATION OF ENVIRONMENTAL FEASIBILITY" PROPOSED PHASE II EXPANSION
A-4 PROJECT OVERVIEW MEETING MINUTES
A-5 PRELIMINARY NOTICE OF INTENT TO FILE/ NOTICE OF RIGHT TO INTERVENOR ASSISTANCE
A-6 PUBLIC INFORMATION MEETING DOCUMENTATION
A-7 PUBLIC NOTICE OF INTENT TO FILE APPLICATION
A-8 CERTIFICATE OF GOOD CORPORATE STANDING
A-9 PUBLIC BENEFIT DETERMINATION ORDER

SME
SEVEE & MAHER
ENGINEERS

A-1

MEDEP CURRENT FACILITY SOLID WASTE ORDER

SME
SEVEE & MAHER
ENGINEERS

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

BOARD ORDER

IN THE MATTER OF

STATE OF MAINE, ACTING THROUGH	)	SOLID WASTE LICENSE,
THE BUREAU OF GENERAL SERVICES	)	NATURAL RESOURCES
OLD TOWN, PENOBSCOT COUNTY, ME	)	PROTECTION ACT, AND
JUNIPER RIDGE LANDFILL EXPANSION	)	WATER QUALITY CERTIFICATION
#S-020700-WD-BI-N and #L-19015-TG-D-N	)	
(APPROVAL WITH CONDITIONS)	)	NEW LICENSE

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STATE OF MAINE, ACTING THROUGH	2	SOLID WASTE LICENSE,
THE BUREAU OF GENERAL SERVICES	)	NATURAL RESOURCES
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JUNIPER RIDGE LANDFILL EXPANSION	)	WATER QUALITY CERTIFICATION
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(APPROVAL WITH CONDITIONS)	)	NEW LICENSE

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Reference to "Finding [#]" refers to the specified section in the Findings of Fact narrative portion of the license. Conclusions and Conditions are listed separately at the end of the license.

STATE OF MAINE, ACTING THROUGH	3	SOLID WASTE LICENSE,
THE BUREAU OF GENERAL SERVICES	)	NATURAL RESOURCES
OLD TOWN, PENOBSCOT COUNTY, ME	)	PROTECTION ACT, AND
JUNIPER RIDGE LANDFILL EXPANSION	)	WATER QUALITY CERTIFICATION
#S-020700-WD-BI-N and #L-19015-TG-D-N	)	
(APPROVAL WITH CONDITIONS)	)	NEW LICENSE

Pursuant to the provisions of the *Maine Hazardous Waste, Septage and Solid Waste Management Act*, 38 Maine Revised Statutes (M.R.S.) §§ 1301 to 1319-Y; *Solid Waste Management Hierarchy*, 38 M.R.S. §2101; the *Rule Concerning the Processing of Applications and Other Administrative Matters*, 06-096 Code of Maine Rules (C.M.R.) ch. 2 (last amended October 19, 2015); the *Solid Waste Management Rules: General Provisions*, 06-096 C.M.R. ch. 400 (last amended April 6, 2015), *Landfill Siting, Design and Operation*, 06-096 C.M.R. ch. 401 (last amended April 12, 2015), and *Water Quality Monitoring, Leachate Monitoring, and Waste Characterization*, 06-096 C.M.R. ch. 405 (last amended April 12, 2015) (collectively, the Rules); the *Natural Resources Protection Act* (NRPA), 38 M.R.S. §§ 480-A to 480-JJ; Section 401 of the *Federal Water Pollution Control Act*, 33 U.S.C. § 1341; *Wetlands and Waterbodies Protection*, 06-096 C.M.R. ch. 310 (last amended January 26, 2009); and *Assessing and Mitigating Impacts to Existing Scenic and Aesthetic Uses*, 06-096 C.M.R. ch. 315 (effective June 29, 2003), the Board of Environmental Protection (Board) has considered the application of the State of Maine acting through the Bureau of General Services, with all supportive data, agency review comments, and other related materials on file, and FINDS THE FOLLOWING FACTS:

APPLICATION OVERVIEW AND PROCEDURAL HISTORY

1. APPLICATION SUMMARY

A. Application

The State of Maine, acting through the Bureau of General Services (BGS), has applied for Maine Hazardous Waste, Septage and Solid Waste Management Act, Natural Resources Protection Act, and Water Quality Certification approval to construct a 9.35 million cubic yard expansion of the existing Juniper Ridge Landfill (JRL), located in Old Town, Maine. The northern edge of the property parcel borders, and a portion of the access road is located in, Alton, Maine. The solid waste application under the Maine Hazardous Waste, Septage, and Solid Waste Management Act and the land application under NRPA were processed as a consolidated licensing proceeding and are both addressed in this license.

BGS, as the owner of JRL, and NEWSME Landfill Operations, LLC (NEWSME), as the operator of JRL, prepared the application for the proposed expansion.

The NRPA application was originally identified as license #L-24251-TG-C-N, which was incorrect. It is now correctly identified as license #L-19015-TG-D-N.

B. History

The following history is a summary and does not include all licensing actions:

STATE OF MAINE, ACTING THROUGH THE BUREAU OF GENERAL SERVICES OLD TOWN, PENOBSCOT COUNTY, ME JUNIPER RIDGE LANDFILL EXPANSION #S-020700-WD-BI-N and #L-19015-TG-D-N (APPROVAL WITH CONDITIONS)	4)))))	SOLID WASTE LICENSE, NATURAL RESOURCES PROTECTION ACT, AND WATER QUALITY CERTIFICATION NEW LICENSE

(1) On July 28, 1993, James River Paper Company, Inc. was issued a license to construct and operate a 68-acre secure landfill, known as the West Old Town Landfill, to dispose of the James River Paper Company's pulp and papermaking residuals (license #S-020700-7A-A-N). The project impacted 1.31 acres of freshwater wetland. The compensation package included preservation of 27.92 acres of land adjacent to the facility and the restoration and enhancement of 1.76 acres of wetland within the preserved parcel.

(2) On August 24, 1995, the Department approved, with conditions, a modification to the compensation package (licenses #L-19015-31-A-M and #S-20700-DW-B-M).

(3) On October 21, 2003, the Department issued conditional approval for the transfer of licenses for the West Old Town Landfill, from the Fort James Operating Company, to the State of Maine, State Planning Office (SPO) (licenses #S-020700-WR-M-T and #L-019015-TH-C-T); the transfer became effective when the sale of the landfill to the State of Maine, acting by and through SPO, occurred on February 5, 2004.

(4) On February 5, 2004, the State of Maine, acting by and through the SPO, and Casella Waste Systems, Inc. (Casella) entered into an Operating Services Agreement (OSA) for the operation of the West Old Town Landfill.

(5) On April 9, 2004, the Department approved an amendment application (license #S-020700-WD-N-A) for a vertical increase in the final elevation of the landfill and the disposal of additional waste streams.

(6) In 2006, the West Old Town Landfill became known as the Juniper Ridge Landfill.

(7) On January 31, 2012, the Department issued to the State of Maine, acting through the SPO, a Public Benefit Determination (license #S-020700-W5-AU-N) partial approval, with conditions, for additional landfill capacity of 9.35 million cubic yards, decreased from the original 21.9 million cubic yard capacity proposed.

(8) Pursuant to PL 2011, ch. 655, § GG-69, on July 1, 2012, the BGS, within the Department of Administrative and Financial Services (DAFS), became the state agency acting as the owner and licensee of JRL. The Department

of Economic and Community Development is the manager of JRL. NEWSME, a wholly-owned indirect subsidiary of Casella, operates the landfill for the State of Maine, acting through the Bureau of General Services.

(9) To date, approximately 62.6 acres of the facility's 68-acre existing licensed footprint have been developed, including Cells 1, 2, 3A, 3B, 4, 5, 6, 7, 8, and 9 (current active cell).

C. Terms and Acronyms

The following terms and acronyms can be found in this license and are listed in Table 1 for ease of reference:

Table 1: License Terms and Acronyms

applicant	Refers to both BGS and NEWSME (or a successor operator)
Board	Maine Board of Environmental Protection
BGS	Bureau of General Services
BMP	Best Management Practices
Casella	Casella Waste Systems, Inc.
CDD	Construction and Demolition Debris
C.M.R.	Code of Maine Rules
dBA	Decibels adjusted for frequency extremes
Department	Maine Department of Environmental Protection
EMP	Environmental Monitoring Plan
FEMA	Federal Emergency Management Agency
FEPR	Front End Process Residue
GCL	Geosynthetic Clay Liner
H_2S	Hydrogen Sulfide
HDPE	High-Density Polyethylene
JRL	The Juniper Ridge Landfill
LFG	Landfill Gas
MDOT	Maine Department of Transportation
M.R.S.	Maine Revised Statutes
MSW	Municipal Solid Waste
MSW Bypass	Any MSW that is destined for disposal or processing at a solid waste incinerator, but that cannot be disposed of or processed at that incinerator because of the incinerator's malfunction, insufficient capacity, inability to process or burn, down-time, or any other comparable reason as approved by the Department
NEWSME	NEWSME Landfill Operations, LLC
NRPA	Natural Resource Protection Act

OBW	Oversized Bulky Waste
OSA	Operating Service Agreement
ppb	Parts per Billion
PBD	Public Benefit Determination License
PIR	Preliminary Information Report
Rules	The Department's Solid Waste Management Rules, including 06-096 C.M.R. chs. 400, 401, and 405
SME	Sevee & Maher Engineers, Inc.
Soft Layer	A protective layer of waste above the liner and leachate collection systems
State Plan	Maine Materials Management Plan: 2014 State Waste Management and Recycling Plan Update & 2012 Waste Generation and Disposal Capacity Report, January 2014, prepared by the Maine Department of Environmental Protection
SVP	Significant Vernal Pool

D. Summary of Proposal

The application is for the construction and operation of a 9.35 million cubic yard expansion at JRL. The existing solid waste footprint is proposed to be expanded by 54 acres, to be developed in phases. An additional 20 acres is planned for ancillary infrastructure including roads, piping, sedimentation ponds, scales, and buildings. The proposed expansion would extend the life of the landfill by approximately 10 to 12 years.

The proposed expansion design consists of various engineered systems for the construction and operation of the landfill. Landfill gas generated on-site will be combusted in the facility's flare. The leachate from the expansion will be treated off-site, as is the current practice.

The requested wastes to be placed in the proposed expansion are similar to the accepted wastes currently allowed in the existing landfill. The accepted wastes will include only non-hazardous waste generated within the State and will not include MSW, except for MSW bypass as described in Finding 37 of this license.

The application for the proposed expansion includes the direct alteration of 2.04 acres of freshwater wetlands. A compensation plan was proposed for wetland impacts. Additionally, a Permit-by-Rule Notification Form (PBR#60159) was submitted for clearance for an electrical line and perimeter fence through the critical terrestrial habitat of a significant vernal pool (SVP) pursuant to *Permit By Rule Standards*, 06-096 C.M.R. ch. 305, § 19 (last amended June 8, 2012). The Department accepted the PBR on July 29, 2015.

The solid waste and NRPA applications were accepted as complete for processing on August 7, 2015 and July 31, 2015, respectively. The Department commented on various aspects of the application and received responses. These include the following: November 12, 2015 Department review letter on select portions of the application; January 22, 2016 Department review transmittal letter with two technical memoranda; March 4, 2016 BGS and NEWSME response to comments; April 4, 2016 Department follow-up comment transmittal letter with two technical memoranda; May 13, 2016 BGS and NEWSME follow-up responses; and July 1, 2016 Department letter with two memoranda.

E. Ownership and Operation of the Juniper Ridge Landfill

The State of Maine, acting through BGS, owns JRL. Casella is the operator of the landfill through NEWSME, a Casella subsidiary. The terms and conditions of NEWSME's operation of the landfill are established by the OSA between the State of Maine and Casella dated February 5, 2004, and amended on July 24, 2006 and November 2, 2006.

In accordance with the OSA, Casella is required to pay all costs associated with the development, operation, closure and post-closure care of the landfill and the proposed expansion. In addition, Casella is required by the OSA to establish and maintain financial assurances for the landfill and the expansion sufficient to meet the closure and post-closure care provisions of the applicable Rules, assume liability for the landfill and the proposed expansion under both the current and future conditions, and assure that adequate disposal capacity is provided for the wastes currently disposed in the landfill for at least a 20-year period. Resolve 2003, Chapter 93 requires contract terms and conditions to be "revenue-neutral to the State and as the office [former Executive Department, State Planning Office] determines are advisable and in the public interest."

NEWSME has prepared an application to expand JRL in accordance with the terms of the OSA. The OSA is a contract between the State of Maine, acting through BGS, and Casella. The Board and Department are not parties to the OSA. Section 4.1 of the OSA includes language that specifies that the State shall work with Casella in maintaining in the State's name the existing permit, amendments, and all permits, licenses, statutory amendments and legislation, approvals and authorizations reasonably requested by Casella and agreed to by the State for the operation of the landfill in accordance with the terms of the OSA, including without limitation the expansion permit.

Reference to the "applicant" in this license determination refers to both BGS, as the owner of JRL, and NEWSME, as the current operator, acting as an agent on behalf of BGS in accordance with the terms in the OSA.

2. PUBLIC PARTICIPATION

A. Pre-Application Requirements

(1) Preliminary Information Report

A Preliminary Information Report (PIR) is required by 06-096 C.M.R. ch. 401, § 1(E). The PIR, prepared by SME, was submitted to the Department on November 22, 2006 for a larger 106-acre expansion with 22 million cubic yards of capacity. The proposed 54-acre expansion is to be located within the boundary of the area described in the original submittal. A follow-up meeting was held on February 21, 2007 among representatives of the SPO (since abolished), the Department, NEWSME, SME, and Pierce Atwood, LLP to discuss the PIR.

(2) Determination of Environmental Feasibility

The Department issued a letter addressing the PIR on April 13, 2007 stating that the proposed expansion appeared to be environmentally feasible and that the siting criteria of 06-096 C.M.R. ch. 401, § 1(C)(2) did not prohibit the proposed expansion.

(3) Pre-Application Meetings

The Department's rule at 06-096 C.M.R. ch. 2, § 10 includes requirements for pre-application and pre-submission meetings. The applicant held four pre-application meetings in 2014 with the Department and interested persons, including the City of Old Town, the Landfill Advisory Committee, the Penobscot Nation, and the general public. The Town of Alton did not attend the pre-application meetings. The meetings took place September 9, October 16, November 20, and December 18. Additional meetings also occurred among the applicant, the Department, and the U.S. Army Corps of Engineers on October 29, 2014 and April 27, 2015. A representative of the U.S. Fish and Wildlife Service attended the October 29, 2014 meeting.

B. Public Informational Meeting

A public informational meeting was held on June 3, 2015 in the City of Old Town as required by 06-096 C.M.R. ch. 2, § 13. The applicant mailed notice of the public informational meeting to the abutters, the Old Town and Alton municipal offices, the Landfill Advisory Committee and the Penobscot Nation. The notice was published in the Bangor Daily News on May 22, 2015.

C. Notice of Intent to File

A Notice of Intent to File an application was published in the Bangor Daily News and Penobscot Times on July 9, 2015, in addition to being mailed to the abutters, the Old Town and Alton municipal offices, the Landfill Advisory Committee and the Penobscot Nation. The notice and mailing of the notice to the Landfill Advisory Committee fulfilled the public and local participation requirement of 38 M.R.S. § 1310-S(1), the citizen's advisory committee notification requirement of 38 M.R.S. § 1310-N(12), and the public notice requirements of 06-096 C.M.R. ch. 2, § 14.

D. Public Hearing Requests and Board Jurisdiction

The Department received 27 timely requests in August 2015 for a public hearing. On September 17, 2015 the Board, on the recommendation from the Department, voted to assume licensing jurisdiction over the application and convene a public hearing.

E. Public Hearing Process

(1) Intervenors

a. Petitions to Intervene

Intervenor status was requested by several entities. State law at 38 M.R.S. § 1310-S(3) provides municipal intervenor status, if requested, for the municipality in which the facility would be located. The City of Old Town requested intervenor status on June 4, 2015. The Town of Alton notified the Department on July 30, 2015 that it would not be requesting intervenor status. The Board received intervenor status requests from two abutting property owners, Jesse Pekkala and SSR, LLC, who have intervenor status under 38 M.R.S. § 1310-S(3-A). Petitions for intervenor status

were received from three interested persons: Edward Spencer, Dana Snowman, and Antonio Blasi.

b. Board Action on Petitions to Intervene by Interested Persons

The Board's First Procedural Order, issued on January 21, 2016, granted intervenor status to Mr. Spencer and Mr. Snowman. Mr. Blasi was denied intervenor status due to the finding that his petition did not demonstrate that he may be substantially and directly affected by the proceeding.

c. Withdrawal from Participation

On May 10, 2016, Mr. Pekkala withdrew as an intervenor.

d. Intervenor Designations

The following entities participated as intervenors in the licensing process:

i. City of Old Town, as a municipal intervenor;

ii. Edward Spencer, as an interested person petitioner;

iii. Dana Snowman, as an interested person petitioner; and

iv. SSR, LLC, as an abutter.

(2) Procedural Orders

Prior to the public hearing, the Board issued six Procedural Orders:

a. The First Procedural Order, issued on January 21, 2016, addressed the designation of intervenors as described in Finding 2(E)(1) of this license.

b. The Second Procedural Order, issued February 25, 2016, documented the pre-hearing conference held on February 10, 2016. The pre-hearing conference included a review of the procedural rules in preparation for, and during, the hearing; the roles and responsibilities of the applicant, intervenors, and Department staff; and the relevant licensing criteria. The Second Procedural Order

established the deadline for the intervenors to submit a list of issues they expected to address at the hearing through testimony, along with a list of expert witnesses.

c. The Third Procedural Order, issued May 27, 2016, documented the pre-hearing conference held on May 18, 2016. The pre-hearing conference included a review of the list of issues submitted by the intervenors, agreement on issues not contested by the intervenors, and discussion of the Board's site visit and schedule of pre-hearing testimony submissions. The Third Procedural Order established submission deadlines for the applicant's and intervenors' lists of witnesses, pre-filed direct testimony and exhibits, and pre-filed rebuttal testimony, as well as setting the dates for the public hearing.

d. The Fourth Procedural Order, issued July 7, 2016, addressed the requirements for submission of pre-filed testimony and scheduling decisions made in consultation with the parties following the June 23, 2016 Board meeting.

e. The Fifth Procedural Order, issued August 25, 2016, addressed the rulings of the Presiding Officer on the motions to strike pre-filed direct testimony.

f. The Sixth Procedural Order, issued September 28, 2016, documented the pre-hearing conference held on September 14, 2016. The pre-hearing conference included a review of procedures and a draft schedule for the public hearing.

(3) Site Visit

A site visit to JRL occurred on June 23, 2016 for the purpose of allowing Board members to view the physical features of the site and the nature of the surrounding areas. The applicant and intervenors were also present during the tour. Department staff conducted the tour and responded to Board members' questions.

(4) Public Hearing

The Board held a public hearing on the proposed expansion application on October 18 and 19, 2016 in Bangor, Maine pursuant to the Maine Administrative Procedure Act, 5, §§ 9051-9064; 38 M.R.S. §§ 341-D(2)

and 1310-S(2); and the *Rules Governing the Conduct of Licensing Hearings*, 06-096 C.M.R. ch. 3 (last amended February 16, 2015). At the hearing, the witnesses for the parties summarized their pre-filed direct and rebuttal testimony, and were subject to cross-examination by the other parties and questioning by Board members and staff.

The Board held an evening session on October 18 to receive testimony from members of the general public, and 33 persons testified at that session. Prior to the close of the evidentiary record, the Board received 31 written comments from the general public. The testimony and written comments by the general public included opposition to, and support for, the proposed expansion.

Following the filing of post-hearing briefs by the parties on November 23, 2016, the Board held a deliberative session on December 15, 2016 to review the evidentiary record with Department staff.

Issues addressed in pre-filed testimony, hearing testimony, and post-hearing briefs included, but were not limited to: the solid waste management hierarchy regarding CDD and OBW, site geology, design and operation of the proposed expansion, the facility's odor complaint procedure, stormwater management and extreme weather events, ground and surface water monitoring, leachate treatment and disposal, NRPA alternative analysis, impacts to Atlantic salmon, fees and payments to the City of Old Town for the use of CDD fines and soft layer waste, traffic on Bennoch Road, third party administration of the Declaration of Covenants and Restrictions, and hydrogen sulfide action levels and notification procedures.

Issues raised in testimony by the general public in opposition to the project included: impacts on the Penobscot River and natural resources, impacts on public health, leachate treatment, prohibiting additional waste disposal at the site, out-of-state waste coming into the State for disposal at a State landfill, and the solid waste hierarchy.

Issues raised in testimony by the general public in support of the project included: the facility as a well-designed, operated, and maintained landfill; the importance of the landfill to businesses and the community; and the need for a landfill option for material that cannot be reduced, reused, or recycled utilizing current technology and practices.

The hearing transcript and hearing documents are included in the record on file. Additional discussion of testimony and comments are addressed in the findings of fact of this license, as appropriate.

F. Draft License Comment Period

A draft license was made available for comment on April 14, 2017 through notification to the applicant, intervenors, and interested persons. The draft license was posted on the Department's website and the 15 working day comment period closed on May 8, 2017. A total of 48 commenters submitted written comments on the draft license. All of the comments were reviewed and given consideration in relation to the relevant review criteria of State laws and rules.

Comments were received from the applicant, intervenor Edward Spencer, intervenor Dana Snowman, intervenor City of Old Town, and the public (including three industry entities) and included, but were not limited to, the following:

(1) Applicant

Comments on the draft Board Order included:

a. Insertion of NEWSME in the header as an additional licensee;

b. Removal of sand dune references;

c. Changes to the test pad requirements; and

d. Comment to allow MSW if needed for the soft layer.

(2) Intervenor Edward Spencer

Comments on the draft Board Order included:

a. Hierarchy findings and the definition of waste generated within the state;

b. Usage of vague language;

c. Regulated and regulator control;

d. Non action on the PBD recommendation to review CDD imported and processing residue disposed;

e. OBW information;

f. A need for a more thorough evaluation of other viable site locations;

g. Impact on the Penobscot Nation;

h. Technical issues (underdrains and pumping with possible effect on wetlands, site selection process with respect to wetlands and surface water used, odor);

i. Leachate disposal;

j. Financial ability and criminal or civil record;

k. The endangered species evaluation; and

l. MSW bypass issues.

(3) Intervenor Dana Snowman

Comments on the draft Board Order included opposition to the acceptance of out-of-state waste.

(4) Intervenor City of Old Town

No additional comments on the Board Order were stated.

(5) Industry Entities

Comments on the draft Board Order included:

a. MSW bypass language;

b. Utilizing enforceable provisions to preclude MSW for disposal if it can be processed at another facility;

c. Removal of the clause allowing bypass of waste delivered under interruptible contracts with the PERC incinerator;

d. Additions of definitions and limits on the PERC incinerator's FEPR that may be disposed of at JRL;

e. Recalculation of the OBW limits to use an average tons/year over 5 years and to apply the Consumer Price Index (CPI) for 3 years; and

f. Clarification that if the required third party OBD audit is not completed in a timely manner through no fault of the processing facility, the OBW may be disposed of at the expansion.

(6) Public

Comments on the draft Board Order included:

a. Harm to the environment (air, land, and waters);

b. Environmental justice;

c. Meeting hierarchy requirements;

d. Not taking proactive action to meet the State's waste management goals, priorities, and policies; and

e. State designations of in-state waste and out-of-state waste.

Based on comments received, revisions were made to the draft license that address the relevant review criteria and issues raised within the purview of the Board's authority. The revisions include, but are not limited to, general clarification language, revisions to the liner system barrier soil test pad language, added information in Finding 38 on the association between wetlands and the proposed underdrains, additional clarification of the allowance of only MSW bypass in the proposed expansion, removal of the provision governing waste delivered under an interruptible contract, revisions to the bypass notification requirement, and the addition of a provision concerning the receipt if the third party OBW audit is not completed in a timely manner.

All comments received are part of the record and were made available to the Board and posted on the Department's website.

3. PROJECT DESCRIPTION AND SITE DESIGN

The 9.35 million cubic yard proposed expansion of the existing Juniper Ridge Landfill will be located within the 780-acre parcel in Old Town. The northern edge of the property parcel is on the Alton/Old Town border and a portion of the access road is located in Alton. Six cells, Cells 11 through 16, are proposed to be constructed in a phased manner. The construction is projected to begin in 2018 with Cell 11 and then is proposed to continue with a new cell constructed approximately every 2 years. In total, the proposed expansion footprint will be approximately 54 acres, plus an additional 20 acres of ancillary infrastructure, with the same peak elevation as the existing landfill, approximately 390 feet above mean sea level. The side slopes are designed at 3H:1V (horizontal to vertical), with the south side of the expansion to abut the northern side of the existing landfill.

The proposed expansion design includes an underdrain system and augmented secondary liner system over portions of the proposed expansion footprint, a secondary liner system, a leak detection system, a primary liner system, leachate collection and off-site treatment for liquid in contact with waste, landfill gas collection and control infrastructure, stormwater management, and a water quality monitoring network. Similar types of non-hazardous waste generated within the State, as currently placed in existing landfill cells, are proposed for the expansion, including CDD, FEPR, MSW incinerator ash, wood biomass ash, sludges, contaminated soil, OBW, MSW bypass, and other approved special wastes.

The proposed expansion will have direct impacts on 2.04 acres of freshwater wetlands. As stated in Finding 1(D) of this license, the applicant previously obtained a permit-by-rule for clearing of 0.1 acres of the critical terrestrial habitat associated with a significant vernal pool for construction of the fence and electrical line. The applicant also identified additional vernal pools subject to regulation by the U.S. Army Corps of Engineers. The applicant submitted a compensation plan consisting of a designated on-site preservation area of 266 total acres for impacts to both the wetlands regulated by the State and those regulated by the U.S. Army Corps of Engineers.

GENERAL SOLID WASTE PROVISIONS

4. HOST COMMUNITY AGREEMENTS AND MUNICIPAL INTERVENOR GRANTS

A. Host Community Agreement

State law at 38 M.R.S. § 2170-A requires that host community agreements be in place with all applicable communities prior to issuing a license to a solid waste disposal facility owned or operated by the State. Copies of the two host

community agreements with the City of Old Town and the Town of Alton were submitted with the application. The Host Community Compensation and Facility Oversight Agreement, dated December 8, 2005, was signed by the State of Maine, the City of Old Town and Casella Waste Systems, Inc. The Community Benefits Agreement, dated October 6, 2005, was signed by the State of Maine, the Town of Alton, and NEWSME Landfill Operations, LLC.

B. Municipal Intervenor Grants

The Department's rule at 06-096 C.M.R. ch. 400, § 7(B) establishes procedures for the use of funds by a municipality that has requested intervenor status, pursuant to 38 M.R.S. § 1310-S(4), for an expanded solid waste disposal facility proposed to be located in that municipality. A municipal intervenor may request financial assistance to pay for direct expenses associated with its substantive participation in the application review process.

The City of Old Town requested, and was automatically granted, intervenor status on June 4, 2015. The City of Old Town meets the eligibility requirements to receive financial grants to support participation in the licensing process. The Town of Alton notified the Department on July 30, 2015 that it would not be requesting intervenor status.

5. TITLE, RIGHT OR INTEREST

The applicant must demonstrate sufficient title, right, or interest in all of the property which is proposed for development or use pursuant to 06-096 C.M.R. ch. 400, § 4(A). The applicant has provided evidence of the State's title to the property pursuant to the Rules by submitting a copy of its warranty deed to the 780-acre parcel of land on which the proposed expansion will be located. The deed for the parcel is recorded in Book 9188, page 152 at the Penobscot County Registry of Deeds. A deeded right-of-way to the parcel from Route 16 is also recorded in the Registry. The Board therefore finds that the applicant has demonstrated sufficient title, right, or interest in the property proposed for the expansion.

6. FINANCIAL ABILITY AND FINANCIAL ASSURANCE

State law at 38 M.R.S. § 1310-N(2-F)(A) (siting standards) requires that the applicant have the financial ability to develop the project in a manner consistent with state environmental standards and the provisions of the statute. State law at 38 M.R.S. § 1310-Y requires the applicant to provide assurance of its financial ability to satisfy the estimated costs for corrective action and assurance of financial capacity to satisfy the estimated costs of closure and post closure care; however, 38 M.R.S. § 1310-Y applies to

privately owned solid waste facilities. The Department's rules at 06-096 C.M.R. ch. 400, § 4(B)(1) and § 11 require financial ability and financial assurance for the design, construction, operation, maintenance, closure and post-closure care of a proposed solid waste facility; however, as a State-owned facility the proposed expansion is not subject to the requirements of § 11 to provide financial assurance sufficient to ensure that funds are available to pay for the anticipated costs of compliance with all facility closure, post-closure maintenance, post-closure monitoring requirements, and corrective action.

Although not all of the financial requirements of the State laws and Rules apply to the State owned JRL, Casella maintains financial assurance as required by the OSA and as described below.

A. Financial Ability: Design, Construct, Operate, Maintain, Close, and Post-Closure Care

Permitting, design, construction, operation, and closure of JRL are funded by Casella, as set forth in the OSA with the State of Maine. Ongoing activities at JRL are funded by revenues generated from the operation of the landfill (i.e., tipping fees). The applicant provided a letter dated May 21, 2015 from the Bank of America, N.A. showing that Casella maintains a secured credit facility administered by that bank. The applicant represented that this letter demonstrates the ability of NEWSME and its ultimate parent company, Casella, to fund the expansion of JRL from working capital, if necessary.

Table 2 includes the opinion of expansion costs submitted by the applicant (Volume I of the application, Table 3-1, page 3-2). The application included an estimated cost of construction for the first cell of the expansion, Cell 11, of $6,240,000.

Table 2: Opinion of Expansion Costs

Activity	Estimated Cost ($)
Design and Permitting	$4,800,000
Construction	$19,800,000
Operations	$7,000,000
Closure	$12,400,000
Post-Closure Care	$8,700,000

Notes:
1. Design costs include MEDEP permit fees in 2015.
2. Construction costs are in 2015 dollars.
3. Operations costs represent estimated yearly costs.
4. Closure costs for the entire project in 2015 dollars at a per acre closure cost at $226,000 per acre.

5. Post-closure care includes costs to maintain and monitor the facility for the 30-year post-closure period in 2015 dollars based on a per-acre cost of $160,400 per acre.

The Board finds that financial ability is maintained by NEWSME as the current operator of JRL to design, operate, maintain, close, and accomplish post-closure care in a manner consistent with applicable State law and Rule requirements.

B. Financial Assurance

The applicant maintains a surety bond as financial assurance for final closure costs and post-closure care costs for the entire developed site for a 30-year period. Financial assurance is required by the OSA, Sections 13.7 and 21. A surety bond will be utilized as financial assurance for the proposed expansion, as well. The closure and post-closure care costs are updated yearly with updates of costs by an independent third party and the documentation of any changes made to the funding agreement submitted in the facility's Annual Report. The most recent updated surety bond documentation was submitted to the Department in an August 9, 2016 letter with attachments.

The Board finds that sufficient financial assurance is maintained by NEWSME as the current operator of JRL for closure and post-closure care, provided NEWSME submits the appropriate financial assurance package updates to the Department on an annual basis.

7. TECHNICAL ABILITY

The applicant must have the technical ability to develop the project in a manner consistent with State environmental standards in accordance with the 38 M.R.S. § 1310-N (2-F)(A) siting standards and must submit evidence that affirmatively demonstrates the technical ability to design, construct, operate, maintain, close, and accomplish post-closure care, as well as meeting civil or criminal record standards as stated in 06-096 C.M.R. ch. 400, § 4(C)(1).

A. Technical Experience

NEWSME has managed JRL since April 2004 and employs qualified management and staff at the facility, along with utilizing qualified consultants for design, construction, and operations. The application included position descriptions and responsibilities, along with resumes, of key personnel. NEWSME's parent company, Casella is also available to provide extensive

expertise in solid waste, recycling, and resource management. The specific consultants retained for the proposed expansion application include: SME of Cumberland, Maine as the primary consultant with expertise in geology, hydrogeology, and landfill design; Sanborn, Head & Associates, Inc. of Concord, New Hampshire for landfill gas design; Gorrill Palmer of Gray, Maine for traffic assessment; SMRT, Inc. of Portland, Maine for visual assessment; Epsilon Associates, Inc. of Maynard, Massachusetts for noise assessment; and Stantec Consulting Services, Inc. (Stantec) of Topsham, Maine for wetland and other natural resources assessments.

The Board finds that the combination of BGS staff, NEWSME operations and management personnel, and the consultants retained by the applicant have the technical ability to develop the proposed expansion in a manner consistent with the applicable State law and Rule requirements.

B. Civil or Criminal Record

Finding 23 of this license contains the information on civil and criminal disclosure.

8. PROVISIONS FOR TRAFFIC MOVEMENT

The applicant must make adequate provisions for safe and uncongested traffic movement of all types into, out of, and within the proposed solid waste facility as set forth in the 38 M.R.S. § 1310-N(2-F)(B) siting standards and in 06-096 C.M.R. ch. 400, § 4(D)(1).

The primary waste haul route to JRL utilizes the Interstate system, I-95, to the Route 16 Bennoch Road interchange (exit 199), then Route 16 West for 0.1 miles to JRL's site access road. This haul route is to remain unchanged. New internal roads required for the proposed expansion have been designed for continuous traffic flow to minimize danger to pedestrians or other vehicles. The site access and internal site roads are maintained by NEWSME, including winter plowing and summer dust control.

The applicant submitted a traffic assessment prepared by Gorrill Palmer, dated June 2015, to determine if traffic increase due to the expansion will be adequately accommodated. Based on 2014 weight scale records and turning movement volumes collected on September 30, 2014, it was determined that the 2014 peak design hour trip generation was 28 during the morning and 25 during the afternoon. The proposed expansion is expected to increase accepted waste tonnages to 700,000 tons annually from about 629,000 tons received in 2014, resulting in an estimated 31 and 28 truck round trips during the peak morning and afternoon hours, respectively. For the proposed expansion, the total daily vehicle trips generation is expected to be 203 (one way traffic, therefore,

approximately 101 total vehicles per day), of which 20 would be non-trucks and 183 would be various trucks with gross vehicle weights from 70,000 to 100,000 pounds. Gorrill Palmer noted that a disposal volume of approximately 700,000 tons was accepted in both 2010 and 2011.

For the proposed expansion, the primary 30-foot wide paved access road to the landfill will remain at its current location. Prior to a federal law change in 2011 which increased the allowable gross vehicle weight on I-95 from 80,000 to 100,000 pounds, vehicles over 80,000 pounds were required to use the state and local roadways. The weight limit change has reduced the traffic on local roadways by allowing trucks to utilize I-95. The applicant will encourage trucks to utilize the I-95 haul route when trucking waste to the proposed expansion.

In addition to addressing the existing and future traffic volumes and haul routes, the traffic assessment also looked at the future capacity of the facility, the Maine Department of Transportation (MDOT) accident inventory, sight distances, and internal access roads. The assessment concluded that the existing street system will continue to accommodate the vehicles associated with operation of the expansion.

During the course of the application review, traffic issues were raised by the City of Old Town regarding JRL related truck traffic on Bennoch Road (State Route 16). To address road conditions, BGS contacted MDOT concerning the possibility of improvements to the northern part of Bennoch Road. Preservation paving and highway rehabilitation work were added to MDOT's 2018 work plan. To encourage truck usage on I-95 rather than Bennoch Road, the facility has installed two signs that read "Trucks Please Use I-95". One sign is located just beyond the scale house, seen by drivers leaving the scales, and the other is located across from the landfill entrance, seen by drivers as they leave the facility. In addition, MDOT agreed to install two additional signs. At the hearing, the City of Old Town stated that their concerns regarding expansion truck traffic impacts have been addressed.

The Board finds that the applicant has demonstrated that the roads and intersections in the vicinity of JRL have the ability to safely and appropriately handle all of the traffic attributable to the proposed expansion into, out of, and within the facility pursuant to the applicable State law and Rule requirements. The Board further finds that the applicant will continue its policy of encouraging trucks to utilize I-95.

9. FITTING THE SOLID WASTE FACILITY HARMONIOUSLY INTO THE NATURAL ENVIRONMENT

In accordance with the 38 M.R.S. § 1310-N(2-F)(C) siting standards, the applicant must make adequate provisions for fitting the proposed solid waste facility harmoniously into

the existing natural environment. Pursuant to the requirements in 06-096 C.M.R. ch. 400, § 4(E)(1), JRL must have buffer strips of sufficient size and quality to adequately protect aquatic and wildlife habitat and the natural environment; and may not unreasonably adversely affect protected natural resources and rare, threatened and endangered plant and animal species. The buffer must be a minimum of 100 feet between the facility site and the listed locations and habitats, unless otherwise approved or required.

The applicant retained Stantec to identify and inventory the presence of wetlands; potential significant wildlife habitats, unusual natural areas; vernal pools; and rare, threatened, and endangered species on the proposed project site. A review of records and contact with the following agencies occurred: the Maine Department of Inland Fisheries and Wildlife, the Department of Agriculture, Conservation, and Forestry, the Department, and U.S. Fish and Wildlife Service. Field studies were performed to assess the potential presence of State or federally listed rare, threatened, and endangered species, along with the delineation of wetlands and waterbodies.

Stantec did not directly observe State or federally listed rare, threatened and endangered plant or wildlife species on site during the field work which took place in 2008-2009 and 2014-2015. However, two areas were identified at the facility for further review: the forested area on site which is located in the range of the northern long-eared bat and the northeast portion of the facility which is located in the National Oceanic Atmospheric Association's mapped critical habitat for Atlantic salmon.

The northern long-eared bat (Myotis septentrionalis) was listed as threatened effective May 4, 2015 with a 4d ruling by the U.S. Fish and Wildlife Service under the Endangered Species Act. Stantec conducted an acoustic bat survey during the nights of June 10 and 11, 2015 utilizing the current U.S. Fish and Wildlife Service guidelines and did not detect the presence of the northern long-eared bat.

Atlantic salmon are protected under the final 2009 ruling issued by the National Marine Fisheries Service and U.S. Fish and Wildlife Service under the Endangered Species Act. The expansion is proposed to be located approximately 800 feet from an unnamed intermittent brook, 950 feet from an unnamed tributary to Pushaw Stream and 2,350 feet from Judkins Brook. All of these streams are located in the watershed of the Penobscot River which contains Atlantic salmon. Isolated freshwater wetlands occur within the 780 acre facility parcel, including approximately two acres directly impacted by the proposed expansion; however, no delineated or mapped streams were identified within the proposed development area of the site. The Department of Marine Resources (DMR) stated that the proposed project should not cause any significant adverse impact to Atlantic salmon or other marine resources. The Maine Department of Inland Fisheries and Wildlife (MDIFW) stated that fisheries staff does not anticipate any adverse impacts on fisheries resources associated with this landfill expansion.

At the hearing, intervenor Edward Spencer's expert witness, Dr. Stephen Coghlan, questioned the applicant's conclusions regarding no expected impacts to Atlantic salmon. He testified on the life history and habitat requirements of Atlantic salmon and its sensitivity to various toxins, and argued that leachate generated by the project as well as impacts to the freshwater wetlands on-site have the potential to negatively impact its viability. He also argued that potential impacts to Atlantic sturgeon (federally-listed as threatened) and shortnose sturgeon (federally-listed as endangered) which are found in the lower Penobscot River Watershed should be considered. Dr. Coghlan testified that continued deforestation, urbanization and wetland alteration in the Penobscot River watershed have a detrimental impact on the habitat and viability of these endangered species as a result of increased runoff of nutrients and toxic chemicals. Dr. Coghlan also stated that in the event of a catastrophic breach of the liner system or a large storm event, leachate and/or stormwater runoff may contaminate adjacent waterways and ultimately the Penobscot River. Dr. Coghlan pointed out that in light of the success of the Penobscot River Restoration Trust's work on the Penobscot River that other important anadromous fish species have seen population increases recently and that the proposed expansion may put those species at risk again.

In response, Bryan Emerson, the applicant's wetland's expert, stated in his rebuttal testimony that the proposed expansion does not directly impact any river, stream or brook. The largest wetland being impacted in the middle of the proposed expansion is "an isolated forested wetland with no surface hydrological connection to a stream or floodplain wetlands, and the wetlands being impacted on the edge of the expansion are not floodplain wetlands. Therefore, no direct impacts to Atlantic salmon or their habitat are likely to occur." He further testified that Judkins Brook, which is within federally mapped Critical Habitat for Atlantic salmon, is located in a different watershed than the landfill expansion. With respect to Dr. Coghlan's concerns regarding potential impacts to Atlantic sturgeon and shortnose sturgeon in the Penobscot River, Mr. Emerson testified that Judkins Brook is located approximately 6.5 river miles upstream from the Stillwater River, and Pushaw Steam, more than 8.4 river miles. The Stillwater River then flows approximately 6 to 8 river miles before it reaches the mainstream of the Penobsot River, making it "highly unlikely" that there would be any adverse impacts to Atlantic sturgeon or shortnose sturgeon as a result of the JRL expansion.

Based on Stantec's evaluation results; the design of the landfill; the distance from the solid waste boundary to the intermittent and perennial streams; the fact that these streams do not contain habitat for Atlantic Salmon, Atlantic sturgeon, or shortnose sturgeon; and that the leachate is collected and treated at an off-site facility that has a waste discharge license from the Department, the Board finds the project will not have an unreasonable impact to Atlantic salmon, Atlantic sturgeon, or shortnose sturgeon.

The expansion will impact approximately 2.04 acres of primarily forested freshwater wetlands through direct filling and 0.1 acres of the critical terrestrial habitat of one significant vernal pool regulated under the Natural Resources Protection Act. The impacts to the significant vernal pool were authorized in a permit-by-rule that was accepted by the Department on July 29, 2015. Finding 38 of this license addresses impacts to freshwater wetlands and compliance with the Natural Resources Protection Act and associated rules.

In addition to the NRPA regulated wetlands, the applicant identified 14 vernal pools within and adjacent to the expansion area, 12 of which are regulated by the U.S. Army Corps of Engineers. Stantec prepared a Wetlands Compensation Plan to meet both NRPA and Corps requirements.

The MDIFW reviewed the proposed project and stated that, with the exception of one Significant Vernal Pool, there are no other essential or significant wildlife habitats at the project site.

The Board finds that the applicant has demonstrated that the facility will have sufficient buffers to adequately protect aquatic life and wildlife habitat and the natural environment; and that there will be no unreasonable adverse effects to protected natural resources and rare, threatened and endangered plant and animal species pursuant to 38 M.R.S. § 1310-N (2-F)(C) and 06-096 C.M.R. ch. 400, § 4(E)(1).

10. NO UNREASONABLE ADVERSE EFFECT ON EXISTING USES AND SCENIC CHARACTER

The solid waste facility may not unreasonably adversely affect exiting uses and scenic character as set forth in the 38 M.R.S. § 1310-N(2-F)(C) siting standards and in 06-096 C.M.R. ch. 400, § 4(F)(1), including consideration of bird hazard to aircraft, historical sites, established public viewing areas, excessive noise at the property boundary or at any protected location, or existing uses of neighboring property.

A. Bird Hazard to Aircraft

The proposed expansion is located over 13,000 feet from Dewitt Field Old Town Municipal Airport, the closest airfield. The Rules require a description of all airport runways within 10,000 feet of the facility.

Based on the distance to the airport, the Board finds that the expansion is not expected to present a bird hazard to aircraft.

B. Historical Site Preservation

In a letter dated January 15, 2015, from the Deputy State Historic Preservation Officer of the Maine Historic Preservation Commission, it was concluded that there would be no historic properties affected by the proposed expansion.

The Board finds that the proposed expansion will not unreasonably adversely affect historic properties.

C. Visual Assessment

A visual assessment dated July 2015 was prepared for the applicant by SMRT Inc. to evaluate whether the proposed expansion will unreasonably interfere with views from established public viewing areas. Public viewing area is defined in 06-096 C.M.R. ch. 400, § 1(Ll) as "an area designated for the public to view scenic areas, historical sites, unusual natural features or public monuments. These areas include but are not limited to scenic highways; public easements; scenic turnouts; public monuments; and national, state or municipal parks." The Rules require descriptions of protected locations and established public viewing areas within 2,000 feet of the proposed expansion.

The visual assessment included defining the existing site characteristics around the facility, quantification of the site viewshed, identification of public viewing areas, development of maps for line of site and viewsheds, and preparation of final landfill topography illustrations. Computer-generated modeling, weather balloons at strategic locations and elevations, field visits, and photography were used. To determine public viewing areas within 2,000 feet of the proposed expansion, stakeholders contacted by correspondence included Maine Bureau of Parks and Lands, MDOT, City of Old Town, the towns of Alton, Glenburn, Greenbush, Hudson, and Milford, and the Penobscot Nation. No public viewing areas were identified within 2,000 feet of the proposed expansion, but the study area was expanded to a 6-mile distance based on a question raised in a pre-submittal meeting regarding possible views from the western shore of Pushaw Lake and vicinity. The stakeholder process identified the following potential scenic resources within 6 miles of the proposed expansion: Pushaw Lake, Pushaw Stream, Penobscot River, Stillwater River, Hirundo Wildlife Refuge, Sunkhaze Meadows National Wildlife Refuge, Mud Pond (also known as Perch Pond) and the Perch Pond Recreational Trail, the Costigan Historical Cemetery, and the Penobscot River corridor at the public boat launch. Views were also considered from the following roadways: Route 16, I-95 Southbound, and Route 43.

The assessment performed using U.S. Forest Service standards and guidelines in 06-096 C.M.R. ch. 315 concluded that Pushaw Lake and the Penobscot and Stillwater Rivers had no significant scenic features reported or identified within the study area. The scenic resources within the study area were determined not to have views to the landfill or are considered background by the U.S. Forest Service as being 4 miles to the horizon. The area roadways were not defined as public viewing areas, scenic resources, or scenic byways. The views from Route 16 were considered intermittent, the distant view from I-95 includes broken line of sight by roadside vegetation, and Route 43 has a screening of plantings.

Views of the landfill will change during construction and operation. The operating landfill will generally be seen as grayish in color with equipment in sight. Prior to final closure, the landfill is proposed to be covered by a temporary black geomembrane, and at closure it will be fully planted with a vegetative layer and will resemble nearby hillsides with similar height, scale, and form.

The Board finds that the design of the proposed expansion takes into account the surroundings and when completed, capped, and vegetated, the expansion will not have an unreasonable adverse effect on the scenic character of the surrounding area as required pursuant to 38 M.R.S. § 1310-N(2-F)(C) siting standards and in 06-096 C.M.R. ch. 400, § 4(F)(1).

D. Noise

A Sound Level Assessment Report, dated July 2015, was prepared for the applicant by Epsilon Associates, Inc. to evaluate sound levels from the proposed expansion. The Rules include noise standards, as noise is considered unwanted sound and sound levels can be measured in decibels (dBA = decibels adjusted to reflect the ear's response to different frequency of sound). Table 3 includes the sound level limit standards of 06-096 C.M.R. ch. 400, § 4(F)(2).

Table 3: Sound Level Limit Standards

Sound Level Limit	**Applicable Hours** Daytime: 7:00 am to 7:00 pm Nighttime: 7:00 pm to 7:00 am	**Location**
75 dBA	Daytime and Nighttime	Facility property boundary
60 dBA	Daytime	Protected location zoned or usage not predominantly commercial or industrial (i.e., residential)
50 dBA	Nighttime	

The assessment included existing sound levels around the operating landfill and measurement of potential noise sources (operations and equipment), computer

modeling to predict future sound levels for various operating scenarios, and comparisons to the sound level limits. Sound levels from mobile equipment (excluding registered and inspected on-road vehicles), the Thiopaq® landfill gas treatment facility, and the anticipated future on site landfill gas-to-energy plant were included in the modeling. Operations for the proposed expansion were considered to be the same as current operations: 6:00 am to 6:00 pm Monday to Friday and 7:30 am to 2:30 pm Saturday and Sunday.

During periods of operations, modeled results were below the 75 dBA sound level limits for daytime and nighttime at the facility property boundary. However, residential areas are considered protected locations in the Rules and the western and northern property lines border residential properties. Additionally, there is a residential parcel to the south beyond the property boundary. These locations were assessed for compliance with the more restrictive sound level limits. The assessment results were below 60 dBA for the daytime operations, but were above 50 dBA for the one operating hour from 6:00 am to 7:00 am considered nighttime. To meet the sound level limit for this one hour of operation, the facility will be restricted to utilizing landfill equipment with a combined sound level of 77 dBA at 50 feet or less during the 6:00 am to 7:00 am hour when within 60 feet from the western solid waste boundary (approximately 480 feet from the western property line). This equates to utilizing a Caterpillar 836 compactor (77 dBA or less at 50 feet) or a Caterpillar 826 compactor (75 dBA or less at 50 feet), but not both compactors simultaneously.

The applicant will continue to maintain buffer vegetation between the proposed expansion and property lines to minimize sound levels from the facility, with the exception of tree clearing to install the relocated electrical line. The proposed pump stations, future gas-to-energy plant, and other mechanical structures will incorporate acoustical enclosures. Construction and maintenance activities will include environmental noise control devices in proper working condition and maintained as originally provided with the equipment by its manufacturer. Although vehicle warning signals and alarms are exempt from the sound limit levels, NEWSME has replaced the original backup alarms on operating equipment at the landfill with broadband backup alarms having less abrupt sounds.

The Board finds that the noise study for the proposed expansion indicates that routine operations will not generate excessive noise at the property boundary or at any protected location as defined by the Rules; provided that during the hour of 6:00 am to 7:00 am, only equipment with a combined sound level of 77 dBA at 50 feet or less are utilized if within 60 feet of the western solid waste boundary (approximately 480 feet from the western property line).

E. Neighboring Property

The portions of the 780-acre parcel to be developed will be a continuation of the existing site use, with buffers as required by 06-096 C.M.R. ch. 401, §§ 1(C)(2) and (3). Existing land in the vicinity of the expansion is locally zoned for landfilling, rural residences, farming, and under resource protection. The setbacks and buffers from the solid waste boundary in comparison to the Rule requirements are listed in Table 4 (modified from Volume I of the application, Table 3-3, page 3-12):

Table 4: Proposed Expansion Setback and Buffers

Setbacks from the Solid Waste Boundary to:	Actual Proposed (feet)	Rules Setback Requirements (feet)
Prohibitive Siting Criteria		
Class AA or Class SA Waters	> 10,560 (> 2 miles)	1,000
Significant sand and gravel aquifer	5,230 (approximately 1 mile)	300
Fault displaced in Holocene time	None identified on 780-acre parcel. Nearest mapped fault approximately 6 miles northeast of site.	200
Restrictive Siting Criteria		
Nearest public road	2,400	300
Property boundary	420	300
Nearest residence	2,100	1,000
Stratified sand and gravel deposit	275	100
Classified surface water	950	100
Water supply spring or water supply well not owned by the applicant	2,100	1,000

The Board finds that the proposed facility will have no unreasonable adverse effect on existing uses of property neighboring the proposed expansion based on the facility's buffers and setbacks as required in State law and the Rules.

11. NO UNREASONABLE ADVERSE EFFECT ON AIR QUALITY

The solid waste facility may not unreasonably adversely affect air quality pursuant to the siting standards of 38 M.R.S. § 1310-N(2-F)(C) and 06-096 C.M.R. ch. 400, § 4(G)(1). The facility must obtain an air emission license, if required; control fugitive dust and

nuisance odor; and prohibit open burning of solid waste other than clean or painted wood waste.

A. Air Emission License

Air emission license renewal #A-921-70-B-R was issued on October 7, 2014 for the existing landfill facility with findings that emissions from the source will receive Best Practical Treatment, will not violate applicable emissions standards, and will not violate applicable ambient air quality standards in conjunction with emissions from other sources. The air emission license renewal includes State and federal emission limits and operational requirements associated with landfill gas collection and control, as well as monitoring and reporting requirements.

The 2014 air emission license renewal addresses control of landfill gas emissions through use of a landfill gas collection and control system, with the extracted and collected landfill gas passing through a Thiopaq® sulfur removal system, then being combusted in either the main flare (Flare #4) or back-up flares prior to release to the atmosphere. In the future, a landfill gas-to-energy facility may be located at the site, at which time the extracted Thiopaq® treated gas may be combusted in engines to produce power as an alternative to flaring. The Thiopaq® system was required to be installed to decrease total reduced sulfur (mainly H_2S) prior to combustion to reduce sulfur dioxide air emissions. Thiopaq® operations began in early 2015, with a sulfur removal Sulfatreat® system installed as backup. In addition to monitoring air emissions from the control equipment, as well as control equipment parameters, the facility is also required by the Federal New Source Performance Standards (NSPS) to perform periodic gas surface scans on the landfill.

An LFG System Expansion Design Report, dated June 2015, was prepared by Sanborn, Head & Associates, Inc. for the proposed expansion consisting of estimates of future landfill gas generation, descriptions of the proposed gas collection and control system, and how the proposed system would connect to the existing gas collection system infrastructure. The report stated that Flare #4 is adequate for the proposed expansion. Flare #4 capacity and operations are addressed in the air emission license renewal.

The Board finds that the applicant has an air emission license, as required by State law and the Rules.

B. Fugitive Dust

The measures to control dust at the proposed expansion will include utilizing water spray trucks to wet secondary roads during dry weather, paving the primary access road to the proposed expansion, and making use of a road sweeper to remove dirt buildup on paved roadways. Calcium chloride may be utilized on an as-needed basis, primarily on internal cell access roads.

On the landfill's active working area, ash will be off-loaded and primarily utilized as a mix within daily cover or as a bulking agent for sludge. The ash will not be prone to being windblown due to quenching, which is to occur at the point of generation, and the placement of ash and ash mixtures on the active landfill area.

The Board finds that the dust control measures proposed by the applicant are sufficient to control fugitive dust as required by State law and the Rules.

C. Nuisance Odors and H_2S

Three potential primary sources of odor identified by the applicant were odors associated with incoming wastes, leachate storage and transport, and landfill related gases. The facility's Odor Complaint Management and Response Plan to manage landfill-related odors and limit off-site odor migration is part of the facility's current Operations Manual. Incoming waste types with the highest potential for odor generation are FEPR, MSW bypass, and wastewater treatment plant sludge. The leachate has potential for odor during storage at the facility and transport to the wastewater treatment facility. Landfill gases, including odorous H_2S, are produced as the waste in the landfill decomposes.

Measures for minimization of odor associated with incoming odorous waste streams will include placement within a small area in the cell, waste compaction, and placement of another lift (or layer) of non-odorous waste such as ash or CDD waste above it. Daily cover will be applied over the active portion of the landfill at the end of each day of waste placement. The facility will also utilize odor neutralizing spray systems, as needed, such as a bulldozer mounted system within the active cell, a trailer spray system for incoming and outgoing trailer loads, and a perimeter misting system.

To minimize leachate odors, the leachate will be collected and transported by piping systems and stored in an enclosed tank sized to hold all of the leachate generated at the landfill prior to being transported for treatment and disposal. Tanker trucks used to haul the leachate to the wastewater treatment facility will be

required to have their tanker filling points tightly sealed during transportation and have the ability to add chemicals for odor reduction.

Odor from LFG produced as waste degradation occurs will be minimized by the installation of intermediate or final cover over non-active portions of the landfill and the operation of the facility's LFG collection and control system, which will be expanded to accommodate the proposed expansion.

The facility monitors H_2S concentrations through real-time data collected using six Honeywell Analytics Single Point Monitors, four located off-site (on the access road, West Coiley Road, Route 43, and Old Stagecoach Road), and two located on-site, one adjacent to the perimeter fence and one on NEWSME owned land on Route 16. The location and operation of the four off-site monitors have been pre-determined with the Department's approval. The two on-site monitors are solely utilized to assist in operations, and the location and operation of these monitors may change or cease based on ongoing operations. If the monitors detect concentrations of 15 parts per billion (ppb) or above at any of the off-site monitors, the scale house is alerted by automated telephone message. Personnel then report any alert to supervisory staff for follow-up. In addition to monitoring for compliance with the action level of 15 ppb, the monitor data can be utilized in assisting with odor complaints.

Odor complaints received by the facility will follow a specific procedure. Information will be obtained from the complainant and then given to the appropriate complaint response personnel. Follow-up steps will be taken during the complaint investigation including filling out a Complaint Record Form with data about the day, time, wind direction and speed, H_2S levels, unusual conditions at the landfill, and observed waste materials accepted at the time of complaint. Landfill personnel will communicate directly with the complainant, either in person or by phone. For all complaints, the following will also be documented: remedial actions taken, resolution of the complaint, comments made during the investigation, and any other recommendations.

During the licensing proceedings, the City of Old Town raised the issue of H_2S as it relates to odor and exposure. The City's consultant and expert witness, Denis St. Peter, P.E. of CES, Inc., recommended that the facility use acute action levels for concentrations of H_2S exceeding 15 ppb (for reporting of events in the facility's Monthly Status Report) and 30 ppb, with the Old Town Code Enforcement Officer to be contacted if H_2S levels exceed 30 ppb. The applicant agreed and has incorporated the action levels into the facility's Operations Manual. Mr. St. Peter also recommended that the City set forth its own evaluation protocol to review the effect of possible chronic (long-term) exposure

to H_2S on members of the public since JRL does not currently use a chronic exposure standard. A portion of the Host Community funding will be used to hire a consultant to annually review the facility's H_2S data, with the City reporting the findings to the applicant and the Department.

Intervenor Edward Spencer testified on the odor complaint procedure and suggested consideration be made to include law enforcement officials in the process to verify nuisance odors. In response to this concern, Jeremy Labbe, P.E., Environmental Manager at JRL, testified that the City of Old Town receives a summary of every odor complaint at JRL and that JRL can provide copies of individual completed complaint forms to the City if requested. Mr. Labbe further testified that any City employee or citizen may call in an odor complaint.

The Board finds that the applicant has proposed odor control mechanisms sufficient to control nuisance odors from the proposed expansion as required by State law and the Rules. The Board further finds that the facility's current odor complaint procedure includes appropriate documentation and follow-up to odor complaints at this time.

12. NO UNREASONABLE ADVERSE EFFECT ON SURFACE WATER QUALITY

In accordance with the 38 M.R.S. § 1310-N(2-F)(C) siting standards of no unreasonable adverse effect on water quality and the requirements of 06-096 C.M.R. ch. 400, § 4(H)(1), the solid waste facility: may not discharge any water pollutants, directly or indirectly, that affect the state classification of a surface water body, as specified in 38 M.R.S. § 464; may not discharge any pollutant without first obtaining a license pursuant to 38 M.R.S. § 413 (waste discharge licenses); may not degrade water quality by contributing to the phosphorous concentrations in "waterbodies most at risk from new development" as defined in *Direct Watersheds of Lakes Most at Risk from New Development, and Urban Impaired Streams,* 06-096 C.M.R. ch. 502 (last amended December 27, 2006); and may not cause the discharge of a nonpoint source of pollution to waters of the United States that violates any requirement of an area-wide or State-wide water quality management plan that has been approved in compliance with Section 319 of the *Federal Water Pollution Control Act*, as amended.

The proposed expansion includes a leachate collection and off-site treatment system for precipitation that comes into contact with waste and stormwater management and erosion sedimentation control plans to control surface water runoff from covered portions of the facility, construction activities, and non-operational areas. The proposed expansion is not located within the watershed of a "lake at most risk from new development" or an "urban impaired stream." The applicant submitted a Stormwater Management Plan and an Erosion Sedimentation Control Plan, both dated July 2015 and prepared by SME. The

plans address effective drainage, flood prevention, and erosion control. The applicant's best management practices include stormwater detention basins, low velocity (lined) ditches, and stone check dams within on-site ditches. The plans are described in more detail in Findings 14 and 17 of this license.

The facility holds a Multi-Sector General Stormwater Permit (#MER05B477) for the discharge of stormwater associated with industrial activity for Sector L: landfills. The facility also submitted the existing Stormwater Pollution Prevention Plan, originally prepared in April 2006 and most recently revised in June 2013. The Stormwater Pollution Prevention Plan will be updated as necessary to address construction as the proposed expansion is developed.

Leachate generated by the proposed expansion will be collected, stored onsite, and trucked off-site to the MFGR, LLC wastewater treatment plant in Old Town. The project was reviewed by the Department's Bureau of Water Quality, which stated that the treatment plant is licensed to accept the leachate and is currently operating in compliance with that license (Department Order #W-002226-5O-O-R, entered into the evidentiary record). Leachate management is described in more detail in Findings 26(D) and 28(E) of this license.

The Board finds that the stormwater and leachate management systems for the proposed expansion meet the applicable State laws and Rules and are designed to prevent the discharge of sediment and other contaminants conveyed by stormwater from polluting the waters of the State and otherwise unreasonably affecting surface water quality.

13. NO UNREASONABLE ADVERSE EFFECT ON OTHER NATURAL RESOURCES

The solid waste facility may not unreasonably adversely affect other natural resources in the municipality or in neighboring municipalities pursuant to the 38 M.R.S. § 1310-N(2-F)(C) siting standards and 06-096 C.M.R. ch. 400, § 4(I)(1). The facility must conform to the standards of NRPA, 38 M.R.S. §§ 480-A to 480-Z, if proposed to be located in, on, over, or adjacent to a protected natural resource; and must be permitted by the federal government for any activities that require a Federal Wetlands permit.

Finding 38 of this license addresses impacts to protected natural resources under the NRPA and includes the Board's findings regarding compliance with NRPA requirements. The applicant has applied to the U.S. Army Corps of Engineers for a permit for impacts to federally regulated wetlands located in and adjacent to the expansion area.

14. SOIL TYPES THAT ARE SUITABLE AND WILL NOT CAUSE UNREASONABLE EROSION

In accordance with 38 M.R.S. § 1310-N(2-F)(D) siting standards and 06-096 C.M.R. ch. 400, § 4(J)(1), the solid waste facility must be located on soil types suitable to the nature of the undertaking and the facility must not cause unreasonable erosion of soil or sediment.

An Erosion and Sediment Control Plan, dated July 2015 and prepared by SME, was submitted with the application to address the site setting including watersheds, wooded areas, and surficial soils; existing and proposed drainage structures, timing and sequence of land disturbance activities during cell construction, landfill operations, and cover placement; temporary, permanent, and standard erosion control measures; and maintenance and inspection of erosion control features to ensure proper function. In addition, a site assessment report was submitted with the application consisting of site investigation findings and site characteristics, along with other analyses.

The surficial soils were investigated with the use of site test pits and soil borings and through the use of the Natural Resources Conservation Service Web Soil Survey of Penobscot County, Maine 2014. The surficial soils under and around the proposed expansion footprint are primarily Plaisted very stony loam and Howland very stony loam. On-site observations and a review of soils mapping did not identify areas near the proposed expansion that would be prone to or highly susceptible to erosion, such as exposed sideslopes.

The design and implementation of all erosion control measures will follow the requirements of the Rules and will be in accordance with the appropriate version of Maine's Erosion and Sediment Control Best Management Practices (BMP) Manual, most recently updated in March 2015 for Contractors and in October 2016 for Designers and Engineers (the previous version was dated 2003). BMP's to minimize erosion from the proposed expansion will include utilizing grass lined and riprap lined channels, catch basins, sediment detention ponds, culverts, ditches, storm drains, riprap aprons, riprap plunge pools, and level spreaders. Analyses were performed to appropriately size and locate these structures. Some existing structures will be utilized as they exist without modifications and others will be modified or removed. For example, Detention Ponds 1 and 9 will be modified, Detention Pond 5 will be removed, Detention Ponds 2 and 6 will remain unmodified, and Detention Ponds 10, 11, and 12 will be added.

Prior to disturbance of soil during development, appropriate erosion and sedimentation control measures will be put in place. Temporary measures will include silt fences, temporary seeding, mulching, and stone check dams. Permanent measures will include downspouts, sedimentation ponds, permanent seeding, mulching, and culvert inlet and

outlet protection. The amount of area disturbed at any one time will be minimized by the phased development of the landfill over time.

The Board finds that the construction and operation of the proposed expansion will not cause unreasonable sedimentation or erosion of soil and that suitable soil types underlie the landfill, meeting the applicable State laws and Rules; provided that the erosion and sedimentation control plan is implemented as proposed, incorporating any future revisions as a result of the Department's review and approval of each new cell construction as detailed in a specific design package as phased landfill development occurs.

15. NO UNREASONABLE RISK THAT A DISCHARGE TO A SIGNIFICANT GROUND WATER AQUIFER WILL OCCUR

Pursuant to 38 M.R.S. § 1310-N(2-A), the 38 M.R.S. § 1310-N(2-F)(E) siting standards, and 06-096 C.M.R. ch. 400, § 4(K)(1), the proposed solid waste facility may not: overlie any significant sand and gravel aquifers; pose an unreasonable threat to the quality of a significant sand and gravel aquifer; pose an unreasonable threat to the quality of an underlying fractured bedrock aquifer; or pose an unreasonable risk that a discharge to a significant ground water aquifer will occur. Significant ground water aquifer is defined in 06-096 C.M.R. ch. 400, §§ 1(Ccc) as "a porous formation of ice contact and glacial outwash sand and gravel supplies or fractured bedrock that contains significant recoverable quantities of water likely to provide drinking water supplies", with a similar definition found in 38 M.R.S. § 1310-N(2-A).

The application included a comprehensive Site Assessment Report dated July 2015, prepared by SME, of the geologic and hydrogeologic characteristics of the site, in addition to the water quality of the site, future water quality monitoring, and travel time analyses.

The Maine Geological Survey maps (Open File 08-87, Tolman and Lanctot, 2008) show the nearest mapped sand and gravel aquifer in the vicinity of the proposed expansion is approximately one mile east of the landfill. There are no stratified sand and gravel deposits mapped by the Maine Geological Survey within the facility site (Borns and Thomspson, 1981; Foster and Smith, 2001). Therefore, the proposed expansion does not overlie any significant sand and gravel aquifers.

An investigation was performed to determine whether the proposed expansion would pose a risk or affect the quality of a significant sand and gravel aquifer or a bedrock aquifer. Although no mapped stratified sand and gravel deposits are located near the proposed expansion and ground water from bedrock beneath, directly adjacent to, and immediately downgradient of the proposed site is not likely to be used for domestic

consumption due to the State's ownership of land 400 feet downgradient of the proposed solid waste boundary, two formations were evaluated further. These formations consist of the isolated stratified sand zones contained within the basal till greater than 100 feet beyond the southeast side of the proposed expansion boundary and the off-site bedrock immediately adjacent to the site property boundary.

The on-site stratified sand and off-site bedrock formations were evaluated utilizing the time of travel analysis and the contaminant transport analysis included in the application. These analyses are described in more detail in Findings 25 and 29 of this license, respectively.

The Board finds that the proposed expansion will not be located over a significant sand and gravel aquifer and that the facility poses no unreasonable risk to a significant sand and gravel aquifer or underlying fractured bedrock aquifer, as required by State law and the Rules. Adequate protection of water quality will be provided by the soils under the proposed expansion, the design of the proposed expansion, the ground water flow conditions, and implementation of the Water Quality Monitoring Program discussed further in Finding 33 of this license.

16. ADEQUATE PROVISION FOR UTILITIES AND NO UNREASONABLE ADVERSE EFFECT ON EXISTING OR PROPOSED UTILITIES

The applicant shall provide for adequate utilities, including adequate water supplies and appropriate sanitary wastewater disposal, and the facility may not have an unreasonable adverse effect on existing or proposed utilities in the municipality or area served by those utilities, in accordance with the 38 M.R.S. § 1310-N(2-F)(F) siting standards and in 06-096 C.M.R. ch. 400, § 4(L)(1).

Existing sanitary wastewater disposal systems located at the maintenance buildings (on the southeast side of the facility) and the office building and scale house (currently located on the north side of the facility) will continue to be utilized by personnel. However, with the development of Cell 12, the office building and scale house will be relocated northeast from its current position and a well and new on-site sanitary wastewater disposal system will be installed.

Water for dust control, leachate pipe cleaning, and other needs of the facility will continue to be met by the existing on-site water supply sources. The leachate generated by the landfill will continue to be collected and stored on-site and treated off-site.

As part of the proposed expansion, an approximate 3,700-foot portion of the facility's three-phase, 480-volt power electrical service will be relocated. This electrical service enters the site along the existing access roadway which will be modified to accommodate

the development of the proposed expansion. The new leachate pump stations associated with the proposed expansion will require three-phase, 480-volt power, which will be supplied to each pump station through additional on-site electrical cables to be installed along the site access roads.

The Board finds that the applicant has provided for adequate utilities and the proposed facility will not have an unreasonable adverse effect on existing or proposed utilities in the municipality or area served by the utilities, pursuant to the applicable State law and Rules.

17. NOT UNREASONABLY CAUSE OR INCREASE FLOODING

The solid waste facility may not unreasonably cause or increase flooding on-site or on adjacent properties nor create an unreasonable flood hazard to a structure pursuant to the 38 M.R.S. § 1310-N(2-F)(G) siting standards. As set forth in 06-096 C.M.R. ch. 400, § 4(M)(1), the facility may not be located in a 100-year flood plain or restrict the flow of a 100-year flood. In addition, the facility must include a stormwater management system that controls run-on and run-off; and infiltrates, detains, or retains precipitation falling on the facility site during a storm of an intensity up to and including a 25-year, 24-hour storm, such that the rate of flow of stormwater from the facility after construction does not exceed the rate of outflow of stormwater from the facility site prior to the construction of the facility.

The most recent Federal Emergency Management Agency (FEMA) flood plain map of the proposed expansion's location shows that the proposed expansion is not located on a 100-year flood plain (Quad panel number 2301120002A, dated April 1978).

The Stormwater Management Plan prepared by SME and dated July 2015 for the proposed expansion application included pre-and post- development stormwater analyses, for storm events up to and including a 25-year, 24-hour storm event. The post-development design includes modifications to some of the existing stormwater structures, along with the addition of three detention ponds and various drainage ditches, catch basin, storm drains, and culverts. The stormwater analyses showed that post-development peak flows did not exceed pre-development peak flows. The results of the submitted analyses are shown in Table 5 (Volume I of the application, Appendix J, Table 4-1, page 9). Changes in precipitation data, requirements, or cell development plans may result in revisions to the analyses as the proposed expansion is developed.

Table 5: Summary of Peak Flows

Analysis Point	Peak Flow (cubic feet per second, cfs)					
	Pre-Development			Post-Development		
	2-Year	10-Year	25-Year	2-Year	10-Year	25-Year
1	29.5	92.6	130.9	16.2	50.4	68.3
2	10.2	26.6	36.0	9.8	24.6	33.2
3	29.1	74.1	100.3	29.1	74.1	100.3
4	36.1	92.1	124.5	33.4	84.7	112.5
5	6.2	14.6	19.3	5.7	13.4	17.7

Note: Peak flow of analysis point after routing through the detention pond and/or reaches.

Dr. Stephen Coghlan, Intervenor Spencer's expert witness, raised concerns in pre-filed direct testimony on the date of the 1978 flood plain map used by the applicant. Department staff verified through a website search of FEMA's floodplain maps that the most recent map for the proposed expansion area was utilized, as required. Dr. Coghlan also testified on the potential for extreme rainfall events and flooding due to climatic changes and questioned the adequacy of an analysis based upon a 25-year, 24-hour storm event. Michael Booth, P.E. of SME, one of the applicant's expert witnesses, testified that the rules require that an event of intensity up to and including a 25-year, 24-hour storm be utilized in the analysis. In addition, Mr. Booth testified that the stormwater ponds include structures that also allow stormwater flow from a 100-year storm to be managed without impacting the integrity of the structures and that with respect to the age of the flood plain maps, the expansion is located on a high point and not susceptible to flooding.

The Board finds that the facility will not be located in a 100-year flood plain and that adherence to the facility's stormwater management plan will control run-on and run-off; and will infiltrate, detain, or retain water falling on the facility site during a storm of an intensity up to and including a 25-year, 24-hour storm, such that post-development stormwater flows from the facility are below pre-development stormwater flows from the facility site. These findings meet the applicable requirements of State law and the Rules.

18. SOLID WASTE MANAGEMENT HIERARCHY

A. Applicable Law

As stated in 38 M.R.S. § 1310-N(1)(D) and 06-096 C.M.R. ch. 400, § 4(N)(1), the purpose and practices of the solid waste facility must be consistent with the State's solid waste management hierarchy (hierarchy) set forth in 38 M.R.S. § 2101(1), which reads as follows:

> Priorities. It is the policy of the State to plan for and implement an integrated approach to solid waste management for solid waste generated in the State and solid waste imported into this State, which must be based on the following order of priority:
>
> A. Reduction of waste generated at the source, including both amount and toxicity of the waste;
> B. Reuse of waste;
> C. Recycling of waste;
> D. Composting of biodegradable waste;
> E. Waste processing that reduces the volume of waste needing land disposal; including incineration; and
> F. Land disposal of waste.

For the purpose of 06-096 C.M.R. ch. 400, § 4(N):

> reducing, reusing, recycling, composting and/or processing waste to the "maximum extent practicable" prior to disposal means handling the greatest amount of waste possible through means as high on the solid waste management hierarchy as possible, resulting in maximizing waste diversion and minimizing the amount of waste disposed, without causing unreasonable increases in facility operating costs or unreasonable impacts on other aspects of the facility's operation. Determination of the "maximum extent practicable" includes consideration of the availability and cost of technologies and services, transportation and handling logistics, and overall costs that may be associated with various waste handling methods.

In addition, 38 M.R.S. § 2101(2) establishes that "it is the policy of the State to actively promote and encourage waste reduction measures from all sources and maximize waste diversion efforts by encouraging new and expanded uses of solid waste generated in the State as a resource."

The Department's rule at 06-096 C.M.R. ch. 400, § 4(N)(2)(a) states that for a solid waste disposal facility, the applicant must affirmatively demonstrate consistency with the hierarchy, including the following:

> that the waste has been reduced, reused, recycled, composted, and/or processed to the maximum extent practicable prior to incineration or landfilling, in order to maximize the amount of material recycled and reused, and to minimize the amount of waste

> being disposed. Such evidence shall include, but is not limited to, a description of the reduction, reuse, recycling, composting and/or processing programs/efforts that the waste is or will be subject to, and that are sufficiently within the control of the applicant to manage or facilitate, including relevant metrics to evaluate effectiveness; and a description of ongoing efforts to increase the effectiveness of these programs/efforts.

State law also imposes limits on the origin of wastes accepted at a State-owned solid waste facility. In accordance with 38 M.R.S. § 1310-N(11),

> a solid waste facility owned by the State may not be licensed to accept waste that is not waste generated within the State. For the purposes of this subsection, "waste generated within the State" includes residue and bypass generated by incineration, processing and recycling facilities within the State or waste, whether generated within the State or outside of the State, if it is used for daily cover, frost protection or stability or is generated within 30 miles of the solid waste disposal facility.

B. Applicant's Summary of Proposed Waste Streams Relative to the Hierarchy

In its application (Volume I) and the testimony of Toni King, P.E., Regional Engineer for Casella Waste Systems, Inc.'s Eastern Region, the applicant provided information, summarized below, on the wastes proposed to be disposed in the expansion and the viable waste management options for these wastes as related to the hierarchy that are sufficiently within the control of the applicant to manage or facilitate:

(1) *CDD* – JRL has received, and is expected to continue to receive in the expansion, CDD from Casella-owned companies and others. Typically, about 30% of the material disposed of at JRL is CDD. In 2014, Casella-owned companies delivered approximately 87,324 tons of CDD material to JRL. Approximately 3,335 tons of clean wood and metals had been removed from this material and JRL has a wood waste handing area which received 46 tons of clean wood and stumps in 2014. These materials were ground and recycled as alternative daily landfill cover. Additionally, Casella controlled/operated transfer stations divert tonnage from JRL, including clean and processed wood and metal, which is removed from the CDD before the CDD is sent to JRL. These Casella facilities also direct or supply CDD to processing facilities such as ReEnergy in Lewiston for beneficial use or recycling.

(2) *FEPR* – FEPR currently comes to JRL from the PERC incinerator in Orrington. PERC's FEPR is approximately 20% by weight of the non-combustible portion of the facility's MSW that cannot be incinerated and is removed mechanically prior to combustion of the refuse-derived fuel. FEPR is currently utilized at JRL as part of the 5-foot layer, referred to as the "soft layer", which is placed above the landfill liner and leachate collection systems as a protective layer. This usage is also proposed for the expansion. At this time, there is no other disposal option allowed in Maine other than secure landfill disposal for FEPR. The applicant states that if FEPR were not available, the facility would need to purchase other materials such as tire chips and sand to provide a soft layer.

(3) *MSW Incinerator Ash and Multi-Fuel Boiler Ash* – The use or reuse of MSW incinerator ash is currently not allowed by regulatory beneficial use standards in Maine due to its chemical characteristics; therefore, the current disposal method is landfilling. Multi-fuel boiler ash is similar to MSW incinerator ash regarding the allowable disposal method, with the exception of a few ashes, such as clean wood ash. Clean wood ash may be land spread or used in the production of flowable fill for certain construction needs. Casella Organics, NEWSME's sister company, has developed, and continues to develop, programs to reuse and recycle suitable clean wood ash, diverting various amounts from the landfill. JRL will utilize ash in its operations as daily cover at the proposed expansion, eliminating the need to use virgin soil (non-waste material) to serve that purpose.

(4) *CDD Processing Fines* – The residue from the processing of CDD is currently utilized as landfill grading, shaping, and alternative daily cover material and is expected to be used in the same manner for the proposed expansion. The current allowable disposal methods for CDD processing fines are either reuse as daily cover or disposal in secure landfills. Use of CDD fines as alternative daily cover materials at landfills is a beneficial use/recycling activity. Approximately 126,000 tons of CDD fines were received at JRL in 2014 and used as alternative daily cover.

(5) *OBW* – OBW is not currently generated by entities within the control of BGS and NEWSME, and there are no prevalent, viable mechanisms for reuse, reduction, or recycling of OBW that are within the control of BGS and NEWSME. The primary management option is landfill disposal for OBW.

(6) *Municipal Wastewater Treatment Plant Sludge* – Municipal wastewater treatment plant sludge not land applied, composted, or alternatively managed is proposed as acceptable waste at the expansion. Casella Organics has developed, and continues to develop, alternative sludge usage programs; however, the usage options for municipal wastewater treatment plant sludge from Maine communities is limited due to factors such as the quality of sludge, available acres for land application, facility capacity restrictions and cost considerations. Landfilling is the disposal option for municipal wastewater treatment plant sludge not otherwise land applied, composted or alternatively managed.

(7) *Industrial Wastewater Treatment Plant Sludge and Residuals* – As with municipal wastewater treatment plant sludge, industrial wastewater treatment plant sludge and residuals are expected to be disposed of in the proposed expansion. Maine industries with wastewater or process treatment plants (the generator of this type of sludge) are responsible for reducing and recycling this waste material to the maximum extent practicable. As stated above, Casella Organics has an active alternative sludge usage program to divert some of this waste material from the landfill; however, the sludge not otherwise processed is landfilled. For example, in 2014 Casella Organics handled approximately 42,000 tons of short paper fiber from the Cascades Auburn Fiber pulp mill in Auburn, Maine, all but 8000 tons of which was diverted from disposal to beneficial uses.

(8) *Contaminated Soils and Oil Spill Debris* – Contaminated soils and oil spill debris are currently accepted at JRL at an estimated amount of about 1% of the total tonnage (approximately 6,500 tons in 2014) and are expected to be accepted in the proposed expansion. This waste type often is the result of accidental spills and releases and is managed in accordance with regulated practices (such as facility spill prevention, control, and countermeasure plans). While some of these wastes can be used in construction projects or in secure settings, reuse is typically limited due to physical and/or chemical characteristics or practical limitations such as transportation costs. Alternate use decisions are within the control of the generator, not BGS or NEWSME.

(9) *Miscellaneous Special Wastes* – Generators of miscellaneous special wastes are responsible for reducing to the maximum practicable extent the amount of these wastes that are landfilled. These special waste streams are handled either through individual one-time or ongoing special waste permits when there is not an alternative to landfilling based on regulatory

standards and practical cost and transportation considerations. Alternative use decisions are within the control of the generator, not BGS or NEWSME.

(10) *MSW Bypass from Maine MSW Incinerators* – The only MSW that will be disposed of in the JRL expansion is bypass from Maine MSW incinerators (pre-filed testimony by Ms. King page 10; pre-filed testimony by Jeremy Labbe, Environmental Manager at JRL, page 13; hearing testimony by Michael Barden, the State's Manager for State-owned landfills, pages 15 and 147 of the hearing transcript; and during questioning of Intervenor Edward Spencer page 419 of the hearing transcript). These incinerators are required by their licenses to provide an alternative management method (bypass) if the facility receives MSW that is in excess of its ability to accept, process, and/or combust that waste (i.e., during planned shutdowns or unplanned production problems). The decision to bypass and where to dispose of the bypass is made by the incinerator facility and is not within the control of BGS or NEWSME.

C. Testimony Regarding the Hierarchy

Compliance with the State's solid waste management hierarchy was a major issue at the hearing.

The applicant testified that the proposed expansion will be developed and operated consistent with the hierarchy and that JRL will promote and encourage waste reduction measures and maximize the waste diversion efforts of JRL users to the maximum extent practicable. Toni King, Regional Engineer for Casella Waste Systems, Inc.'s Eastern Region, testified that a high percentage of material to be disposed of in the proposed expansion is ranked in the State Plan (Maine Materials Management Plan: 2014 State Waste Management and Recycling Plan Update & 2012 Waste Generation and Disposal Capacity Report, January 2014, prepared by the Maine Department of Environmental Protection) as either a high or medium option for landfill disposal; i.e., landfill disposal is the primary management technique available (high) or a middle option (medium). Ms. King testified that approximately 30% of the waste material accepted at JRL is utilized in landfill operations and is considered recycling in accordance with the applicable State laws and Rules. This includes residuals from waste processing facilities used as alternative daily cover, thereby offsetting the amount of landfill capacity used by non-waste materials. Ms. King noted in her testimony that the Department evaluated JRL's use of alternative daily cover as part of the Public Benefit Determination for the proposed expansion and concluded that the amount

used at JRL is comparable to the amount used at the Crossroads landfill in Norridgewock, Maine.

Ms. King also testified that NEWSME's parent company operates Casella Recycling, LLC and Casella Organics, both of which contribute to the reduction of waste landfilled. Casella Recycling, LLC, a Zero-Sort facility in Lewiston, recycled approximately 87,700 tons of material in 2014 and the non-recyclable residuals (9% of the waste stream) were sent to the Mid Maine Waste Action Committee (MMWAC) incinerator in Auburn, with ecomaine in Portland available as backup. Casella Organics composts and land applies organic wastes, landfilling their customers' waste only when the physical or chemical properties of the material do not allow for beneficial reuse, if there is a lack of site access for land application, or when reuse/recycling outlets are not available.

Intervenor Edward Spencer addressed the following issues in his testimony and post-hearing brief: a concern that wastes have been coming into JRL without adequate assurance of source reduction; wastes sent to JRL should have been handled according to the State's hierarchy at their source, their point of discard, including wastes discarded outside of Maine and subsequently sent to Maine processing facilities; the definition of "waste generated within the State" is concerning since CDD processing facilities can accept out-of-state wastes but once processed, those wastes (fines, OBW, etc.) are considered in-state waste; and as a state-owned landfill, the focus should be on preserving capacity by exerting more control over the waste accepted for disposal.

With respect to CDD and associated residuals, Mr. Spencer testified that for the last five years (2011 through 2015) wastes categorized as CDD, OBW, and CDD process fines when combined accounted for over 57% of inputs to JRL. Mr. Spencer expressed concern over the origin of CDD ultimately disposed of at JRL, and testified that the majority of wastes entering the Lewiston processing facility (ReEnergy) and "continuing to JRL" were not discarded in Maine. Mr. Spencer expressed concern about the amount of OBW in the CDD, and questioned the amount of effort that goes into recycling various components of OBW such as mattresses, appliances, and furniture. Mr. Spencer argued in support of an annual limit on the amount of OBW disposed of at JRL and for waste audits of processing facilities as set forth in the Public Benefit Determination for the proposed expansion.

Intervenor Dana Snowman raised similar concerns regarding the amount and origin of wastes coming to JRL and the statutory definition of "waste generated within the State" in his questioning of the applicant's witnesses.

In response to these concerns, Michael Barden, the State's Manager for State-owned landfills, testified that out-of-state wastes are "excluded wastes" and disposal at JRL is prohibited, and he affirmed that JRL accepts only waste which meets the definition of "waste generated within the State."

Ms. King further testified that discussion of the "point of discard" is irrelevant; the State's solid waste rules do not require evidence of the point of origin. With respect to CDD and associated residuals, Ms. King testified that CDD processing facilities in Maine must demonstrate that they are complying with Maine State law "by recycling or processing into fuel for combustion all wastes accepted at the facility to the maximum extent practicable, but in no case at a rate of less than 50%." Ms. King testified that two processing facilities cited by Mr. Spencer, ReEnergy in Lewiston and ARC in Eliot, reported recycling rates in 2015 of 78.7% and 84%, respectively, (BGS/NEWSME Exhibits #49 and #50), and have met their statutory recycling and source reduction requirements. Therefore, residuals, including CDD fines and OBW, from these facilities are legally "waste generated within the State" and may be accepted at JRL.

Ms. King testified that the question for the applicant is whether the applicant could further reduce, reuse, compost, or incinerate the post-processing CDD material that JRL receives from these processing facilities. Her response was that it could not; she testified that the fines are used as alternative daily cover (a use which is defined as recycling), the primary option for handling of OBW is landfilling, and that these materials cannot be further reduced, incinerated or composted.

With respect to mattresses, a component of OBW, Ms. King testified that Casella has had limited experience with mattress recycling at other facilities in New England, but that by the time mattresses arrive at JRL, they are in poor condition (fabric contaminated, wood broken) and are not easily recycled.

Ms. King testified that waste streams entering JRL are, and will continue to be, managed consistent with the hierarchy to the extent within the applicant's control and to the maximum extent practicable, and that the hierarchy does not require a solid waste facility to control those who generate waste.

D. Board Finding

The Board finds that Casella-owned facilities have active recycling and reuse programs that divert waste from JRL. In addition, the waste management options available for most of the materials proposed to be disposed of in the landfill expansion, as set forth in the State Plan, are at or near the bottom of the hierarchy.

The concern that OBW from CDD processing facilities are landfilled without limitation is addressed by the establishment of an OBW limit for the proposed expansion in Finding 37 of this license. Compliance with the recycling and source reduction provisions of State law is further addressed in Finding 19 of this license.

With respect to intervenors Edward Spencer and Dana Snowman's argument that generators located outside Maine should be subject to Maine's laws governing recycling and source reduction, the Board finds that under current law, provided the Maine solid waste processing facilities which accept waste from outside Maine are in compliance with the terms of their licenses and State law regarding recycling, residue and bypass generated by these Maine facilities' operations sent to JRL is "waste generated within the State" and may be disposed of in the proposed JRL expansion.

The Board further finds that the applicant's purpose and practices of the proposed expansion are consistent with the applicable State laws and Rules relating to the hierarchy; provided that evolving waste management techniques and practices sufficiently within the control of the applicant continue to be explored and implemented as appropriate to reduce, reuse, recycle, compost, and/or process to the maximum extent practicable prior to landfilling. In each Annual Report, the applicant must summarize the steps taken by the facility in the respective reporting year to meet the hierarchy, submitting relevant metrics to evaluate effectiveness (i.e., tons of material diverted from landfill disposal by Casella companies; tons of materials reused, reduced, recycled at the landfill), a description of ongoing efforts to increase the effectiveness of these programs/efforts, and any additional pertinent hierarchy-related information.

19. RECYCLING

In addition to demonstrating compliance with the State's solid waste management hierarchy as described in Finding 18 of this license, State law at 38 M.R.S. § 1310-N(5-A) requires the applicant to demonstrate that the proposed solid waste disposal facility will accept solid waste that is subject to recycling and source reduction programs, voluntary or otherwise, at least as effective as those in the statute and other provisions of State law; and the applicant has shown consistency with the recycling provisions of the State Plan. Similarly, 06-096 C.M.R. ch. 400, § 6(B) requires a determination by the Department that the volume of the waste and the risks related to its handling and disposal have been reduced to the maximum practical extent by recycling and source reduction prior to being landfilled or incinerated, consistent with state recycling programs and the State Plan.

The applicant submitted the information presented in Table 6 below (Volume I of the application, Table 5-1, page 5-2 and BGS/NEWSME Pre-filed Direct Testimony Exhibit #4 appended to the testimony of Toni King) to address opportunities for recycling of the waste streams proposed to be accepted for disposal in the proposed expansion. The applicant testified that the tonnages of the various waste types in the table were estimated for design purposes and were not intended to be limits on the amounts received.

Table 6: Waste Management Techniques for Proposed Expansion Materials

Material Category	Proposed Waste Types to be Accepted in Expansion		Is Material a Residual from a Processing Facility that reduced the amount of material landfilled?	Is Material subject to recycling efforts by generator or otherwise prior to landfilling or is its use in the landfill considered recycling?	State Plan[1] Ranking of Landfill Disposal as Current Management Method	State Plan[1] Ranking for Source Reduction, Recycle, Compost, Beneficial Reuse Processing As Current Management Method
	Tons	Percentage of Total Tonnage				
Waste Treatment Plant Sludges and Biosolids	70,000	10	No	Yes	L	H,L,N,N/A
Contaminated Soils	30,000	4.3	No	Yes	H	N/A,N
Municipal Solid Waste Incinerator Ash	58,000	8.3	Yes	No	H	N/A
Front-End Processing Residue[2]	54,000	7.6	Yes	No	H	N/A
Biomass and Fossil Fuel Combustion Ash	35,000	5	Yes	Yes	M/H	N/A,M
Construction and Demolition Debris	195,000	27.9	No	Yes	H,M	N/A,N, M
Construction and Demolition Debris Processing Facility Fines	138,000	19.7	Yes	Yes	N/E	N/E
Oversized Bulky Waste	60,000	8.6	No	No	H	L

Material Category	Proposed Waste Types to be Accepted in Expansion		Is Material a Residual from a Processing Facility that reduced the amount of material landfilled?	Is Material subject to recycling efforts by generator or otherwise prior to landfilling or is its use in the landfill considered recycling?	State Plan[1] Ranking of Landfill Disposal as Current Management Method	State Plan[1] Ranking for Source Reduction, Recycle, Compost, Beneficial Reuse Processing As Current Management Method
	Tons	Percentage of Total Tonnage				
Miscellaneous special waste	35,000	5	No	No	M,H	N/A,N,M
MSW Bypass and Soft Layer Material[3]	25,000	3.6	Yes	Yes	M, H	N, N/A
Total[4]	**700,000**	**100**	**44.2**	**70.5**		

Notes: [1] Source: MEDEP Maine Materials Management Plan, January 2014, Appendix C Current Management of Maine's Solid Waste by Type; N=None L=Low; M=Medium; H=High; N/A = Not Applicable (not possible); N/E Not Evaluated.
[2] Listed as shredder residuals.
[3] Note included in Table as an individual category compared to MSW Other Organics.
[4] Values are percent of total material landfilled except tons total.

The applicant also presented evidence on Casella's efforts to facilitate recycling of a number of other waste streams and thereby decrease the volume of wastes landfilled including Casella Recycling's Zero-Sort system used by Maine municipalities (which recycles paper, cardboard, plastic, glass and metals) and Casella Recycling's offer of waste audits to commercial and industrial customers to assist with the recycling of difficult to recycle items (Pre-filed direct testimony of Ms. King).

A summary of testimony at the hearing regarding recycling and source reduction and the hierarchy, and the applicant's responses, are summarized in Finding 18 of this license.

As shown in Table 6, it is expected that 44.2% of waste disposed will be residuals (MSW incinerator ash, 8.3%; FEPR, 7.6%; Biomass and fossil fuel combustion ash, 5.0%; CDD processing fines, 19.7%; and MSW bypass, 3.6%) from processing facilities that already reduce the amount of materials landfilled. Approximately 70.5% of the waste disposed will be materials (waste treatment plant sludges and biosolids, 10%; contaminated soils, 4.3%; biomass and fossil fuel combustion ash, 5.0%; CDD, 27.9%; CDD processing fines, 19.7%; and MSW bypass, 3.6%) subject to recycling at its source or are considered recycling based upon the landfill's use.

While the percentages in the table may vary with actual operations, a review of the data indicates that overall the facility follows the State Plan ranking for recycling. A high percentage of material to be disposed of is ranked in the State Plan as either a high or medium option for landfill disposal; i.e., landfill disposal is the primary management technique available (high) or a middle option (medium). The only low landfill disposal ranked material that will be accepted at JRL includes waste treatment plant sludges and biosolids. Casella Organics, a subsidiary of NEWSME's parent company Casella, does actively compost and reuse this material at the Hawk Ridge Compost Facility in Unity, Maine. The record indicates that in 2014, 29,068 tons of waste water treatment plant sludges and biosolids were manufactured into compost and mulches, while 38,000 tons were brought to JRL for disposal (Volume I of the application, page 5-3).

The Board finds that the applicant has demonstrated that material proposed to be landfilled in the JRL expansion has been reduced to the maximum practical extent by recycling and source reduction prior to being landfilled in accordance with applicable State law and Rules provided the facility's Annual Report includes updates on recycling information similar to that in Table 6 for the waste disposed, as specified by the Department.

20. PUBLIC BENEFIT DETERMINATION

Pursuant to the provisions of 38 M.R.S. § 1310-AA and in accordance with 06-096 C.M.R. ch. 400, § 5, proposals for new or expanded solid waste disposal facilities must be found by the Commissioner to provide a substantial public benefit.

As stated in Finding 1(B)(7) of this license, the applicant originally proposed to expand JRL by 21.9 million cubic yards. The Commissioner issued a PBD approval, with conditions, for a 9.35 million cubic yard capacity increase of JRL on January 31, 2012. On appeal, the Board affirmed the Commissioner's PBD in a decision dated July 19, 2012. Pursuant to 38 M.R.S. §1310-N(3-A)(B), the Commissioner's determination of public benefit is not subject to review by the Board as part of this licensing process.

In the PBD, the Commissioner concluded that the proposed expansion will provide a substantial public benefit, provided the expansion is limited to 9.35 million cubic yards, and provided an annual limit on OBW disposal in the expansion is established. The approval included the following conditions (among others):

3. The applicant shall, if, and when, a license is issued for the construction and operation of the 9.35 million cubic yard expansion, comply with the limit, and any subsequent modifications to the limit, established by the Department in the license on the tonnage of OBW that may be disposed in the 9.35 million cubic yard expansion.

4. Periodic independent third party audits of CDD processing operations that are anticipated to transport more than 10,000 tons of OBW to the 9.35 million cubic yard expansion for disposal on an annual basis shall be conducted to verify the results of the demonstrations required under the provisions of 06-096 [C.M.R. ch. 409, § (2)(C)], focused on the nature and volume of processing residues being sent to JRL for disposal. Third party audits will be conducted by a qualified consultant selected by the Department in consultation with the affected CDD processing facilities and Casella. Casella shall reimburse the Department for the cost of the audits. The first such audit(s) shall occur prior to the disposal of OBW from these processing facilities in the 9.35 million cubic yard expansion. Audits will be conducted at 2 year intervals, unless or until the Department approves their discontinuation.

These conditions of the PBD are included in the conditions of this license. See Finding 37 of this license for further discussion of a limitation on the annual amount of OBW that may be accepted at JRL.

21. HAZARDOUS AND SPECIAL WASTE HANDLING AND EXCLUSION PLAN

Pursuant to 06-096 C.M.R. ch. 400, § 9(A), only permitted wastes may be accepted for handling at a solid waste facility; the operator shall comply with all applicable Federal and State laws regarding the detection, identification, handling, storage, transportation and disposal of special wastes, biomedical wastes and hazardous wastes; and the operator shall develop and implement a Hazardous and Special Waste Handling and Exclusion Plan for the detection, identification, handling, storage, transportation and disposal of any and all wastes that may be delivered to the facility.

Consistent with JRL's current license, only non-hazardous waste will be allowed to be accepted in the proposed expansion. The types of acceptable wastes for disposal are further described in Finding 37 of this license. Included in the facility's Operations Manual is a Hazardous and Special Waste Handling and Exclusion Plan which will apply to the waste delivered to the proposed expansion. This plan includes provisions for waste inspection at the gate and at the point of offloading, as well as procedures to follow if non-acceptable waste does enter the site.

Based upon the information provided by the applicant, the Board finds that the facility will not be licensed to accept hazardous waste and has an appropriate Hazardous and Special Waste Handling and Exclusion Plan for the detection, identification, handling, storage, transportation and disposal of delivered wastes. The Hazardous and Special

Waste Handling and Exclusion Plan will be updated as necessary with the annual review and revision of the facility's Operations Manual.

22. LIABILITY INSURANCE

The Department's rule at 06-096 C.M.R. ch. 400, § 10 requires a solid waste disposal facility, except public entities, to submit proof of liability insurance for the active life and closure of the solid waste disposal facility. The applicant is a public entity and is exempt from the liability insurance requirements of 06-096 C.M.R. ch. 400, § 10. Liability insurance is required by the OSA, Section 21. NEWSME submitted the current certificate of insurance maintained for the facility and NEWSME will provide copies of the updates to the current certificate of insurance in the facility's Annual Report during operation of the proposed expansion.

The Board finds that the applicant is exempt from the liability insurance requirements of 06-096 C.M.R. ch. 400, § 10 of the Rules; however, liability assurance is being maintained by NEWSME as the current operator of JRL and will be maintained for the expansion.

23. CRIMINAL OR CIVIL RECORD

In accordance with 38 M.R.S. § 1310-N(7) and 06-096 C.M.R. ch. 400, § 12, a license for a solid waste facility or activity may be denied if the owner or the operator or any person having a legal interest in the applicant or the facility has been convicted of any criminal law or adjudicated or otherwise found to have committed any civil violation of environmental laws or rules of the State, other states, the United States, or another country.

Civil and criminal disclosure statements were submitted for the BGS and NEWSME as part of the application. The disclosure statements included those for NEWSME's operation of JRL, a related entity New England Waste Services of ME, Inc. (operator of the Pine Tree Landfill), and the five officers, directors, and partners of the two businesses. Additionally, in response to the Department's review and comment on the application, the applicant submitted an organizational chart of the Casella companies authorized to do business in Maine.

In the five year environmental compliance history submitted for New England Waste Services of ME, Inc., four notices of violations and one administrative order were listed. These have been addressed through responses required by the notices of violation and administrative order.

Based upon information in the application, the Board finds that the applicant filed complete disclosure statements as required by applicable State law and Rule. Based on the disclosure statements submitted and the evaluation criteria contained in 06-096 C.M.R. ch. 400, § 12(B), the Board finds no basis for denying the license.

24. VARIANCES

Pursuant to 06-096 C.M.R. ch. 400, § 13, an applicant may seek a variance to the requirements of the Rules for establishing, altering, operating or closing a solid waste facility or handling solid waste provided the applicant demonstrates that its proposal will comply with the intent of State laws and the Rules.

The applicant requested no variances from the Rules for siting, design, or operation of the proposed expansion. The applicant submitted two variance requests related to construction practices regarding the maximum barrier soil lift thickness required by the Rules. In lieu of the variance requests, Department staff commented that the alternative design process required by 06-096 C.M.R. ch. 401, § 2(E) should be used to clearly and convincingly demonstrate the technical equivalency of the proposed alternative (see Department technical memorandum dated January 20, 2016 from S. Farrar, V. Eleftheriou, and K. Libbey). The alternative design standard procedure was agreed to by the applicant and is addressed in Finding 27 of this license.

SOLID WASTE SITING, DESIGN, AND OPERATION

25. SITE ASSESSMENT: GEOLOGIC AND HYDROGEOLOGIC

In accordance with 06-096 C.M.R. ch. 401, § 2(B) and (C), an applicant must submit the results of site investigations and assessments performed to properly describe the surficial stratigraphy and bedrock beneath and adjacent to the proposed solid waste boundary; ground and surface water investigations performed to determine water table information and horizontal and vertical ground water flow gradients and for phreatic surface (water table) observations; and geotechnical investigations to support the stability and settlement assessments. The applicant submitted a Site Assessment Report dated July 2015 prepared by SME (Volume II of the application). The applicant must demonstrate the proposed expansion meets the performance standards and siting criteria in 06-096 C.M.R. ch. 401, § 1(C).

Department staff reviewed the geological and hydrogeological aspects of the proposed expansion prior to the hearing and submitted comments to the applicant in several memoranda. The applicant addressed a number of the staff's comments and made a number of adjustments to the application in response to those comments.

A. General Site Geology Description

Information submitted by the applicant shows that the site of the proposed expansion is in an area underlain by glacial till, on an elongated hill oriented in a northwest-southeast direction understood to have been formed as a glacial drumlin. Dense, silt-clay glacial till is primarily beneath the proposed expansion, with occasional thin, isolated portions of washed till observed typically just above the bedrock. Marine clay was observed over till beyond the proposed expansion boundary. The glacial till ranges from less than 5 feet to greater than 50 feet thick beneath the proposed expansion footprint (average thickness between the landfill base grades and bedrock surface is an estimated 24.5 feet), with approximately 3.6 acres of the footprint having an existing overburden thickness of less than 5 feet. The near-surface till was determined to be fractured above the frost/desiccation zone due to weathering and frost action.

Bedrock beneath the proposed expansion is mapped as interbedded metamorphosed quartzite, siltstone, graywacke, and phyllite of the Vassalboro Formation (Maine Geological Survey mapping, Griffen, 1979a, Osberg et al, 1985), with no bedrock faults mapped within the site. Core samples were primarily metagraywacke and phyllite, with some metasiltstone. Four bedrock outcroppings were observed directly adjacent to the proposed expansion with fracture groupings oriented northwest/southeast and northeast/southwest. The bedrock is only slightly broken, weathered, and stained within the upper several feet, but is generally hard, unweathered, and competent with depth.

Hydraulic conductivities were measured during previous JRL investigations, with the following results: brown and gray glacial tills ranged from 1.8×10^{-5} to 2.4×10^{-8} centimeters per second (cm/sec); discontinuous washed till and sandy zones within the basal till had a geometric mean of 5.3×10^{-4} cm/sec; and bedrock ranged from 3.2×10^{-3} to 9.2×10^{-8} cm/sec.

Based upon the information in the application and supporting documents in the record, the Board finds that the applicant characterized the site geology in accordance with the requirements of 06-096 C.M.R. ch. 401, § 2(B)(1).

B. General Site Ground and Surface Water Description

The application includes information showing that the total 780-acre parcel is divided into four watersheds which drain to the east, northwest, northeast, and southwest. There is a relatively shallow water table from approximately 5 to 10 feet beneath much of the facility property due to the relatively low hydraulic conductivities of the natural soils and bedrock; therefore, the ground water flow

generally follows the topography and is expected to flow from the higher elevations towards the west and east following the drumlin as a ground water divide. Recharge at the higher topographical elevations occurs primarily through precipitation and snowmelt, with ground water moving mainly horizontally and discharging to locations along streams and low-lying topography. Upward vertical seepage gradients are located on the east and west lower portion of the drumlin beyond the proposed expansion footprint.

There are no stratified sand and gravel deposits mapped by the Maine Geological Survey within the landfill site. Further discussion of standards related to significant ground water aquifer can be found in Finding 15 of this license.

Based upon the information in the record, the Board finds that the applicant characterized the site hydrogeology in accordance with the requirements of 06-096 C.M.R. ch. 401, § 2(B)(2).

C. Site Investigations and Proposed Expansion Area Specifics

The applicant submitted data and summaries of site-specific investigations conducted within and around the proposed expansion area from 2004 to the present, including:

(1) Wetlands delineation within 2,000 feet of the proposed expansion footprint;

(2) Subsurface test pits and borings to sample and evaluate soil and bedrock lithologies;

(3) Bedrock coring for mapping, fracture frequency measurement, and porosity estimation;

(4) Surficial geophysical surveys using electrical earth resistivity and Very Low Frequency-Electromagnetic (VLF-EM) methods to identify bedrock fracture zones and other features;

(5) Borehole geophysical logging to identify and quantitatively characterize bedrock fracture orientation and structural features;

(6) Installation of multi-level piezometer clusters and monitoring wells to determine seasonal ground water flow rates and direction;

(7) In-situ hydraulic conductivity testing in monitoring wells and piezometers for both till and bedrock;

(8) Testing of soil properties;

(9) Laboratory hydraulic conductivity testing of undisturbed till samples for vertical hydraulic conductivity;

(10) Natural gradient ground water tracer tests to measure ground water velocities in till and bedrock;

(11) Ground water age-dating for ground water velocity verification;

(12) Bedrock pumping tests for fracture interconnectivity; and

(13) Water quality testing of the natural background ground water.

The information collected, specific methods used, and the results of the evaluations were included in the application. The results of the evaluations were utilized to confirm the site characteristics and in the design of the proposed expansion.

The water table (ground water phreatic surface depth) was found to vary between 0 and 2 feet below the existing ground surface during the wet season, whereas the dry season water table varies between 5 and 10 feet beneath the existing ground surface. Due to the shallow water table depth, the northeast side of the proposed expansion will be subject to upward ground water seepage into the construction excavations; therefore, the applicant will install an underdrain in the 12.7-acre area. It is expected that the seepage into the underdrain will continue, but then will eventually diminish since there will be less recharge once the area is covered, first by the liner systems, and eventually by a final cover system.

Information provided by the applicant shows that the fine-grained glacial till can be considered to provide some natural containment under the proposed expansion. The applicant used a variety of hydrogeological methods to estimate the horizontal ground water velocities. The calculated ground water velocities ranged from 1 to 24 feet per year (ft/yr) through the till. The natural gradient tracer test revealed a range of horizontal ground water velocities of about 10 to 24 ft/yr for the near surface weathered till. Subsequent estimates of travel time to sensitive receptors incorporated conservative estimates of horizontal ground water velocities.

Ground water movement through the bedrock under the proposed expansion is a function of the overall interconnectivity of the bedrock's fracture and joint openings. Based on pumping tests, bedrock tracer tests, and other investigative methods, the applicant concluded that the degree of bedrock fracture interconnectivity beneath the proposed expansion allows for a level of predictability of ground water movement through the site's bedrock and could be utilized for controlling ground water flow directions by means of ground water extraction wells if a leachate leak were to occur. The applicant's estimates of site-wide horizontal bedrock ground water velocities range from about 0.4 to 10 feet per day. Based on its ground water modeling, the applicant estimated that post-construction ground water flow directions beneath the proposed expansion are projected to be in a generally southerly direction.

Over the course of the review and comment period on the application, Department staff requested the collection of supplemental data from three additional boreholes at suggested locations within the proposed expansion footprint, and the geophysical downhole logging of those boreholes and the two water supply wells serving the office and scale house. The applicant conducted the requested drilling and geophysical downhole logging and submitted the results of the data collected in a report to the Department on June 7, 2016.

During its review of the application, Department staff raised several questions regarding the interpretation of the pumping test data and resulting ground water level drawdowns. The applicant responded to the Department's questions through additional correspondence, resulting in a Department memorandum dated June 21, 2016 from R. Behr stating that the Department's concerns have been addressed.

In his testimony and cross-examination, intervenor Edward Spencer posed questions regarding the site geology, including the impact of glacial rebound on landfill stability, the use of an underdrain system below ground water level, and potential ground water flow beyond the site. One of the applicant's expert witnesses, John Sevee, P.E., C.G., testified that glacial rebounding will have no effect on the integrity of the landfill or the slope of the drainage pipes since the crustal rebound is occurring over the entire region surrounding the landfill. Michael Booth, expert witness for the applicant, testified that the underdrain system was primarily designed to facilitate construction and will be monitored as part of the water quality monitoring program. Mr. Sevee testified that ground water flow paths were investigated through wells and borings, along with utilizing ground water simulations which indicated that ground water emanating from the landfill site does not pass to ground water users along Route 16, Route 43, or Stagecoach Road.

Based upon the information in the record, the Board finds that the applicant has submitted a site assessment report and subsequent information addressing Department staff's review comments, identified the site characteristics and recommendations for landfill design and construction, identified potential impacted sensitive receptors, and estimated ground water flow time of travel as required by 06-096 C.M.R. ch. 401, §§ 2(B) and (C). See Finding 33 of this license for further discussion regarding the Water Quality Report and Ground Water Monitoring Program.

The Board further finds that the underdrain system was included and designed specifically to minimize ground water intrusion during construction and that, in the future, the ground water level will flatten due to less recharge once the proposed liner system is placed. Addressing the concern of ground water flow beyond the site, the Board finds that extensive site assessments have been undertaken and submitted in the past and with this application to characterize the geology and hydrogeology at the site and to serve as the basis for the selection of the design of the proposed expansion.

D. Geotechnical Investigation

The applicant submitted the results of its geotechnical investigations as part of the site assessment. Based on the information provided by the applicant in the site investigations, including published data, on-site field and laboratory data, and specific seismic information, the Board finds that the applicant gathered sufficient information to support the stability and settlement assessments described in Findings 28A and B of this license, as required by 06-096 C.M.R. ch. 401, § 2(B)(3).

E. Time of Travel Calculations

The applicant submitted a time of travel analysis to demonstrate conformance with the Rule's performance standard of greater than 6 years from the bottom of the landfill to sensitive receptors and greater than 3 years from leachate storage structures and pump stations to sensitive receptors set forth in 06-096 C.M.R. ch. 401, § 1(C)(1)(c). Improvement allowances for the leak detection system and a composite secondary liner system were included in the calculations as described in Finding 26B of this license. An imported soil layer of 12 inches of compacted, low permeability, marine clay to be placed below the secondary liner system in the proposed expansion area was also taken into account in the calculations as allowed in 06-096 C.M.R. ch. 401, § 2(C)(2), based on the use of improvement allowances and the hydraulic conductivity and effective porosity of the marine

clay. The analysis included time of travel from each of the proposed expansion cells and the two proposed permanent leachate sumps. The applicant did not include the existing leachate storage tank in its calculations because it was previously addressed in license #S-020700-WD-N-A, dated April 9, 2004.

The sensitive receptors were selected based on the requirements in the Rules and site-specific characteristics and are listed in Table 7 (Volume II of the application, Table 7-1, page 7-6).

Table 7: Identified Site Sensitive Receptors

Identification	Location Description
Point A	Southeast sandy zone
Point B	Hypothetical Groundwater Supply Well at Closest Property Boundary on Eastern Side.
Point C	Surface Water Discharge to the East. An Unnamed tributary to Judkins Brook.
Point D	Surface Water Discharge to the Southwest. An Unnamed Tributary to Pushaw Stream.
Point E	Hypothetical Groundwater Supply Well at Closest Northern Corner of Property Boundary on Western Side.
Point F	Hypothetical Groundwater Supply Well at Closest Southern Corner of Property Boundary on Western Side.
Point G	Surface Water Discharge to the Northwest. An Unnamed Tributary to Pushaw Stream.

The applicant provided results of the time of travel calculations as shown in Table 8 (based on combining two tables in the application, Volume II, Tables 7-3 and 7-4 on page 7-11, and the applicant's update in the second response to comments dated May 13, 2016, with added footnotes for clarity). The analysis was performed twice: under current conditions and under future conditions when the ground water table flattens due to the cutoff of precipitation recharge when the area is covered (first by the liner system, then eventually by the final cover system).

Table 8: Calculated Travel Times to Site Sensitive Receptors

Landfill Node	Site Sensitive Receptor	Offset Credits[1] (yrs)	Imported Soils[2] (yrs)	Existing Conditions		Future Conditions		Rule Requirement (yrs)
				Calculated Travel Time in Soil and Bedrock (yrs)	Total Travel Time (yrs)	Calculated Travel Time in Soil and Bedrock (yrs)	Total Travel Time (yrs)	
Cell 11 Southern End	Point A	3	3	10.5	**16.5**	10.5	**16.5**	**6**
Cell 11 Center	Point B	2	3	3.9	**8.9**	3.9	**8.9**	**6**

Landfill Node	Site Sensitive Receptor	Offset Credits[1] (yrs)	Imported Soils[2] (yrs)	Existing Conditions		Future Conditions		Rule Require-ment (yrs)
				Calculated Travel Time in Soil and Bedrock (yrs)	Total Travel Time (yrs)	Calculated Travel Time in Soil and Bedrock (yrs)	Total Travel Time (yrs)	
Cell 12 Center	Point C	2	3	11.3	**16.3**	11.4	**16.4**	**6**
Cell 13 Center	Point C	2	3	11.0	**16.0**	11.2	**16.2**	**6**
Cell 13 Leachate Sump	Point C	2	3	35.8	**40.8**	36.1	**41.1**	**3**
Cell 14 Center	Point D	3	3	47.7	**53.7**	62.2	**68.2**	**6**
Cell 14 Center	Point E	3	3	3.3	**9.3**	17.7	**23.7**	**6**
Cell 15 Center	Point F	2	3	1.2	**6.2**	1.4	**6.4**	**6**
Cell 16 Center	Point G	2	3	4.7	**9.7**	5.3	**10.3**	**6**
Cell 16 Leachate Sump	Point G	3	3	10.3	**16.3**	10.3	**16.3**	**3**

Notes: [1] Improvement allowance offset credits are described in Finding 26B of this license.
[2] 06-096 C.M.R. ch. 401, § 2(C)(2) allows for imported soils used for base preparation below liner systems to account for up to three years in the time of travel calculations, as appropriate.

Intervenor Edward Spencer testified that time of travel calculations appear to be an acknowledgement that a landfill leak will occur. Michael Booth, an expert witness for the applicant, testified that the time of travel analysis is required by the Rules and is utilized as a design evaluation tool.

Based on the information in the record, the Board finds that the applicant meets the Rule requirements of ground water time of travel from the bottom of the landfill liner systems (greater than 6 years) and leachate storage structures and pump stations (greater than 3 years) to all identified sensitive receptors. The applicant installed piezometers and water table observation wells at a sufficient number of locations to enable a calculation of ground water time of travel and performed the calculations with the appropriate information in accordance with the Rules.

26. DESIGN STANDARDS: ENGINEERING

The Department's rule at 06-096 C.M.R. ch. 401, § 2(D) requires an engineering design for a proposed landfill to meet specific design and performance standards. The applicant submitted engineering design information in support of the proposed expansion. As noted previously, a number of rounds of comments and responses occurred between Department staff and the applicant on the technical aspects of the proposed expansion design.

In general, the applicant's design of the proposed expansion consists of an underdrain and augmented secondary liner system over portions of the proposed expansion footprint, two liner systems (primary and secondary), a leak detection system, leachate and gas collection and control systems, and intermediate and final cover systems. The outer side slopes are designed at 3H:1V (3 horizontal to 1 vertical), with a maximum final elevation of 390 feet above mean sea level. Six operational cells are proposed. The applicant submitted a detailed engineering design including drawings, contract administrative documents, technical specifications and a construction quality assurance plan for Cell 11 with the application. Similar detailed engineering designs are required to be submitted for Department review and approval prior to each subsequent cell's construction.

A. Liner System Requirements

The liner system proposed for the expansion includes a composite primary liner, a leak detection system, and a secondary liner system. The proposed liner system consists of the following from top to bottom:

(1) A composite primary liner system consisting of an 80-mil HDPE textured geomembrane, a GCL, and a 12-inch compacted clay layer (hydraulic conductivity less than or equal to $1x10^{-7}$ cm/sec);

(2) A leak detection system consisting of a 12-inch layer of sand (average hydraulic conductivity greater than or equal to $1x10^{-2}$ cm/sec and a minimum hydraulic conductivity of $5x10^{-3}$ cm/sec), a network of 6-inch diameter perforated HDPE pipe, and a drainage geocomposite; and

(3) A secondary liner system consisting of a 60-mil HDPE textured geomembrane. The secondary liner system will be augmented with a GCL and 12 inches of compacted clay (hydraulic conductivity less than or equal to $1x10^{-7}$ cm/sec) on approximately 11 acres where the existing soil depth between the bedrock and landfill base grades is less than 10 feet.

Intervenor Edward Spencer voiced concerns in his testimony that the liner systems will eventually leak. In response, Michael Booth, expert witness for the applicant, countered the claim that all liner systems must necessarily leak, focusing on the following proposed expansion items: the expansion primary and secondary liner system was specifically designed to address potential leak issues, the construction process will include an electrical leak location survey of the primary geomembrane, the specifications for the geomembranes require compliance with ASTM standards (including stress cracking standards), construction specifications and practices will mitigate pressure points beneath the geomembrane that could lead to stress cracks, and the proposed expansion design eliminates liner penetrations for piping.

The Board finds that the liner system proposed by the applicant was designed in accordance with 06-096 C.M.R ch. 401, § 2(D)(1). The Board also finds that the proposed HDPE geomembranes for both the primary and secondary liner systems are thicker than the 60-mil and 40-mil Rule requirements, respectively. The Board finds that the geomembranes, GCLs, drainage geocomposites, and soils proposed will meet the performance requirements of the Rules, including material characteristics (i.e., Geosynthetic Research Institute standards and American Society for Testing and Materials (ASTM) standards) and installation requirements. Further, the applicant will be required to submit detailed design packages including the engineering design, drawings, contract administrative documents, technical specifications and a construction quality assurance plan to the Department for review and approval prior to the construction of each cell.

B. Improvement Allowance System (Time of Travel)

The Department's rule at 06-096 C.M.R. ch. 401, § 2(D)(2) allows for the use of improvement allowance offsets when calculating existing ground water time of travel to achieve the minimum 6 year time of travel to sensitive receptors.

The applicant incorporated improvement allowance offsets in the time of travel demonstration. Finding 25(E) of this license includes additional time of travel information.

The Board finds that the applicant utilized the allowance offsets appropriately as permitted by the Rules for the following two design improvements: a two year offset for the addition and monitoring of a leak detection system and geomembrane secondary liner for the areas of the proposed expansion where the design is applied; and a three year offset for the addition of a composite liner system (secondary liner augmented by a GCL) and leak detection system for the

areas where the bottom of the secondary liner system and the bedrock surface is generally less than 10 feet.

C. Base Preparation Below Liner Systems

The base preparation below the liner system proposed by the applicant includes grading native till subgrades, filling with native till material (maximum 12-inch lift), placement of an underdrain system (12 inches of sand and 4-inch collection pipes) where the proposed grades are below the phreatic surface, and placement of 12 inches of compacted clay soils (maximum hydraulic conductivity of $1x10^{-7}$ cm/sec).

Based upon the information provided by the applicant, the Board finds that the base preparation below the liner system proposed by the applicant was designed in accordance with 06-096 C.M.R. ch. 401, § 2(D)(3). The proposed grading plan will result in positive drainage to the perimeter of the landfill for the underdrain, leak detection, and leachate collection systems. The materials and placement will meet the performance criteria in the Rules, including gradation, moisture content, density, and hydraulic conductivity.

D. Leachate Conveyance System and Storage Structure Standards

The applicant submitted leachate collection and conveyance system designs for the proposed expansion to handle the predicted leachate, leak detection, and landfill gas condensate flows. The leachate management system components include leachate collection, leak detection, landfill gas condensate collection, leachate transport from the landfill to on-site storage, and the on-site leachate storage tank. The leachate, leak detection, and gas condensate systems include pumping systems and force mains to pump flows from each collection point to the tank. The design of the piping system for collection and conveyance accounts for the stresses due to dynamic and static loading conditions and climate effects anticipated over the life of the landfill. System designs also address filter criteria such as sizing of piping perforations, soil gradation, and component interfaces, so that clogging of the systems will be minimized. The systems were designed for use during operations, closure, and post-closure. All piping components are designed with access for inspection and cleaning.

(1) Leachate Collection System

The applicant designed the leachate collection system to allow all leachate to drain to a collection sump at the low point of the individual landfill cells. Components of the leachate collection system include 6-inch and 8-

inch diameter HDPE collection piping, 12 inches of sand (average hydraulic conductivity greater than $1x10^{-2}$ cm/sec and minimum hydraulic conductivity of $5x10^{-3}$ cm/sec), filter stone and drainage stone around the piping, and a drainage geocomposite.

The applicant used the U.S. Environmental Protection Agency (EPA)'s Hydrogeologic Evaluation for Landfill Performance (HELP) model to estimate leachate generation rates for the proposed expansion. The leachate depth (head) over the primary liner system will be limited to 12 inches, except in leachate sumps. The leachate levels within the landfill cells will be monitored using pressure transducers located at the bottom of each cell.

The application shows that a five-foot layer of select waste will be placed directly over the drainage sand component of the leachate collection system for frost protection, to protect the liner from puncture by other wastes placed in the landfill, and to serve as a filter medium.

In his testimony, intervenor Edward Spencer questioned whether the horizontal pipes in the leachate collection system may collapse. Michael Booth, expert witness for the applicant, testified that the leachate collection pipes are specifically designed for the expansion setting.

Based on the information in the application and hearing record, the Board finds the leachate collection system proposed by the applicant was designed in accordance with 06-096 C.M.R. ch. 401, § 2(D)(4). The Board further finds that the applicant performed static and seismic stability and settlement analyses to address potential movement of the piping in addition to including piping specifications in the application.

(2) Leak Detection System

The application shows that a leak detection system for the proposed expansion will be located under the primary liner system and will consist of the following, from top to bottom: 12-inches of drainage sand, crushed stone, perforated 6-inch diameter HDPE pipe surrounded with drainage stone and a drainage geocomposite. The applicant designed the leak detection system to detect leachate from each cell's primary liner system within 30 days. The fluids collected in the leak detection system will drain by gravity to individual collection sumps located at the low point of each cell and will be pumped to the leachate collection system and from

there pumped into the leachate transport system. Each pump will include a flow meter and sampling ports.

The Board finds the leak detection system proposed by the applicant was designed in accordance with 06-096 C.M.R. ch. 401, § 2(D)(4).

(3) Landfill Gas Condensate System

The application shows that the LFG condensate collection system for the proposed expansion consists of U-shaped condensate traps at low points in the gas conveyance pipe to remove liquid. Condensate collected in the traps will drain to a primary leachate collection system pipe. From there it will be conveyed to an existing landfill leachate header pipe and transported to the on-site leachate storage tank.

The Board finds that the applicant has appropriately addressed collection of LFG condensate as required by 06-096 C.M.R. ch. 401, § 2(D)(4).

(4) Leachate Transport

As stated in the application, leachate transport for the proposed expansion includes temporary and permanent internal cell pump stations that will deliver leachate to dual-walled force mains (6-inch by 10-inch diameter) located within the eastern and western perimeter berms. Temporary pump stations will be installed in each of Cells 11, 12, 14, and 15 and will be utilized during each cell's active period, to be discontinued when each cell becomes inactive and the subsequent lower grade cells are developed. The inactive cell's leachate piping will be connected to the next cell's piping system. The permanent pump stations will be located in Cells 13 and 16 at the lowest base grades and will be operated during active and post-closure periods. Both the temporary and permanent leachate pump stations will utilize a sump and pump design that avoids penetrations of the liner system. The pump stations were sized using the HydroCAD Model to account for storm events and storage volume. Sample ports will be included in all pump stations to allow for the sampling of leachate and each pump will have continuous recording flow meters.

The Board finds the applicant has appropriately addressed the transport of the leachate pursuant to 06-096 C.M.R. ch. 401, § 2(D)(4).

(5) Leachate Storage

As stated in the application, calculations demonstrate that the existing 921,000 gallon above ground glass-lined leachate storage tank is capable of handling the maximum anticipated leachate during the life of the proposed expansion. The storage tank is surrounded by a secondary containment structure with an available volume of 110 percent of the tank. The storage tank was addressed during the issuance of Department license #S-020700-WD-N-A. From the storage tank, tanker trucks will remove the leachate and transport it to the MFGR, LLC wastewater treatment plant in Old Town for treatment and disposal as described in the Leachate Disposal Agreement between MFGR, LLC and NEWSME, effective April 27, 2016. The City of Brewer wastewater treatment plant is available as a back-up disposal facility as described in Industrial Wastewater Discharge Permit #37-2679-07, effective March 3, 2013.

The Board finds the applicant has appropriately addressed on-site leachate storage and off-site treatment and subsequent disposal in accordance with 06-096 C.M.R. ch. 401, § 2(D)(4).

E. Seismic Impact Zone

Information in the application shows that the proposed expansion is located in a seismic impact zone as identified by U.S.G.S. Seismic Hazard Maps. The facility's structures, including liner systems, leachate collection systems, and surface water control systems for the proposed expansion were designed to withstand the maximum horizontal acceleration identified by the Hazard Maps. Additional seismic discussion can be found in Finding 28(A) of this license.

Based upon information in the record, the Board finds that the proposed expansion has been designed to meet the seismic requirements of 06-096 C.M.R. ch. 401, § 2(D)(5).

F. Phased Operations

As set forth in the application, the proposed expansion was designed for phased construction, taking into account waste operations and cover placement, stormwater run-on and run-off, leachate management, protection of the liner system from freeze and thaw effects, and stability. Individual cell size was based on the design waste disposal rates, resulting in approximately 2 years of active waste placement in each cell. Final cover will be installed in a phased manner during construction seasons when new cells are not being developed.

The Board finds that the submitted cell development plans for the 6 proposed cells meet the requirements of 06-096 C.M.R. ch. 401, § 2(D)(6).

27. ALTERNATIVE DESIGN PROCESS

Pursuant to 06-096 C.M.R. ch. 401, § 2(E), an applicant may propose alternatives to the minimum design standard and requirements of section 2(D) of the rule. An applicant is required to submit documentation to clearly and convincingly demonstrate technical equivalency of the proposed alternative.

A. Liner System Barrier Soil Lift Thickness

The landfill liner system requirements include a barrier soil layer placed in maximum lift thicknesses of 9 inches pursuant to 06-096 C.M.R. ch. 401, § 2(D)(1)(g)(iv). The applicant has proposed a barrier soil lift thickness of 12 inches, as has been utilized in the past during construction of Cells 7, 8, and 9 at the existing landfill. The test pad programs utilized during the construction of these cells demonstrated that the performance criteria required in the Rules (densities, moisture content, hydraulic conductivity, soil remolding, and lift bonding) were met utilizing the current available compaction techniques and equipment and project specific soils.

The Board finds that the applicant has submitted documentation referencing past practices that clearly and convincingly demonstrates technical equivalency of placing barrier soil in a 12-inch lift thickness compared to a 9-inch lift thickness, provided that a test pad program is undertaken as proposed in the application and described in Finding 28(L) of this license during construction of each cell of the proposed expansion to demonstrate that the required performance criteria will be met and the results submitted to the Department at least 7 days prior to full scale construction. If the applicant cannot demonstrate technical equivalency, the maximum barrier soil lift thickness will remain 9 inches.

B. Base Preparation Below Liner Systems Lift Thickness

The requirements for constructed base materials below liner systems include a base material maximum allowable compacted lift thickness of 9 inches pursuant to 06-096 C.M.R. ch. 401, § (2)(D)(3)(e). Similar to the liner system barrier soil request described in Finding 27(A) above, the applicant has proposed the placement of barrier soil in a 12-inch lift thickness compared to the required 9-inch lift thickness.

Based on the same reasons noted above for the liner system barrier soil lift thickness, the Board finds that the applicant has submitted documentation during past practices that clearly and convincingly demonstrates technical equivalency of placing barrier soil in a 12-inch lift thickness compared to a 9-inch lift thickness for base material placement, provided that a test pad program is undertaken as proposed in the application and described in Finding 28(L) of this license during construction of each cell of the proposed expansion to demonstrate that the required performance criteria will be met and the results submitted to the Department at least 7 days prior to full scale construction. If the applicant cannot demonstrate technical equivalency, the maximum barrier soil lift thickness will remain 9 inches.

28. ENGINEERING REPORT

The Department's rule at 06-096 C.M.R. ch. 401, § 2(F) requires the applicant to submit an engineering report detailing the basis for engineering design and the proposed construction procedures, utilizing site specific factors and analyzing potential modes and significance of engineered system failures. The application and subsequent information submitted by the applicant addressing Department review comments, included data, calculations, assumptions, and evaluations for the following aspects of the proposed expansion:

A. Stability Assessment

The application for the proposed expansion included a slope stability assessment which analyzed static and seismic loads during construction, operation, and post-closure periods. The stability evaluation included four cross-sections of the proposed expansion representing the steepest base liner slope angle, the steepest final sideslope angles, the greatest waste thickness, and the tallest and steepest exterior waste grades. The geotechnical properties were based on data collected from previous field and laboratory studies and construction projects. The data included density, internal and external friction properties, and cohesion/adhesion as applicable.

The applicant used two potentiometric surfaces in its assessment of landfill stability based on the following: maintenance of the leachate level within the base liner system and a conservative assumption that the potentiometric surface beneath the entire landfill is coincident with the bottom of the base liner system. A sensitivity analysis was completed to evaluate the potential impact of higher water levels. Seismic slope stability was evaluated, utilizing site specific Hazard Maps and the acceptable accelerations. As part of the seismic stability evaluation, the applicant also submitted a liquefaction and deformation analysis. In addition,

a sensitivity analysis was performed on two of the cross-sections for horizontal deformation (strain) of the base liner system.

The site specific data and design parameters were used by the applicant as input to the slope stability computer analysis program SLOPE/W. The resultant calculated factors of safety exceeded the minimum acceptable values required by the Rules, demonstrating that in-place waste and foundation soils beneath and adjacent to the waste can support the proposed expansion loads. The results of the stability assessment and comparison to the applicable safety factor requirements are presented in Tables 9 and 10 (based on the application, Volume III, Table 3-9, page 3-21 and separated into two tables for presentation clarity).

Table 9: Stability Assessment Result Summary
Calculated Slope Stability Minimum Factors of Safety
for Construction and Operations

Cross-Section	Static Condition				Seismic Condition			
	Waste, Shallow surficial	Liner, Block	Foundation (circular)	Rule Minimum	Waste, Shallow surficial	Liner, Block	Foundation (circular)	Rule Minimum
A-A’	1.91	1.73	2.65	1.3	1.54	1.37	2.14	1.1
B-B’	2.43	2.01	2.93		1.88	1.50	2.26	
C-C’	1.90	1.75	2.17		1.53	1.39	1.75	
D-D’	1.92	1.82	2.61		1.55	1.45	2.07	

Table 10: Stability Assessment Result Summary
Calculated Slope Stability Minimum Factors of Safety
for Post Closure

Cross-Section	Static Condition				Seismic Condition			
	Waste, Shallow surficial	Liner, Block	Foundation (circular)	Rule Minimum	Waste, Shallow surficial	Liner, Block	Foundation (circular)	Rule Minimum
A-A’	1.81	1.72	2.65	1.5	1.11	1.00	1.62	1.0
B-B’	2.33	1.98	2.90		1.32	1.05	1.64	
C-C’	1.81	1.74	2.17		1.11	1.01	1.33	
D-D’	1.84	1.81	2.54		1.11	1.04	1.52	

As the proposed expansion development occurs, the applicant will perform individual slope and interface stability assessments as part of each cell design to

confirm the construction and operational phase stability. Similar assessments for each cover system construction project will also be performed.

Based on the information provided in the application, the Board finds that the applicant has met the requirements in 06-096 C.M.R. ch. 401, § 2(F)(1) for static and seismic stability factors of safety, as demonstrated in a slope stability assessment for static and seismic loads during construction, operation, and post-closure periods.

B. Settlement Assessment

The applicant submitted a settlement assessment to predict total and differential settlements of the landfill liner systems, leachate management systems, and cover system components. The settlement assessment quantified the anticipated primary and secondary settlements of the landfill waste and foundation soils and evaluated the effect of the settlements on the base liner system, leachate collection, and cover system components.

The foundation soils below the proposed expansion are a dense to very dense glacial till. Settlement of the foundation soils is predicted to be between 0.0 to 0.3 feet. It was determined that neither the base liner nor leachate collection systems will be compromised by the predicted settlement, since the strains on the geosynthetics (i.e., geomembrane, GCL, drainage geocomposite) will be within acceptable limits, the base liner slopes are estimated to change by less than 0.1% from the design slopes, and the leachate collection piping would continue to maintain positive drainage.

The waste and cover settlement was projected based on the similar composition and behavior of waste existing at the facility. The calculated combined primary and secondary settlements would be between 0 to 8 feet at the end of the 30-year post-closure period. The applicant does not expect these settlements to compromise the cover system since the settlement is projected to occur in a uniform, gradual manner, the cover system's initial slope angles are sufficient to maintain positive drainage even with the predicted settlement, and tensile strains at 0.1% are well below the allowable strain for the textured, linear low density polyethylene (LLDPE) or HDPE geomembrane to be used as a component of the final cover system.

The Board finds that the applicant has met the settlement requirements in 06-096 C.M.R. ch. 401, § 2(F)(2), confirming future predicted settlement will not adversely affect the landfill liner system, leachate collection system, and cover system components.

C. Stability and Settlement Monitoring Plan

The Stability and Settlement Monitoring Plan submitted in the Design Report prepared by SME (Volume III, Section 3.1.5, page 3-26) and the referenced geotechnical monitoring plan (Operations Manual, Volume IV, Appendix N of the application) proposed for the expansion include the installation and monitoring of pore-water pressure transducers at the base of each cell and geotechnical slope stability and settlement inspections of the facility. The pressure transducers will be connected to the pump station control panels and will measure leachate head on the liner system to confirm the leachate collection system design assumptions. The annual inspections will be performed by a qualified geotechnical engineer to observe slopes for cracks, sloughs, seeps, leachate breakouts, displacements, toe-heaving, areas of stressed vegetation; to observe any water ponding; and to compare recent waste placement topographic maps with the previous year's information.

As part of the annual geotechnical inspection, the applicant proposes to conduct an annual review of waste types, quantities, location of waste placement; evaluation of pore pressure data; and review of site aerial topographic surveys. If the design assumptions such as waste streams and pore pressures have changed, then a reassessment may be warranted. A summary of the geotechnical inspections and evaluations will be included in the facility's Annual Report.

The Board finds that the Stability and Settlement Monitoring Plan submitted by the applicant meets the requirements of 06-096 C.M.R. ch. 401, § 2(F)(3) and that the applicant must include the results of the geotechnical inspections and evaluations in a geotechnical report submitted in the Annual Report.

D. Water Balance

EPA's Hydrologic Evaluation of Landfill Performance (HELP) Model was used by the applicant to evaluate the rates and volumes of leachate, including consolidation water, to be generated by the landfill during operations, closure, and post-closure periods. The model results identified the most critical leachate generation conditions over the life of the proposed expansion and were used to design the leachate collection system. Three simulations were performed under conditions of open active waste filling assuming 10 feet of waste and no cover, an intermediate covered condition assuming 90 feet of waste and 18 inches of soil cover, and a final cover condition. The average daily leachate flows were estimated to be approximately 48,000 gallons per day from the entire facility during the operation of the proposed expansion, with an average daily flow during

the peak monthly condition of approximately 57,500 gallons per day. The estimated yearly flows ranged from approximately 22.9 million gallons per year during the operation of Cell 12 to approximately 13.8 million gallons per year during the operation of Cell 15.

The Board finds that the applicant has met the requirements in 06-096 C.M.R. ch. 401, § 2(F)(4) for adequately designing the leachate collection system to convey the predicted leachate flow from the proposed expansion.

E. Leachate Management

The Rules require the applicant to select an appropriate leachate management method and require a leachate management plan. In accordance with 06-096 C.M.R. ch. 401, § 2(F)(5), leachate management options available to the applicant include "off-site transport to a licensed wastewater treatment facility for treatment and disposal." The applicant has proposed to continue the method currently employed at the existing landfill; namely, leachate will be collected and conveyed through a series of pipes above the primary liner system, pumped to the on-site leachate storage tank and trucked to the MFGR, LLC (MFGR) wastewater treatment plant in Old Town (disposal agreement signed April 27, 2016). A contingency plan for leachate disposal limitations at contracted treatment facilities is required in 06-096 C.M.R. ch. 401, § 2(F)(5)(e)(iii), including a letter of intent or service contracts for such proposed contingencies. To meet this requirement, the applicant has provided a back-up agreement for leachate treatment, held with the City of Brewer wastewater treatment plant (disposal agreement effective March 3, 2013). Both MFGR and City of Brewer disposal agreements have a term of 5 years and both treatment facilities hold current wastewater licenses from the Department, as required by the Rules.

The design calculations and drawings for the leachate collection and transport system were submitted with the application and are further described in Finding 26(D) of this license. The leak detection system, located beneath the primary liner system, includes the capability to measure both flow and quality of liquid collected by the system. The leak detection system was based on a design leakage rate as defined in 06-096 C.M.R. ch. 400. The design leakage rate for the primary liner component of the system was calculated to be 0.26 gallons per acre per day, based on potential variables such as geomembrane imperfections, the head above the primary liner, the uniformity of contact between the geomembrane and underlying soil/GCL, and the hydraulic conductivity of the material in contact with the primary liner. In conjunction with the siting and design specifics of the proposed landfill, the design leakage rate is required to be taken into account for assessing hypothetical failures. The leak detection system was designed to detect

leaks from each cell's primary liner system within 30 days, and have sufficient hydraulic capacity to transmit the flow associated with the Action Leakage Rate (ALR) for the proposed expansion. The applicant proposed to determine leachate leakage by comparing the measured specific conductance to values calculated using the selected ALR, leachate specific conductance, and baseline measurements. The monitoring methodology was included in the Liner Action Plan (LAP), submitted as part of the proposed expansion application in the Operations Manual.

During review of the application, Department staff commented on the proposed LAP and recommended an initial two-tiered ALR program based on 20 and 100 gallons per acre per day, followed by consultation with Department staff to determine the appropriate response action (Department technical memorandum dated January 20, 2016 from S. Farrar, V. Eleftheriou, and K. Libbey). Specific conductance could then be utilized to determine further action, but would not be the primary ALR method initially. The applicant may request revisions to the LAP upon submittal of actual field data as the proposed expansion is developed for the Department's approval through changes to the Operations Manual.

Contingency plans were built into the designs for conveyance and transport system failures as described in the application, including conservative design factors and assumptions; materials to be used; periodic maintenance, cleaning, and inspection; monitoring pressure transducers and pressure gauges; alarm systems; back-up pumps and generators; force main dual-containment piping; and easy access to cell pumps.

The volume of leachate generated will be measured through the use of flow meters at each pump station. Leachate and the leak detection system quality will be monitored in accordance with the facility's Environmental Monitoring Plan (EMP), as described in Finding 33 of this license. The leachate management system will be maintained, inspected, and cleaned periodically, as addressed in the facility's Operations Manual section on site maintenance and inspection.

As stated above, the applicant has proposed to transport leachate off-site to the MFGR wastewater treatment facility for treatment and subsequent disposal. Taking into account the proposed expansion, leachate hauling is expected to be approximately 48,000 gallons per day, with an estimated 57,500 gallons per day during peak months. This represents an increase from current hauling loads which average 30,000 gallons per day and 46,000 gallons per day during peak months. The quality of the leachate to be taken off-site and treated is expected to be consistent with the current leachate quality since there is no change in accepted waste types proposed. Leachate samples will be routinely collected from the on-

site storage tank and the leachate and leak detection pump stations for characterization. Data on characteristics of the leachate will be sent to the wastewater treatment facility.

During the hearing, intervenor Edward Spencer questioned the adequacy of the MFGR wastewater treatment facility given closure of the pulp and papermaking operations at the former mill site. Mr. Spencer's witness, Dr. Steve Coghlan, expressed concerns regarding the potential for the discharge of pollutants including metals from the wastewater treatment plant to adversely impact the Penobscot River.

The Board finds that evidence in the record indicates that MFGR's waste discharge license was most recently renewed and amended on October 12, 2016 to reflect the change in wastewater loading to the facility including leachate from JRL. The MFGR license specifically recognizes that "the wastewater characteristics are no longer representative of a kraft pulp mill operation as sources of wastewater are primarily storm water, landfill leachate from JRL, wastewater from the commercial LaBree's Bakery, filter backwash from the Orono-Veazie Water District and septage dewatering filtrate, leachate and storm water runoff from a composting facility" (Department license #W-002226-5O-O-R). In addition to State standards, MFGR's wastewater application was evaluated for compliance with National Effluent Guidelines set forth in 40 CFR, Part 445, *Landfills Point Source Category*, Subpart B, *RCRA Subtitle D Non-Hazardous Waste Landfill.*

MFGR's wastewater treatment license places limits on the concentration of various pollutants in the discharge and requires that discharges from the MFGR wastewater treatment facility be monitored for a range of parameters including, but not limited to, flow, pH, biological oxygen demand, total suspended solids, mercury, whole effluent toxicity, and priority pollutants. The license states that the wastewater treatment facility modifies its treatment protocols as appropriate based on operating parameters such as influent flow, strength, and temperature to meet the effluent limits, including those for metals (metals can be present in the sludge and also within the discharged effluent at allowable levels). In issuing MFGR's renewal license, the Commissioner concluded, based upon a knowledge of the influent and the operation of the MFGR facility, that all applicable licensing criteria for the proposed waste discharge had been met and that the "discharge, either by itself in combination with other discharges, will not lower the quality of any classified body of water below such classification" and that "the provisions of the State's antidegradation policy, 38 M.R.S., § 464(4)(F), will be met."

The Board finds that the applicant has met the applicable requirements in 06-096 C.M.R. ch. 401, § 2(F)(5) for leachate management, based on the submitted leachate management design plans and utilization of a licensed wastewater treatment facility, along with a back-up licensed wastewater treatment facility as the contingency plan, for the treatment of the collected leachate; provided that the applicant maintains a valid leachate disposal contract(s) with licensed waste water treatment facility(ies) for the treatment and disposal of leachate from the proposed expansion.

F. Gas Management

The Landfill Gas Expansion Design Report dated June 2015, prepared by Sanborn Head & Associates, Inc. and submitted with the application, addresses LFG management for the proposed expansion. The existing active LFG extraction system will be expanded to accommodate gas generated from future waste placement. The LFG collection and control system consists of horizontal extraction trenches and vertical extraction wells. Once extracted, the LFG passes through a moisture separator, followed by treatment at a Thiopaq® sulfur removal system to reduce hydrogen sulfide, and is then combusted at the flare. The June 2015 report demonstrates that the existing H_2S removal equipment and flares as addressed in the landfill's existing air license renewal are adequate to handle the LFG from the proposed expansion. A landfill gas to energy facility may be proposed in the future as an alternative to flaring and to generate electricity.

The application states that the LFG collection and control system is utilized to control air emissions, including methane and odors from hydrogen sulfide, as described previously in Finding 11(A) of this license. The existing facility is required to meet the EPA's New Source Performance Standards, 40 CFR Part 60, Subpart WWW, *Standards of Performance for Municipal Solid Waste Landfills* (initially published in 61 FR 9919, March 12, 1996). The application included reference to Subpart WWW, but in 2016, 40 CFR Part 60, Subpart XXX, *Standards of Performance for Municipal Solid Waste Landfills that Commenced Construction, Reconstruction, or Modification after July 17, 2014* (published in 81 FR 59368, Aug. 29, 2016) was promulgated. The proposed expansion will be subject to 40 CFR Part 60, Subpart XXX upon commencing construction of Cell 11. Requirements in the federal regulation include operational standards for gas collection and control systems, as well as provisions for compliance and monitoring.

In the application, Sanborn Head & Associates estimated the LFG generation rate using the EPA's *Landfill Gas Emissions Model, Version 3.02* (LandGEM) for the years 2004 to 2050, with a peak collection rate of approximately 3,600 standard

cubic feet per minute (scfm) in 2031, assuming LFG at 50% methane and taking into account the proposed expansion construction to commence in 2018. The application states that the LFG collection system will be installed in phases as the proposed expansion cells are built. Horizontal extraction trenches will be located in the waste mass, constructed 4-feet wide by 5-feet deep, and contain a 6-inch perforated HDPE pipe surrounded by coarse aggregate. The trenches will be installed approximately every 40 feet in vertical elevation and spaced approximately 100 feet apart. The permanent vertical extraction wells will be constructed of 8-inch diameter schedule 80 polyvinyl chloride pipe, slotted on the lower portion. They will be installed approximately 100 feet on center. Conveyance HDPE pipes will vary from 4 inches to 24 inches in diameter and will be sloped to provide condensate drainage and account for settlement.

LFG management at the facility also includes the installation of intermediate and final cover on non-active portions of the landfill to promote efficient gas collection.

Intervenor Edward Spencer questioned in testimony whether the horizontal pipes in the landfill gas collection system may collapse. Michael Booth, an expert witness for the applicant, testified that the horizontal gas collector trenches are only a temporary collection method and only need to function until the permanent vertical extraction wells are installed once the appropriate waste depth is achieved.

The Board finds that the applicant has met the requirements in 06-096 C.M.R. ch. 401, § 2(F)(6) for LFG collection and control based on the submitted LFG design report and cell development plans, and the proposed expansion will be subject to the requirements of 40 CFR Part 60, Subpart XXX when JRL commences construction on the proposed expansion. The Board further finds that the design and operation of the LFG collection and control system will minimize LFG related nuisance odors.

G. Cell Development Plan

A Cell Development Plan was submitted with the application which illustrates the sequence of development for the proposed expansion in a phased manner, allowing operation in an active landfill cell while construction occurs on the next cell. Phased intermediate and final cover placement are also proposed. Table 11 includes general cell development information, with a schedule for new cell construction approximately every two years. Table 11 was compiled from information in the application, Volume III, Section 3.5.1. Specific plan details with layout of cells, projected grades, location and timing of intermediate and

final cover, location and construction of cell access, relevant aspects of leachate and stormwater management measures, relevant aspects of erosion and sedimentation control measures, and other pertinent facility-specific features are included in the facility's Operations Manual and will be updated with the facility's Annual Report.

Table 11: Proposed Expansion Cell Development Plan Summary* (cell construction listed from first to last, occurring every two years)

Cell Number	Size (acres)	Disposal Capacity (cubic yards)	Construction Items of Note
11	9.5	1,460,000	• Expansion of existing Detention Pond 9; • Year following Cell 11 construction, final cover placed over approximately 14.3 acres of existing landfill.
12	12.6	1,500,000	• Construction of Detention Pond 10; • Relocation of the administration building; • Year following Cell 12 construction, final cover placed over approximately 18.6 acres of existing landfill.
13	11.8	1,580,000	• Construction of Detention Pond 11; • Relocation of the scale house; • Year following Cell 13 construction, final cover placed over approximately 14.6 acres of existing landfill.
14	6.7	1,670,000	• Year following Cell 14 construction, final cover placed over approximately 13.3 acres of existing landfill.
15	6.0	1,500,000	• Year following Cell 15 construction, final cover placed over approximately 15.0 acres of existing landfill.
16	7.1	1,640,000	• Construction of Detention Pond 12; • Over a several year period following Cell 16 construction, final cover placed over remaining 45.5 acres.
Note: *Size and capacity information is approximate. Variations in construction scheduling may occur as development progresses.			

The Board finds that the applicant has met the Cell Development Plan Rule requirements in 06-096 C.M.R. ch. 401, § 2(F)(7), including cell development sequencing and phased placement of intermediate and final cover. The Board further finds that the applicant shall update the Cell Development Plan on an annual basis as the proposed expansion is developed.

H. Phased Final Cover System Proposal

The applicant proposed a phased final cover system for the expansion consisting of the following, from top to bottom: 12 inches of vegetative soil, 12 inches of

drainage sand, a 40-mil LLDPE or HDPE textured geomembrane, and 24 inches of barrier soil. Prior to each phase of final cover system construction, an engineering report, construction contract bid documents, including drawings, technical specifications, and contract administrative documents and a quality assurance plan will be submitted to the Department for review and approval. The applicant anticipates that final cover system construction will occur about every other year.

The Board finds that the applicant has met the requirements in 06-096 C.M.R. ch. 401, § 2(F)(8) for a phased cover system; provided that an engineering report, construction contract bid documents, including drawings, technical specifications, and contract administrative documents and a quality assurance plan are submitted to the Department for review and approval at least four months prior to each proposed application of a phased final cover system.

I. Waste Storage, Staging, and Burn Areas Design

The applicant has not proposed additional waste storage and staging areas outside of the solid waste boundary, or a burn area for wood waste or CDD. Rather, the applicant proposes to use the existing permitted wood waste handling area adjacent to the maintenance facility for the proposed expansion. In addition, areas within the existing landfill may be used to temporary stockpile soft layer material to be placed in the bottom of newly constructed cells.

The Board finds that the applicant is not proposing additional waste storage and staging areas outside of the solid waste boundary, or a burn area for wood waste or CDD and will utilize the existing permitted wood waste handling area. Therefore, the provisions requiring submittal of a design and operating plan in accordance with 06-096 C.M.R. ch. 401, § 2(F)(9) do not apply to the proposed expansion; however, the facility shall continue to operate the existing storage and burn area in accordance with the applicable operating requirements.

J. Waste Characterization and Design Compatibility

The Department's rule at 06-096 C.M.R. ch. 401, § 2(F)(10) requires that the wastes proposed to be accepted at the expansion must be characterized to enable the Department to determine that the wastes to be landfilled are non-hazardous and suitable for disposal in accordance with the proposed design, and to support the analytical parameters proposed in the Environmental Monitoring Plan (EMP).

The procedures for the characterization, testing and acceptance of waste at JRL are included in the facility's Solid Waste Characterization Plan in the Operations

Manual. The wastes proposed to be accepted in the expansion are similar to the wastes currently approved for JRL, with the exception of MSW (except for bypass) which will not be accepted in the proposed expansion. Generally, the waste types include wastewater treatment plant and miscellaneous sludge, FEPR, contaminated soils, MSW incinerator ash, biomass and fossil fuel ash, MSW bypass from incinerators, CDD, OBW, CDD process fines, and miscellaneous waste. Finding 37 of this license addresses the acceptable wastes in more detail.

The applicant states that the currently accepted waste types have been previously determined by the Department and JRL to be non-hazardous, compatible for commingling, and compatible with the engineered systems components.

The Board finds that the applicant has provided appropriate waste characterization procedures for the proposed expansion as required by 06-096 C.M.R. ch. 401, § 2(F)(10).

K. Surface Water Control Plans

The Department's Rules at 06-096 C.M.R. ch. 401, § 2(F)(11) require that an applicant submit two surface water control plans: an erosion and sedimentation control plan which meets the standards and submission requirements of 06-096 C.M.R. ch. 400, § 4(J) and a stormwater management plan which meets the standards and submission requirements of 06-096 C.M.R. ch. 400, § 4(M). The applicant's Erosion and Sedimentation Control Plan and the Stormwater Management Plan are described in Findings 14 and 17 of this license.

The Board finds that the applicant has submitted the two required surface water control plans required by 06-096 C.M.R. ch. 401, § 2(F)(11) and that these plans meet the requirements of 06-096 C.M.R. ch. 400, §§ 4(J) and 4(M) as set forth in Findings 14 and 17 of this license.

L. Test Pad Submission

The applicant has proposed to utilize test pads to demonstrate that the proposed barrier soil material and construction methods will result in barrier soil meeting the specified requirements. The test pad program will evaluate the construction techniques to determine conformance with the project technical specifications, similar to the program used during construction of the existing cells at JRL. For base grade, liner, and final cover system construction, a test pad covering an area of approximately 50,000 square feet will be constructed in the cell or cover area. During placement and compaction of the test pad, testing will be performed for moisture, density, and in-place hydraulic conductivity at the appropriate locations

and frequencies. Once the performance criteria is met, up to four shallow test pits will be excavated in the test pad area to evaluate the remolding and bonding of the barrier soil. If the entities involved in construction and oversight, including the Department, concur with the results, the construction techniques utilized on the test pad will continue for the project and the frequency of in-place hydraulic conductivity testing may be reduced with approval from the Department. If the borrow source or material properties change during the course of construction, a new test pad will be required.

The Board finds that the applicant has submitted an appropriate test pad program as required by 06-096 C.M.R. ch. 401, § 2(F)(12). Any reduction in the frequency of the in-place hydraulic conductivity testing must be authorized by the Department.

M. Special Construction Requirements

In accordance with 06-096 C.M.R. ch. 401, § 2(F)(13), at facilities where ground water monitoring in bedrock is anticipated or is being conducted, the applicant must submit information on all measures to be taken to minimize the disturbance of soil material within five feet of the bedrock surface.

The applicant submitted information on measures to be taken to minimize the disturbance of soil material within 10 feet of the bedrock surface where the augmented secondary liner system will be installed. In these areas, the base grade will be cut one foot to accommodate the additional foot of compacted clay to be placed under the secondary liner system. To achieve minimal soil disturbance, the excavator will complete the cut prior to placement of imported soils.

In other areas of the site where the proposed base grades are below the phreatic surface, the applicant has proposed to install an underdrain system to assist with dewatering and to facilitate base liner system construction.

The Board finds that the applicant has submitted measures to minimize soil disturbance that meet the 5 feet to bedrock separation requirement in 06-096 C.M.R. ch. 401, § 2(F)(13).

29. CONTAMINANT TRANSPORT ANALYSIS

In accordance with 06-096 C.M.R. ch. 401, § 2(G), an applicant is required to provide a thorough analysis of the proposed site and the adjacent area that could be affected during operation and after closure of the landfill in the event of releases of contaminants to ground water beyond engineered systems to assess the potential for an unreasonable

threat to sensitive receptors and to identify any operational or monitoring measures needed to ensure protection of sensitive receptors. As defined in the Rules, the potential for an unreasonable threat to a sensitive receptor is an arrival time of less than 6 years from the landfill or less than 3 years from leachate storage structures and pump stations of a concentration of a pollutant which would result in contamination of that sensitive receptor.

The contaminant transport analysis submitted by the applicant consisted of modeling potential leakage scenarios using information from site investigations and appropriate inputs and assumptions. An analytical three-dimensional ground water solute transport equation was used to simulate leachate concentrations from hypothetical leaks. Evaluated hypothetical scenarios included complete failure of the liner system, a leaking liner system, and a leaking leachate force main. The leachate constituents modeled were iron, nitrate, alkalinity, arsenic, chloride, and ammonia since these constituents have the highest concentrations in leachate relative to the ground water and surface water criteria. A sensitivity analysis was also performed.

Based upon information in the application, the Board finds that under the hypothetical failure scenarios, the results of the analysis showed that sensitive receptors in the vicinity of the proposed expansion will not be unreasonably threatened by leachate leaks; the proposed monitoring locations and monitoring frequency will be sufficient to detect changes in water quality from potential failures; and the currently proposed design will provide greater than six years travel time from the landfill's base liner to the sensitive receptors.

The Board further finds that the applicant provided an analysis of potential releases of contaminants to ground water that meets the requirement of the 06-096 C.M.R. ch. 401, § 2(G) and has demonstrated that the proposed expansion will not pose unreasonable threats to sensitive receptors.

30. PLAN VIEW AND PROFILE VIEW DRAWINGS

The Department's rules at 06-096 C.M.R. ch. 401, § 2(H) require that an applicant submit plan and profile drawings that provide information specified in the rule.

The Board finds that the applicant submitted the drawings required in 06-096 C.M.R. ch. 401, § 2(H), including the drawings for existing site conditions, site development, site base grading, underdrain piping, leak detection piping, leachate collection piping, the gas collection and control system, final site drainage, final site development, landfill cross-sections, and specific details of engineered systems.

31. QUALITY ASSURANCE PLAN

The Department's rules at 06-096 C.M.R. ch. 401, § 2(I) requires that an applicant submit a Quality Assurance Plan to assure that design specifications and performance requirements for all facility components are met during construction. The Quality Assurance Plan submitted by the applicant for the proposed expansion includes the following, as related to construction: quality assurance measures to be implemented; the relationship between the Quality Assurance Plan, construction quality control, and the construction contract bid documents; responsible authorities and a resolution process; qualifications of quality assurance personnel and testing laboratories; inspections and tests to be performed for construction conformance; sampling details; recordkeeping and reporting requirements; and a list and description of all items requiring quality assurance certification.

The Board finds that the applicant has submitted a Quality Assurance Plan that addresses the items required by 06-096 C.M.R. ch. 401, § 2(I) to verify conformance with construction design specifications and performance requirements.

32. CONSTRUCTION CONTRACT BID DOCUMENTS

Pursuant to 06-096 C.M.R. ch. 401, § 2(J), an applicant is required to submit construction bid documents. The applicant may submit draft documents at the time the application is filed, and subsequently submit final detailed construction contract bid documents to the Department for review and approval on a schedule approved by the Department.

The application included construction bid documents for Cell 11 consisting of contract administrative documents, technical specifications, and drawings.

The Board finds that the applicant provided the construction contract bid documents for Cell 11 in accordance with the Rules. Prior to the construction of individual subsequent cells (Cells 12 through 16), detailed construction contract bid documents shall be submitted to the Department for review and approval four months prior to commencing construction activities at each cell.

33. WATER QUALITY REPORT AND PROPOSED MONITORING PROGRAM

In accordance with 06-096 C.M.R. ch. 401, § 2(K), an applicant is required to provide a water quality report addressing the site characterization requirements of 06-096 C.M.R. ch. 405, including a water quality monitoring program.

The application includes information on the water quality monitoring program which was established at the site in 1990 and currently includes periodic sampling of 22 monitoring

wells, 3 ground water discharge locations, 6 surface water locations, 10 underdrain locations, and 1 leachate location. The specific sampling and monitoring procedures utilized are detailed in the facility's EMP. The proposed expansion will be integrated into the existing water quality monitoring program, with updates and revisions as appropriate.

The proposed expansion will include the addition of 45 monitoring locations consisting of: background and downgradient piezometers and wells, additional surface water and pore water sampling points, and leak detection and underdrain system monitoring points. The locations will be phased in with the development of the proposed cells over a 10 to 12 year period.

Leachate monitoring for the proposed expansion will consist of sampling at the leachate tank; each leak detection sump discharge; and underdrain discharge. Ground water monitoring for the proposed expansion will consist of sampling of 23 new monitoring wells and 11 existing wells and piezometers. Several existing ground water monitoring wells, piezometers, and open-boreholes in the area of the proposed expansion footprint will be abandoned in accordance with the provisions of 06-096 C.M.R. ch. 405, § 5(H). Surface water monitoring will include sampling of two additional locations to characterize potential shallow ground water discharge and runoff impacts to nearby streams and wetland areas. Water quality sampling for the leachate tank, underdrain and leak detection systems, and monitoring wells will be performed three times a year. The leak detection sump discharges and underdrain discharge will be assessed monthly for flow and specific conductance (the Liner Action Plan, included in the Operations Manual, addresses steps to be taken if water quality changes occur).

During review of the application, Department staff commented that the ground water flow directions are anticipated to change with proposed expansion development and that the EMP should provide for an annual assessment of ground water flow directions (Department technical memorandum dated April 1, 2016 from R. Behr).

As set forth in the application, the water quality monitoring program will continue to be adjusted annually based on the operational status of the cells, development at the facility, the previous year's water quality evaluation, and the results of the Department's annual review of the water quality data.

The Board finds that the applicant submitted a water quality report which both characterized the existing site and proposed a water quality monitoring program as required by the Rules. Water quality monitoring shall be performed according to the EMP for the site. An Annual Water Quality Report evaluating JRL's water quality and an assessment of ground water flow directions as the proposed expansion is developed shall

be compiled each year and submitted with the facility's Annual Report. Proposed changes to the water quality monitoring program shall require Department approval.

34. OPERATIONS MANUAL

In accordance with 06-096 C.M.R. ch. 401, § 2(L), a copy of the facility's operations manual must be submitted as part of the application. The facility's Operations Manual was prepared in accordance with 06-096 C.M.R. ch. 401, § 4(A) and contains revisions to JRL's existing operations manual to address the proposed expansion. As required, the Operations Manual will be reviewed annually by the operator and will be updated as necessary. Since the July 2015 version of the Operations Manual submitted with the application, updates to portions of the Operations Manual have been submitted to the Department as a result of Department comments during the application review process.

The Board finds that the applicant has submitted an Operations Manual in accordance with the requirements of 06-096 C.M.R. ch. 401, § 2(L).

35. CONSTRUCTION

The proposed expansion is subject to the regulatory requirements of 06-096 C.M.R. ch. 401, § 3 during construction, as summarized below:

A. Preconstruction Conference

Unless waived by the Department, a pre-construction conference will be held between the applicant and/or the agents of the applicant and the Department, with at least a 7-day advance notice given to the Department.

B. Quality Assurance Plan

The Quality Assurance Plan (QAP) must be implemented at the beginning of construction. Construction Quality Assurance (CQA) must include continuous site inspections by the CQA personnel. Geosynthetics and barrier soil layers must be inspected, tested, and certified by qualified CQA personnel separate from the owner/operator and contractor.

C. Liner Installation

Before installation of any type of liner system, the applicant must evaluate the impacts of climatic conditions, proposed installation procedures, and the proposed installation schedule on liner system integrity. Results and recommendations from the test pad program must be submitted to the Department for review and

approval. Liner systems may be installed only between April 15 and November 1, and only when the ambient temperature exceeds 32 degrees Fahrenheit, unless a specific cold weather installation plan is submitted to the Department for review and approval.

D. Changes from Approved Plans and Specifications

Prior to implementing any changes to the approved landfill design, the leachate management systems, or project specifications, the applicant must receive approval from the Department through an amendment or minor revision, or through a change order approval.

E. Weekly Inspection Reports

The CQA team responsible for construction inspection at the landfill shall keep daily and weekly construction inspection reports and provide a copy to the Department within one week after each construction week.

F. Photographic Documentation

In the final construction report, the applicant shall provide the Department with representative photographic documentation of each stage of construction.

G. Record Drawings

The applicant shall provide record drawings, signed and stamped by a State of Maine Licensed Professional Engineer, to the Department within 45 days after construction completion of each cell.

H. Final Construction Report and Commencement of Operations

The applicant shall submit a written request that the Department conduct an inspection of the completed construction for a finding of compliance with the facility license. The applicant may commence operations of the landfill upon Departmental approval or ten working days after submitting the written certification stating that the project was constructed in accordance with the approved plans and specifications, and after the Department conducts or waives the need for a final construction inspection. The Department may delay commencement of operations pending resolution of issues identified during its inspection and/or during review of the written certification.

The applicant shall submit a final construction report to the Department within 45 days following construction completion of each cell which includes the items specified in the Rules. The written certification is required as part of the final construction report, but may be submitted prior to the final report in order to expedite approval for commencement of operations.

The Board finds that the applicant must follow the applicable regulatory requirements of the Rules during construction.

36. OPERATIONS

The proposed expansion is subject to the regulatory requirements of 06-096 C.M.R. ch. 401, § 4 during landfill operations, as summarized below.

A. Operations Manual

The Operations Manual must be reviewed annually by the operator and updated as necessary. These updates shall be distributed to the entities holding certified copies, including the Department and key operating and management personnel of the landfill. The landfill operator shall familiarize operating personnel with relevant sections of the Operations Manual.

B. Operator Training and Certification Program

At least two key personnel must be trained in the operation of, and regulatory requirements for, the landfill and be certified as required by the Rules.

C. Operating Requirements

The policy and procedures utilized by JRL to meet the operating requirements in the Rules are addressed in the facility's Operations Manual. These operating requirements include, but are not limited to, updating the Operations Manual on an annual basis, accepting only wastes allowed by the facility's licenses and characterizing these wastes appropriately, and providing for facility inspection and maintenance on a regular basis. Requirements for utilization of an approved cell development plan, environmental monitoring and the appropriate installation of daily, intermediate and final cover are also outlined in the Operations Manual.

D. Annual Report

Pursuant to 38 M.R.S. § 1310-N(6-D) and as stated in 06-096 C.M.R ch. 401, §(4)(D), an Annual Report and fee shall be submitted to the Department in the

timeframe stated in the Rules, currently by April 30 of each year. The Annual Report shall contain the applicable information required by the Rules. The operator shall keep copies of the Annual Reports submitted to the Department throughout the operational and the post-closure care period of the landfill.

The Board finds that the applicant has submitted an Operations Manual for the proposed expansion in accordance with the applicable requirements of the Rules, as also discussed in Finding 34 of this license.

37. ACCEPTABLE WASTE AND OBW LIMIT

A. Acceptable Waste

JRL is currently licensed to accept non-hazardous waste generated within the State, including up to 81,000 tons of MSW a year until March 31, 2018 (license #S-020700-WD-BG-Z issued June 19, 2014). The proposed expansion will be licensed to accept similar waste types; however, the proposed expansion will be prohibited from accepting municipal solid waste, except MSW bypass material. For the purpose of this license, MSW bypass is defined as any MSW that is destined for disposal or processing at a solid waste incinerator, but that cannot be disposed of or processed at that incinerator because of the incinerator's malfunction, insufficient capacity, inability to process or burn, down-time, or any other comparable reason as approved by the Department.

Table 12 is a summary of the non-hazardous waste generated within the State currently allowed in the existing landfill (Volume IV of the application, Table 7-1, page 7-2) and also proposed for disposal in the expansion with the exception of MSW as referenced in the paragraph above.

Table 12: Summary of Acceptable Waste for Disposal in the Proposed Expansion

Air & Water Filtration Media	Leather Scrap Waste
Approved Landfill Utilization Wastes	Municipal Solid Waste (MSW)/MSW Bypass
Asbestos (non-friable)	Municipal Solid Waste Ash
Biomass Boiler Ash	Non-hazardous Chemical Related Products
Biomedical Incinerator Ash	Oversized Bulky Wastes
Burned Railroad Ties & Associated Ash	Pigeon Waste
Catch Basin Grit	Pulp & Paper Mill Sludge
Clean Wood Open Burn Ash	Sandblast Grit
Construction & Demolition Debris	Spoiled Foods
Dredged Spoils from Waterways	Sulfur Scrubbing Residue
Dried Paint Residue & Related Debris	Treated Biomedical Waste
Filter Press Cake & Collagen Scrapings	Urban Fill-type Soils

Fossil Fuel Boiler Ash	Virgin Petroleum Contaminated Soil & Debris
Gasoline Contaminated Soil & Debris, Surface Spill	Waste Oil Contaminated Soil & Debris (Oily Debris)
Gasoline Contaminated Soil & Debris, (UST)	Wastewater Treatment Plant Sludge
Grit Screening Waste	Water Treatment Plant Sludge
Laundry Sludge	

In addition to the above waste streams, JRL may accept individually approved wastes after obtaining the proper special waste licenses from the Department.

In accordance with 38 M.R.S. § 1310-N(11), a solid waste disposal facility owned by the State may not be licensed to accept waste that is not waste generated within the State. As set forth in 38 M.R.S. § 1310-N(11) "waste generated within the State" is defined as including "residue and bypass generated by incineration, processing and recycling facilities within the State or waste, whether generated within the State or outside of the State, if it is used for daily cover, frost protection or stability or is generated within 30 miles of the solid waste disposal facility."

During the hearing, intervenor Edward Spencer and a number of commenters at the public session voiced concerns that incinerators, and processing and recycling facilities are allowed to accept waste from out of state, and once the material is processed by these Maine facilities, the residue and bypass is then considered in-state waste that may be taken to JRL for operational use or disposal. Mr. Spencer and commenters raised concerns that waste with out-of-state point of origins would be allowed to be disposed in a state-owned landfill.

The Board finds that the definition of "waste generated within the State" applies to wastes to be disposed of in the proposed expansion. The Board has no authority to alter State statute.

The Board finds that all waste streams accepted at the facility must be characterized (i.e., tested) and accepted following the procedures in the facility's Solid Waste Characterization Plan. For actual delivery onto JRL's site, waste haulers must have the proper manifest documentation as required in the Operations Manual.

B. OBW Limit

Condition 3 of the PBD requires the applicant to comply with a Department-established OBW tonnage disposal limit, and any subsequent modification to this limit, for the proposed expansion. The PBD condition is stated in full in Finding 20 of this license.

Condition 4 of the PBD requires periodic independent third party audits of CDD processing operations that are anticipated to transport more than 10,000 tons of OBW to the proposed expansion on an annual basis, focusing on the nature and volume of processing residues sent to JRL for disposal. The third party audits are to be conducted by a qualified consultant selected by the Department in consultation with the affected CDD processing facilities and the applicant, with the applicant providing reimbursement for the cost of the audits. The first audit(s) is(are) to occur prior to the disposal of OBW from these processing facilities in the proposed expansion and at subsequent 2-year intervals, unless or until the Department approves their discontinuation. The PBD condition is stated in full in Finding 20 of this license.

The term OBW is not defined in regulation or statute; therefore, for the purpose of this licensing action, OBW refers to the standard industry meaning that includes large items that may be difficult to process, such as mattresses, furniture, appliances, and certain other components of demolition debris.

During the hearing, the applicant and the intervenors presenting testimony were asked to propose an OBW limit. The City of Old Town did not propose a limit. Intervenor Edward Spencer testified that he would need to perform calculations utilizing data from other waste disposal facilities and consider the population to determine a limit. Toni King, Regional Engineer for Casella Waste Systems, Inc.'s Eastern Region, initially testified that no OBW limit was necessary since circumstances related to OBW management have changed since the PBD was issued. Later in the hearing, Ms. King testified that if a limit was to be set, she suggested an OBW limit of 118,000 tons, based on the rounded 2011 amount of 99,000 tons and a 3% Consumer Price Index (CPI) annualized to current time. With respect to the amount of 60,000 tons, as listed in Finding 19, Table 6 of this license, Ms. King testified that 60,000 tons was used in the application for design purposes and was not a proposed OBW quantity limit.

In order to establish an appropriate OBW tonnage limit for the proposed expansion, the Board took into consideration the intent of the PBD condition, the expected operating conditions of the proposed expansion, currently available recycling options and potential future conditions. Table 13 below presents the actual data of OBW disposed at JRL over the last 5 years (excerpted from information submitted in the August 1, 2016 letter from Donald Meagher, NEWSME; note added for clarification).

Table 13: Historical Disposal of OBW at Juniper Ridge Landfill

Year	Generator	Tons	Generator	Tons	Generator	Tons	Generator	Tons	Total
2011	KTI Biofuels	97,584	MERC	1,129	PERC	174	-	-	98,887
2012	KTI Biofuels	62,945	MERC	1,700	PERC	44	-	-	64,689
2013	KTI Biofuels	29,873	MERC	126	PERC	24	ReEnergy	24,330	54,353
2014	-	-	-	-	-	-	ReEnergy	48,219	48,219
2015	-	-	-	-	-	-	ReEnergy	47,388	47,388

Note: From 2011 to 2012 operational efficiencies and recovery capability improvements occurred at the KTI Biofuels facility which reduced the volume of OBW sent to JRL.

The median disposal amount of OBW for the five years was determined to be 54,353 tons. The median CPI from this 5 year timeframe was determined to be 1.5% (the five-year period CPIs were 3.0% (2011), 1.7% (2012), 1.5% (2013) 0.8% (2014), and 0.7% (2015)). During hearing cross-examination, Ms. King noted that 10,000 tons of OBW from the PERC facility will likely need to be disposed of annually at JRL due to an operations change at PERC (based on current 2016 data). Utilizing this information, a calculation consisting of the median plus the estimated PERC amount multiplied by the median CPI was performed with a result of approximately 65,000 tons OBW [((54,353 + 10,000) x 1.015) = 65,000].

The Board finds that an OBW limit of 65,000 tons on an annual basis at the proposed expansion is consistent with the intent of Condition 3 of the PBD and is appropriate to meet the State's current OBW solid waste needs provided that the OBW limit is evaluated annually and adjusted as necessary based on current OBW recycling opportunities, economic factors, and other relevant factors at the time of the annual evaluation. If a limit adjustment is required, the OBW limit will be revised either through the provisions of 38 M.R.S. § 341-D(3) or a license application submitted by the applicant through the provisions of 38 M.R.S. § 344(9) and 06-096 C.M.R. chs. 2 and 400. The Board further finds that the Department will coordinate periodic independent third party audits of CDD processing operations that are anticipated to transport more than 10,000 tons of OBW to the proposed expansion on an annual basis consistent with Condition 4 of the PBD.

STATE OF MAINE, ACTING THROUGH	90	SOLID WASTE LICENSE,
THE BUREAU OF GENERAL SERVICES	)	NATURAL RESOURCES
OLD TOWN, PENOBSCOT COUNTY, ME	)	PROTECTION ACT, AND
JUNIPER RIDGE LANDFILL EXPANSION	)	WATER QUALITY CERTIFICATION
#S-020700-WD-BI-N and #L-19015-TG-D-N	)	
(APPROVAL WITH CONDITIONS)	)	NEW LICENSE

NATURAL RESOURCES PROTECTION ACT

38. NATURAL RESOURCES PROTECTION ACT AND WATER QUALITY CERTIFICATION

In accordance with the Natural Resources Protection Act, 38 M.R.S. § 480-D, the Department shall grant a permit when it finds that the applicant has demonstrated that the proposed activity meets the applicable standards including provisions pertaining to the following: existing scenic, aesthetic, recreational and navigational uses; soil erosion; harm to habitats and fisheries; interference with natural water flow; water quality; flooding; sand or gravel supply; and outstanding river segments. NRPA standards applicable to the proposed expansion are discussed in this Finding section.

To identify and assess impacts to protected natural resources, the applicant submitted a natural resources assessment for the expansion prepared by Stantec Consulting Services, Inc. (Stantec).

The natural resources assessment indicates that the proposed expansion will impact approximately 2.04 acres of primarily forested freshwater wetlands through direct filling and 0.1 acres of the critical terrestrial habitat of one significant vernal pool (SVP) due to clearing for a relocated perimeter fence and an electric line. The impacts to the NRPA regulated SVP were authorized in a permit-by-rule that was accepted by the Department on July 29, 2015 and are not further considered in this licensing proceeding. With the exception of the one vernal pool addressed in the permit-by-rule, the wetlands that will be impacted by the expansion are not Wetlands of Special Significance as defined in 06-096 C.M.R. ch. 310, § 4.

Stantec evaluated the functions and values of the impacted wetlands and prepared a Wetlands Compensation Plan which was submitted in support of its NRPA permit application. The Wetlands Compensation Plan also addresses 12 vernal pools within and adjacent to the expansion area which are regulated by the U.S. Army Corps of Engineers but which are not regulated by the Department under NRPA.

A. Existing Scenic, Aesthetic, Recreational, or Navigational Uses

Pursuant to 38 M.R.S. § 480-D(1), the applicant must demonstrate that the activity will not unreasonably interfere with the existing scenic, aesthetic, recreational or navigational uses of the protected natural resources. The Department's rule 06-096 C.M.R. ch. 315, guides the Department in its analysis of impacts to existing scenic and aesthetic uses resulting from activities in, on, over or adjacent to protected natural resources subject to NRPA.

In support of its application and in accordance with 06-096 C.M.R. ch. 315, the applicant submitted a copy of the Department's Visual Evaluation Field Survey Checklist as Appendix A to the NRPA application along with a description of the property and the proposed project. The applicant also submitted several photographs of the proposed project site including an aerial photograph. The Board visited the project site on June 23, 2016 to view the physical features of the site, including portions of the wetlands that will be filled by the expansion, and the nature of the surrounding area.

An unreasonable adverse visual impact is defined in 06-096 C.M.R. ch. 315, § 4 as one that is "expected to unreasonably interfere with the general public's visual enjoyment and appreciation of a scenic resource." The freshwater wetland impacted by the expansion does not meet the definition of a scenic resource as set forth in 06-096 C.M.R. ch. 315 § 10 in that it is not one of the listed scenic resources nor is it a wetland that is "visited by the general public, in part, for the use, observation, enjoyment and appreciation of its natural and cultural visual qualities."

Finding 10(C) of this license analyzes and makes findings on the proposed expansion's compliance with the scenic character criteria under the solid waste Rules.

There is no evidence of any existing recreational or navigational uses of the impacted wetlands.

Based upon the information in the record including the applicant's scenic assessment, photographs of the site, and the site visit, the Board finds that the proposed activity will not unreasonably interfere with existing scenic, aesthetic, recreational or navigational uses of the protected natural resource.

B. Soil Erosion

In accordance with 38 M.R.S. § 480-D(2), the applicant must demonstrate that the activity will not cause unreasonable erosion of soil or sediment nor unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment.

As discussed in Finding 14 of this license, the applicant conducted an assessment of surficial soils at the site and submitted an Erosion and Sedimentation Control Plan, dated July 2015, prepared by SME. The applicant proposes to install silt fence and other temporary erosion control measures, detention ponds and berms for each landfill cell prior to the construction of the cells. Once a cell has been

completed and filled with waste, the cell cover will be installed, and final stabilization measures will be taken. The applicant states that the design and implementation of all erosion control measures will follow the requirements of the solid waste Rules and will comply with Maine's Erosion and Sedimentation Control Best Management Practices.

Based upon the information in the record including the construction plan with phased development of landfill cells and the Erosion and Sedimentation Control Plan, the Board finds that the proposed expansion will not cause unreasonable erosion of soil or sediment nor unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment, as required by 38 M.R.S. § 480-D(2).

C. Habitat Considerations

Pursuant to 38 M.R.S. § 480-D(3), the applicant must demonstrate the activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life.

The expansion will impact 2.04 acres of primarily forested freshwater wetland due to filling. Impacts to these wetlands and associated compensation are discussed in Finding 38(F). Additionally, the proposed expansion is located approximately 800 feet from an unnamed intermittent brook, 950 feet from an unnamed tributary to Pushaw Stream, and approximately 2,350 feet from Judkins Brook. All of these streams are located in the watershed of the Penobscot River which contains Atlantic salmon, and Judkins Brook is located within federally mapped Critical Habitat for Atlantic salmon.

Intervenor Edward Spencer's expert witness, Dr. Steve Coghlan, testified that the expansion could negatively impact Atlantic salmon, Atlantic sturgeon, and shortnose sturgeon due, in part, to the potential for stormwater and leachate to contaminate adjacent waterways and ultimately the Penobscot River.

The applicant responded that its natural resources assessment prepared by Stantec inventoried and assessed potential impacts to natural resources at the site, including rare, threatened and endangered species. Stantec concluded that the project would not have an unreasonable adverse impact on these resources due in part to the location of the expansion relative to the protected resources, the design of the expansion, and management of stormwater and leachate.

Dr. Coghlan's concerns and the applicant's response are discussed further in Finding 9 of this license which is incorporated herein.

Additionally, Mr. Spencer commented that pumping groundwater to allow for construction will have an impact on the adjacent wetlands and Atlantic salmon habitat. Many of the wetlands surrounding the site are forested wetlands and their hydrology is not due to groundwater discharge, but rather results from surface water perched on the low permeability glacial till. Furthermore, the technical design of the underdrain system is that the underdrains (sand and piping) will collect and transport groundwater by gravity, not by active pumping, over portions of three cells where the bottom of the cell will be below the groundwater table. It is expected that the seepage into the underdrain will continue, but then will eventually diminish over time.

The Maine Department of Marine Resources (DMR) reviewed the proposed project and stated that it should not cause any significant adverse impact to Atlantic salmon or other marine resources.

The Maine Department of Inland Fisheries and Wildlife (MDIFW) reviewed the proposed project and stated that, with the exception of one SVP (impacts to which were authorized in the permit-by-rule), there are no other essential or significant wildlife habitats at the project site.

Based on the setback of the expansion from the streams, the evidence supplied by the applicant in its natural resources assessment and related expert testimony, and the review comments submitted by sister agencies DMR and MDIFW, the Board finds that the activity will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life pursuant to 38 M.R.S. § 480-D(3).

D. Water Quality Considerations

Pursuant to 38 M.R.S. § 480-D(4), the applicant must demonstrate that the activity will not unreasonably interfere with the natural flow of any surface or subsurface waters. Pursuant to 38 M.R.S. § 480-D(5) and Section 401 of the Federal Water Pollution Control Act, the applicant must demonstrate that the activity will not violate any state water quality law, including those governing the classification of the State's waters.

As set forth above, the expansion will be located approximately 800 feet from an unnamed intermittent brook, 950 feet from an unnamed tributary to Pushaw

Stream, and approximately 2,350 feet from Judkins Brook. Information in the record shows that the nearest mapped sand and gravel aquifer is located approximately one mile east of the landfill expansion area.

As discussed more fully in Findings 12, 14, and 15 of this license, the applicant submitted a Stormwater Management Plan and an Erosion and Sedimentation Control Plan, dated July 2015, prepared by SME to manage surface water runoff and minimize impacts to surface water quality from siltation. Additionally, the landfill expansion is designed in accordance with the Department's solid waste Rules to minimize the potential for contamination of groundwater. Leachate from the expansion will be collected, stored on-site, and trucked off-site to the MFGR, LLC wastewater treatment plant in Old Town which is licensed to accept the leachate. The project was reviewed by the Department's Division of Water Quality Management which stated that the treatment plant is currently operating in compliance with its license.

The Board finds that the proposed expansion meets state water quality law, including those governing the classification of the State's waters based on the location of the expansion relative to the protected natural resources, the existing and proposed Stormwater Management System, the Erosion and Sedimentation Control Plan, and the collection and subsequent treatment of the leachate at a licensed wastewater treatment facility.

E. Flooding

In accordance with 38 M.R.S. § 480-D(6), the applicant must demonstrate that the activity will not unreasonably cause or increase the flooding of the alteration area or adjacent properties.

As discussed in Finding 17, the expansion will not be located in a 100-year flood plain or restrict the flow of a 100-year flood. The applicant also submitted a Stormwater Management Plan which included pre- and post-development stormwater analyses up to and including a 25-year, 24-hour storm event which demonstrate that post-development peak flows will not exceed pre-development peak flows.

Based upon the location of the expansion outside the floodplain and the Stormwater Management Plan, the Board finds that the expansion will not unreasonably cause or increase the flooding of the alteration area or adjacent properties.

F. Wetlands and Waterbodies Protection Rules

The applicant proposes to directly alter 2.04 acres of primarily forested freshwater wetlands to construct the proposed landfill expansion. Including this proposed project and the previous projects on this site, the total cumulative amount of wetland alteration at the site will be 3.35 acres.

The Department's rule at 06-096 C.M.R. ch. 310 elaborates on the NRPA criteria for obtaining a permit. The rules guide the Department in its determination of whether a project's impacts would be unreasonable. A proposed project would generally be found to be unreasonable if it would cause a loss in wetland area, functions and values and there is a practicable alternative to the project that would be less damaging to the environment. Each application for a NRPA permit that involves a freshwater wetland alteration must provide an analysis of alternatives.

(1) Alternatives Analysis

The applicant provided an alternatives analysis (Volume V, Attachment 2 of the Application) which summarized the need for the project and examined alternatives to the selected project site and project design, including: development of alternative sites, a "no build" alternative, waste reduction/alternative waste management strategies, and alternative designs on-site that would impact less wetland area. The applicant stated that alternative State-owned landfill sites, such as Dolby in Millinocket and Carpenter Ridge in T2R8 NWP (currently undeveloped), and the one commercial landfill (Crossroads in Norridgewock) were not viable options because JRL was the only site which had a Public Benefit Determination. The applicant stated that the "no build/do nothing" option was not viable because existing landfills could not accommodate the anticipated waste volumes and a need for 9.35 million cubic yards of additional landfill capacity had already been documented and approved in the PBD for JRL. The alternatives analysis also considered waste management options (discussed in Findings 18 and 19 of this license). Finally, the analysis examined the placement of the expansion on the site and the design of the expansions cells in relationship to the existing waste disposal cells at JRL.

Intervenor Edward Spencer questioned whether the applicant would be required to demonstrate that the proposed expansion could not occur at another location, such as the state-owned Dolby Landfill in Millinocket or by development of the state-owned site at Carpenter Ridge. In response, the Board Chair ruled in the Third Procedural Order that since the Commissioner had issued a PBD for a 9.35 million cubic yard expansion

at JRL, consideration of alternative sites and the no-build alternative were not issues to be addressed in the current licensing proceeding. The Third Procedural Order states:

> The Applicant has received a Public Benefit Determination for the proposed expansion at the Juniper Ridge site and that determination was upheld by the Board on appeal. As stated in the Second Procedural Order, statute prohibits the Board from revisiting the Public Benefit Determination in this licensing proceeding (38 M.R.S. § 1310-N(3-A)(B)). Therefore, the Board will not allow testimony or cross-examination by the parties regarding the need for the proposed 9.35 million cubic yard expansion. Additionally, testimony that the State should seek to develop other landfill sites is not relevant to the current licensing proceeding. However, to the extent the Public Benefit Determination imposes conditions on any license that may be issued in this proceeding, including limits on the types and volumes of waste, those limits are arguably relevant and may be addressed in testimony and cross-examination (Third Procedural Order).

The Board finds that the amount of capacity needed and the general location of disposal were settled with the Commissioner's issuance of the PBD, leaving only the question of whether or not the proposed project could be located on the subject parcel and designed to avoid and minimize wetland impacts.

(2) Avoidance of On-Site Impacts

As discussed above, the applicant submitted an alternatives analysis for the proposed project dated July 2015. The applicant considered two other on-site designs for the JRL expansion, a 70-acre expansion which would have resulted in 4.5 acres of wetland impact and a 60-acre expansion which would have resulted in 3.4 acres of wetland impact. The design submitted for approval and which is the subject of this license will expand the solid waste footprint at JRL by approximately 54 acres and will directly impact 2.04 acres of freshwater wetlands. In its application, the applicant stated that it has located all roads, stormwater ponds, administrative buildings, and other infrastructure to avoid the greatest amount of wetland impacts. According to the applicant, in order to meet

the stated project purpose, some impacts to freshwater wetlands are unavoidable.

(3) Minimization of On-Site Impacts

In accordance with 06-096 C.M.R. ch. 310, § 5(B), the amount of freshwater wetland to be altered must be kept to the minimum amount necessary for meeting the overall purpose of the project. The applicant's design of the expansion utilizes upland areas for a majority of the expansion. The applicant proposes to build cells vertically, thereby minimizing the horizontal footprint and associated wetland impacts. Finally, additional capacity is obtained by utilizing the "in-fill" areas between existing landfill cells and the proposed expansion cells. The Board finds that the applicant's design minimizes impacts to wetlands to the greatest extent practicable.

(4) Compensation

In accordance with 06-096 C.M.R. ch. 310, § 5(C), compensation is the off-setting of a lost wetland function with a function of equal or greater value. The goal of compensation is to achieve no net loss of freshwater wetland functions and values. The amount of compensation required to replace lost functions depends on a number of factors including: the size of the alteration activity, the functions of the wetlands to be altered, the type of compensation to be used, and the characteristics of the compensation site. When wetland preservation is the type of compensation proposed, Department rules generally require a ratio of 8:1 (area preserved to area impacted). As stated previously, the applicant's Wetlands Compensation Plan was designed to address both NRPA and Corps requirements.

The applicant proposes to preserve a 266-acre area on the same parcel as the landfill expansion to address NRPA compensation requirements as well as Corps compensation requirements. The proposed preservation area is adjacent to an existing 16-acre preservation area along Judkins Brook. The functions and values of the freshwater wetlands on the parcel were evaluated by the applicant using the U. S. Army Corps of Engineers Highway Methodology (September, 1999). The functions and values of the freshwater wetlands proposed to be impacted by the project include flood flow alteration, nutrient removal, sediment and toxicant removal, and wildlife habitat. There are no SVPs (other than the one which was the

subject of the permit-by-rule) or other significant wildlife habitats in the wetlands to be impacted.

The preservation area contains 57 acres of freshwater wetland, 25 vernal pools, and upland habitat. Three of the vernal pools are SVPs and eight others are highly functioning vernal pools that met the biological criteria to be considered an SVP, but did not meet all of the necessary criteria. The functions and values of the preservation area include sediment and toxicant removal, flood flow alteration, nutrient removal, and wildlife habitat. Bryan Emerson, professional wetland scientist and witness for the applicant, testified that the applicant has proposed compensation in excess of that required by both NRPA and the Corps. NRPA requires approximately 16.3 acres of wetland compensation for the 2.04 acres of direct impact to wetlands. The Corps compensation requirements differ from those of the Department and require a greater ratio of acres preserved to acre impacted.

The applicant proposes to preserve the area through the use of a Declaration of Covenants and Restrictions (Declaration) and submitted proposed language that meets Department standards. The City of Old Town has agreed to be the Third Party under the Declaration, with third party rights of administration and enforcement. Prior to the start of construction, the applicant must record the Declaration in the Registry of Deeds and must submit a copy of the recorded deed to the Department's Bureau of Land Resources within 60 days of recording.

Based on the Public Benefit Determination, the applicant's alternatives analysis, the project's design, and the land preservation proposal, the Board finds that the applicant has avoided and minimized freshwater wetland impacts to the greatest extent practicable, and has provided compensation for wetland impacts in accordance with Department rules and in exceedance of NRPA requirements. The Board further finds that the proposed project represents the least environmentally damaging alternative that meets the overall purpose of the project provided that, prior to construction, the applicant records the Declaration of Covenants and Restrictions and submits a copy to the Department's Bureau of Land Resources as described above.

BASED on the above Findings of Fact, and subject to the Conditions listed below, the Board makes the following CONCLUSIONS pursuant to 38 M.R.S. §§ 1310 to 1319-Y, 38 M.R.S. § 2101, and the applicable Department Rules:

STATE OF MAINE, ACTING THROUGH	99	SOLID WASTE LICENSE,
THE BUREAU OF GENERAL SERVICES	)	NATURAL RESOURCES
OLD TOWN, PENOBSCOT COUNTY, ME	)	PROTECTION ACT, AND
JUNIPER RIDGE LANDFILL EXPANSION	)	WATER QUALITY CERTIFICATION
#S-020700-WD-BI-N and #L-19015-TG-D-N	)	
(APPROVAL WITH CONDITIONS)	)	NEW LICENSE

1. The applicant has submitted evidence that the proposed expansion will not pollute any water of the State, contaminate the ambient air, constitute a hazard to health or welfare, or create a nuisance pursuant to 38 M.R.S. § 1310-N(1)(A) and 06-096 C.M.R. ch. 400, § 3(D).

2. The applicant has complied with the public and local participation and notification requirements pursuant to 38 M.R.S. §§ 1310-S(1) and 1310-N(12) and 06-096 C.M.R. ch. 2, §§ 10, 13, and 14.

3. The applicant has demonstrated sufficient title, right, or interest in all of the property which is proposed for development or use pursuant to 06-096 C.M.R. ch. 400, § 4(A).

4. The applicant has provided a sufficient demonstration of financial ability and assurance and technical ability for the permitting, design, construction, operation, closure, and post-closure care of the proposed landfill expansion pursuant to 38 M.R.S. §§ 1310-N (2-F)(A) and § 1310-Y, and 06-096 C.M.R. ch. 400, §§ 4(B)(1) and 4(C)(1), provided NEWSME submits the appropriate financial assurance package updates in accordance with the Rules on an annual basis.

5. The applicant has provided a civil/criminal disclosure statement demonstrating that the entities are not in violation of environmental or criminal law pursuant to 38 M.R.S. § 1310-N(7) and 06-096 C.M.R. ch. 400, § 4(C)(1)(b) and § 12.

6. The applicant has provided sufficient provisions for safe and uncongested traffic movement of all types into, out of, and within the proposed landfill expansion pursuant to 38 M.R.S. § 1310-N (2-F)(B) and 06-096 C.M.R. ch. 400, § 4(D)(1); provided the facility continues to encourage waste haulers to use I-95 as a primary hauling route.

7. The applicant has provided sufficient provisions for fitting the proposed landfill expansion harmoniously into the existing natural environment; has provided buffer strips of sufficient size and quality to adequately protect aquatic and wildlife habitat and the natural environment; and will not unreasonably adversely affect protected natural resources and rare, threatened and endangered plant and animal species pursuant to 38 M.R.S. § 1310-N(2-F)(C) and 06-096 C.M.R. ch. 400, § 4(E)(1).

8. The applicant has sufficiently demonstrated that the proposed expansion will not unreasonably adversely affect existing uses and scenic character, including bird hazard to aircraft, historical sites, established public viewing areas, excessive noise at the property boundary or at any protected location, or existing uses of neighboring property pursuant to 38 M.R.S. § 1310-N(2-F)(C) and 06-096 C.M.R. ch. 400, § 4(F)(1); provided equipment use is restricted in the operating hour of 6:00 am to 7:00 am to only equipment

with a combined sound level of 77 dBA at 50 feet or less if within 60 feet of the western solid waste boundary (approximately 480 feet from the western property line).

9. The applicant has sufficiently demonstrated that the proposed expansion will not unreasonably adversely affect air quality pursuant to 38 M.R.S. § 1310-N(2-F)(C) and 06-096 C.M.R. ch. 400, § 4(G)(1).

10. The applicant has sufficiently demonstrated that the proposed expansion will not unreasonably adversely affect water quality or cause an unreasonable threat to the quality of a classified body of surface water pursuant to 38 M.R.S. §§ 1310-N(2-F)(C) and 1310-N(1-A) and 06-096 C.M.R. ch. 400, § 4(H)(1).

11. The applicant has sufficiently demonstrated that the proposed expansion will not unreasonably adversely affect other natural resources in the municipality or in neighboring municipalities pursuant to 38 M.R.S. § 1310-N(2-F)(C) and 06-096 C.M.R. ch. 400, § 4(I)(1).

12. The applicant has sufficiently demonstrated that the proposed expansion will not: overlie any significant sand and gravel aquifers; pose an unreasonable threat to the quality of a significant sand and gravel aquifer; pose an unreasonable threat to the quality of an underlying fractured bedrock aquifer, or pose an unreasonable risk that a discharge to a significant ground water aquifer will occur, pursuant to 38 M.R.S. §§ 1310-N(2-A) and 1310-N(2-F)(E), and 06-096 C.M.R. ch. 400, § 4(K)(1).

13. The applicant has made sufficient provisions for adequate utilities, including adequate water supplies and appropriate sanitary wastewater disposal, and sufficiently demonstrated that the facility will not have an unreasonable adverse effect on existing or proposed utilities in the municipality or area served by those utilities, pursuant to 38 M.R.S. § 1310-N(2-F)(F) and 06-096 C.M.R. ch. 400, § 4(L)(1).

14. The applicant has sufficiently demonstrated that the proposed expansion will be located on soils types suitable to the nature of the undertaking and the facility will not cause unreasonable erosion of soil or sediment pursuant to 38 M.R.S. §§ 1310-N(2-F)(D) and 1310-N(1-A)(A) and 06-096 C.M.R. ch. 400, § (4)(J)(1).

15. The applicant has sufficiently demonstrated that the proposed expansion will not unreasonably cause or increase flooding on-site or on adjacent properties nor create an unreasonable flood hazard to a structure pursuant to 38 M.R.S. §§ 1310-N(2-F)(G) and 06-096 C.M.R. ch. 400, § 4(M)(1).

16. The applicant has sufficiently demonstrated that the purpose and practices for the proposed expansion are consistent with the solid waste management hierarchy pursuant

to 38 M.R.S. §§ 2101 and 1310-N(1)(D) and 06-096 C.M.R. ch. 400, § 4(N)(1), provided that a summary of continued efforts to meet the hierarchy and relevant supporting data are submitted annually in the Annual Report.

17. The applicant has sufficiently demonstrated that the proposed expansion will accept solid waste that is subject to recycling and source reduction programs, voluntary or otherwise, at least as effective as those in the statute and other provisions of State law; the volume of the waste and the risks related to its handling and disposal have been reduced to the maximum practical extent by recycling and source reduction prior to being landfilled or incinerated; and the applicant has shown consistency with the recycling provisions of the State plan pursuant to 38 M.R.S. § 1310-N(5-A) and 06-096 C.M.R. ch. 400, § 6(B).

18. The applicant is exempt from the liability insurance requirements of 06-096 C.M.R. ch. 400, § 10.

19. The applicant has clearly and convincingly demonstrated the technical equivalency of placing a barrier soil layer in a 12-inch lift thickness compared to the required 9-inch lift thickness, provided that a test pad program is undertaken during construction of each cell of the proposed expansion as described in the application and Finding 28(L) of this license to demonstrate that the required performance criteria have been met and the results are submitted to the Department at least 7 days prior to full-scale construction. If the applicant cannot demonstrate technical equivalency, the maximum barrier soil lift thickness will remain 9 inches.

20. The applicant has completed a site assessment report that adequately supports the design of the proposed expansion and will conduct water quality monitoring in accordance with the Rules.

21. The applicant has submitted a quality assurance plan and construction contract bid documents including drawings, technical specifications, and contract administrative documents for Cell 11 of the proposed expansion in accordance with 06-096 C.M.R. ch. 401, § 2 (I) and (J).

22. The applicant has proposed an expansion design meeting the requirements of the Rules, provided that, an engineering report, construction contract bid documents, including drawings, technical specifications, and contract administrative documents, a quality assurance plan and erosion and sedimentation control and stormwater management plans are submitted to the Department for review and approval at least four months prior to the commencement of construction activities within each subsequent cell (Cells 12 through 16) of the proposed expansion; and the applicant maintains a valid leachate disposal contract(s) with licensed waste water treatment facility(ies) for the treatment and disposal of leachate from the proposed expansion.

23. The applicant has submitted a phased final cover system meeting the requirements of the Rules, provided that an engineering report, construction contract bid documents, including drawings, technical specifications, and contract administrative documents, and a quality assurance plan and erosion and sedimentation control and stormwater management plans are submitted to the Department for review and approval at least four months prior to the proposed application of a phased final cover system.

24. The applicant has submitted an Operations Manual that meets the operating requirements of 06-096 C.M.R. ch. 401, § 2(L), provided that the Operations Manual is reviewed annually and updated as necessary with the Annual Report.

25. The PBD partial approval issued by the Commissioner in 2012 requires that an annual limit be established in this license on the tonnage of OBW that may be disposed of in the proposed expansion, with future review and potential subsequent modification to the OBW limit, and established provisions for the independent third party audits of CDD processing operations that are anticipated to transport more than 10,000 tons of OBW to the proposed expansion for disposal on an annual basis.

BASED on the above Findings of Fact, and subject to the Conditions listed below, the Board makes the following CONCLUSIONS pursuant to 38 M.R.S. §§ 480-A through 480-JJ, Section 401 of the Federal Water Pollution Control Act, and the applicable Department rules:

26. The applicant has sufficiently demonstrated that the proposed expansion will not unreasonably interfere with existing scenic, aesthetic, recreational or navigational uses pursuant to pursuant to 38 M.R.S. § 480-D(1).

27. The applicant has sufficiently demonstrated that the proposed expansion will not cause unreasonable erosion of soil or sediment nor unreasonably inhibit the natural transfer of soil from the terrestrial to the marine or freshwater environment pursuant to 38 M.R.S. § 480-D(2).

28. The applicant has sufficiently demonstrated that the proposed expansion will not unreasonably harm any significant wildlife habitat, freshwater wetland plant habitat, threatened or endangered plant habitat, aquatic or adjacent upland habitat, travel corridor, freshwater, estuarine or marine fisheries or other aquatic life pursuant to 38 M.R.S. § 480-D(3), provided the applicant records the Declaration of Covenants and Restrictions as described in Finding 38(F) of this license above.

29. The applicant has sufficiently demonstrated that the proposed expansion will not unreasonably interfere with the natural flow of any surface or subsurface waters pursuant to 38 M.R.S. § 480-D(4).

30. The applicant has sufficiently demonstrated that the proposed expansion will not violate any state water quality law, including those governing the classification of the State's waters pursuant to 38 M.R.S. § 480-D(5) and Section 401 of the Federal Water Pollution Control Act.

31. The applicant has sufficiently demonstrated that the proposed expansion will not unreasonably cause or increase the flooding of the alteration area or adjacent properties pursuant to 38 M.R.S. § 480-D(6).

THEREFORE, the Board APPROVES the noted applications of the applicant, SUBJECT TO THE ATTACHED CONDITIONS, and all applicable standards and regulations:

1. The Standard Conditions of Approval for Solid Waste and NRPA, copies attached.

2. Severability. The invalidity or unenforceability of any provisions, or part thereof, of this license shall not affect the remainder of the provision or any other provision. This license shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

3. Soil Erosion. The applicant shall take all necessary actions to ensure that its activities or those of its agents do not result in unnecessary or noticeable erosion of soils on site during construction and operation of the landfill expansion.

4. Financial Assurance. The applicant shall submit the appropriate financial assurance package updates in accordance with the Rules on an annual basis, including the most recent surety bond documentation.

5. New Cell Construction Submittals. At least 4 months prior to new cell construction and related infrastructure, the applicant must submit the detailed design package for the Department's review and approval. The submittal shall contain the information required by the Rules, including, but not limited to an engineering report, construction contract bid documents consisting of technical specifications, drawings and contract administrative documents, a quality assurance plan and erosion and sedimentation control and stormwater management plans. If the Rules applicable to any aspect of the design and construction of the landfill expansion and its ancillary structures change during the development of the proposed expansion, the applicant shall address the new requirements in subsequent pertinent submittals.

6. Equipment Use - Noise Limitation. From the hour of 6:00 am to 7:00 am, the applicant shall limit equipment use within 60 feet of the western solid waste boundary

(approximately 480 feet from the western property line) to equipment with a combined sound level of 77 dBA at 50 feet or less.

7. Hauler Policy. The applicant shall continue its policy of encouraging hauling trucks to utilize I-95 to reduce use of the Bennoch Road (Route 16).

8. Leachate Disposal Contracts. In accordance with the Rules, the applicant shall maintain valid leachate disposal contract(s) with licensed waste water treatment facility(ies) for the treatment and disposal of leachate from the proposed expansion. A contingency plan for leachate disposal limitations at contracted treatment facilities shall be in place, including a letter of intent or service contracts for such proposed contingencies. Subsequent updates to the leachate disposal documentation shall be submitted to the Department to demonstrate compliance with the leachate management requirements of the Rules.

9. Liner Action Plan (LAP). The LAP shall initially consist of two-tiered action leakage rates of 20 and 100 gallons per acre per day, requiring notification and follow-up interactions with the Department to determine the appropriate response action. Specific conductance shall be utilized as the secondary approach for determining additional response action. As the proposed expansion is developed and upon submittal of actual field data, the applicant may request revisions to the LAP through Operations Manual updates requiring Department approval through the Annual Report.

10. Acceptable Waste

A. In the landfill expansion, the applicant may accept the same non-hazardous waste generated within the State allowed in the existing landfill and under the previously issued waste stream licenses for the facility, with the exception of MSW.

B. The applicant is prohibited from accepting MSW in the landfill expansion. MSW bypass may be accepted in accordance with Condition 11 of this license.

C. OBW disposal at the proposed landfill expansion shall be limited pursuant to Condition 12 of this license.

D. Prior to accepting any waste for disposal not listed or referenced in the application and previously licensed, the applicant shall submit an application for the new waste to the Department for review and approval.

E. Allowable wastes shall be accepted at the landfill expansion in accordance with the facility's Solid Waste Characterization Plan and regulatory and statutory requirements.

11. MSW Bypass

A. The applicant shall not dispose of any unprocessed MSW from any source other than MSW bypass from MSW incinerators located in Maine.

B. The applicant shall not accept MSW bypass from an incinerator without verifiable authorization from the owner/operator of an incinerator that a MSW bypass event has been called.

C. The applicant shall notify the Department within 24 hours if a MSW bypass event continues from a particular incinerator for a period exceeding 2 days, and provide the reason for the MSW bypass event.

12. OBW

A. The applicant shall be restricted to an OBW disposal limit of 65,000 tons on an annual basis in the proposed expansion.

B. No OBW from the CDD processing operations subject to audit shall be disposed in the proposed expansion prior to the first independent third party audit of CDD processing operations conducted as set forth in Condition 12(D) of this license, unless otherwise approved by the Department.

C. The OBW limit shall be evaluated annually by the Department and modified as needed based on current OBW recycling opportunities, economic factors, and other relevant factors. Modification of the OBW limit will be accomplished either through a license modification process pursuant to 38 M.R.S. § 341-D(3) or a license application submitted by the applicant pursuant to 38 M.R.S. § 344(9) and 06-096 C.M.R. chs. 2 and 400.

D. NEWSME shall reimburse the Department for periodic independent third party audits of CDD processing operations that are anticipated to transport more than 10,000 tons of OBW to the expansion for disposal on an annual basis. The audits shall be conducted to verify the results of the demonstrations required under the provisions of *Processing Facilities,* 06-096 C.M.R. ch. 409, § 2(C), focused on the nature and volume of processing residues being sent to the JRL expansion for disposal. The independent third party audits shall be conducted by a qualified consultant selected by the Department in consultation with the affected CDD processing facilities and NEWSME. The first such audit(s) shall occur prior to the disposal of OBW from these processing facilities to the proposed expansion,

unless otherwise approved by the Department. Audits will be conducted at 2-year intervals, unless or until the Department approves their discontinuation.

13. Monthly Activity Reports. Monthly activity reports shall be provided to the Department and include the quantities of the various waste types, and their sources, delivered to the proposed expansion.

14. Annual Reports

In addition to the specific requirements set forth in the Rules, the applicant shall include the following in the facility's annual reports submitted to the Department:

A. The amount of unprocessed MSW bypass received at the proposed expansion from each of the approved sources.

B. A summary of the steps taken by the facility in the reporting year to continue to meet the hierarchy, including relevant metrics to evaluate effectiveness (i.e., tons of material diverted from landfill disposal by Casella companies; tons of materials reused, reduced, recycled at the landfill); a description of ongoing efforts to increase the effectiveness of these programs/efforts; and any additional pertinent hierarchy-related information.

C. A geotechnical report, including a summary of the geotechnical inspections; the annual review of waste types, quantities, and location of waste placement; the evaluation of pore pressure data; and the review of site aerial topographic surveys.

15. EMP - Ground Water Quality and Flow. The applicant shall provide for an annual assessment of ground water quality and flow directions as the proposed expansion is developed through updates to the EMP which shall occur on an ongoing basis and in accordance with Department recommendations.

16. Construction Requirements. The applicant shall meet the construction requirements of 06-096 C.M.R. ch. 401, § 3 for the proposed expansion, including, but not limited to: implementing the Quality Assurance Plan; meeting liner installation requirements; receiving approval from the Department for changes to the approved plans and specifications; and documenting and reporting appropriately, including submittal of a final construction report. At least 7 days prior to full scale barrier soil construction, the applicant shall submit the results of a test pad to demonstrate the technical equivalency of placing barrier soil in a 12-inch lift thickness compared to a 9-inch lift thickness. If the applicant cannot demonstrate technical equivalency, the maximum barrier soil lift thickness shall remain 9 inches.

STATE OF MAINE, ACTING THROUGH THE BUREAU OF GENERAL SERVICES OLD TOWN, PENOBSCOT COUNTY, ME JUNIPER RIDGE LANDFILL EXPANSION #S-020700-WD-BI-N and #L-19015-TG-D-N (APPROVAL WITH CONDITIONS)	107)))))	SOLID WASTE LICENSE, NATURAL RESOURCES PROTECTION ACT, AND WATER QUALITY CERTIFICATION NEW LICENSE

17. Operating Requirements. The applicant shall meet the operating requirements of 06-096 C.M.R. ch. 401, § 4 for the landfill expansion, including, but not limited to: reviewing and updating the Operations Manual as applicable; training and certifying key personnel; operating the facility per the Rule requirements; and submitting an Annual Report and associated fee.

18. Federal Requirements - LFG Collection and Control System. The applicant shall meet the applicable requirements of 40 CFR Part 60, Subpart XXX for the LFG collection and control system for air emissions minimization and odor control.

19. Phased Final Cover. The applicant shall submit the engineering report, construction contract bid documents, consisting of technical specifications, drawings, and contract administrative documents, a quality assurance plan and erosion and sedimentation control and stormwater management plans for the placement of phased final cover to the Department for its review and approval at least 4 months prior to each proposed application of final cover.

20. Declaration of Covenants and Restrictions. Prior to the start of construction, the applicant shall record the Declaration of Covenants and Restrictions for the preservation area in the Registry of Deeds and shall submit a copy of the recorded deed to the Department's Bureau of Land Resources within 60 days of recording.

21. The Findings of Fact, Conclusions and Conditions remain as approved in Department license #L-19015-31-A-M dated August 24, 1995, and subsequent Licenses to date.

DONE AND DATED AT AUGUSTA, MAINE THIS 1st DAY OF June, 2017.

BOARD OF ENVIRONMENTAL PROTECTION

BY: _____
James W. Parker, Board Chair and Presiding Officer

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

Date of initial receipt of application: July 21, 2015
Date of application acceptance: August 7, 2016 (solid waste); July 31, 2016 (NRPA)

Date filed with the Board of Environmental Protection:

Appendix A

STANDARD CONDITIONS
TO ALL SOLID WASTE LANDFILL LICENSES

STRICT CONFORMANCE WITH THE STANDARD AND SPECIAL CONDITIONS OF THIS APPROVAL IS NECESSARY FOR THE PROJECT TO MEET THE STATUTORY CRITERIA FOR APPROVAL. VIOLATIONS OF THE CONDITIONS UNDER WHICH A LICENSE IS ISSUED SHALL CONSTITUTE A VIOLATION OF THAT LICENSE AGAINST WHICH ENFORCEMENT ACTION MAY BE TAKEN, INCLUDING REVOCATION.

1. **Approval of Variations from Plans.** The granting of this approval is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted and affirmed by the license. Any consequential variation from these plans, proposals, and supporting documents is subject to review and approval prior to implementation.

2. **Compliance with All Applicable Laws.** The licensee shall secure and comply with all applicable federal, state, and local licenses, permits, authorizations, conditions, agreements, and orders prior to or during construction and operation, as appropriate.

3. **Compliance with All Terms and Conditions of Approval.** The licensee shall submit all reports and information requested by the Department demonstrating that the licensee has complied or will comply with all terms and conditions of this approval. All preconstruction terms and conditions must be met before construction begins.

4. **Transfer of License.** The licensee may not transfer the solid waste facility license or any portion thereof without approval of the Department.

5. **Initiation of Construction or Development Within Two Years.** If the construction or operation of the solid waste facility is not begun within two years of issuance of within 2 years after any administrative and judicial appeals have been resolved, the license lapses and the licensee must reapply to the Department for a new license unless otherwise approved by the Department.

6. **Approval Included in Contract Bids.** A copy of the approval must be included in or attached to all contract bid specifications for the solid waste facility.

7. **Approval Shown to Contractors.** Contractors must be shown the license by the licensee before commencing work on the solid waste facility.

8. **Background of key individuals.** A licensee may not knowingly hire as an officer, director or key solid waste facility employee, or knowingly acquire an equity interest or debt interest in, any person convicted of a felony or found to have violated a State or federal environmental law or rule without first obtaining the approval of the Department.

9. **Fees.** The licensee must comply with annual license and annual reporting fee requirements of the Department's rules.

10. **Recycling and Source Reduction Determination for Solid Waste Disposal Facilities.** This condition does not apply to the expansion of a commercial solid waste disposal facility that accepts only special waste for landfilling.

The solid waste disposal facility shall only accept solid waste that is subject to recycling and source reduction programs, voluntary or otherwise, at least as effective as those imposed by 38 M.R.S. Ch. 13.

11. **Deed Requirements for Solid Waste Disposal Facilities.** Whenever any lot of land on which an active, inactive, or closed solid waste disposal facility is located is being transferred by deed, the following must be expressly stated in the deed:

A. The type of facility located on the lot and the dates of its establishment and closure.

B. A description of the location and the composition, extent, and depth of the waste deposited.

C. The disposal location coordinates of asbestos wastes must be identified.

Natural Resources Protection Act (NRPA)
Standard Conditions

THE FOLLOWING STANDARD CONDITIONS SHALL APPLY TO ALL PERMITS GRANTED UNDER THE NATURAL RESOURCES PROTECTION ACT, 38 M.R.S.A. § 480-A ET SEQ., UNLESS OTHERWISE SPECIFICALLY STATED IN THE PERMIT.

A. Approval of Variations From Plans. The granting of this permit is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted and affirmed to by the applicant. Any variation from these plans, proposals, and supporting documents is subject to review and approval prior to implementation.

B. Compliance With All Applicable Laws. The applicant shall secure and comply with all applicable federal, state, and local licenses, permits, authorizations, conditions, agreements, and orders prior to or during construction and operation, as appropriate.

C. Erosion Control. The applicant shall take all necessary measures to ensure that his activities or those of his agents do not result in measurable erosion of soils on the site during the construction and operation of the project covered by this Approval.

D. Compliance With Conditions. Should the project be found, at any time, not to be in compliance with any of the Conditions of this Approval, or should the applicant construct or operate this development in any way other the specified in the Application or Supporting Documents, as modified by the Conditions of this Approval, then the terms of this Approval shall be considered to have been violated.

E. Time frame for approvals. If construction or operation of the activity is not begun within four years, this permit shall lapse and the applicant shall reapply to the Board for a new permit. The applicant may not begin construction or operation of the activity until a new permit is granted. Reapplications for permits may include information submitted in the initial application by reference. This approval, if construction is begun within the four-year time frame, is valid for seven years. If construction is not completed within the seven-year time frame, the applicant must reapply for, and receive, approval prior to continuing construction.

F. No Construction Equipment Below High Water. No construction equipment used in the undertaking of an approved activity is allowed below the mean high water line unless otherwise specified by this permit.

G. Permit Included In Contract Bids. A copy of this permit must be included in or attached to all contract bid specifications for the approved activity.

H. Permit Shown To Contractor. Work done by a contractor pursuant to this permit shall not begin before the contractor has been shown by the applicant a copy of this permit.

DEP INFORMATION SHEET

Appealing a Department Licensing Decision

Dated: March 2012 **Contact: (207) 287-2811**

SUMMARY

There are two methods available to an aggrieved person seeking to appeal a licensing decision made by the Department of Environmental Protection's ("DEP") Commissioner: (1) in an administrative process before the Board of Environmental Protection ("Board"); or (2) in a judicial process before Maine's Superior Court. An aggrieved person seeking review of a licensing decision over which the Board had original jurisdiction may seek judicial review in Maine's Superior Court.

A judicial appeal of final action by the Commissioner or the Board regarding an application for an expedited wind energy development (35-A M.R.S.A. § 3451(4)) or a general permit for an offshore wind energy demonstration project (38 M.R.S.A. § 480-HH(1)) or a general permit for a tidal energy demonstration project (38 M.R.S.A. § 636-A) must be taken to the Supreme Judicial Court sitting as the Law Court.

This INFORMATION SHEET, in conjunction with a review of the statutory and regulatory provisions referred to herein, can help a person to understand his or her rights and obligations in filing an administrative or judicial appeal.

I. ADMINISTRATIVE APPEALS TO THE BOARD

LEGAL REFERENCES

The laws concerning the DEP's *Organization and Powers*, 38 M.R.S.A. §§ 341-D(4) & 346, the *Maine Administrative Procedure Act*, 5 M.R.S.A. § 11001, and the DEP's *Rules Concerning the Processing of Applications and Other Administrative Matters* ("Chapter 2"), 06-096 CMR 2 (April 1, 2003).

HOW LONG YOU HAVE TO SUBMIT AN APPEAL TO THE BOARD

The Board must receive a written appeal within 30 days of the date on which the Commissioner's decision was filed with the Board. Appeals filed after 30 calendar days of the date on which the Commissioner's decision was filed with the Board will be rejected.

HOW TO SUBMIT AN APPEAL TO THE BOARD

Signed original appeal documents must be sent to: Chair, Board of Environmental Protection, c/o Department of Environmental Protection, 17 State House Station, Augusta, ME 04333-0017; faxes are acceptable for purposes of meeting the deadline when followed by the Board's receipt of mailed original documents within five (5) working days. Receipt on a particular day must be by 5:00 PM at DEP's offices in Augusta; materials received after 5:00 PM are not considered received until the following day. The person appealing a licensing decision must also send the DEP's Commissioner a copy of the appeal documents and if the person appealing is not the applicant in the license proceeding at issue the applicant must also be sent a copy of the appeal documents. All of the information listed in the next section must be submitted at the time the appeal is filed. Only the extraordinary circumstances described at the end of that section will justify evidence not in the DEP's record at the time of decision being added to the record for consideration by the Board as part of an appeal.

WHAT YOUR APPEAL PAPERWORK MUST CONTAIN

Appeal materials must contain the following information at the time submitted:

1. *Aggrieved Status*. The appeal must explain how the person filing the appeal has standing to maintain an appeal. This requires an explanation of how the person filing the appeal may suffer a particularized injury as a result of the Commissioner's decision.
2. *The findings, conclusions or conditions objected to or believed to be in error.* Specific references and facts regarding the appellant's issues with the decision must be provided in the notice of appeal.
3. *The basis of the objections or challenge.* If possible, specific regulations, statutes or other facts should be referenced. This may include citing omissions of relevant requirements, and errors believed to have been made in interpretations, conclusions, and relevant requirements.
4. *The remedy sought.* This can range from reversal of the Commissioner's decision on the license or permit to changes in specific permit conditions.
5. *All the matters to be contested*. The Board will limit its consideration to those arguments specifically raised in the written notice of appeal.
6. *Request for hearing.* The Board will hear presentations on appeals at its regularly scheduled meetings, unless a public hearing on the appeal is requested and granted. A request for public hearing on an appeal must be filed as part of the notice of appeal.
7. *New or additional evidence to be offered.* The Board may allow new or additional evidence, referred to as supplemental evidence, to be considered by the Board in an appeal only when the evidence is relevant and material and that the person seeking to add information to the record can show due diligence in bringing the evidence to the DEP's attention at the earliest possible time in the licensing process or that the evidence itself is newly discovered and could not have been presented earlier in the process. Specific requirements for additional evidence are found in Chapter 2.

OTHER CONSIDERATIONS IN APPEALING A DECISION TO THE BOARD

1. *Be familiar with all relevant material in the DEP record.* A license application file is public information, subject to any applicable statutory exceptions, made easily accessible by DEP. Upon request, the DEP will make the material available during normal working hours, provide space to review the file, and provide opportunity for photocopying materials. There is a charge for copies or copying services.
2. *Be familiar with the regulations and laws under which the application was processed, and the procedural rules governing your appeal.* DEP staff will provide this information on request and answer questions regarding applicable requirements.
3. *The filing of an appeal does not operate as a stay to any decision.* If a license has been granted and it has been appealed the license normally remains in effect pending the processing of the appeal. A license holder may proceed with a project pending the outcome of an appeal but the license holder runs the risk of the decision being reversed or modified as a result of the appeal.

WHAT TO EXPECT ONCE YOU FILE A TIMELY APPEAL WITH THE BOARD

The Board will formally acknowledge receipt of an appeal, including the name of the DEP project manager assigned to the specific appeal. The notice of appeal, any materials accepted by the Board Chair as supplementary evidence, and any materials submitted in response to the appeal will be sent to Board members with a recommendation from DEP staff. Persons filing appeals and interested persons are notified in advance of the date set for Board consideration of an appeal or request for public hearing. With or without holding a public hearing, the Board may affirm, amend, or reverse a Commissioner decision or remand the matter to the Commissioner for further proceedings. The Board will notify the appellant, a license holder, and interested persons of its decision.

II. JUDICIAL APPEALS

Maine law generally allows aggrieved persons to appeal final Commissioner or Board licensing decisions to Maine's Superior Court, see 38 M.R.S.A. § 346(1); 06-096 CMR 2; 5 M.R.S.A. § 11001; & M.R. Civ. P 80C. A party's appeal must be filed with the Superior Court within 30 days of receipt of notice of the Board's or the Commissioner's decision. For any other person, an appeal must be filed within 40 days of the date the decision was rendered. Failure to file a timely appeal will result in the Board's or the Commissioner's decision becoming final.

An appeal to court of a license decision regarding an expedited wind energy development, a general permit for an offshore wind energy demonstration project, or a general permit for a tidal energy demonstration project may only be taken directly to the Maine Supreme Judicial Court. See 38 M.R.S.A. § 346(4).

Maine's Administrative Procedure Act, DEP statutes governing a particular matter, and the Maine Rules of Civil Procedure must be consulted for the substantive and procedural details applicable to judicial appeals.

ADDITIONAL INFORMATION

If you have questions or need additional information on the appeal process, for administrative appeals contact the Board's Executive Analyst at (207) 287-2452 or for judicial appeals contact the court clerk's office in which your appeal will be filed.

Note: The DEP provides this INFORMATION SHEET for general guidance only; it is not intended for use as a legal reference. Maine law governs an appellant's rights.

A-2

OPERATING SERVICES AGREEMENT

SME
SEVEE & MAHER
ENGINEERS

OPERATING SERVICES AGREEMENT

This OPERATING SERVICES AGREEMENT (this "Agreement") is made as of this 5th day of February, 2004, by and between CASELLA WASTE SYSTEMS, INC., a Delaware corporation with a place of business at 25 Greens Hill Lane, Rutland, Vermont 05702 ("Casella"), and the STATE OF MAINE, acting by and through its Executive Department, State Planning Office (the "State").

WITNESSETH:

WHEREAS, the State has contemporaneously with the execution and delivery hereof and payment of the amounts due hereunder acquired the solid waste landfill located in Old Town, Maine and more fully described below, previously owned by Fort James Operating Company, a Delaware corporation ("FJ"); and

WHEREAS, the State desires that Casella operate and develop the Landfill pursuant to the terms and conditions contained herein;

NOW, THEREFORE, in consideration of the mutual promises and agreements hereinafter contained, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Casella and the State agree as follows:

SECTION 1 DEFINITIONS

Capitalized words and phrases used but not otherwise defined herein shall have the following meanings:

1.1 "Affiliates" shall mean any corporation or other business entity controlling, controlled by, or under common control with the subject corporation, business enterprise or person.

1.2 "Acceptable Waste" shall mean such material as may from time to time be legally

accepted at the Landfill in accordance with applicable MDEP permits and other applicable laws and regulations, excluding, however, all Excluded Waste.

1.3 "Biomass Ash" shall mean the ash resulting from the operation of the Biomass Generating Facility to the extent the same is disposable at the Landfill under the Existing Permit and meets the definition of "special waste" as defined under Maine Environmental Law.

1.4 "Biomass Generating Facility" shall mean the electric generating facility fueled principally with biomass fuel, to be installed at the Old Town Mill.

1.5 "Capacity Credit" is defined in Section 2.8(d).

1.6 "Cash Application" is defined in Section 2.8(d).

1.7 "CERCLA" means the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. §§ 9602 et seq.

1.8 "Closure" shall mean those acts and activities required by applicable law and regulations which result in a permanent cessation of use of a solid waste landfill or portion thereof, as those requirements and regulations may be amended or modified from time to time, and which result in a stabilized solid waste Landfill which is not in active use, excluding those acts and activities which are required for Post-Closure Care.

1.9 "Damages" shall mean liability, loss, costs and expenses of every nature and type and howsoever arising that a Person may incur (including, without limitation, costs of investigation and defense and reasonable attorneys', paralegals and other professionals' fees and expenses).

1.10 "Disposal Application" is defined in Section 2.8(d).

1.11 "Effective Date" shall mean the date hereof.

1.12 "Environmental Law" shall mean any federal, state or local law, statute, rule,

order, directive, judgment, Governmental Approval or regulation or the common law relating to the environment (including the ambient air, surface water, groundwater, land surface or subsurface strata), or exposure of persons or property to Materials of Environmental Concern, including any statute, regulation, administrative decision or order pertaining to: (i) the presence of or the treatment, storage, disposal, generation, transportation, handling, distribution, manufacture, processing, use, or recycling, of Materials of Environmental Concern or documentation related to the foregoing; (ii) air, water and noise pollution; (iii) groundwater and soil contamination; (iv) the release, threatened release, or accidental release into the environment, or other areas of Materials of Environmental Concern, including emissions, discharges, injections, spills, escapes or dumping of Materials of Environmental Concern; (v) transfer of interests in or control of real property; (vi) land use, subdivision and zoning; (vii) community or worker right-to-know disclosures with respect to Materials of Environmental Concern; (viii) the protection of wild life, aquatic and marine life and wetlands, and endangered and threatened species; and (ix) storage tanks, vessels, containers, abandoned or discarded barrels and other open or closed receptacles. As used above, the term "release" shall have the meaning set forth in CERCLA, and to the extent it is more extensive or comprehensive, as defined in Maine Environmental Law. Without limiting the foregoing, the term "Environmental Law" shall include the Maine Forest Practices Act, 12 M.R.S.A. §§8867-A et seq.

1.13 "Environmental Matters" shall mean any liability or obligation arising under Environmental Law, whether arising under theories of contract, tort, negligence, successor or enterprise liability, strict liability or other legal or equitable theory, including (i) any failure to comply with an applicable Environmental Law and (ii) any liability or obligation arising from the presence of, release or threatened release of, or exposure of persons or property to, Materials

of Environmental Concern at the Premises or associated with the Premises. As used above, the term "release" shall have the meaning set forth in CERCLA, and to the extent it is more extensive or comprehensive, as defined in Maine Environmental Law.

1.14 "Escrow Agent" means Lawyers Title Insurance Corporation, appointed as escrow agent to hold and administer the Improvement Fund under Section 2.2(b) of the Acquisition Agreement pursuant to a separate Escrow Agreement between FJ and the State.

1.15 "Existing Permit" means Maine Department of Environmental Protection Permit # S 020700 7A-A-N, issued July 28, 1993, as amended or revised.

1.16 "Expansion Permit" shall mean any and all federal, state, local and other governmental permits, permit modifications, operation plan modifications, other modifications, statutory amendments and legislation, licenses, approvals, authorizations or amendments necessary for the expansion of the Landfill beyond the licensed footprint as of the date hereof.

1.17 "Excluded Waste" shall mean (a) any Acceptable Waste or any other waste of any nature generated outside of the State of Maine, (b) any waste as of the date of Casella's response to the RFP under contract for delivery to another disposal facility or processing facility unless agreed to in writing by such facility's waste generator or responsible party, and (c) any other waste or material excluded from disposal in the Landfill by applicable laws or regulations, or excluded by any of the terms and conditions of any permits, licenses, authorizations or approvals obtained with respect to the construction or operation of the Landfill, provided that Excluded Waste shall not include any waste that would otherwise constitute Excluded Waste hereunder if such category of waste is accepted at another disposal facility in the State of Maine owned or operated by the State, subject in all instances to the prior receipt of any and all required licenses or permits for such category of waste. Notwithstanding the foregoing, the parties acknowledge

and agree that, subject to applicable laws and regulations and such certifications as the State may reasonably require, Casella may bring construction and demolition waste generated outside the State of Maine for processing within the State of Maine solely for purposes of allowing Casella to generate biomass fuel required in connection with the provision of biomass fuel to FJ or its successor or assigns under the C&D Fuel Agreement in the form attached hereto as Exhibit B. Casella agrees to use its best efforts to ensure that any such construction and demolition waste generated outside the State of Maine and processed in the State of Maine is free of putrescible waste. This term shall also include such other wastes and materials as Casella determines, in the reasonable exercise of its commercial judgment, pose a risk or danger to the operation or safety of the Landfill or to the human or natural environment or are otherwise reasonably unacceptable to Casella provided, however, that in no event may FJ Waste be excluded or otherwise deemed Excluded Waste unless such exclusion is required by applicable law, regulation, permit, license, authorization or approval.

1.18 Intentionally omitted.

1.19 Intentionally omitted.

1.20 "FJ Waste" is defined in Section 2.8(a).

1.21 "Force Majeure" shall mean any act, event or condition affecting the Landfill or to the extent that it materially and adversely affects the ability of either party to perform or comply with any obligation, duty or agreement required of the party under this Agreement, provided such act, event or condition is beyond the reasonable control of the party or its agents relying thereon and is not the result of the willful or negligent act or omission of the party relying thereon. Force Majeure includes, without limitation but by way of illustrating the actions, events and conditions constituting a Force Majeure hereunder: (a) an act of God, epidemic, landslide,

lightning, earthquake, fire, explosion, storm, flood or similar occurrence; (b) an act of the public enemy, war, blockage, insurrection, riot, general arrest or restraint of government and people, civil disturbance or disobedience, sabotage or similar occurrence; or (c) a strike, work slowdown, or similar industrial or labor action.

1.22 "Governmental Approval" means any and all approvals, licenses, permits, authorizations (or the transfer thereof) required by any Governmental Authority for the design, construction, improvement, alteration, ownership or operation of the Landfill and all related projects, improvements or land use or the transfer thereof.

1.23 "Governmental Authority" means any federal, state or local governmental subdivision, board, body or regulatory authority.

1.24 "Hazardous Waste" shall mean any pollutant, contaminant, chemical, industrial, toxic or other waste or material that constitutes hazardous waste or material as defined pursuant to the Resource Conservation and Recovery Act, 42 U.S.C. §9601, et seq., or similar Maine laws, or the regulations adopted thereunder, or any successor laws regulating the same or similar substances, and Materials of Environmental Concern.

1.25 "Landfill" shall mean the solid waste landfill located in Old Town, Maine, that the State proposes to acquire from FJ pursuant to the Acquisition Agreement and all of the assets and properties acquired by the State from FJ in connection with said landfill, including any expansion of the solid waste landfill located at the Premises, whether such expansion is effected under the Existing Permit or under a new, amended or additional Governmental Approval, and any associated land, buildings, appurtenances, equipment and fixtures, the full benefit of all utility arrangements, licenses, approvals and permits to the extent transferable, including rights of assignment to the extent any such licenses and permits are assignable (but subject to any third

party consents, when required).

1.26 "Letter of Credit" means an irrevocable, unconditional, direct pay letter of credit in the form of Exhibit E attached to the Acquisition Agreement issued by a financial institution acceptable to FJ, in its discretion, (i) issued to FJ in the face amount of $12,500,000 under Section 2.2(a)(ii) of the Acquisition Agreement, and (ii) issued to the Escrow Agent in the face amount of $1,000,000 under Section 2.2(a)(iii) of the Acquisition Agreement.

1.27 "License Amendment" shall mean any and all federal, state, local and other governmental permits, permit modifications, operation plan modifications, other modifications, statutory amendments and legislation, licenses, approvals, authorizations or amendments necessary for the development of the Landfill within the currently permitted footprint for an additional 7 million cubic yards.

1.28 "License Application" shall mean the application for License Amendment submitted to the MDEP on October 30, 2003.

1.29 "Lincoln" shall mean Lincoln Pulp & Paper Co., Inc.

1.30 "Lincoln Agreement" means the Biomass Ash Disposal Agreement between FJ and Lincoln Pulp and Paper, Co., Inc. dated September 30, 2003.

1.31 "Lincoln's Biomass Ash" means the ash resulting from the operation of the Lincoln biomass boiler located in Lincoln, Maine.

1.32 "Leachate" shall mean the liquid or semi-solid residue from waste deposited at the Landfill and either collected within a liner system to be installed at the Landfill, or otherwise collected for disposal.

1.33 "Materials of Environmental Concern" shall mean any: pollutants, contaminants or hazardous substances (as such terms are defined under CERCLA, the Maine Protection and

Improvement of Waters Act, 38 M.R.S.A. § 361-A, or the Maine Uncontrolled Hazardous Substances Sites Law, 38 M.R.S.A. § 1362.1), pesticides (as such term is defined under the Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. §§ 136 et seq.), solid wastes and hazardous wastes (as such terms are defined under the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901 et seq., and Maine's Hazardous Waste, Septage and Solid Waste Management Act, 38 M.R.S.A. §§ 1301 et seq.), chemicals, other hazardous, radioactive or toxic materials, oil, petroleum and petroleum products (and fractions thereof), asbestos and asbestos-containing materials, polychlorinated biphenyls ("PCBs") or PCB-containing materials, or any other material (or article containing such material) listed or subject to regulation under any law, statute, rule, regulation, order, Governmental Approval, or directive due to its potential, directly or indirectly, to harm the environment or the health of humans or other living beings.

1.34 "MDEP" shall mean the Maine Department of Environmental Protection, and any successor agency or department of the State of Maine.

1.35 "Mill Waste" shall mean waste from the Old Town Mill of a composition consistent with the waste FJ (or its successors or assigns) is permitted to dispose of at the Landfill under the Existing Permit, provided it meets the definition of "special waste" as currently defined by Maine Environmental Law.

1.36 "Old Town Mill" shall mean the pulp and paper mill owned and operated by FJ located in Old Town, Maine, and all related facilities and improvements.

1.37 "Post-Closure Care" shall include those acts and activities which are required under applicable laws, regulations and permits for post-closure care of a solid waste landfill or portion thereof, including monitoring, reporting and maintenance for the time set forth in the relevant laws, regulations and permits.

1.38 "Premises" means the real estate, together with all buildings and improvements thereon, situated in Alton and Old Town, Maine and more particularly described in Exhibit A attached hereto and incorporated herein by reference, including the Landfill.

1.39 "Prime Rate" means the fluctuating interest rate per annum equal to the rate of interest published in The Wall Street Journal as the Prime Rate or the base rate on corporate loans posted by at least 75% of the nation's thirty (30) largest banks, as it may vary. In the event The Wall Street Journal ceases to publish the Prime Rate, the parties shall select a comparable substitute interest rate index.

1.40 "RFP" means the 'Request For Proposals: Contract for Landfill Operations', as issued on June 13, 2003, by the Maine State Planning Office, Waste Management & Recycling Program.

1.41 "Special Waste" shall mean any discarded waste and solid material, other than those which are typically found in household, commercial or municipal refuse, including, without limitation, materials such as industrial waste (but not including Mill Waste or Biomass Ash), institutional waste, animal manure, petroleum contaminated soil of a nonhazardous nature, ash, residue from incineration, waste treatment plant sludge, food processing wastes, dredging wastes, asbestos, or waste which requires special or exceptional handling or approval from MDEP, but only to the extent the foregoing is permitted for disposal in the Landfill under applicable MDEP permits, and shall not include any Excluded Waste, any solid waste generated by sources other than household and typical commercial establishments that exists in such an unusual quantity or in such a chemical or physical state, or any combination thereof, that may disrupt or impair effective waste management or threaten the public health, human safety or the environment and requires special handling, transportation and disposal procedures. Special

Waste includes, but is not limited to: (a) ash; (b) industrial and industrial process waste; (c) sludge and dewatered septage; (d) debris from nonhazardous chemical spills and cleanup of those spills; (e) contaminated soils and dredge materials; (f) asbestos and asbestos-containing waste; (g) sand blast grit and non-liquid paint waste; (h) high and low pH waste; (i) spent filter media residue; and (j) shredder residue.

1.42 "Shut-Down Period" is defined in Section 2.8(d).

1.43 "SPO" means the State Planning Office, an Executive Department of the State.

1.44 "State/FJ Agreement" or the "Acquisition Agreement" means the Agreement Regarding Solid Waste Disposal Facility Acquisition and Operation between the State and FJ pursuant to which the State has acquired the Landfill.

1.45 "Term" shall mean that period of time commencing on the Effective Date and ending on the earlier to occur of (i) thirty (30) years after the Effective Date, or (ii) the date this Agreement is terminated by one or more of the parties as provided for herein.

1.46 "Tipping Fees" shall mean the aggregate of all fees, charges, levies and assessments charged by Casella for the disposal of waste at the Landfill, including any contractors, subcontractors or other service providers employed by Casella, excluding any transportation costs associated with delivery of waste to the Landfill.

SECTION 2 LANDFILL OPERATION AND MANAGEMENT

2.1 Operation, Management and Exclusive Use—General. The State grants to Casella during the Term and subject to the terms and conditions hereof and all applicable laws, regulations and permits, the exclusive right, license and privilege to occupy, operate, maintain, repair, design, redesign, construct and utilize the Landfill, including, without limitation, the right to take possession of, occupy and have the exclusive use of the Landfill, subject to the terms and conditions of this Agreement. Without limiting the generality of the foregoing and subject in all

instances to the terms and conditions hereof, these rights include the following:

2.1.1 The right to take possession of and use all of the Landfill. Casella shall prominently post the hours of operation and other limitations and conditions of access at the entrance to the Landfill. Casella shall have the right to post additional signage at the Landfill indicating its operation of the Landfill and any other information it deems necessary or desirable, subject in all instances to applicable laws and regulations.

2.1.2 The exclusive right to operate and dispose of Acceptable Waste at the Landfill and, subject to the terms hereof, to create and implement rules and policies pertaining to disposal at, and operation of, the Landfill, provided that in no event shall such rules and policies cause a default by the State of its obligations under the State/FJ Agreement or otherwise violate or restrict Casella's obligations under Section 2.8.

2.1.3 To the extent permitted by applicable law, the right to use the permits, licenses, approvals and authorizations issued in the State's name and the right, with the consent of the State (which consent will not be unreasonably withheld), to seek any modifications, transfers or renewals of the same, consistent with this Agreement.

2.1.4 The right to take and use any landfill gas generated at the Landfill, all in accordance with applicable laws and regulations.

2.2 Construction.

(a) Subject to the terms of all applicable laws, regulations and permits, Casella shall have the right to design, locate, permit, construct and remove at the Landfill such buildings and fixed resources as it deems necessary for the operation of the Landfill, including, without limitation, garages, office

buildings, recycling facilities and other structures, fixtures, appurtenances, and improvements, provided that Casella's actions shall in no event impair or limit Casella's obligation to satisfy the capacity commitment to FJ under Section 2.8. The use of the Landfill shall be restricted to development and operation of a solid waste landfill, or other facilities providing for the disposal or recycling of solid waste or other management of solid waste or, with the prior written consent of the State which may be granted or withheld in the State's sole discretion, other uses that do not prohibit or impair the operation of a solid waste landfill of sufficient size, nature, scope and limitation as is required to satisfy Casella's capacity commitment to FJ under Section 2.8 during the term hereof. Casella shall be prohibited from constructing any facility or improvement at the Landfill that would prohibit or impair the construction and operation of a solid waste landfill of sufficient size, nature, scope and location as is required to satisfy Casella's capacity commitment to FJ under Section 2.8. Any capital improvements to or at the Landfill shall be and remain the property of the State upon termination of this Agreement without any compensation to Casella.

(b) Subject to the issuance of all necessary State and local licenses permits and approvals, Casella shall construct a new sewer line to convey leachate to the Old Town Waste Water Treatment Plant on or before five years from the Effective Date.

2.3 Operation.

2.3.1 Casella shall have full control, both physical and managerial, of the

Landfill, subject in all instances to the terms and conditions of this Agreement.

2.3.2 Subject in all instances to the terms and conditions hereof and all applicable laws, regulations, licenses and permits, Casella shall be responsible for, and shall have sole authority over, the day-to-day operation of the Landfill, including weighing of waste pursuant to Section 2.4, testing of waste, preparation of waste for disposal, Landfill construction as provided in Section 2.2, establishment of Tipping Fees pursuant to Section 2.11, acceptance and disposal of Acceptable Waste, preparation and application of daily interim and final cover, construction of temporary roads and other temporary access, and installation and monitoring of groundwater wells. Notwithstanding the foregoing or anything to the contrary herein, Casella agrees to operate the Landfill gate and scale house in such manner, and on such terms so as to provide no price or entry discrimination or benefit (consistent with Section 2.11) in favor of its affiliated haulers or otherwise as to disadvantage haulers that are not Affiliates or who do not have business relations with Casella or its Affiliates.

2.3.3 Subject in all instances to the terms and provisions hereof and all applicable laws, regulations, licenses and permits, Casella shall be responsible for providing at its own cost and expense and shall have sole authority regarding:

(a) all engineering and other services necessary for the design, permitting, construction and operation of the Landfill (with the exception of those construction services for those portions of the Landfill which have already been constructed); and

(b) the employment of all personnel needed to operate the Landfill; and

(c) all services incidental to the business of the Landfill, including security,

accounting, legal, fire prevention and pollution control.

2.3.4 Without limiting the foregoing, Casella shall have the right to detain and inspect the contents of all vehicles delivering waste to the Landfill. Casella shall have the right to refuse or reject any Excluded Waste in its sole discretion or, if not detected prior to entering the Landfill, and Casella becomes aware that Excluded Waste has been disposed of at the Landfill, Casella shall immediately notify MDEP and manage the treatment of such Excluded Waste as MDEP may require. In addition, Casella may proceed against the hauler and/or generator for removal and proper disposal costs and other costs incurred by Casella. Subject in all instances to its obligations under Section 2.8 and Subsection 2.3.2, Casella shall have the right to ban haulers from disposing at the Landfill until such time as the expenses for reimbursement for the removal of any such Excluded Waste are paid to Casella. Subject in all instances to its obligations under Section 2.8 and Subsection 2.3.2, Casella shall have the right to ban any and all haulers which violate any of the rules and policies it establishes for the Landfill. Casella shall not allow members of the general public access to the Landfill for the discharge of solid waste.

2.3.5 Casella shall have the right to operate the Landfill during hours of its selection in accordance with any relevant permits, approvals, licenses, orders or agreements, and shall not discriminate against haulers who do not have business relations with Casella or its Affiliates.

2.3.6 Casella shall not accept any Excluded Waste at the Landfill.

2.4 Weighing. In connection with Casella's operation of the Landfill hereunder, Casella shall weigh all vehicles containing waste to be delivered to the Landfill pursuant to this

Agreement. Casella shall utilize scales approved by the State to weigh all waste delivered to the Landfill. The State or its authorized representative shall have the right at the State's expense to test the accuracy of scales used by Casella in the performance of its obligations hereunder, provided that such tests are conducted at reasonable times and do not unreasonably interfere with Casella's operation of the scales or the Landfill.

2.5 Revenues. Subject in all instances to payment of all governmental taxes, fees and charges and without limiting its payment obligations hereunder, all revenue, income and other financial benefits generated by, at, or related to operation of, the Landfill during the Term, shall be collected by Casella and shall be the property of Casella.

2.6 Inspection. The State shall have the right to inspect the Landfill during reasonable business hours to confirm compliance with the provisions of this Agreement, that policies are in place to provide that only Acceptable Waste will be received at the Landfill, and that the Landfill is being operated in conformity with state and federal environmental laws and regulations and other applicable laws.

2.7 Maintenance Responsibilities. Casella shall be responsible for, and shall have the sole authority regarding, all necessary maintenance of the Landfill.

2.8 FJ Waste Disposal Capacity. Casella agrees to provide FJ with the following waste disposal capacity at the Landfill during the Term:

(a) Casella will provide disposal capacity at the Landfill to FJ for all Mill Waste and all Biomass Ash (excluding for purposes of clarification and the avoidance of doubt, Lincoln's Biomass Ash) (collectively "FJ Waste"). Casella further hereby assumes FJ's and/or the State's responsibilities to provide for the disposal of Lincoln's Biomass Ash at the Facility under and in

accordance with the terms and provisions of the Lincoln Agreement.

(b) The Tipping Fees charged to FJ for disposal of FJ Waste will be fixed at the following levels:

(i) For the first 50,000 tons per year of FJ Waste, Tipping Fees will be fixed at a maximum of $10 per ton for the first five (5) years of the Term. On the sixth anniversary of this Agreement, and thereafter on each anniversary of this Agreement throughout the Term, Tipping Fees shall be adjusted upward or downward annually by a percentage equal to the percentage change in the Consumer Price Index (U.S.-national) ("CPI") from the date of the immediately preceding anniversary of this Agreement through the then current anniversary of this Agreement. In no event shall the CPI adjustment be less than one percent (1%) per year or in excess of five percent (5%) per year.

(ii) For FJ Waste in excess of 50,000 tons per year, but less than 75,000 tons per year, Tipping Fees shall be fixed at a maximum of $40.00 per ton for the first 5 years of the Term. On the sixth anniversary of this Agreement, and thereafter on each anniversary of the Agreement throughout the Term, the Tipping Fees shall be adjusted upward or downward annually by a percentage equal to the percentage change in the CPI from the immediately preceding anniversary of this Agreement through the then current anniversary of this Agreement. In no event shall the CPI adjustment be less than one percent (1%) per year or in excess of five percent (5%) per year.

(iii) Tipping Fees for FJ Waste in excess of 75,000 tons per year will be assessed at the then prevailing market rate.

For purposes of this Section 2.8, reference to a year means the period of twelve (12) months extending from the Effective Date to the first anniversary thereof, or from one anniversary of the Effective Date of this Agreement to another, as applicable.

(c) Casella shall provide for the disposal of up to six thousand (6,000) tons per year of Lincoln's Biomass Ash at the Landfill for four (4) years from the Effective Date at no cost, and thereafter shall provide for the disposal at the Landfill of Lincoln's Biomass Ash at the same pricing and on the same terms as for FJ Waste.

(d) Casella shall provide FJ with a "Capacity Credit" for unused disposal capacity during the Term in the event FJ Waste disposed of at the Landfill is less than 50,000 tons in any year during which the Mill has operated its commercial pulping facility. The Capacity Credit will be at the rate of one (1) ton of future disposal at the Tipping Fee in effect for the first 50,000 tons of FJ Waste for the year in which the Capacity Credit is utilized by FJ. This Capacity Credit will be provided to FJ by allowing FJ to choose, at its option, one of the following alternatives:

(i) During any year when FJ disposes of more than 50,000 tons of FJ Waste, apply any Capacity Credit accumulated during the preceding three (3) years to FJ Waste in excess of the first 50,000 tons disposed of that year ("Disposal Application"); or

(ii) Payment in cash by Casella to FJ of an amount equal to the

monetary value of the Capacity Credit accumulated over the previous three (3) years and not applied to actual disposal under subsection (i) above. In determining the monetary value of the Capacity Credit, each ton of Capacity Credit shall be valued at the Tipping Fee per ton applicable during the year in which the Capacity Credit is cashed out (the "Cash Application"). Cash Application amounts shall be paid to FJ in cash within thirty (30) days following the date of exercise of the Cash Application option.

FJ may exercise its option to apply Capacity Credits through Disposal Application at any time during a year when the volume of FJ Waste disposal exceeds 50,000 tons. FJ may exercise its option to apply Capacity Credits through Cash Application at any time following the end of the year in which the Capacity Credit has been generated. FJ shall exercise its option by written notice to Casella with a copy to the State. In the event FJ has not provided written notice of its choice of option by the end of the third year following the year in which a Capacity Credit is earned, then FJ shall be deemed to have exercised its option to receive the Capacity Credit through Cash Application as of the last day of such year.

For purposes of calculation of the Capacity Credit, the 50,000 ton per year threshold shall be adjusted downward to account for any period in which the Old Town Mill is not operated for a period of fifty-three (53) or more days during any calendar year (a "Shut-Down Period"). The adjustment shall be a reduction in the 50,000 ton threshold by a per diem of 135 tons per day for each day the Old Town Mill is not operated in excess of the initial fifty-three (53) days in a calendar year.

(e) Notwithstanding anything to the contrary herein, if, despite the best efforts of

Casella in preparing, amending, submitting, resubmitting and prosecuting the same, the Expansion Permit does not issue as a direct result of a material change in law, made after the date hereof, that is generally applicable to landfills in the State of Maine and that by its terms prohibits the expansion and/or permitting of landfills for a period of more than two consecutive years, and if as a result thereof disposal capacity at the Landfill is thereby limited to the 10,000,000 cubic yards available under the Existing Permit and, when issued, the License Amendment (a "Capacity Limiting Event"), then (i) Casella's obligation to provide disposal capacity for FJ Waste under subsections (a), (b) and (d) above shall be limited to a period of fifteen (15) years unless and until such law is repealed (in which case, if Casella or any of its Affiliates is still the operator at the Landfill, its disposal capacity obligation shall be reinstated for the balance of this Agreement) ("Reduced Capacity Commitment"); and (ii) FJ shall, subject to the provisions of this Subsection 2.8(e), forfeit its disposal capacity (including any claim for Capacity Credits and Cash Application) in excess of the Reduced Capacity Commitment (that is, disposal capacity otherwise available to FJ hereunder on and after the fifteenth (15th) anniversary hereof) to the extent necessary to allow Casella to operate the Landfill at a level of five hundred thousand (500,000) tons of waste disposal per year through the twentieth (20th) anniversary of the Effective Date hereof.

Casella agrees that regardless of the occurrence of a Capacity Limiting Event,

it shall be obligated to accept the FJ Waste at the Landfill, at the price and on the terms specified herein, for a period of at least fifteen (15) years and thereafter until the disposal capacity at the Landfill is exhausted. Upon exhaustion of the disposal capacity at the Landfill as aforesaid, Casella will make available to FJ disposal capacity for FJ Waste for a price and on the terms specified above at any other landfill in the State of Maine owned and/or operated by Casella or any Affiliate that is licensed to accept FJ Waste for up to an additional fifteen (15) years (for a total commitment of thirty (30) years) or such earlier time as disposal capacity at such landfill(s) is exhausted; provided, however, that FJ shall pay any and all costs of transporting FJ Waste to such site.

In the event of a Capacity Limiting Event and if Casella or any Affiliate is not able to satisfy the thirty (30) year commitment to FJ (or its successors or assigns) as aforesaid at the Landfill or any alternative landfills in the State of Maine, the State will make available to FJ disposal capacity for FJ Waste for the price and on the terms specified above at any other landfill in the State of Maine owned and/or operated by the State that is licensed to accept FJ Waste until the first to occur of the thirtieth (30th) anniversary of the date hereof or when disposal capacity at such landfill(s) for FJ Waste has been exhausted; provided, however, that FJ shall pay any and all costs of transporting FJ Waste to such site.

The parties and FJ intend the provisions of this subsection (e) to be construed

narrowly and to apply only to the specific and generally applicable laws enacted after the Effective Date that by their terms prohibit the expansion of landfills and thereby the issuance of the Expansion Permit and leave Casella only with the disposal capacity at the Landfill provided under the Existing Permit and License Amendment . For purposes of clarification and illustration, a moratorium prohibiting the licensing of an expansion of landfills in the State of Maine for in excess of two (2) years represents the type of change in law triggering the application of this subsection (e), while a change in law that modifies operating requirements for landfills, the qualifications or requirements for operators, the expense of operating landfills or other requirements associated with the operation, management or permitting of landfills would not excuse performance of Casella's obligations under this Agreement.

(f) Casella's commitment to provide disposal capacity described in this Section 2.8 shall apply to FJ, its successors and assigns, including without limiting the generality of the foregoing any subsequent owner, lessor or operator of the Old Town Mill.

(g) The foregoing Tipping Fees are exclusive of any fees, charges, levies or assessments ("Waste Disposal Fees") which may be imposed by the State after the date hereof for the disposal of waste at landfills. The parties acknowledge that Section 5.2 of the Acquisition Agreement exempts FJ from Waste Disposal Fees. However, in the event FJ Waste is subjected to Waste Disposal Fees notwithstanding the Section 5.2 exemption, (i) Casella shall not

be obligated to pay any such Waste Disposal Fees, and (ii) FJ shall have exclusive liability for such Waste Disposal Fees.

2.9 Other Tipping Fees on FJ Waste. Other than as specifically provided in Section 2.8 hereof, Casella will not charge or assess any Tipping Fees on FJ Waste, or Lincoln's Biomass Ash, whether related to disposal in existing built Landfill space or space constructed in the future.

2.10 Maintenance of Capacity for FJ Waste. Casella agrees throughout the Term that it will maintain fully permitted/licensed, fully constructed, unused capacity at the Landfill in the amount sufficient to satisfy the obligation of the State to FJ regarding disposal capacity under the Acquisition Agreement and Casella's obligations to FJ and with respect to Lincoln Biomass Ash under Section 2.8 hereof, including without limitation at all times after October 1, 2004 (which date shall be extended to the final resolution of any appeals with respect to the License Amendment) , one million five hundred thousand (1,500,000) tons of fully constructed available capacity at the Landfill dedicated to and reserved for FJ Waste minus fifty thousand (50,000) tons on each anniversary of the Effective Date This capacity shall be reserved by Casella solely to satisfy its obligations under Section 2.8 with respect to FJ Waste and Lincoln Biomass Ash and the corresponding obligation of the State to FJ under the Acquisition Agreement. Upon request from the State, executive officers of Casella shall periodically certify to the State Casella's compliance with this subsection and the State may inspect the Landfill to confirm the same. Casella's agreement to satisfy the State's obligation to FJ as per Subsection 2.8 and the Acquisition Agreement represent a material condition of the State's agreement to enter into this Agreement.

2.11 Tipping Fees on Non-FJ Waste.

(a) Casella shall charge Tipping Fees for disposal of waste that is not FJ Waste or Lincoln's Biomass Ash according to the following schedule:

• Certain Special Wastes, including without limitation bottom ash / fly from municipal solid waste incinerators and sandblast grit.	$48.00 / Ton
• Oversized, bulky waste from municipal solid waste incinerators, that are unacceptable at municipal solid waste incinerators.	$58.00 / Ton
• Front-end residue from municipal solid waste incinerators.	$48.00 / Ton
• Municipal solid waste, including municipal solid waste designated as "by pass" on an infrequent basis.	$58.00 / Ton
• Construction and demolition debris, free of putresible waste.	$58.00 / Ton

Subject in all instances to Casella's obligations under Section 2.3.2 hereof, the foregoing Tipping Fees are "not to exceed" fees (it being understood that Casella may, in its sole discretion charge lower fees), are exclusive of any Tipping Fees which may be imposed by the State under laws enacted or regulations promulgated after the Effective Date, and shall be subject to annual adjustment in accordance with changes in the CPI and changes in law which materially affect the cost of landfill design, construction, operations or closure. The fee schedule above is inclusive

of all charges, including the Host Community Benefit Package costs referred to in Casella's response to the RFP.

(b) The State reserves the right to direct solid waste to the Landfill, as may be required by changes in State law or in MDEP rules and regulations. The Tipping Fees established by Casella for the waste stream most closely matching these directed wastes shall apply. Prior to redirection of these wastes, the State shall notify Casella as to the reason for the redirection and an estimate of the expected volume/tonnage of wastes. In no event shall the State's exercise of its rights under this subsection restrict or impair the capacity reserved for FJ under Section 2.8.

2.12 Costs. Casella shall bear all costs, expenses, and liabilities associated with the operation and maintenance of the Landfill and the fulfillment of Casella's other responsibilities hereunder during the term of this Agreement including, without limitation, any liabilities for claims of employees performing activities under this Agreement that arise out of any provision of the workers' compensation law or otherwise.

2.13 Waste Management Hierarchy. Casella agrees to use its best efforts to achieve the following goals:

(a) to operate the Landfill following the State's solid waste management hierarchy (reduce, reuse, recycle, compost, incinerate, landfill);

(b) to implement the Public/Private Partnership agreement with the Municipal Review Committee (MRC);

(c) to draw upon Casella's FCR Division to analyze and develop the best collection, processing and marketing options for all MRC member

communities;

(d) to implement Green Mountain Glass's technology for recovery and recycling of all color glass containers;

(e) to work with the MRC to analyze and help develop organics recycling programs that enhance or expand current practices of MRC communities;

(f) to work with the MRC members in developing program to collect, store and process (where applicable) Universal Wastes and mercury containing products;

(g) to work with MRC members in developing programs to identify, collect and properly dispose of household hazardous wastes;

(h) to work with the MRC and appropriate research facilities to assess the viability of using Maine developed ablation technology as a source of air emission control for biomass boilers combusting up to 50% clean C&D wood as a fuel source, such as being proposed by GP;

(i) to expand C&D processing capability of Casella and its Affiliates to achieve an increase in C&D waste volume requiring disposal with a focus on recovering the clean C&D wood waste that would assist in meeting the biomass fuel commitment to FJ. Other recyclable materials would be separated and utilized in other applications, including aggregate and metals.

2.14 Real and Personal Property Taxes. Casella shall be responsible for the payment of all real and personal property taxes with respect to the Landfill during the Term.

SECTION 3 CONTRACTS WITH THIRD PARTIES

3.1

(a) During the Term hereof, but after the issuance of the License Amendment,

Casella shall, subject to the terms and conditions hereof, have the exclusive right and authority to negotiate and enter into various contracts regarding the Landfill. These contracts may include, among others, (i) long-term contracts for the disposal of waste at the Landfill, (ii) a long-term contract for the disposal of Leachate generated at the Landfill, (iii) long-term contracts for the disposal of local municipal solid waste at the Landfill, and (iv) long-term host community agreement with the City of Old Town, all on terms and conditions reasonably acceptable to Casella. Casella shall provide the State with notice of and adequate time to review and comment on such contracts and agreements prior to their execution. These contracts will not bind State without the State's prior written consent, and shall be expressly subject to the Unwind Provisions described in Section 5.3 (a).

(b) Casella agrees to assume the leachate trucking agreement between FJ and Thornton's Construction and the Landfill operations agreement between FJ and J.A. Buchanan, or, if such contracts cannot be assumed without the consent of the other contract party, to use its best efforts to secure such consents. If Casella is unable to secure such consents, Casella shall use its best efforts to negotiate the termination of such agreements with no impact on FJ or the State. Casella shall further be solely responsible for any liabilities associated with assignment or termination of such contracts, including any contract buyout obligations or termination fees or damages arising from the termination or breach thereof, and hereby indemnifies and holds the State and FJ harmless for any liabilities arising from or relating to the assumption or

termination of such contracts.

SECTION 4 PERMITTING MODIFICATIONS AND COOPERATION

4.1 Cooperation. The State agrees (a) to cooperate reasonably with Casella in obtaining and, where applicable, in maintaining in the State's name (i) the Existing Permit and License Amendment, and (ii) all permits, licenses, statutory amendments and legislation, approvals and authorizations reasonably requested by Casella and agreed to by the State for the operation of the Landfill in accordance with the terms hereof, including without limitation the Expansion Permit, but at no cost or expense to the State and (b) to provide reasonable assistance to Casella but at no cost to the State, in dealing with all federal, state and local agencies to obtain the issuance, modification, transfer or amendment of all permits reasonably requested by Casella and agreed to by the State. The parties shall diligently pursue in good faith the acquisition of all such permits, licenses, approvals and authorizations, and any modifications or amendments thereto, for the Landfill as contemplated by and subject to the terms of this Agreement. The parties, however, recognize that the MDEP is an independent permitting authority before which the State must appear as any other person. Therefore, the parties acknowledge that any commitment of the State to cooperate with and seek a governmental approval is not a guaranty of issuance of such approval or the terms of such approval.

4.2 Permit Responsibility.

(a) Casella shall use its best and most diligent efforts to maintain in full force and effect the Existing Permit and, when issued, License Amendment. Casella shall not take any action or suffer any omission that causes, or provides a basis for, the revocation, suspension or restriction of the Existing Permit and, when issued, License Amendment, or limit or restrict Casella's or the State's ability to operate the Landfill.

(b) Casella shall use its best and most diligent efforts to, at its own cost and expense, apply for, seek and maintain in full force and effect (i) the License Amendment, (ii) the Expansion Permit, and (iii) such other federal, state and local permits, licenses and authorizations as otherwise required in connection with Casella's obligations under this Agreement, including, without limitation, any required zoning, subdivision and site plan approval. Without limiting the generality of the foregoing, Casella shall prepare on or before the third anniversary of the Effective Date an application for the Expansion Permit and shall conduct geologic and engineering studies and bear the cost of any consulting services related to all such permit/license and approval efforts. Subject to the foregoing, Casella shall determine the timing of the submission and the content of any such applications to the appropriate regulatory entities. Casella currently contemplates an application for the Expansion Permit for ten million (10,000,000) cubic yards of additional capacity, but, following exhaustion of all appeals of any approval of the Expansion Permit authorizing a lesser disposal capacity, Casella hereby agrees to accept any such approval so issued in connection with any application for the Expansion Permit, provided that, taken together, the initial application so submitted by Casella for the Expansion Permit shall provide that the Existing Permit, the License Amendment and the Expansion Permit will collectively provide sufficient capacity to dispose of at least 500,000 tons of waste per year over twenty (20) years of operation. If issued, Casella shall not take any action or suffer any omission that causes, or provides a basis for the revocation, suspension or

restriction of the Expansion Permit, or limit or restrict Casella's or the State's ability to operate the Landfill.

SECTION 5 PAYMENT AND BONDS; UNWIND PROVISIONS

5.1 Payments to the State. Contemporaneously with the execution of this Agreement, Casella shall pay to the State, and the State directs Casella to pay FJ, a total of Twenty-six Million Dollars ($26,000,000) as follows: (a) $12,500,000 in cash or by certified or bank cashier's check or by wire transfer to an account designated by the State; (b) $12,500,000 by issuance of a Letter of Credit in such amount; and (c) $1,000,000 by issuance of a Letter of Credit in such amount to the Escrow Agent for deposit into the Improvement Fund (as defined in the Acquisition Agreement). The aforesaid Letters of Credit may be fully drawn by FJ and the Escrow Agent, as applicable, in the event that, within five (5) business days following the receipt of the License Amendment that is materially consistent with the License Application, Casella fails to pay the amounts of the Letters of Credit to FJ and the Escrow Agent, respectively, in cash or by certified or bank cashier's check or by wire transfer. In the event that Casella pays the amounts of the Letters of Credit to the respective beneficiaries as aforesaid, the State shall cause the Letters of Credit to be immediately revoked and returned to Casella. There shall be no requirement that any appeal period expire or that any appeal of the issuance of the License Amendment be resolved prior to drawing under the Letters of Credit.

5.2 Bonds.

(a) Casella's obligation to perform its obligations hereunder shall be secured by a Four Million Dollar ($4,000,000) payment and performance bond in the form attached hereto as Exhibit C, which shall be delivered within five (5) business days from the date hereof.

(b) On the Effective Date Casella shall post, and thereafter shall maintain, closing and post-closing bonds in substitution for those provided by FJ in such amounts and on such terms as MDEP and federal law may require. Copies of the proposed closing and post-closing bonds shall be provided to the State within ten (10) business days of the Effective Date.

5.3 (a) Unwind Provisions. In the event that the License Amendment is (i) not received by June 30, 2004, or (ii) received by June 30, 2004 but is materially inconsistent with the License Application, or (iii) received by June 30, 2004 but successfully challenged on appeal such that a final judgment or court order either invalidates the License Amendment or results in the License Amendment being materially inconsistent with the License Application, Casella shall have the right to terminate this Agreement and rescind the transaction, at a simultaneous closing complying with the terms of Section 2.10 of the Acquisition Agreement. The closing shall occur within thirty (30) days of the exercise by Casella of its right to terminate and rescind hereunder, or such later date when the parties obtain MDEP authority to transfer the Existing Permit. At the closing, FJ shall promptly refund the $12,500,000 paid by Casella pursuant to Section 5.1, and FJ shall return or cause to be returned the cash or the Letters of Credit (as the case may be) described in Section 5.1. Appropriate provision shall be made for the closure and post-closure bonds identified in Section 5.2(b) in accordance with applicable law, and Casella shall undertake any remedial action as a result of its activities hereunder required by applicable regulatory authorities. Casella agrees to cooperate with the State and FJ in connection with the reconveyance of the Landfill described in Section 2.10 of the Acquisition Agreement, including filing necessary applications for transfer of all federal, state and local permits and approvals for operation of the Landfill as a generator-owned landfill (provided that FJ shall have the option to

assume the License Amendment, if any, and to the extent allowable under applicable law and so long as Casella and the State are released from any liability for post-assignment activities), and undertaking all other actions required to unwind the transaction described in the Acquisition Agreement and place the parties as nearly as reasonably possible in the same positions they were in prior to said transaction, with the exception that each party shall be responsible for its own out-of-pocket costs associated with said transaction and effecting the foregoing unwind provisions. Casella's right to terminate this Agreement and rescind the transaction hereunder must by exercised within thirty (30) days after the last to occur of the three events described in the first sentence of this Section 5.3(a). Any dispute regarding rights or obligations under this Section 5.3 shall be resolved by binding arbitration in accordance with the Commercial Arbitration Rules of the American Arbitration Association, provided that the arbitrators shall be directed to make an arbitration award within ninety (90) days, and that Casella shall continue to operate the Landfill pursuant to the terms hereof until the issuance of a final arbitration award.

(b) The State shall have no liability or obligation to Casella with respect to the repayment of the cash or return of the Letters of Credit as described in Section 5.3(a), and Casella agrees to look solely to FJ for the repayment of such cash and return of the Letters of Credit and hereby waives and releases the State of any liability arising thereunder or relating thereto, howsoever arising.

SECTION 6 EQUIPMENT

Casella shall be responsible for all operating, repair and maintenance costs associated with any equipment used in the operation of the Landfill, and shall maintain and replace such equipment as it deems necessary.

SECTION 7 COMPLIANCE WITH LAW

Except as otherwise provided in this Agreement, and subject to Section 8 hereof, Casella shall be responsible for all costs and expenses related to Landfill regulatory compliance. Notwithstanding the foregoing, Casella shall have the right, at its own cost and expense, to contest or review by legal or administrative proceedings the validity or legality of any law, order, ordinance, rule, regulation, direction or certificate of occupancy, and, to the extent permitted by law, during such contest Casella may refrain from complying therewith, subject, however, to the terms and conditions hereof.

SECTION 8 INDEMNIFICATION

8.1 Indemnification.

(a) Casella will indemnify, defend, and hold the State and FJ, their respective Affiliates and their respective officers, directors, employees, agents and Affiliates harmless from and against any and all Damages that arise from or related to any past, current or future design, construction, improvement, ownership or operation of the Landfill or any other activities associated therewith, or any breach of Casella's obligations under this Agreement, including without limiting the generality of the foregoing, any and all Damages resulting from:

(i) groundwater or surface water contamination caused by the Landfill, whether or not such liability results from operation of the

Landfill by FJ or any third parties;

(ii) on-Premises or off-Premises contamination;

(iii) violation of any Environmental Law at or in connection with the Landfill or Premises;

(iv) any fine, penalty, judgment, award, or settlement of any legal or administrative proceeding relating in any way to Environmental Matters relating to the Landfill or the Premises;

(v) any compliance, corrective or remedial measure required under any Environmental Law or other requirement including any clean-up, removal, containment or other remediation or response actions associated with the Landfill or the Premises; and

(vi) any and all Environmental Matters.

8.2 Limitations. Anything in this Section 8 to the contrary notwithstanding, in the event that this Agreement is terminated pursuant to Section 15 below, Casella's indemnity obligations hereunder shall survive termination hereof and the unwind of the transaction described in Section 5.3 (a) but shall be limited to Environmental Matters and other Damages arising from or relating to breaches, conditions, events, transactions or occurrences which occurred at any time prior to the termination of this Agreement or the unwind of the transaction but regardless of when the same shall be discovered or become manifest. Furthermore, Casella's indemnity obligations hereunder shall not extend to Damages arising from breaches of FJ's representations and warranties under Article 3 of the Acquisition Agreement.

SECTION 9 SUBCONTRACTING

In the performance of its obligations hereunder, Casella shall have the unrestricted right to subcontract those services that it deems appropriate in its sole discretion, including, without

limitation, construction, engineering, design, permitting, operation, maintenance, management and administration; provided, that Casella shall remain fully responsible for the performance of any and all obligations subcontracted hereunder.

SECTION 10 RECORDS, AUDITS AND CONFIDENTIALITY

10.1 Annual Report; Inspection Rights. In addition to other reports that Casella may be required to maintain under applicable law, Casella shall prepare and provide to the State an annual report summarizing in reasonable detail the business and technical operation of the Landfill during the preceding calendar year or portion thereof and such other records and information as the State may reasonably require, including certifications regarding the as built and available disposal capacity reserved for FJ (or its successor or assign). Casella shall maintain accurate records, books and data with respect to the amount of all Acceptable Waste disposed of at the Landfill during any period that Casella is the operator of the Landfill. The State shall have the right at reasonable times and upon not less than three (3) business days prior notice to inspect and examine Casella's books and records related to the operation of the Landfill to confirm Casella's compliance with this Agreement and applicable permits and environmental laws and regulations. The State shall further have the right to visit and enter upon the Landfill to confirm, among other matters, satisfaction by Casella of its obligations under Sections 2.8 and 2.10 hereof. The parties shall cooperate in good faith to develop a list of the books, records and data which shall be available for such inspection and examination by the State. Casella shall maintain any such books, records or other data for so long as Casella's indemnity obligations under Section 8 shall continue in effect. Upon termination of this Agreement, the State shall have the right to review and copy, and shall have a permanent, irrevocable, exclusive license to make use of all of Casella's technical information, data, studies, engineering, operational records and other materials and information of any nature related to the Landfill and/or the design,

construction, licensing or operation of the Landfill, including without limitation, all testing results, design materials, engineering studies and other engineering work, all applications for Governmental Approvals related to the Landfill and any and all such other data and materials as relate in any way to the premises and/or the development of the Landfill.

SECTION 11 NO JOINT VENTURE

Without limiting Casella's obligations hereunder (including the obligation to satisfy the State's obligation to FJ under the Acquisition Agreement), the parties acknowledge and agree that nothing contained in this Agreement is intended to nor shall be construed to create a partnership or joint venture between Casella and the State or make Casella and the State partners or joint venturers, or make either party in any way liable or otherwise responsible for the debts, actions, obligations or losses of the other party.

SECTION 12 SPECIAL PROVISIONS CONCERNING THE STATE

12.1 Appropriations. The State's obligations and liabilities hereunder are subject to available budgetary appropriations and shall not create any obligation of payment on behalf of the State in excess of such appropriations and other funds and assets available to the State for the performance of its obligations. Notwithstanding any other provision of this Agreement, if the State does not receive sufficient funds to fund this Agreement and the State's obligations hereunder and other obligations of the State, if funds are deappropriated, or if the State does not receive legal authority to expend funds from the Maine State Legislature or Maine courts, then the State is not obligated to make any payment otherwise due under this Agreement. The SPO hereby represents that it reasonably believes that funds will be made available through appropriation by the Legislature to make all payments required hereunder and to fund all obligations of performance hereunder by the State. Without limiting the foregoing, the SPO hereby covenants and agrees that it will exercise all reasonable efforts to obtain, maintain and

properly request and pursue appropriation of funds and other revenue sources from which all payments to be made hereunder shall be satisfied, and through which all obligations of performance will be funded, including, without limitation, making provisions for such payments in any and all budgets submitted for the purposes of obtaining appropriations and/or funding, using all reasonable efforts to have such portion of the budget approved. Without limiting the foregoing, it is the State's intent to make all payments required hereunder and perform all of its obligations hereunder if funds are legally available therefor.

12.2 No Waiver of Sovereign Immunity. Casella acknowledges and agrees that the Legislative Resolve authorizing this Agreement specifically provides that nothing in this Agreement, or the execution and delivery of this Agreement, or the agreement by the State to perform its obligations hereunder constitutes or is intended to constitute abrogation of the sovereign immunity of the State with respect to each and every term of this Agreement. In this regard, the State expressly reserves its right of sovereign immunity with respect to its obligations hereunder, and the execution and delivery of this Agreement by the State, and its undertakings herein in no way waive, partially waive, imply a waiver, limit or restrict the State's unconditional right to exercise its right of, or to assert sovereign immunity with respect to any matter, term or issue arising under or relating to this Agreement.

SECTION 13 CERTAIN REPRESENTATIONS, WARRANTIES AND COVENANTS OF CASELLA

Casella represents and warrants to the State as follows:

13.1 Casella is a corporation duly organized and existing under the laws of the State of Delaware with the full legal right, power and authority to enter into and fully and timely perform its obligations under this Agreement.

13.2 Casella has duly authorized, executed and delivered this Agreement, and this

Agreement constitutes a legal, valid and binding obligation, enforceable against Casella in accordance with its terms, subject to bankruptcy, insolvency and other laws affecting creditors' rights generally.

13.3 Neither the execution or delivery by Casella of this Agreement nor the performance by Casella of its obligations in connection with the transactions contemplated hereby or Casella's fulfillment of the terms and conditions hereof conflicts with, violates or results in a breach of any law or governmental regulation applicable to Casella or materially conflicts with, violates or results in a breach of, any term or condition of any order, judgment or decree or any agreement or instrument to which Casella is a party or by which Casella or any of its properties or assets is bound, or otherwise constitutes a default thereunder.

13.4 No approval, authorization, order, consent, declaration, registration or filing with any federal, state or local governmental authority or agency is required for the valid execution and delivery by Casella of this Agreement or the performance by Casella of its obligations hereunder.

13.5 Casella covenants and agrees to operate Landfill and otherwise conduct all aspects of its business at the Landfill in compliance with all applicable laws and regulations and permits. Casella further agrees to maintain, and not to take any action or fail to take any action that would cause denial or revocation of the Existing Permit or the License Amendment, or, if issued, the Expansion Permit or any other license or permit issued during the Term relating to the Landfill. Casella further agrees to assume responsibility for all closure and post-closure aspects of the Landfill arising during the Term and to close those portions of the Landfill which reach final grade in accordance with approved plans and specifications.

13.6 Casella agrees to make all contributions to the State of Maine's Solid Waste

Management Fund (or any successor fund) or other payments required under applicable laws and regulations as if the Landfill were a commercial landfill under applicable law.

13.7 Casella shall maintain in full force and effect throughout the Term and for one year following termination, the $4,000,000 payment and performance bond in the form attached hereto as Exhibit C during the term hereof and the closure and post-closure bonds required hereunder upon closure of the Landfill with financially sound and reputable sureties and/or insurers qualified to issue sureties and bonds in the State, reasonably acceptable to the State. The State acknowledges that Evergreen National Indemnity Company is a financially sound and reputable surety as of the date hereof.

13.8 Casella agrees that all improvements to the Landfill of every nature and type shall be the property of and ownership of the same shall vest in the State on termination of this Agreement.

13.9 Throughout the term hereof, Casella agrees to participate in, and support to the best of its ability, the joint citizen advisory committee, comprised of representatives from the City of Old Town and the Town of Alton, as created by the Legislative Resolve permitting the State Planning Office to purchase the Landfill and cause it to be operated, all at no cost or expense to the State.

13.10 Casella shall perform its obligations under the C&D Fuel Agreement and shall not amend the same without the prior written consent of the State, which consent will not be unreasonably withheld

SECTION 14 SURVIVAL OF REPRESENTATIONS, WARRANTIES AND COVENANTS

All representations and warranties and covenants made herein or in any schedules attached hereto, or in any instruments or documents delivered by or on behalf of either party

pursuant to this Agreement, shall remain in effect during the Term and shall survive termination hereof to the extent specifically contemplated herein. The indemnity commitment described in Section 8 hereof shall continue until the expiration of the longest of the statutes of limitations applicable to Environmental Matters subject to the indemnification thereunder.

SECTION 15 TERMINATION

15.1 Events. This Agreement may be terminated at any time:

(a) By mutual written agreement of the parties;

(b) By either party if, prior to the Effective Date, litigation is filed or threatened, or any governmental authority institutes an action or investigation, intended to prohibit or prevent consummation of any of the transactions contemplated hereby or by the Acquisition Agreement, or any governmental authority does anything by the Effective Date which in a party's reasonable commercial judgment renders such consummation imprudent.

(c) By Casella if:

(i) Casella exercises its right to terminate under Section 5.3, subject to the limitations and qualifications set forth in said Section 5.3.

(ii) an Expansion Permit has not issued as a result of a Capacity Limiting Event and the licensed and permitted capacity of the Landfill (in excess of the capacity reserved for FJ Waste pursuant to Section 2.8) has been exhausted, provided that Casella cannot exercise its right to terminate under this clause (i) until on or after the fifteenth (15th) anniversary hereof.

(iii) An Event of Default by the State occurs as set forth in Section 16, which default remains uncured beyond any applicable period for cure

thereof;

Without in any respect limiting the foregoing or affecting other terms and provisions hereof, and solely for purposes of illustration, Casella shall not have the right to terminate this Agreement in the event:

(A) The application for the Expansion Permit is denied under State law in effect as of the date of this Agreement;

(B) The construction, engineering, design, permitting, licensing, operation, maintenance, management and administration of the Landfill is more expensive under the terms of the Expansion Permit as granted than as anticipated by Casella;

(C) The application for the Expansion Permit is granted but restricted such that the new capacity, when added to the then permitted capacity, is insufficient to allow Casella to dispose of 500,000 tons of waste a year for a period of twenty (20) years;

(D) Casella is unable or fails to comply with the terms and conditions under which the Landfill is permitted and licensed;

(E) There is a change in Federal or State law after the Effective Date of this Agreement that increases the cost of the construction, engineering, design, permitting, licensing, operation, maintenance, management and administration of the Landfill; or

(F) The Expansion Permit is revoked or modified.

(d) By the State if:

(i) an Event of Default by Casella occurs as defined in Section 16.1,

which default remains uncured beyond any applicable period for cure thereof; or

(ii) any of the conditions to closing in the Acquisition Agreement for either the State's or FJ's benefit shall not have been satisfied or waived and such Agreement shall have been terminated in accordance with terms thereof; or

(iii) any representation or warranty made by Casella hereunder is not true, accurate and complete in any material respect when made or becomes untrue, inaccurate or incomplete in any material respect during Term; or

(iv) FJ exercises its right of reverter under Article 10 of the Acquisition Agreement and the underlying breach is not cured within the applicable cure period or Casella breaches its obligations under the C&D Fuel Agreement and the underlying breach is not cured within the applicable cure period; or

(v) if the State reasonably determines that the issuer of the payment and performance bond attached hereto as Exhibit C is not financially sound or reputable, notifies Casella of the same and Casella fails to secure an alternative bond in form and content reasonably satisfactory to the State issued by a financially sound and reputable surety reasonably acceptable to the State and licensed to issue surety bonds and/or insurance policies within ninety (90) days.

15.2 Effects of Termination.

(a) If this Agreement is terminated pursuant to Subsections 15.1(a) or (b), this Agreement shall terminate and neither party shall have any further or continuing obligation hereunder.

(b) If the State terminates this Agreement pursuant to subsection 15.1(d), in addition to whatever other rights or remedies it may have (none of which are waived), the State (a) may remove Casella and its agents from, and on demand Casella and its agents shall, vacate the Landfill, and (b) and/or make demand under the payment and performance bond.

(c) Upon termination of this Agreement for any reason, the State shall own all fixed capital improvements to the Landfill and all other buildings, fixtures and other improvements without any obligation to pay Casella.

(d) Termination of this Agreement for any reason shall not relieve a party of its obligations arising prior to the termination date or those obligations that survive termination, including certain of Casella payment obligations under Section 5.2 and Casella's obligations under Section 8.

SECTION 16 DEFAULT AND REMEDIES

16.1 Notice/Cure. If either party fails to perform a material obligation under this Agreement, then the other party shall give notice of such alleged material failure, describing the alleged material failure and the action required to cure such material failure, if any. If the party receiving such notice fails to cure any such material failure to perform pursuant to Section 17 hereof, then an "Event of Default" shall be deemed to have occurred and the other party shall have the rights and remedies set forth in subsection 15.1 above and 16.2 below.

16.2 Remedies. If any Event of Default occurs (as defined in subsection 16.1 above), then (i) this Agreement may be terminated by the non-defaulting party by giving notice of

termination to the defaulting party, and/or (ii) the non-defaulting party shall have the right to take whatever action at law or in equity it deems necessary or desirable to collect any amounts then due or thereafter to become due under this Agreement or to enforce performance of any covenant or obligation of the defaulting party under this Agreement, including as to the State the right to make demand on the payment and performance bond securing Casella's obligations under this Agreement.

SECTION 17 RIGHT TO CURE BREACH

Upon its receipt of a notice of alleged material failure to perform a material obligation under this Agreement issued under subsection 16.1 hereof, the receiving party shall either:

17.1 Cure the material failure to perform within thirty (30) days of receipt of the written notice from the other party, provided that there shall be no cure period for a breach by Casella of its obligations under section 13.7 and 21.2; or

17.2 Continuously demonstrate, for those defaults for which cure periods exist, within such thirty (30) day cure period that it is actively pursuing a course of action which reasonably can be expected to lead to a cure of the material failure to perform (and the cure period shall be extended for so long as the curing party is actively and continuously pursuing such course of action) within a commercially reasonable period of time not to exceed ninety (90) days; provided, however, that with respect to a default by Casella under Section 2.10, the aforesaid period of time shall be extended to one (1) year on the condition that Casella has established and is maintaining a capital improvement plan designed to bring Casella into compliance with and maintain Casella's compliance with the requirements of Section 2.10; alternatively, Casella shall have the right to cure such a default by posting a performance bond in the amount of the insufficient capacity, calculated at the rate of $2.90 per ton; provided further that, in the event of the failure of either party to pay the other party any amount required to be paid hereunder when

due, cure shall consist of payment in full which shall be made within ten (10) business days of written demand from the party entitled to the payment, together with interest accruing from the date the payment was due at a per annum rate equal to the Prime Rate, unless said sums are being contested.

SECTION 18 NON-BINDING MEDIATION

18.1 Non-Binding Mediation. The parties agree that in the event of any dispute, controversy or claim arising under or relating to this Agreement or any alleged breach thereof, other than a breach by Casella of its payment obligations or its obligations under Sections 13.7, 21.1 or 21.2 hereof, the parties shall attempt to come to a reasonable settlement of any dispute (i) by having their authorized representatives attempt to negotiate a resolution of the dispute for a period of thirty (30) days, and, if not resolved by the authorized representatives (ii) by having other more senior members of each party's management, who have no previous involvement in the dispute, but who have the authority to resolve the dispute, attempt to negotiate a resolution of the dispute for an additional fifteen (15) days.

18.2 Waiver of Jury Trial. THE STATE AND CASELLA AGREE THAT NEITHER OF THEM NOR ANY ASSIGNEE OR SUCCESSOR SHALL (A) SEEK A JURY TRIAL IN ANY LAWSUIT, PROCEEDING, COUNTERCLAIM OR ACTION ARISING UNDER OR RELATING TO THIS AGREEMENT, OR (B) SEEK TO CONSOLIDATE ANY SUCH ACTION WITH ANY OTHER ACTION IN WHICH A JURY TRIAL CANNOT BE OR HAS NOT BEEN WAIVED. THE PROVISIONS OF THIS PARAGRAPH HAVE BEEN FULLY DISCUSSED BY THE STATE AND CASELLA, AND THESE PROVISIONS SHALL BE SUBJECT TO NO EXCEPTIONS. NEITHER THE STATE NOR CASELLA HAS AGREED WITH OR REPRESENTED TO THE OTHER THAT THE PROVISIONS OF THIS SECTION WILL NOT BE FULLY ENFORCED IN ALL INSTANCES.

18.3 Consent to Jurisdiction. The parties and their assigns submit to the jurisdiction of any state or federal court located in the State of Maine in connection with any proceeding or action arising from or relating to this Agreement or the agreements referred to herein. The parties consent to the jurisdiction and venue of any such court and waive any argument that venue in such forums is not convenient. In the event a party commences any action in another jurisdiction or venue under any tort or contract theory arising directly or indirectly from the relationship created by this Agreement, the other party at its option shall be entitled to have the case transferred to one of the jurisdictions and venues above-described, or if such transfer cannot be accomplished under applicable law, to have such case dismissed without prejudice.

SECTION 19 FORCE MAJEURE

If either party hereto is rendered unable, in whole or in part, to perform any of its obligations under this Agreement (other than an obligation to pay money when due) as a result of the occurrence of an event of Force Majeure, then the obligations of the affected party shall be suspended and its non-performance thereof excused during the continuation of the event of Force Majeure. At any time that a party intends to rely upon an event of Force Majeure to suspend its obligations or excuse its non-performance as provided in this Section 19, the affected parties shall notify the other party as soon as reasonably practicable (but in no event later than 72 hours following such event) describing in reasonable detail the circumstances of the event of Force Majeure and its ongoing efforts to mitigate the effects of such event of Force Majeure. Notice shall again be given when the effect of the event of Force Majeure has ceased. As a condition of invoking the protection afforded by this Section 19, the party relying upon an event of Force Majeure shall be required to exercise its best and most diligent efforts to eliminate the Force Majeure or devise a means of performance notwithstanding the Force Majeure and re-establish performance hereunder as rapidly as possible

Notwithstanding anything to the contrary herein, upon the occurrence of a force majeure, Casella will make available to FJ disposal capacity for FJ Waste and Lincoln Biomass Ash at the then prevailing market rate at any other landfill in the State of Maine owned and/or operated by Casella or any Affiliate that is licensed to accept FJ Waste and Lincoln Biomass Ash for a total commitment of thirty (30) years or such earlier time as disposal capacity at such landfill(s) is exhausted; provided, however, that FJ or Lincoln, as applicable, shall pay any and all costs of transporting FJ Waste and Lincoln Biomass Ash to such site. Except as aforesaid, Casella's obligations to provide disposal capacity for FJ Waste and Lincoln Biomass Ash shall be suspended during the pendency of any Force Majeure.

SECTION 20 EMINENT DOMAIN

The State agrees to cooperate with Casella in opposing any effort by any governmental authority to exercise its rights of eminent domain. In the event an eminent domain award is made, the amount of the award, after deducting amounts due FJ resulting from any breach of the Acquisition Agreement or Casella's obligations to FJ hereunder shall be apportioned between the State and Casella on the basis of the value of Casella's contractual and other interests under this Agreement, including without limitation, the value of any capital improvements made by Casella hereunder, and the value of lost revenue under any Landfill waste disposal capacity otherwise available to Casella hereunder.

SECTION 21 INSURANCE

21.1 General Insurance Requirements. Casella shall maintain liability, fire and workers' compensation insurance insuring both the State and Casella in the amounts set forth in Schedule 21 attached hereto, issued by financially sound and reputable insurance companies reasonably acceptable to the State that are authorized and licensed to issue such policies in the

State of Maine. Casella shall pay any premiums with respect to such policies as they come due. If Casella fails to pay any such premiums when due, the State shall have the right and option to pay any such premiums, whereupon the amount of any such premiums paid by the State shall be reimbursed by Casella to the State upon demand therefor. Upon request from the State, Casella shall promptly provide copies of such policies to the State.

21.2 Environmental Impairment. During the Term hereof, and annually thereafter for a period equal to the longest applicable statute of limitations (so long as such insurance is commercially available) for claims (including governmental actions) under Environmental Laws, Casella shall cause the Landfill to be insured for third party environmental impairment under a claims made policy carried by Casella. The policy shall provide a limit of not less than the greater of (a) the amount required under applicable laws and regulations from time to time in effect or required in connection with license and permits, or (b) $1,000,000 primary coverage and a $10,000,000 umbrella, increased annually by Two Hundred Twenty-five Thousand Dollars ($225,000) on each anniversary date of the Effective Date. Such policies shall name the State and FJ as additional insureds and shall be reasonably acceptable to the State and FJ.

SECTION 22 COVENANT OF QUIET ENJOYMENT

The State covenants and agrees that Casella, upon its performance of its obligations hereunder, shall lawfully, peacefully and quietly hold, occupy and enjoy the Landfill during the Term without hindrance, objection or disturbance, subject in all instances to the terms and provisions hereof.

SECTION 23 THIRD-PARTY BENEFICIARY

23.1 Third Party Benefit to FJ. FJ is an intended third-party beneficiary of all agreements, commitments and promises of Casella under this Agreement that provide benefit to FJ, including without limiting the generality of the foregoing, the provisions of Sections 2.8, 2.9,

2.10, 3.1, 4.1, 4.2, 8, 13, 14, 19, 20, 21 and 23.2 hereof, including related definitions from Section 1 and Exhibits (collectively, the "FJ Commitments"). The parties acknowledge and agree that FJ has provided consideration for its status as a third-party beneficiary hereunder through the sale of the Landfill to the State contemporaneously herewith, and that FJ's status as a third-party beneficiary under this Agreement was a material inducement to FJ selling the Landfill to the State. FJ's status hereunder shall be fully vested and shall be absolute as of the date hereof and FJ shall be entitled to take whatever action, in law or in equity, as may be available to enforce FJ's rights hereunder against Casella or any Affiliate operating the Landfill. FJ's status hereunder as a direct, intended, fully vested, absolute third-party beneficiary shall not in any way limit, restrict, abrogate or otherwise alter its rights against the State under the Acquisition Agreement.

23.2 Third Party Benefit to Casella. Casella is an intended third party beneficiary of the Unwind Provisions set forth in Section 2.10, the Representations and Warranties of FJ set forth in Article 3, and the Reverter Option set forth in Section 10.1, of the Acquisition Agreement. The parties acknowledge that Casella has provided consideration for its status as a third party beneficiary through its undertakings hereunder, and that such status shall be fully vested and absolute as of the date hereof and that Casella shall be entitled to take whatever action, in law or equity, as may be available to enforce Casella's rights as a third party beneficiary.

23.3 Successors and Assigns. The provisions of this Section 23 shall inure to the benefit of, and be binding upon FJ and its respective successors and assigns. Casella shall not assign or otherwise transfer its obligations under the FJ Commitments without the express written consent of FJ.

SECTION 24 MISCELLANEOUS PROVISIONS

24.1 Assignment. This Agreement may not be assigned by either party without the prior written consent of the other, which consent may be granted or withheld by such party in its sole discretion; notwithstanding the foregoing, Casella shall have the right to assign this Agreement to any Affiliate provided that Casella remains fully liable hereunder and provides reasonable assurances of the same to State in connection with any such assignment; furthermore, until such time as the License Amendment is received and is substantially consistent with the terms and conditions of the License Application, Casella shall have the right to delegate or subcontract the operation of the Landfill to J.A. Construction, Inc., subject to the terms and conditions of this Agreement. Each party further agrees not to unreasonably withhold its consent to a collateral assignment of this Agreement by the other party of such party's rights under this Agreement.

24.2 Cumulative Remedies. The specified remedies available to a party under this Agreement are not exclusive of any other remedies or means of redress to which such party may be lawfully entitled in the event of any breach or threatened breach by the other party of any provision(s) of this Agreement.

24.3 Captions and Headings. Captions and headings contained in this Agreement are inserted for convenience and reference only and the words contained therein shall in no way be held or deemed to define, limit, describe, explain, modify, amplify or add to the interpretation, construction or meaning of any provision or of the scope or intent of this Agreement, nor in any way to affect this Agreement.

24.4 Amendments and Modifications. This Agreement shall not be amended, modified or changed, except pursuant to an agreement in writing signed by or on behalf of the party against whom enforcement of the amendment, modification or change is sought.

24.5 Notices. All notices or other communications required or permitted hereunder shall be in writing and may be given by personal delivery, by overnight express delivery, or by registered or certified U.S. mail, postage prepaid, return receipt requested, properly addressed as follows:

To the State:

Executive Department
State Planning Office
38 State House Station
Augusta, Maine 04333-0038
Attention: Director

With a copy to:

William H. Laubenstein III Esq.
Assistant Attorney General
State of Maine
Office of the Attorney General
6 State House Station
Augusta, ME 04333-0006

To Casella:

c/o Casella Waste Systems, Inc.
25 Greens Hill Lane
Rutland, VT 05702-0866

With a copy to:

Gordon F. Grimes, Esq.
Bernstein, Shur, Sawyer & Nelson, P.A.
100 Middle Street, P.O. Box 9729
Portland, Maine 04104

Either party may change the address to which notices are required to be sent by giving notice of such change in the manner provided in this Section 24.5. All notices shall be deemed to have been received on the date of delivery if service is made in person, on the day after sent by

overnight express delivery service, or on the third (3rd) business day after mailing in accordance with this Section 24.5, except that any notice of a change of address shall be effective only upon actual receipt.

24.6 Strict Performance. The failure of either party to insist on the strict performance of any of the terms, covenants and provisions of this Agreement or to exercise any right, remedy or option herein contained shall not be construed as a waiver or a relinquishment for the future of such term, covenant, condition, provision, right, remedy or option.

24.7 Severability. In the event that any one or more of the terms or provisions of this Agreement shall for any reason he held by a court or other tribunal of competent jurisdiction to be invalid, illegal or unenforceable in any respect, in whole or in part, such invalidity, illegality or unenforceability shall not affect any other terms or provisions of this Agreement, and this Agreement shall be construed as if such invalid, illegal or unenforceable term or provision had never been contained herein, provided that it is the intention of the parties that, in lieu of such term or provision held to be invalid, illegal or unenforceable, there shall be added by mutual agreement as a part of this Agreement a term or provision as similar in terms to such illegal, invalid or unenforceable term or provision as may be possible, valid, legal and enforceable.

24.8 Construction. Words connoting the singular number shall include the plural in each case, and vice versa, and words connoting persons shall include corporations, companies, firms or other entities. The terms "herein", "hereunder", "hereby", "hereof" and any similar terms shall refer to this Agreement; the term "heretofore" shall mean before the date of execution of this Agreement. This Agreement is the result of joint negotiations and drafting and no part of this Agreement shall be construed as the product of any one of the parties hereto.

24.9 Entire Agreement. This Agreement, including covenants in the Acquisition

Agreement incorporated or referred to herein and the other agreements contemplated hereby, the covenants of Casella in the C&D Fuel Agreement and all exhibits and schedules attached hereto and thereto, constitute the entire agreement between the State and Casella with respect to the subject matter hereof, and supersede all prior or contemporaneous negotiations, representations, understandings and agreements, whether written or oral, between the parties with respect to the subject matter hereof.

24.10 Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original for all purposes, but all of which together shall constitute one and the same agreement.

24.11 Governing Law. This Agreement shall be governed by and construed and enforced in accordance with the laws of the State of Maine, without regard to the conflicts of law principles of such State.

24.12 Binding Effect; No Third Party Rights. This Agreement shall be binding upon and shall inure to the benefit of the parties hereto and their respective legal representatives, successors (whether by sale, assignment, transfer, merger, other acquisition, operation of law, or court ruling) and/or permitted assigns without releasing Casella of its obligations herein and shall be binding on any entity or entities that acquire all or substantially all of the assets or business of Casella and/or its Affiliates, in one or more transactions, whether by sale of assets, stock, merger or otherwise. Subject to the foregoing, and except as otherwise expressly provided herein (including Subsections 23.1 and 25), nothing in this Agreement shall be construed to confer any benefit on, or create any obligation, duty or liability to, or create any standard of care with respect to, any person, firm or entity not a party to this Agreement.

24.13 Authority of Parties. Each party hereto represents and warrants that the individual

who has executed this Agreement on its behalf has the full and complete authority to sign on behalf of such party for the purpose of duly binding such party to this Agreement.

24.14 State Special Services Agreement. This Agreement is subject to certain provisions of Rider B to the State's standard form of Agreement for Special Services, which provisions are attached hereto as Exhibit D.

SECTION 25 C&D FUEL COMMITMENT

Contemporaneously with the execution of this Agreement, Casella and FJ shall enter into a C&D Fuel Agreement in the form attached hereto as Exhibit B.

IN WITNESS WHEREOF, the parties have executed and delivered this Agreement as of the date first above written.

CASELLA WASTE SYSTEMS, INC.

Witness

Name: [illegible]

By: [signature]
Name: James W. Bohlig
Its President

STATE OF MAINE, Acting by and Through its Executive Department, State Planning Office

Witness

Name: George M. MacDonald

By: Martha E. Freeman
Name: Martha E. Freeman
Its Director

EXHIBITS

Exhibit A	Alton and Old Town, Maine real estate
Exhibit B	C&D Fuel Agreement
Exhibit C	Performance Bond
Exhibit D	Agreement for Special Services

Exhibit A

Parcel Description

Four parcels located at **Old Town, Penobscot County, Maine,** and described as follows (individually referred to as "Parcel" and collectively referred to as "Parcels"):

PARCEL ONE: A certain parcel of land with any buildings thereon, situated on the northeast side of Route 43, 3.4 + miles west of the intersection of Route 43 and Route 95, in the city of Old Town, County of Penobscot, State of Maine and being more particularly described as follows:

1) BEGINNING at a 3/4 inch rebar located on the northeast side of Route 43, at the northwest corner of land now or formerly of Scott E. Bergquist as described in deed recorded at the Penobscot County Registry of Deeds in Book 3608, Page 247. Said rebar is also located at the southwest corner of the "Cadorette Parcel" as shown on plan entitled "Perkins & Cadorette Parcels, Standard Boundary Survey (with exceptions)" by Squaw Bay Corp. of Cumberland, Maine, June, 1995, Ronald M. Carpentier, PLS #2042, recorded at the Penobscot County Registry of Deeds, Plan Book D46-95, to which reference is hereby made;

2) THENCE South 82° 12' 30" East, 1445.38 feet along the land of said Bergquist to a cedar post and the land now or formerly of James River Paper Company, Inc. as described in the deed recorded at the Penobscot County Registry of Deeds in Book 4870, Page 200;

3) THENCE North 4° 27' 20" East, 809.31 feet along the land of said James River Paper Company, Inc. to a point;

4) THENCE North 5° 59' 05" East, 15.69 feet along the land of said James River Paper Company, Inc. to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the land now or formerly of Alfred Perkins and Florine Perkins as described in the deed recorded at the Penobscot County Registry of Deeds in Book 1448, Page 22;

5) THENCE North 82° 46' 26" West, 2014.87 feet along the land of said Perkins to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the sideline of Route 43;

6) THENCE South 29° 43' 31" East, 1013.29 feet along Route 43 to a 3/4 inch rebar and point of beginning.

The above-described parcel contains 32.4 acres.

Being the same premises described in a Warranty Deed given by Francis R. Cadorette and Rhonda B. Cadorette to James River Paper Company, Inc., dated June 13, 1995, and recorded in said Registry in Book 5878, Page 272.

PARCEL TWO: A certain parcel of land with any buildings thereon situated on the northeast side of Route 43, 3.4+ miles west of the intersection of Route 43 and Route 95, in the City of Old Town, County of Penobscot, State of Maine, and being more particularly described as follows:

COMMENCING at a 5/8 inch rebar with survey cap marked "RMC NO. 2042" located at the intersection of the northeast sideline of Route 43, and the southerly boundary line of land now or formerly of Alfred Perkins and Florine Perkins as described in deed recorded at the Penobscot County Registry of Deeds in Book 1448, Page 22. Said rebar is also located at the northwest corner of the "Cadorette Parcel" as shown on plan entitled "Perkins & Cadorette Parcels, Standard Boundary Survey (with exceptions)" by Squaw Bay Corp. of Cumberland, Maine, June, 1995, Ronald M. Carpentier, PLS #2042. to be recorded at the Penobscot County Registry of Deeds to which reference is hereby made. Thence South 82° 46' 26" East, 1485.52 feet along the Cadorette parcel to the point of Beginning.

1) THENCE from the Point of Beginning South 82°46'26" East, 529.45 feet along the Cadorette Parcel to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the land now or formerly of James River Paper Company, Inc., as described in the deed recorded at the Penobscot County Registry of Deeds in Book 4870, Page 200;

2) THENCE North 5° 59' 05" East, 828.72 feet along the land of said James River Paper Company, Inc. to a cedar post and the land of Alfred J. Meister as described in the deed recorded at the Penobscot County Registry of Deeds in Book 3738, Page 197;

3) THENCE North 84° 06' 52" West, 529.33 feet along the land of said Meister to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the land now or formerly of said Perkins;

4) THENCE South 5° 59' 05" West, 816.33 feet along the land of said Perkins to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the Point of Beginning.

The above-described parcel contains 10 acres.

Being the same premises described in a Warranty Deed given by Alfred K. Perkins and Florine J. Perkins to James River Paper Company, Inc. dated June 13, 1995, and recorded in said Registry of Deeds in Book 5878, Page 278.

PARCEL THREE: Lots 1 through 9 and 14 through 22, inclusive, as shown on the survey "Tyron Tree Farm" dated February 23, 1988, recorded in the Penobscot County Registry of Deeds in Plan file C26-88, together with a strip of land fifty (50) feet wide leading from Bennoch Road to the northerly line of Lot 11 on said plan, which strip was conveyed to Patten Corporation – Downeast by deed of Lyman B. Feero and Rosalita Feero, dated June 4, 1988, and recorded in said Registry in Book 4244, Page 5, and together with a right of way for all purposes over the roads fifty (50) feet wide, the centerlines of which are shown on said plan, leading from the northerly line of Lot 11 to the lots hereby conveyed. This right of way includes, but is not limited to, the right to install, use, maintain, repair and replace utility lines, poles and cables.

Together with all right, title and interest in and to that portion of the discontinued roadway lying northerly of the above described Parcel Three and southerly of the Town of Alton southerly line.

Being the same premises described in a Warranty Deed given by James River Corporation to James River Paper Company, Inc. dated July 10, 1991, and recorded in said Registry in Book 4870, Page 200.

Exceptions

The Parcels are conveyed subject to the following exceptions:

ALL PARCELS:

1. State of Maine, Department of Environmental Protection, Site Location Findings of Fact and Order, dated August 24, 1995, and recorded in the Penobscot County Registry of Deeds in Book 5939, Page 147.

2. Declarations of Covenants and Restrictions by James River Paper Company, Inc., dated December 20, 1993, recorded in said Registry in Book 5518, Page 67; Corrected Declaration of Covenants and Restrictions, dated January 20, 1994, recorded in said Registry in Book 5549, Page 162; and Amendment to Declaration of Covenants and Restrictions, dated November 30, 1995, recorded in said Registry in Book 6044, Page 118.

PARCELS ONE AND TWO ONLY:

1. Such state of facts as shown on the plan entitled "Cadorette House Lots, Route 43, Old Town, Maine," prepared by Squaw Bay Corp., dated June 1995, and recorded in said Registry in Plan 1996-59.

2. Such statement of facts as shown on the plan entitled "Perkins & Cadorette Parcels, Route 43, Old Town, Maine," prepared by Squaw Bay Corp., dated June 1995, recorded in said Registry in Plan D46-95.

PARCEL THREE ONLY:

1. Rights of way acquired by the University of Maine System by deeds dated July 27, 1989, and recorded in said Registry in Book 4490, Page 322 and Book 4490, Page 325.

2. Restrictions and conditions set forth in the deed from Pattern Corporation to James River Corporation recorded in said Registry in Book 4654, Page 310.

3. Rights of way reserved in the deed form Camillis G. Kidder to Napoleon Parady, dated January 10, 1910, and recorded in said Registry in Book 750, Page 407.

4. Order of the Grantee of Maine, Department of Environmental Protection, dated October 3, 1988, recorded in said Registry in Book 4345, Page 19.

5. Such statement of facts, including easements and rights of way, as shown on the plan entitled "Tryon Tree Farm, Patten Corporation-Downeast," prepared by Raymond S. Silsby, dated February 23, 1988, and recorded in said Registry in C26-88.

NOTICE OF SOLID WASTE DISPOSAL FACILITY

Pursuant to Maine Department of Environmental Protection Solid Waste Management Regulation, Chapter 400 Appendix C.11, Grantor provides the following notice:

The Premises contains an active secure solid waste disposal facility (the "Facility"). The Facility was licensed by the Maine Board of Environmental Protection on July 28, 1993. The Facility began operations on December 2, 1996. The Facility is 68 acres and is located southern quadrant of Parcel Three of the Premises. The following non-hazardous wastes have been placed in the Facility to a maximum depth of approximately 30 feet:

- pulp and papermill wastewater treatment plant sludge,
- lime wastes and grit,
- woodwastes and inert debris,
- small quantities of soil and sawdust contaminated with process chemicals that are non-hazardous,
- virgin oily contaminated debris,
- soil rags, oil filters, absorbent materials, crushed grease drums and waste grease,
- sand from sand filters,

- non-hazardous sand from sand blasting,
- multifuel fly ash and bottom ash from the Lincoln Pulp and Papermills, and
- wood ash from the City of Old Town

EXHIBIT B
FUEL SUPPLY AGREEMENT

This C&D FUEL AGREEMENT (this "Agreement") is made as of this _____day of February, 2004, by and between CASELLA WASTE SYSTEMS, INC., a Maine corporation with a place of business at 25 Green Hill Lane, Rutland, Vermont 05702 ("Casella"), and the FORT JAMES OPERATING COMPANY, a Delaware corporation ("FJ").

Recitals

1. The State of Maine, acting by and through its Executive Department, State Planning Office ("State") and FJ entered into an Agreement Regarding Solid Waste Disposal Facility Acquisition and Operation dated November 20, 2003 ("Landfill P&S").

2. The State and Casella entered into an Operating Services Agreement dated _____, 2003 ("Operating Agreement").

3. Both the Landfill P&S and the Operating Agreement contemplate that FJ and Casella will formalize and agreement regarding the C&D fuel commitments described herein.

Agreement

In consideration of the foregoing, and the promises set forth herein, the parties agree as follows:

1. **Definitions.** Capitalized terms used but not defined herein shall have the meanings assigned to those terms in the Landfill P&S. Capitalized terms used but not defined herein or in the Landfill P&S shall have the meanings assigned to those terms in the Operating Agreement.

"C&D Fuel" means processed construction and demolition debris, which shall meet the following criteria:

(a) Provides a minimum of at least 4,000 BTUs per pound (HHV) and an average of 6,800 BTUs per pound (HHV);

(b) Meets such specifications as the DEP may require for legitimate fuel substitution;

(c) Constitute "processed" C&D Fuel, in a form ready to burn in FJ's Biomass Generation Facility;

(d) Restricted to the type of waste which the FJ's Biomass Generation Facility is licensed to burn; and

(e) In no event shall C&D Fuel constitute or contain pentachlorophenol, arsenic or creosote-treated wood waste, except in such trace amounts as are consistent within the

DEP's current or future definition of "clean" C&D waste fuel and within the allowances for such substances set forth in the DEP permit for the Biomass Generation Facility.

2. **C&D Fuel Commitment.** (a) Casella hereby grants to FJ an option to purchase from Casella or its Affiliates, all or any portion of FJ's requirements for C&D Fuel ("C&D Fuel Option") for FJ's proposed Biomass Generating Facility in excess of any requirements satisfied by burning all available bark from FJ's pulping operations (estimated at a minimum of 100,000 tons per year) under the terms and conditions set forth below.

(b) The terms and conditions of the option be as follows:

(i) The term of the C&D Fuel Option shall extend for the shorter of: (x) the term, or any extended term, of the Operating Agreement or (y) a period of thirty (30) years following the date of commencement of operation of the Biomass Generation Facility ("Biomass Commencement Date").

(ii) The price charged to FJ for C&D Fuel will be fixed for the entire term of the C&D Fuel Option at the following levels:

(A) The price shall be fixed at the lesser of (x) market price or (y) $4 per ton for the first five (5) years following the Biomass Commencement Date.

(B) On the sixth anniversary of the Biomass Commencement Date, the price shall be the lesser of (x) market price or (y) $4 per ton, adjusted as set forth below. On the sixth anniversary of the Biomass Commencement Date, and thereafter on each anniversary of the Biomass Commencement Date throughout the remaining term of the C&D Fuel Option, the $4 per ton shall be adjusted upward or downward annually by a percentage equal to the percentage change in the Consumer Price Index (U.S.-national) ("CPI") from the immediately preceding anniversary through the then current anniversary of the Biomass Commencement Date. In no event shall the CPI adjustment be less than one percent (1%) per year or in excess of five percent (5%) per year.

For purposes of this section, reference to a "year" means the period of twelve (12) months extending from the Biomass Commencement Date to the first anniversary thereof, or from one anniversary of the Biomass Commencement Date to another, as applicable.

(iii) The volume of C&D Fuel available at the pricing set forth above is 75,000 tons in the first year of operation of the Biomass Generating Facility, 90,000 tons in the second year, and 100,000 tons in the third year and thereafter for the remainder of the term of this C&D Fuel Option.

3. **Chip Fuel Option.** Casella hereby grants to FJ an option to purchase from Casella, or its Affiliates, all or any portion of FJ's requirements for green wood chip fuel for FJ's proposed Biomass Generating Facility in excess of any requirements satisfied by burning all available bark

from FJ's pulping operations and C&D Fuel under the terms and conditions set forth below ("Chip Fuel Option").

(i) In the event FJ is not able to obtain all necessary Governmental Approvals to burn C&D Fuel at the Biomass Generating Facility, and during any period in which such Governmental Approvals have not yet been obtained, lapse or are otherwise not in force, Casella will provide to FJ up to 75,000 tons of green wood chip fuel at a price of $9 per ton for the first year following the Biomass Commencement Date, and thereafter adjusted upward or downward on each anniversary of the Biomass Commencement Date throughout the remaining term of this Chip Fuel Option by a percentage equal to the percentage change in the CPI from the date of the previous adjustment through the then current anniversary of the Biomass Commencement Date. In no event shall the CPI adjustment be less than one percent (1%) per year or in excess of five percent (5%) per year.

(ii) During the first year following the Biomass Commencement Date, Casella will provide FJ with up to 25,000 tons green wood chip fuel, if any, required by the Biomass Generating Facility to operate in normal mode to produce approximately 15 megawatts of electricity after utilization of FJ's available bark fuel and the C&D Fuel at a cost of $9 per ton for the first year following the Biomass Commencement Date, and thereafter adjusted upward or downward on each anniversary of the Biomass Commencement Date throughout the remaining term of this Chip Fuel Option by a percentage equal to the percentage change in the CPI from the date of the previous adjustment through the then current anniversary of the Biomass Commencement Date. In no event shall the CPI adjustment be less than one percent (1%) per year or in excess of five percent (5%) per year. The foregoing obligation will be reduced to 18,000 tons during the second year following the Biomass Commencement Date, and 9,000 tons in the third and each successive year thereafter until the end of the thirty-year term of this Chip Fuel Option. FJ agrees to utilize all green wood chip fuel provided by the operator as fuel for the Biomass Generating Facility.

4. **Alternative Fuel Source.** For any period during which the combination of FJ's available bark fuel, the C&D Fuel provided under Section 2 and the green wood chip fuel provided under Section 3 do not result in a fuel mixture that enables the Biomass Generating Facility to produce 15 megawatts of power on a sustained basis, Casella and its Affiliates shall exercise their best and most diligent efforts to provide FJ with other more efficient sources of fuel that will enable the Biomass Generation Facility to produce at the level specified above at prevailing market rates.

5. **Terms of Payment.** Payment shall be made by FJ to Casella net 30 days from date of invoice for each delivery.

6. **Supply Terms.**

(a) Timing and Volume. FJ and Casella acknowledge and agree that they shall work cooperatively and in good faith to establish a supply schedule that will provide consistent supply

of fuel hereunder as required to meet FJ's requirements for efficient Biomass Generating Facility operation. FJ and Casella shall meet not less often than once per month to review FJ's projected supply requirements for the ensuing three (3) months and establish a mutually acceptable delivery schedule. The delivery schedule shall represent a firm order for the fuel designated therein for the first [month/weeks/week] reflected in the delivery schedule. The remainder of the schedule will be advisory only. FJ and Casella agree to periodically adjust the schedule between monthly meetings, as required to reflect FJ's actual requirements.

(b) All sales will be FOB FJ's Old Town Mill. Title and risk of loss shall pass to FJ upon delivery and acceptance of each shipment.

(c) FJ shall have a period of [10] days to inspect and test each delivery for conformity to specifications. FJ may reject all or any portion of a delivery that does not meet the specifications described herein by notification to Casella stating the reason for rejection. Casella shall cure any defect or remove any non-conforming delivery and promptly provide conforming product. Rejection of any individual delivery shall not constitute a termination of this Agreement. The foregoing is not intended to limit FJ's remedies at law for dealing with non-conforming deliveries.

7. **Miscellaneous Provisions.**

(a) This Agreement may not be assigned by either party without the prior written consent of the other, which consent may be granted or withheld by such party in its sole discretion; not withstanding the foregoing, Casella shall have the right to assign this Agreement to any Affiliate provided that Casella remains fully liable hereunder.

(b) Captions and headings contained in this Agreement are inserted for convenience and reference only and the words contained therein shall in no way be held or deemed to define, limit, describe, explain, modify, amplify or add to the interpretation, construction or meaning of any provision or of the scope or intent of this Agreement, nor in any way to affect this Agreement.

(c) This Agreement shall not be amended, modified or changed, except pursuant to an agreement in writing signed by or on behalf of the party against whom enforcement of the amendment, modification or change is sought.

(d) Notices. All notices or other communications required or permitted hereunder shall be in writing and may be given by personal delivery, by overnight express delivery, or by registered or certified U.S. mail, postage prepaid, return receipt requested, properly addressed as follows:

To Casella:

Casella Waste Systems, Inc.
25 Green Hill Lane

Rutland, VT 05702-0866

To FJ:

Georgia-Pacific Corporation
Attention: General Counsel
133 Peachtree Street, N.E.
Atlanta, Georgia 30303

Either party may change the address to which notices are required to be sent by giving notice of such change in the manner provided in this Section 7(d). All notices shall be deemed to have been received on the date of delivery if service is made in person, on the day after sent by overnight express delivery service, or on the third (3rd) business day after mailing in accordance with this Section, except that any notice of a change of address shall be effective only upon actual receipt.

(e) The failure of either party to insist on the strict performance of any of the terms, covenants and provisions of this Agreement or to exercise any right, remedy or option herein contained shall not be construed as a waiver or a relinquishment for the future of such term, covenant, condition, provision, right, remedy or option.

(f) This Agreement, including provisions of the Landfill P&S and Operating Agreement incorporated herein constitute the entire agreement between the parties with respect to the subject matter hereof, and supersedes all prior or contemporaneous negotiations, representations, understandings and agreements, whether written or oral, between the parties with respect to the subject matter hereof.

(g) This Agreement may be executed in one or more counterparts, each of which shall be deemed an original for all purposes, but all of which together shall constitute one and the same agreement.

(h) This Agreement shall be governed by and construed and enforced in accordance with the laws of the State of Maine, without regard to the conflicts of law principles of such State.

(i) This Agreement shall be binding upon and shall inure to the benefit of the parties hereto and their respective legal representatives, successors (whether by sale, assignment, transfer, merger, other acquisition, operation of law, or court ruling) and/or permitted assigns. Subject to the foregoing, nothing in this Agreement shall be construed to confer any benefit on, or create any obligation, duty or liability to, or create any standard of care with respect to, any person, firm or entity not a party to this Agreement.

(j) Each party hereto represents and warrants that the individual who has executed this Agreement on its behalf has the full and complete authority to sign on behalf of such party for the purpose of duly binding such party to this Agreement.

(k) FJ and Casella agree that a breach of Casella's obligations under this Agreement shall constitute a failure to perform a material obligation under the Operating Agreement and shall be treated as such for purposes of declaring default and exercising remedies under Section 16 thereof.

IN WITNESS WHEREOF, the parties have executed and delivered this Agreement as of the date first above written.

FORT JAMES OPERATING COMPANY

Witness

_____
Name:

By:_____
Name:_____
Its _____

CASELLA WASTE SYSTEMS, INC.

Witness

_____
Name:

By:_____
Name:_____
Its _____

EXHIBIT C

PAYMENT AND PERFORMANCE BOND

Bond No.: _____

KNOW ALL MEN BY THESE PRESENTS, that we **CASSELLA WASTE SYSTEMS, INC.**, having a place of business at 25 Green Hills Lane, Rutland, Vermont 05702, (the "Principal"), and **EVERGREEN NATIONAL INDEMNITY COMPANY**, having a place of business at 6140 Parkland Boulevard, Suite 300, Cleveland, OH 44124, (the "Surety"), are held and firmly bound unto the **STATE OF MAINE**, acting by and through its Executive Department, State Planning Office, (the "Obligee"), in the penal sum of Four Million Dollars ($4,000,000) for the payment of which we bind ourselves, our heirs, administrators, executors, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Operating Services Agreement for the operation and maintenance of the solid waste landfill located in Old Town, Maine (the "Landfill") with the above mentioned Obligee, dated the _____ day of February, 2004, which agreement, as amended from time to time, is hereby incorporated herein by reference as if fully rewritten (the "Contract").

WHEREAS, it is a condition of the agreement of the Obligee to enter into the Contract that the Principal provide Obligee with a payment and performance bond in form and content satisfactory to Obligee to secure Principal's obligations thereunder;

NOW, THEREFORE, the condition of the above obligation is such that if the Principal shall promptly and faithfully perform this Contract, then this obligation shall be null and void; otherwise, it shall remain in full force and effect and Surety covenants to perform its obligations hereunder, subject, however, to and on the following conditions:

1. This Bond shall be maintained, in full force and effect throughout the Term (as defined in the Contract) and for one (1) year following Termination (as defined in the Contract). Notwithstanding the foregoing, if the Contract is terminated for any reason other than breach by Obligee prior to the date which is thirty (30) years after the Effective Date (as defined in the Contract) of the Contract, and Obligee makes a demand for payment and performance under this Bond prior to or within one (1) year following such Termination, the Bond shall continue to be maintained in full force and effect until the date which is thirty (30) years after the Effective Date (as defined in the Contract) as security for ongoing losses, liabilities and damages Obligee may incur.

2. If there is no material breach or default on the part of the Obligee, then the Surety's payment and performance obligation under this Bond shall arise as follows:

   a. The Obligee shall notify the Principal and the Surety in writing at their respective addresses of the alleged breach with a reasonably detailed description thereof. The parties shall attempt to arrange a conference with the Principal and the Surety to be held not later than fifteen (15) days after receipt of such notice to discuss methods of performing the Contract. During the notice period Obligee shall make available to Surety all books, records, and accounts relevant to the Contract which may be reasonably requested by the Principal or Surety, subject to such reasonable confidentiality undertaking as Obligee may require.

   b. The Principal shall be allowed time to cure the breach during the cure periods referenced in the Contract, if any; but such an agreement shall not waive the Obligee's right, if any, to subsequently declare a Principal default.

   c. If the Principal does not cure such breach or default within the cure periods referenced in the Contract, if any, Obligee may perform or arrange for the performance of Principal's duties under the Contract for the balance of the Term and make a demand for payment and performance under this Bond, and Surety hereby irrevocably covenants to pay Obligee any and all Adverse Consequences of every nature and type that Obligee may incur arising from or relating to Principal's failure to perform its obligations under the Contract, including, without limitation, the costs and expenses of any substitute contractor or any costs and expenses associated with the satisfaction of any obligations owed by the Principal to Fort James Operating Company or Georgia Pacific, Inc. or their successors and assigns. Obligee may make multiple demands for payment and performance under this Bond according to the procedures stated above, and may make demand at one time for all Adverse Consequences it anticipates arising from or relating to Principal's breach of its obligations under the Contract, provided that in no event shall Surety's obligations hereunder exceed $4,000,000. For purposes of this Bond, "Adverse Consequences" means all actions, suits, proceedings, hearings, investigations, charges, complaints, claims, demands, injunctions, judgments, orders, decrees, rulings, damages, dues, penalties, fines, costs, amounts paid in settlement, liabilities, obligations, taxes, liens, losses, expenses, and fees,

including court costs and reasonable attorneys' fees and expenses.

d. The parties acknowledge that under the terms of the Contract, Principal may assign its obligations under the Contract to a wholly-owned subsidiary, without, however, releasing Principal of its obligations under the Contract. Surety acknowledges that its obligations hereunder survive regardless of whether the obligations of Principal under the Contract are or were to be performed by Principal or its successors or assigns.

3. No claim, action, suit or proceeding, except as herein set forth, shall be had or maintained against the Surety pursuant to this Bond unless the same be brought or instituted and process served upon the Surety within one (1) year after the completion or termination of the Contract.

4. The Bond may be extended for additional terms at the option of the Surety, by Continuation Certificate executed by the Surety.

5. Neither non-renewal by the Surety, nor failure, nor inability of the Principal to file a replacement bond shall constitute loss to the Obligee recoverable under this bond.

6. In no event shall the liability of the Surety hereunder exceed the penal sum hereof (namely, $4,000,000).

7. Surety further acknowledges and agrees that (i) Obligee is independent of any agency of the State of Maine with regulatory authority over any aspect of the Landfill or performance of the Contract (an "Agency") such that, among other things, any act or inaction by any such Agency shall not be attributable to Obligee and shall not under any circumstances limit or excuse performance by Surety under this Bond and (ii) any approval, disapproval or conditioned approval by an Agency of a contractor tendered by Surety to perform the Contract is an act independent of the Obligee and shall not limit or excuse performance by Surety under this Bond and (iii) any security held or procured by any Agency with respect to the operation or closure of the Landfill shall not reduce or limit the obligation of Surety hereunder.

8. Surety agrees that the Contract may be amended from time to time without notice to or approval by the Surety.

9. The obligations of Surety and Principal hereunder are joint and several. No past or future act or omission of Principal shall excuse or limit the obligation of Surety to perform under this Bond.

10. Any claim or controversy relating in any way to this Bond shall be governed and interpreted exclusively in accordance with the laws of the State of Maine.

11. Surety's obligation under this Bond may not be assigned without obtaining the prior written consent of the Principal, the Surety and the Obligee.

12. The Bond shall not be amended, modified or changed in any way without obtaining the prior written consent of the Obligee, which consent may be granted or withheld in the sole discretion of Obligee.

13. Without limiting the terms of Section 11 hereof, this Bond shall be binding upon and shall inure to the benefit of the parties hereto and their respective legal representatives, successors (whether by sale, assignment, transfer, merger, other acquisition, operation of law, or court ruling) and/or permitted assigns.

14. Except as otherwise specified herein, Surety hereby waives any and all suretyship defenses.

(The remainder of this page is intentionally left blank.
The signature page follows this page.)

Signed, sealed and executed this _____ day of February, 2004.

Witness

_____
Name:

CASELLA WASTE SYSTEMS, INC.

By:_____

Name:_____
Its _____

EVERGREEN NATIONAL SURETY COMPANY

By: _____
Name:

By: _____

Name:_____
Its _____

SEEN AND AGREED TO

STATE PLANNING OFFICE

By: _____

Its: _____

EXHIBIT D

10. EQUAL EMPLOYMENT OPPORTUNITY. During the performance of this Agreement, Casella (hereinafter, the "Provider") agrees as follows:

a. The Provider shall not discriminate against any employee or applicant for employment relating to this Agreement because of race, color, religious creed, sex, national origin, ancestry, age, physical or mental disability, unless related to a bona fide occupational qualification. The Provider shall take affirmative action to ensure that applicants are employed and employees are treated during employment, without regard to their race, color, religion, sex, age, national origin, or physical or mental disability.

Such action shall include but not be limited to the following: employment, upgrading, demotions, or transfers; recruitment or recruitment advertising; layoffs or terminations; rates of payor other forms of compensation; and selection for training including apprenticeship. The Provider agrees to post in conspicuous places available to employees and applicants for employment notices setting forth the provisions of this nondiscrimination clause.

b. The Provider shall, in all solicitations or advertising for employees placed by or on behalf of the Provider relating to this Agreement, state that all qualified applicants shall receive consideration for employment without regard to race, color, religious creed, sex, national origin, ancestry, age, physical or mental disability.

c. The Provider shall send to each labor union or representative of the workers with which it has a collective bargaining agreement, or other agreement or understanding, whereby it is furnished with labor for the performance of this Agreement a notice to be provided by the contracting agency, advising the said labor union or workers' representative of the Provider's commitment under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

d. The Provider shall inform the contracting Department's Equal Employment Opportunity Coordinator of any discrimination complaints brought to an external regulatory body (Maine Human Rights Commission, EEOC, Office of Civil Rights) against their agency by any individual as well as any lawsuit regarding alleged discriminatory practice.

e. The Provider shall comply with all aspects of the Americans with Disabilities Act (ADA) in employment and in the provision of service to include accessibility and reasonable accommodations for employees and clients.

f. Contractors and subcontractors with contracts in excess of $50,000 shall also pursue in good faith affirmative action programs.

g. The Provider shall cause the foregoing provisions to be inserted in any subcontract for any work covered by this Agreement so that such provisions shall be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.

11. EMPLOYMENT AND PERSONNEL. The Provider shall not engage any person in the employ of any State Department or Agency in a position that would constitute a violation of 5 M.R.S.A. § 18 or 17 M.R.S.A. § 3104. The Contractor shall not engage on a full-time, part-time or other basis during the period of this Agreement, any other personnel who are or have been at any time during the period of this Agreement in the employ of any State Department or Agency, except regularly retired employees, without the written consent of the State Purchases Review Committee. Further, the Provider shall not engage on this project on a full-time, part-time or other basis during the period of this Agreement any retired employee of the Department who has not been retired for at least one year, without the written consent of the State Purchases Review Committee. The Provider shall cause the foregoing provisions to be inserted in any subcontract for any work covered by this Agreement so that such provisions shall be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.

12. STATE EMPLOYEES NOT TO BENEFIT. No individual employed by the State at the time this Agreement is executed or any time thereafter shall be admitted to any share or part of this Agreement or to any benefit that might arise there from directly or indirectly that would constitute a violation of 5 M.R.S.A. § 18 or 17 M.R.S.A. § 3104. No other individual employed by the State at the time this Agreement is executed or any time thereafter shall be admitted to any share or part of this Agreement or to any benefit that might arise there from directly or indirectly due to his employment by or financial interest in the Provider or any affiliate of the Provider, without the written consent of the State Purchases Review Committee. The Provider shall cause the foregoing provisions to be inserted in any subcontract for any work covered by this Agreement so that such provisions shall be binding upon each subcontractor, provided that the foregoing provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.

14. ACCESS TO RECORDS. The Provider shall maintain all books, documents, payrolls, papers, accounting records and other evidence pertaining to this Agreement and make such materials available at its offices at all reasonable times during the period of this Agreement and for such subsequent period as specified under Maine Uniform Accounting and Auditing Practices for Community Agencies (MAAP) rules. The Provider shall allow inspection of pertinent documents by the Department or any authorized representative of the State of Maine or Federal Government, and shall furnish copies thereof, if requested.

FIRST AMENDMENT
TO
OPERATING SERVICES AGREEMENT
BETWEEN
CASELLA WASTE SYSTEMS, INC
AND
STATE OF MAINE, ACTING BY AND THROUGH ITS EXECUTIVE DEPARTMENT, STATE PLANNING OFFICE

This is the First Amendment to the Operating Services Agreement ("Agreement") between Casella Waste Systems, Inc. ("Casella") and State of Maine, State Planning Office ("State"), which was entered into on February 5, 2004.

1. Section 4.2 (b) is amended to read:

Casella shall use its best and most diligent efforts to, at its own cost and expense, apply for, seek and maintain in full force and effect (i) the License Amendment, (ii) the Expansion Permit, and (iii) such other federal, state and local permits, licenses and authorizations as otherwise required in connection with Casella's obligations under this Agreement, including, without limitation, any required zoning, subdivision and site plan approval. Without limiting the generality of the foregoing, Casella shall prepare on or before the fifth anniversary of the Effective Data an application for the Expansion Permit and shall conduct geologic and engineering studies and bear the cost of any consulting services related to all such permit/license and approval efforts. Subject to the foregoing, Casella shall determine the timing of the submission and the content of any such applications to the appropriate regulatory entities. Casella currently contemplates and application for the Expansion Permit of ten million (10,000,000) cubic yards of additional capacity, but, following exhaustion of all appeals of any approval of the Expansion Permit authorizing a lesser disposal capacity, Casella hereby agrees to accept any such approval so issued in connection with any application for the Expansion Permit, provided that, taken together, the initial application so submitted by Casella for the Expansion Permit shall provide that the Existing Permit, the License Amendment and the Expansion Permit will collectively provide sufficient capacity to dispose of at least 500,000 tons of waste per year over twenty (20) years of operation. If issued, Casella shall not take any action or suffer any omission that causes, or provides a basis for the revocation, suspension or restriction of the Expansion Permit, or limit or restrict Casella's or the State's ability to operate the landfill.

2. Except as expressly provided in this First Amendment, the Agreement remains in full force and effect.

Dated: 7/28/06

CASELLA WASTE SYSTEMS, INC

By: _____

Name: Brian Oliver

Its: Vice President, Casella Northeast Region

WITNESS:

_____
(name)

Dated: July 24, 2006

STATE OF MAINE, Acting by and through
its Executive Department, State Planning Office

By: Martha E. Freeman

Name: Martha E. Freeman

Its: Director

WITNESS:

_____
(name)

SECOND AMENDMENT TO OPERATING SERVICES AGREEMENT

This Second Amendment to the Operating Services Agreement ("Amendment") is made as of this 2nd day of November, 2006, by and between CASELLA WASTE SYSTEMS, INC., a Delaware corporation with a place of business at 25 Greens Hill Lane, Rutland, Vermont 05702 ("Casella"), and the STATE OF MAINE, acting by and through its Executive Department, State Planning Office (the "State").

WITNESSETH:

WHEREAS, Casella and the State are parties to an Operating Services Agreement, dated as of February 5, 2004, as amended by the First Amendment to Operating Services Agreement, dated as of July 28, 2006 (the "Agreement"); and

WHEREAS, in connection with the contemplated change in the ownership of and the manner of operating the paper manufacturing facility and the biomass electric generating facility located in Old Town, Maine, FJ proposes to assign to, and Red Shield Environmental, LLC, a Delaware limited liability company ("Red Shield") proposes to assume, the FJ Commitments (as defined in the "Agreement"); and

WHEREAS, the parties wish to amend the Agreement;

NOW, THEREFORE, in consideration of the mutual promises and agreements hereinafter contained, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Casella and the State agree as follows:

1. The recitals and identification of the parties to this Amendment are incorporated by reference as though fully set forth herein. Capitalized terms not defined herein shall have the meaning given to them in the Agreement. Effective upon the consummation of the transactions described in the second recital above, all FJ Commitments, as defined in Section 23 of the Agreement, that refer to "FJ" or "Fort James" are hereby amended to refer to Red Shield.

2. Effective upon the consummation of the transactions described in the second recital above, Section 1 of the Agreement shall be amended as follows:

(a) The definition of "Biomass Ash" is hereby restated as follows: "Biomass Ash" shall mean the ash resulting from the operation of any Biomass Generating Facility installed and operated at the Old Town Facility to the extent the same is disposable at the Landfill under the Existing Permit and meets the definition of "special waste" as defined under Maine Environmental Law.

(b) The definition of "Old Town Mill" is hereby restated as follows: "Old Town Facility" shall mean the pulp and paper mill previously operated by FJ located in Old Town and Orono, Maine, including, without limitation, all industrial operations

conducted by any entity thereon, irrespective of the entity that owns or operates any industrial operation thereon, and all related facilities and improvements.

3. All references to "Old Town Mill" in the Agreement are hereby amended to refer to the "Old Town Facility."

4. All references to "Mill Waste" in the Agreement are hereby amended to refer to "Old Town Facility Waste."

5. Effective upon the consummation of the transactions described in the second recital above, Section 2.8(d) of the Agreement, and all cross-references thereto in the Agreement, are hereby deleted in their entirety.

6. In consideration for (i) Casella's willingness to enter into this Amendment and the Fuel Supply Agreement (the "FSA"), dated of near or even date herewith, between Casella and Red Shield, and (ii) Casella's agreement to cease accepting waste for disposal at the Pine Tree Landfill located in Hampden, Maine, on or prior to December 31, 2009, in accordance with the closure plan submitted to MDEP, and in recognition of Casella's loss of disposal capacity at the Pine Tree Landfill and its need to enter into long-term, binding commitments to accept construction and demolition waste ("C&D") and to develop and construct or expand, or otherwise gain access to one or more processing facilities within the State of Maine in order to assure its ability to produce or obtain C&D Fuel sufficient to fulfill its potential obligations hereunder and under the FSA, the State agrees that, anything to the contrary set forth in the Agreement notwithstanding, and in order to clarify the parties' understanding of the intent of the relevant provisions of the Agreement:

(a) Casella shall be entitled to source from within or outside the State of Maine sufficient quantity of C&D (as defined in the FSA) to produce, at one or more processing facilities located within the State of Maine, C&D Fuel (as defined in the FSA) to meet its delivery obligation under the FSA, and shall be entitled to dispose at the Landfill any and all residue produced in the processing of C&D, at one or more processing facilities located within the State of Maine. In accordance with Section 2.13 of the Agreement, Casella agrees to exercise commercially reasonable efforts to utilize C&D generated within the State of Maine in fulfilling its obligations under the FSA.

(b) Casella shall be entitled to dispose at the Landfill any C&D (up to 20,000 tons in any calendar year) that would have been processed, at a processing facility located within the State of Maine, in the ordinary course to produce C&D Fuel, as contemplated by Section 6(a) or Section 6(c) hereof, but for the fact that such processing facility was shut down for planned or unplanned maintenance or repair.

(c) In the event and to the extent that Red Shield fails to accept delivery of C&D Fuel that was processed at a processing facility located within the State of Maine at the maximum volumes contemplated by Section 2(b)(iii) of the FSA, or in the event that the FSA does not take effect, or the C&D Fuel Option (as defined in the FSA) is

terminated prior to thirty (30) years after the Biomass Commencement Date (as defined in the FSA), Casella shall be entitled to dispose at the Landfill any and all C&D processing residue should Casella elect to continue to produce, at one or more processing facilities located within the State of Maine, C&D Fuel to supply to alternate users.

(d) For purposes of clarification and the avoidance of doubt, no portion of any C&D sourced by Casella or any C&D residue created in the processing of C&D Fuel, in each case, as contemplated by this Section 6, shall be considered Excluded Waste, provided that such C&D and C&D residue does not contain Hazardous Waste.

This Section 6 shall be binding upon the parties irrespective of whether the transactions involving Red Shield contemplated by the second recital above are consummated.

7. Effective upon the consummation of the transactions described in the second recital above, Section 5.3 of the Agreement and all cross-references thereto in the Agreement are hereby deleted in their entirety.

8. Notwithstanding anything in the Agreement to contrary, Red Shield shall have the unrestricted right to mortgage and pledge its rights under the Agreement without Casella's consent, and encumber its rights under the Agreement with any type of security interest to secure debt, or other similar instrument creating a lien or other encumbrance on Red Shield's interest in the Agreement, regardless of the priority thereof (hereinafter, "Security Interest," and each lender with a Security Interest, a "Lender"), any assignment thereof and any modification or amendment of any of the terms thereof, including, without limitation, any extension, renewal or refinancing of any indebtedness secured thereby or an additional advance secured by any Security Interest or any additional Security Interest given to secure the same. A Lender, or its designee, or any purchaser in foreclosure proceedings (including, without limitation, an entity formed by a Lender) may become a legal owner of Red Shield's interest under the Agreement through such foreclosure proceedings or by assignment of Red Shield's interest under the Agreement in lieu of foreclosure. A Lender may enforce its rights under its Security Interest and acquire title to Red Shield's interest in the Agreement in any lawful way. The parties agree that nothing in the Agreement shall be deemed to impose any liability or obligation on (i) any mortgagee or secured party that may at any time hold a mortgage lien on or a security interest in the Agreement, or (ii) any party that becomes a mortgagee in possession, secured party in possession or receiver with respect to the Agreement. With respect to a party that is assigned the rights under the Agreement through a mortgage foreclosure, secured party sale or deed or bill of sale in lieu thereof, such party shall assume the obligations and liabilities under the Agreement first arising as of the date of such assignment.

9. In all other respects, the Agreement shall remain in full force and effect in accordance with its terms. The obligations of the State hereunder shall survive, and shall not be affected by, any termination of the FSA or closure of or cessation of operations at the Biomass Generating Facility.

IN WITNESS WHEREOF, the parties have caused this Amendment to be executed and delivered by their duly authorized representatives as of the day and year first above written.

Witness

CASELLA WASTE SYSTEMS, INC.

By: _____
Name: Brian Olivo
Title: Authorized Agent

Witness

STATE OF MAINE, acting by and through Its Executive Department, State Planning Office

By: _____
Name: Martha Freeman
Title: Director

SEEN AND AGREED TO:

RED SHIELD ENVIRONMENTAL, LLC

By: _____
Name: EDWARD T. PACZKOWSKI
Title: CHAIRMAN

THIRD AMENDMENT TO OPERATING SERVICES AGREEMENT

This Third Amendment to the Operating Services Agreement is made as of this 21st day of December, 2015, by and between Casella Waste Systems, Inc., a Delaware corporation with a place of business at 25 Greens Hill Lane, Rutland, Vermont 065702 ("Casella") and State of Maine, Department of Administrative and Financial Services, Bureau of General Services (the "State").

WITNESSETH:

WHEREAS, by Resolves 2003, ch. 93 (the "Resolve"), the State was authorized to acquire, own and cause to be operated an existing solid waste disposal facility in the City of Old Town now known as the Juniper Ridge Landfill (the "Landfill"), under such terms and conditions as are revenue-neutral and the State determines are advisable and in the public interest; and

WHEREAS, the State of Maine, acting by and through the Department of Administrative and Financial Services, Bureau of General Services, is the owner of the Landfill; and

WHEREAS, the State entered into an Operating Services Agreement (the "OSA") with Casella dated February 5, 2004, as amended by the First Amendment dated July 28, 2006 and the Second Amendment dated November 2, 2006, whereby the State granted to Casella the "...right, license and privilege to occupy, operate, maintain, repair, design, redesign, construct and utilize the Landfill..."; and

WHEREAS, the OSA provides that "the use of the Landfill shall be restricted to development and operation of a solid waste landfill, or other facilities providing for the disposal or recycling of solid waste or other management of solid waste or, with the prior written consent of the State...other uses that do not prohibit or impair the operation of a solid waste landfill..."; and

WHEREAS, the OSA provides that any capital improvements of any nature or type to or at the Landfill shall be and remain the property of the State upon termination of the OSA without any compensation to Casella; and

WHEREAS, under the OSA the State granted to Casella the right "to take and use any landfill gas generated at the Landfill, all in accordance with applicable laws and regulations"; and

WHEREAS, under the OSA the State granted to Casella the right to collect and retain all revenue, income and other financial benefits generated by, at, or related to the operation of the Landfill during the term of the OSA; and

WHEREAS, Casella now wishes to exercise its right under the OSA to take and use the landfill gas ("LFG") generated at the Landfill and the parties wish to amend and clarify the OSA in order to enable Casella to do so as provided herein and in the other agreements and instruments referred to herein; and

WHEREAS, Casella, through its subsidiary, NEWSME Landfill Operations, LLC, has entered into the Landfill Gas Rights Agreement for the Juniper Ridge Landfill dated December 29, 2014, as amended by an amendment dated of near or even date herewith (the "LGRA"), with Juniper Ridge Energy, LLC, a Delaware limited liability company doing business at 46280 Dylan Drive, Suite 200, Novi, MI 48377 ("LES") pursuant to which Casella purported to grant to LES, among other rights, "...the exclusive rights to all LFG collected by NEWSME from the Juniper Ridge Landfill, and any contiguous expansions, and all Environmental Attributes[,]" as the term is defined in the LGRA; and

WHEREAS, Casella has requested the State's consent to the LES landfill gas to energy project being located at and operating at JRL pursuant to Sections 2.1.4 and 2.2(a) of the OSA; and

WHEREAS, the State is not a party to the LGRA; and

WHEREAS, the State recognizes that the use of recovered LFG is of environmental and economic benefit; and

WHEREAS, LFG will continue to be generated by the Landfill, and will need to be collected and managed, beyond the term of OSA; and

WHEREAS, pursuant to the OSA, Casella is responsible for all closure and post-closure aspects of the Landfill arising during the term of the OSA and for closing those portions of the Landfill that reach final grade; and

WHEREAS, pursuant to the OSA, Casella is responsible for the posting of closure and post-closure bonds; and

WHEREAS, Casella acknowledges that the interests and obligations of the State as owner and co-licensee of the Landfill need to be recognized and addressed with regard to any contract or other arrangement for the location and operation of a LFG utilization project ("LFGTE") at the Landfill pursuant to the LGRA; and

WHEREAS, Casella acknowledges that the interests and obligations of the State as owner and co-licensee of the Landfill need to be recognized and addressed with regard to any subordination or collateral access agreement that may be requested in connection with Casella's financing arrangements; and

WHEREAS, Casella may request that the State consent to certain collateral access rights and the subordination of any State interests in machinery or equipment employed by Casella in the operation of the Landfill and to certain collateral access rights and the subordination of any State interests in machinery or equipment employed by LES in the operation of the LFGTE at the Landfill; and

WHEREAS, the State and Casella desire to amend the OSA to address the rights and obligations of the parties with regard to the location and operation of a LFGTE at the Landfill; and

WHEREAS, the State and Casella desire to amend the OSA to address the rights and obligations of the parties with regard to certain collateral access rights and the subordination of any State interests in machinery or equipment employed by Casella in the operation of the Landfill.

NOW THEREFORE, in consideration of the premises and the mutual covenants and obligations set forth herein, the Parties agree as follows:

1. The State hereby consents to the LGRA, subject to the following terms and conditions, including certain amendments to the LGRA agreed to in writing by both Casella and LES and described below in Sections 1.1 – 1.10:

1.1. Section 1.23 of the LGRA shall be amended by deleting the last sentence and replacing it with the following: "The LFGTE Facility Site shall be at the site identified on Exhibit A attached hereto, or such other location at the Landfill mutually agreed to by NEWSME and LES and consented to in writing by the State, which consent shall not be unreasonably withheld, delayed or conditioned, subject in all cases to the receipt of all necessary permits, licenses and approvals, including but not limited to a minor revision of the JRL landfill license, an air license and site plan approval by the City of Old Town. No such change of location may occur without the agreement of NEWSME and LES and the written consent of the State."

1.2. Section 1.25 of the LGRA shall be deleted and replaced with the following: "License shall mean that license to be issued by the State, which will provide for construction of the LFGTE Facility at the Landfill by LES, its contractors or agents and grants access over and across the Landfill for the operation, service and maintenance by LES of the LFGTE Facility for the Term of the OSA, or as may be otherwise agreed to in writing by NEWSME, LES and the State".

1.3. Casella agrees to notify the State of any adverse regulatory action relating to LES's compliance with applicable permits, rules and regulations, including but not limited to air emissions, noise levels related to or associated with the operation and maintenance of the LFGTE Facility and/or the OSA, all as more specifically addressed in Section 4.4 of the LGRA.

1.4. Section 7 of the LGRA shall be deleted and replaced with the following:

"(a) NEWSME acknowledges that LES may, at its sole option, secure financing for some or all of the machineryor equipment owned by LES and that LES requires to perform under this Agreement and hereby consents to any encumbrance or lien on such machineryor equipment that make up the LFGTE Facility listed on Exhibit B hereto (together with any replacements thereof or additions thereto) (the "LES Equipment") and hereby consents to a collateral assignment by LES of the LES Equipment and its rights under this Agreement as required from time to time by any such financing.

"(b) LES acknowledges that NEWSME may, at its sole option, secure financing for some or all of the machinery or equipment owned by NEWSME at the Landfill, including the LFG Management System and the Cameron H2S System. LES hereby consents to any encumbrance or lien thereon and hereby consents to a collateral assignment by NEWSME of its assets and its rights under this Agreement as required from time to time by any such financing."

1.5. Section 9.1 of the LGRA shall be amended to extend to the State (a) LES's indemnity obligations for any and all suits, actions, liabilities, legal proceedings, claims, demands, losses, costs and expenses arising from LES's negligence or willful misconduct in connection with LES's performance under the LGRA; and (b) LES's indemnity obligations arising from LES's violation of any law, regulation, code, judgment, order, permit, license or governmental approval, including but not limited to a violation of the OSA and/or the permit regarding the ownership, operation and maintenance of the Landfill.

1.6. Section 9.2 of the LGRA shall be amended to extend to the State (a) Casella's indemnity obligations for any and all suits, actions, liabilities, legal proceedings, claims, demands, losses, costs and expenses arising from Casella's negligence or willful misconduct in connection with Casella's performance under the LGRA; and (b) Casella's indemnity obligations arising from Casella's violation of any law, regulation, code, judgment, order, permit, license or governmental approval, including but not limited to a violation of the OSA and/or the permit regarding the ownership, operation and maintenance of the Landfill.

1.7. Section 11.1 of the LGRA shall be amended to require Casella and LES to name the State as an additional insured with respect to general liability and automobile coverages. In the event LES and Casella purchase additional insurance, the State shall be named as an additional insured.

1.8. Section 12 of the LGRA shall be amended by adding a new sentence at the end of subsection 12.2 to read: "Notwithstanding the foregoing or the provisions of Section 12.1, any capital improvements to or at the Landfill, including without limitation any capital improvements made by LES, shall be and remain the property of the State without any compensation to

Casella or LES. The parties agree and acknowledge that the LES Equipment does not constitute capital improvements."

1.9. Section 14 of the LGRA shall be amended by deleting the last sentence of subsection 14.3 and replacing it with the following: "In the event of a default which results in termination by LES, LES may remove, without the consent of the State, the LES Equipment, but may not remove any capital improvements made by LES, which capital improvements shall be and remain the property of the State without any compensation to Casella or LES.\ Notwithstanding the foregoing, LES shall notify Casella and the State prior to the removal of the LES Equipment. Such removal shall be conducted in a manner reasonably acceptable to Casella and the State and undertaken in a manner that does not unreasonably interfere with the operation of the Landfill."

1.10 Section 16 of the LGRA shall be amended by adding the words "(except in connection with a collateral assignment to third parties in connection with secured financing)" after the words "provided that" in the two instances where it occurs in the second sentence of Section 16.

1.11. Notwithstanding any provision to the contrary in the LGRA, concurrently with the execution of the Agreement and the effectiveness of the amendment to the LGRA contemplated hereby, the State will enter into a license agreement with LES (the "LES License"), upon terms acceptable to Casella and LES, to permit the construction of the LFGTE Facility at the Landfill by LES or its agents and to grant access over and across the Landfill for the operation, service and maintenance by LES of the LFGTE Facility for the Term of the OSA and thereafter for so long as Casella continues to provide closure and post-closure services at the Landfill. The LES License shall contain provisions reflecting the provisions of this Third Amendment relating to the LES Equipment, including without limitation those confirming that such LES Equipment does not constitute capital improvements for purposes of the OSA.

1.12. Casella shall promptly notify the State of any material operating or regulatory compliance deficiencies relating to the LFGTE Facility and applicable permits, rules and regulations, including but not limited to air emissions, noise levels related to or associated with the operation and maintenance of the LFGTE Facility and/or relating to the OSA, of which

Casella becomes aware, including those coming to Casella's attention pursuant to Section 4.4 of the LGRA. Casella agrees to promptly notify LES of the receipt by Casella of any notice of breach by Casella under the OSA given by the State, and to keep LES promptly informed of any further material actions or proceedings taken or initiated by the State in connection therewith.

2. The OSA is amended by amending Section 2.1.4 to read in its entirety as follows:

"During the Term of the OSA and coterminous with the fulfillment, termination or discharge of Casella's closure and post closure obligations and its rights and obligations under this Agreement with respect to the Landfill, the right to take and use any landfill gas at the Landfill, all in accordance with applicable laws and regulations."

3. The OSA is amended by adding a new subsection 2.1.5 to read as follows:

"2.1.5. The State grants to Casella the right of access over and across the Landfill, upon terms and conditions agreed to by the Parties in writing, to meet Casella's closure and post-closure obligations with respect to the Landfill. The term of the right of access granted in this subsection 2.1.5 shall be coterminous with the fulfillment, termination or discharge of Casella's closure and post-closure obligations and its rights and obligations under this Agreement with respect to the operation of the Landfill."

4. The OSA is amended by adding a new subsection 2.1.6 to read as follows:

"2.1.6. The State grants to Casella the right of access over and across the Landfill, upon terms and conditions agreed to by the Parties in writing, to operate, service and maintain the LFG Management System, as that term is defined in the LGRA. The State agrees and acknowledges that, notwithstanding any other provision to the contrary in this Agreement, the assets listed on Exhibit C hereto, whether or not included in the LFG Management System, together with any replacements thereof and any additions thereto, do not constitute fixed capital improvements, buildings, fixtures or other improvements for purposes of this Agreement. The term of the right of access granted in this subsection 2.1.6 shall be coterminous with the rights granted to Casella pursuant to Section 2.1.5 of this Agreement."

5. Section 10.1 of the OSA is amended by deleting from the last sentence thereof the word "exclusive" and replacing it with the word "non-exclusive".

6. The OSA is amended by adding a new sentence at the end of Section 13.5 to read as follows:

"Casella's responsibility for closure and post-closure of the Landfill, including without limitation the posting of closing and post-closing bonds, shall survive termination of the OSA."

7. The OSA is amended by adding a new subsection 15.1 (d)(vi) to read as follows:

"15.1 (d)(vi) if Casella seeks protection under any bankruptcy, receivership, trust deed, creditors arrangement, composition or comparable proceeding, or if any such proceeding is instituted against Casella and not dismissed within 60 days thereafter; or"

8. The OSA is amended by adding a new subsection 15.1(d) (vii) to read as follows:

"15.1 (d) (vii) if the State has received a written notice from Casella's senior lender that the obligations under Casella's senior secured credit facility (in excess of $15 million) have been accelerated prior to its stated maturity and that such senior lender intends to assert its rights under a written collateral access agreement with the State and to foreclose upon or otherwise dispose of Casella's or its subsidiaries' assets that are located on the Landfill, and such notice is not withdrawn or rescinded within ninety (90) days; or"

9. The OSA is amended by adding a new subsection 15.1 (d) (viii) to read as follows:

"15.1 (d)(viii) if Casella defaults in its obligation in Section 7 hereof to be responsible for all costs and expenses related to Landfill regulatory compliance, including but not limited to Casella's obligation to provide financial assurance for conducting post-closure care and maintenance of the Landfill for at least 30 years after closure of the facility."

10. The OSA is amended by adding a new subsection 15.2 (e) to read as follows:

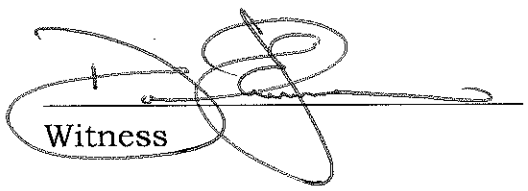
"15.2 (e) Upon request of the State at or following termination of this Agreement (other than upon expiration of the term of this Agreement or a termination arising from the breach hereof by the State), subject to the rights of Casella's senior lenders, Casella shall assign to the State all its interests in the LGRA upon terms and conditions agreed to by the parties."

11. The OSA is amended by adding the following text at the end of Section 24.1 thereof:

"The State agrees that, upon the request of Casella from time to time, the State will execute and deliver subordination and collateral access agreements in favor of Casella's senior secured lenders, in form and substance reasonably acceptable to the State. The parties agree that a subordination and collateral access agreement substantially in the form attached hereto as Exhibit D is deemed reasonably acceptable to the State."

12. Except as provided in this Third Amendment, the OSA shall remain in full force and effect in accordance with its terms.

IN WITNESS WHEREOF, the parties have caused this Third Amendment to Operating Services Agreement to be executed and delivered by their duly authorized representatives as of the day and year first above written.



Witness

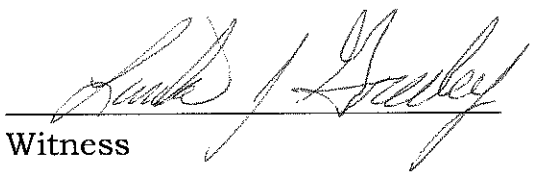
CASELLA WASTE SYSTEMS, INC.

By: _____

Name: Brian Oliver

Title: Vice President

STATE OF MAINE, Department of Administrative and Financial Services, Bureau of General Services



Witness

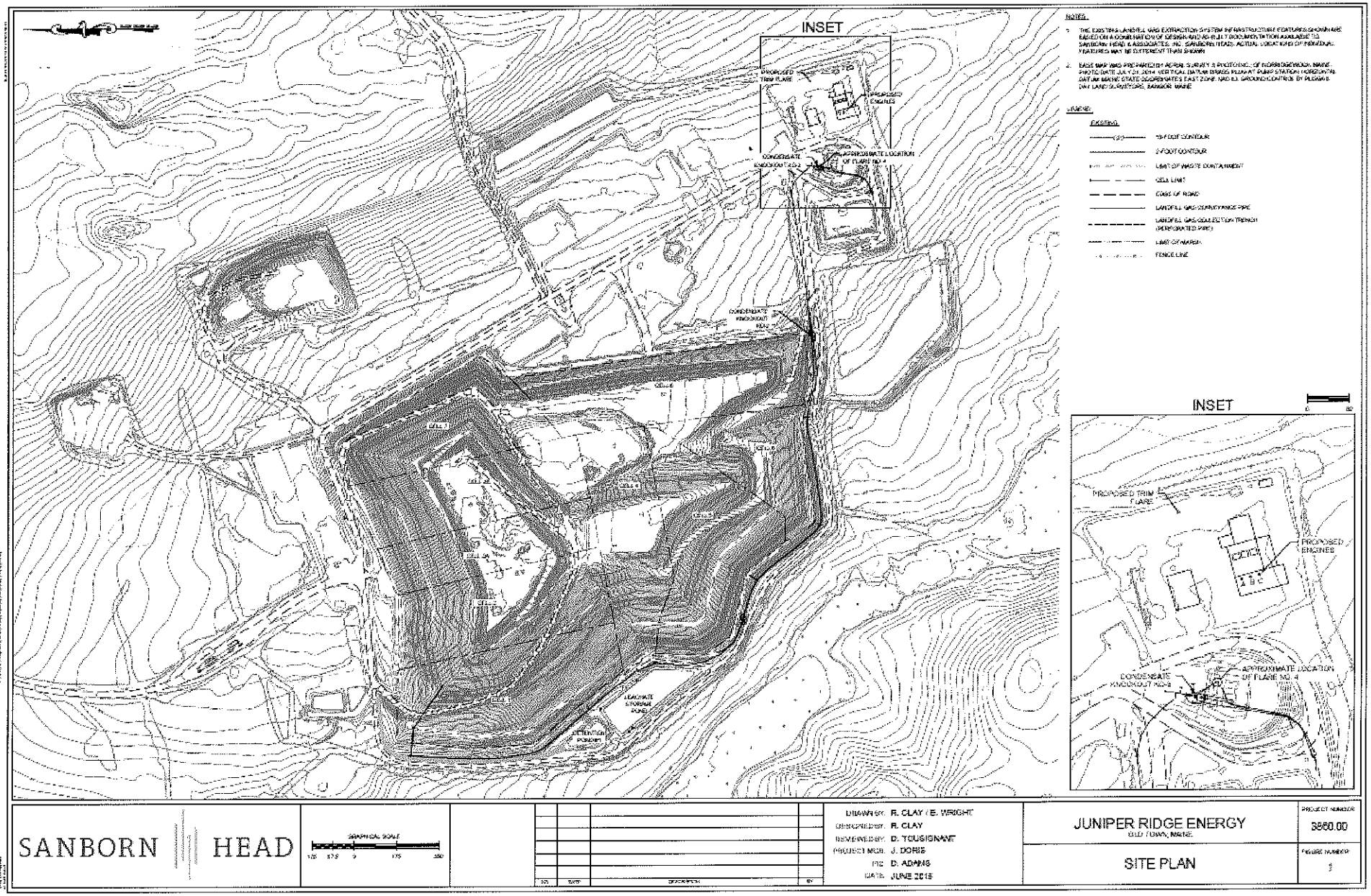
By: Edward A Dahl

Name: Edward A. Dahl

Title: Director

EXHIBIT A

(See Attached)



SANBORN HEAD

GRAPHICAL SCALE

NO.	DATE	DESCRIPTION	BY

DRAWN BY: R. CLAY / E. WRIGHT
DESIGNED BY: R. CLAY
REVIEWED BY: D. TOUSIGNANT
PROJECT MGR.: J. DORIS
PIC: D. ADAMS
DATE: JUNE 2015

JUNIPER RIDGE ENERGY
OLD TOWN, MAINE

SITE PLAN

PROJECT NUMBER: 3660.00

FIGURE NUMBER: 1

EXHIBIT B

Initial LES Equipment

Processing equipment will include the following equipment (together with any replacements thereof and additions thereto):

- Gas Compression
- Gas Treatment components
- Engine-Generators and associated ancillary equipment
- Generation Switchgear
- Generation substation equipment
- Controls and Motor Control Centers associated with above equipment
- Plant office equipment, spare parts inventory

[**NOTE**: Equipment is on order; serial number, etc., not yet available]

EXHIBIT C

Casella/NEWSME Equipment
(non-Capital Improvements)

Asset #	Description	Unit Number	Serial Number
11029	Pickup, 2000 Chevrolet	6252	2GCEK19V7Y1103176
11575	Ford Ranger Pickup, 2000	6355	1FTYR14U0XTB02797
16473	Trailer, 1987 Fruehauf	70831	1H2V04825HH060718
25713	Trailer 8X20 Hydraulicdeckover	71034	434DC25237C062321
2348	Bulldozer, Cat 91 D4H	9923	4664
6224	Auto, Chevy 97 Tahoe	1100	1GNEK13ROVJ378943
10161	Wheel Loader, Cat 966F Ii	9127	1SL02282
12908	Pickup, Chevrolet 1500 1997	6367	1GCEC14W9VZ152430
13029	Dump Truck 97 Intl Tri Axle	6369	1HTGLAET1VH481550
15969	Svc Truck, Ford 97 F450 4X2	6404	3FELF47F6VMA68019
21445	Plow Truck, 1987 Ford L8000	6517	QFDYK8OU7HVA67526
25566	Fuel Truck	9930	1FV6HFBB1SL653608
25569	Fuel Truck	9928	JW6HCFIB4JK000246
27648	Truck, 2008 Ford F350 Pickup	6719	1FTWF31548ED41761
28276	Truck, 2009 Toyota Tundra	6737	5TFBT541X9X015142
30320	Jd 400 Articulating Dump Truck	9855	DW400DT604831
30958	2008 Ford F250	6659	1FTSW215X8EC69134
32545	2007 International 4300	6807	1HTMMAAN67H422908
32789	2006 Toyota Corolla	1527	2TIBR32E36C692844
21444	H2S Analyzer		2249
22202	Gas Pod For Analyzer		
22203	Sander		4685
22846	Jerome H2S Analyzer Model631-X		2312
23130	Honda Pressure Washer On Trlr		4K1PT4C155K000439
24069	Isuzu Diesel Generator 120/240		
24985	Pressure Washer		
24986	Compressor		
24987	Welder-Power Mig 350Mp Package		V1061107395
24988	Welder 225A Dc Welder		LG078260

Asset #	Description	Unit Number	Serial Number
24989	Plasma Cutter		3821963
25142	Shop Tools		
25143	5Hp Light Duty Compressor		6004096
25144	2Hp 24Gal Compressor Irss3R2Gm		
25452	Chain Hoist-5 Ton Electric		
26331	Portable Litter Fence		
26686	Fisher Plow-Extreme V Plow		
30673	Hydraulic Jack		
30674	10' Swanson Sander		
34160	2007 Jd 850J Dozer	9901*	T0850JX128632
34827	Sulfa Treat System		
904764	Forklift-1998 Cat Gp25Lphp	9699	5AM92524
4442	Skid Steer, Bobcat 96 763	9025	512220170
6351	Articulated Truck, Dumptruck	9013	5TN00433
11003	All Terrain Vehicle, 95 Polaris	9212	2587809
12880	Wheel Loader, Cat 01 966G	9469	35W735
13821	Articulated Truck, Cat 95 D250	9013A	
14304	Grapple Bondine 3/2 Tines		
15449	Gas Blower		
16650	Welder On Service Truck #6404		
18069	D6R 1997 Caterpillar Dozer	9654	9PN00663
23680	Excavator, John Deere 270	9846	FF270CX702558
24008	Loader, John Deere 744	9854	DW744JX586551
24009	Crawler Dozer John Deere 850J	9837	T0850JX123883
24071	Trailer Mounted Dav System		
24670	Trimble Gcs900V10 Dual Ms980		T716/T605
24992	Emergency Response Trailer	71033	
25120	966 Bucket 5.25Cy	9469*	
25145	Confined Space Trailer	71035	4U01C10176A029589
27067	80' Portable Spray Unit Trlr		
27793	Jack		
27966	2000 Cat 826G Compactor	9926	7LN552
27987	Somatex Bridge Crane		
27988	Gps System Trimble Sn B900		
28385	Pro Heat Unit X3		
28480	Gideon Air Cleaner		
29668	2007 Fusion Machine		
30288	Bench Press		
30338	Radio Control System For Crane		

Asset #	Description	Unit Number	Serial Number
30367	Track Loader Cat 299C		JSP01105
30666	John Deere 850J Crawler Dozer	90131	1T0850JXJA0190710
30715	Plow/Forks For Track Loader		
30716	Gps System For Jd850	90131*	
30934	Winter Tracks For Skidsteer		
30935	Gps Upgrade	90131**	
31705	2001 Johnston J4000 Sp St Swee	90165	1J9VM4H351C172058
31706	Receiver Board Assembly	90131***	
32069	Skidsteer Attachments		
34942	Gps Receiver Antennas	90131*****	
35554	Sulfa Treat Can X4		
36875	Thiopaq		
36743	Gps Upgrade Trimble		
8335	20Yd, Ro Open Top		
19922	Router, Wan Interface Card		S32396059
22681	Kronos Time Clock		
30339	Tables/Chairs-Conference Room		
	Gem Landfill Gas Monitor		
	Scale System		
29835	Block Heater		

EXHIBIT D

EXECUTION VERSION

AGREEMENT

This **AGREEMENT** ("Agreement") is made and entered into as of this 20th day of August, 2015, by and among the State of Maine, acting by and through its Department of Administrative and Financial Services, Bureau of General Services ("Owner"), Casella Waste Systems, Inc., a Delaware corporation ("Operator"), and BANK OF AMERICA, N.A., as agent ("Agent") for the lenders (collectively, "Lenders") from time to time party to the Loan Agreement described below.

WHEREAS, the Owner and the Operator are party to an operating services agreement (the "Operating Services Agreement") providing for the operation by the Operator of a facility on the Owner's real property commonly known as the solid waste landfill located in Old Town, Maine ("Owner's Property"); and

WHEREAS, Owner is informed that Agent and Lenders have previously entered into a Loan and Security Agreement (the "Loan Agreement") and other loan documents with Operator, and certain of its affiliates, and to secure the obligations arising under such Loan Agreement, Operator has granted to Agent, for its own benefit and the ratable benefit of Lenders, a security interest in and lien upon certain personal property, including without limitation, those assets described on Schedule 1 attached hereto, and replacements thereof, that are owned by Operator and located or to be located in and upon said Premises (the property listed on Schedule 1, collectively, the "Collateral"). For the avoidance of doubt, in no event shall the term "Collateral" include any fixed capital improvements to the Owner's Property or any other buildings, fixtures or other improvements.

NOW, THEREFORE, in consideration of One Dollars ($1.00) and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby agree as follows:

1. **Acknowledgement**. Owner acknowledges that (a) the Operating Services Agreement is in full force and effect, and (b) to Owner's knowledge, without investigation or inquiry, Operator is not in default under the Operating Services Agreement.

2. **Subordination of Owner's Lien**. Owner agrees that until such time as the obligations of Operator to Agent and Lenders are indefeasibly paid in full and all commitments to lend thereunder have terminated, Owner subordinates any interest of Owner in the Collateral to the interests of the Agent and the Lenders, and agrees not to distrain or levy upon any Collateral or assert any lien, right of distraint or other claim against the Collateral for any reason.

3. **Notices**.

(a) Agent will use reasonable efforts to notify Owner in the event Operator is in monetary default under the Loan Agreement and when Operator has paid in full and all commitments to lend have been terminated provided, however, Agent shall have no liability to Owner for failing to so notify Owner.

(b) Owner will use reasonable efforts to provide Agent (at the same time Owner sends such a notice to Operator) with (i) written notice of the termination of the Operating

Services Agreement as a result of any default or failure to perform by Operator under the Operating Services Agreement (a "Termination Notice"), and (ii) any other notice given by the Owner to the Operator of a default or failure to perform a material obligation under the Operating Services Agreement; provided, however, Owner shall have no liability to Agent for failing to provide any such notice to Agent. Operator shall provide Agent with a copy of any Termination Notice or any other notice given by the Owner to the Operator of a default or failure to perform a material obligation under the Operating Services Agreement within two (2) business days of receipt.

(c) All notices required hereunder to be given shall be in writing, sent by certified mail, return receipt requested, or overnight delivery by a reputable overnight courier, to the respective parties at the addresses set forth below, or at such other addresses as the receiving party shall designate in writing:

Owner: State of Maine

Department Administrative & Financial Services
Bureau of General Services
77 State House Station
Augusta, ME 04333-0077
Attention: Director of Bureau of General Services

Operator: Casella Waste Systems, Inc.

25 Greens Hill Lane
Rutland, VT 05701
Attn: Office of General Counsel

Agent: Bank of America, N.A.
225 Franklin Street
MA1 225 02 05
Boston, MA 02110
Attention: Jolanta Bialek

4. Agreements.

(a) Agent may, after the occurrence of an event of default and acceleration of the obligations under the Loan Agreement, give notice (a "Disposition Period Notice") to the Owner and the Operator of the Agent's election to commence a Disposition Period. The "Disposition Period" shall commence on the earlier to occur of (i) the effective date of the termination of the Operating Services Agreement designated by the Owner in a Termination Notice that has been delivered by the Owner to Agent (or if later, 90 days after the date of notice given by the Owner to the Operator (a copy of which has been delivered to the Agent before the effective date of a termination under the Termination Notice) of a default or failure to perform a material obligation under the Operating Services Agreement which default or failure to perform has not been cured and has resulted in the termination specified in the Termination Notice), or (ii) the 90th day following receipt by Owner of a Disposition Period Notice (such time, a "Disposition Period

Commencement Date") and shall end on the Disposition Period End Date. The "Disposition Period End Date" shall be the earlier of (i) 90 days following the Disposition Period Commencement Date and (ii) the date on which the Collateral has been removed from the Premises. Notwithstanding the foregoing, with respect to the Delayed Removal Collateral (defined below), the Disposition Period Commencement Date may be postponed for a period of up to 275 days in a written election of the Owner, if the Owner in its reasonable discretion determines that it is necessary to maintain such Delayed Removal Collateral for an additional period of time to ensure that there is no interruption in the operation and maintenance of the landfill operated at the Owner's Property. The "Delayed Removal Collateral" means the Collateral identified on Schedule 2.

(b) During any Disposition Period, upon at least 48 hours notice, Agent and its representatives may enter into and be present upon the Premises and inspect, repossess, and/or remove the Collateral, and Agent may conduct private sales of the Collateral at the Premises. If Agent conducts a private sale of the Collateral at the Premises, Agent shall notify Owner prior to such sale. Such sale shall be conducted in a manner reasonably acceptable to Owner and undertaken in a manner that does not unreasonably interfere with the operation of the landfill. The Agent will provide information reasonably requested by the Owner regarding the disposition of the Collateral during the Disposition Period.

(c) Agent shall promptly repair, at Agent's expense, or, at Owner's request, immediately reimburse Owner for any physical damage to the Premises caused by the conduct of such private sale and any removal of Collateral by or through Agent (ordinary wear and tear excluded). Subject to the foregoing, neither Agent nor any Lender shall be liable for any diminution in value of the Premises caused by the absence of Collateral removed, and neither Agent nor any Lender shall have any duty or obligation to remove or dispose of any Collateral or any other property left on the Premises by Operator.

(d) After the Owner's receipt of a Disposition Period Notice, Owner may enter into and be present upon the Premises and inspect (or cause to be inspected) the Collateral.

(e) After the Owner's receipt of a Disposition Period Notice and until the Disposition Period End Date, if the Operating Services Agreement has been terminated, or if the Owner has given Casella a notice of Casella's default or failure to perform under the Operating Services Agreement, and such default or failure to perform has not been cured, Owner may use and/or operate (or cause to be used or operated) any Collateral on the Premises as Owner deems necessary in its reasonable discretion, subject to the rights of the Agent under Section 4(b) hereof during a Disposition Period.

(f) No action by Agent or any Lender pursuant to this Agreement shall be deemed to be an assumption by Agent or such Lender of any obligation under the Operating Agreement and/or an assignment of the Operating Agreement to Agent or Lender.

5. **Miscellaneous**.

Section headings are for convenience of reference only and in no way shall be used to construe or modify the provisions set forth in this Agreement. Operator hereby agrees that Owner shall

have no duty or obligation to inquire into the accuracy or validity of any default by Operator with respect to the security agreements, and Operator hereby agrees that nothing contained in this Agreement nor Owner's acts or failures to act in connection herewith shall be deemed a default by Owner under the Operating Services Agreement, and Operator hereby waives all claims of whatever nature or kind Operator may have against Owner in connection with this Agreement and/or Owner's acts or failures to act in connection with herewith. This Agreement shall be governed by and construed in accordance with the laws of the State of Maine. It is specifically understood and agreed that this Agreement shall not be binding in any manner upon any present or future mortgagee of the aforesaid real estate. This Agreement may be executed in any number of several counterparts and shall inure to the benefit of Agent and its successors and assigns provided Owner receives written notice of such transfer and/or assignment and shall be binding upon Owner and its successors and assigns (including any transferees of the Premises). Owner agrees and consents to the filing of this document for recording in the land records of the county in which the Premises is located provided Owner incurs no additional cost in connection therewith.

[Signatures Appear on Following Page]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

Owner: State of Maine, Dept of Administrative and Financial Services
By: R W Rosen
Name: Richard W. Rosen
Title: Commissioner

Agent: Bank of America, N.A., as Agent
By: _____
Name: _____
Title: _____

Operator: _____
By: _____
Name: _____
Title: _____

[Corporate Seal]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

Owner: _____

By: _____

Name: _____

Title: _____

Agent: Bank of America, N.A., as Agent

By: _____

Name: Christopher M. O'Halloran

Title: Senior Vice President

Operator: _____

By: _____

Name: _____

Title: _____

[Corporate Seal]

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year first above written.

Owner: _____

By: _____

Name: _____

Title: _____

Agent: Bank of America, N.A., as Agent

By: _____

Name: _____

Title: _____

Operator: _____

By: _____

Name: JOHN W. CASEKA

Title: Chairman & CEO

[Corporate Seal]

SCHEDULE 1

Asset #	Description	Unit Number	Serial Number
11029	Pickup, 2000 Chevrolet	6252	2GCEK19V7Y1103176
11575	Ford Ranger Pickup, 2000	6355	1FTYR14U0XTB02797
16473	Trailer, 1987 Fruehauf	70831	1H2V04825HH060718
25713	Trailer 8x20 HydraulicDeckover	71034	434DC25237C062321
2348	Bulldozer, Cat 91 D4H	9923	4664
6224	Auto, Chevy 97 Tahoe	1100	1GNEK13ROVJ378943
10161	Wheel Loader, Cat 966F II	9127	1SL02282
12908	PICKUP, CHEVROLET 1500 1997	6367	1GCEC14W9VZ152430
13029	DUMP TRUCK 97 INTL TRI AXLE	6369	1HTGLAET1VH481550
15969	Svc Truck, Ford 97 F450 4x2	6404	3FELF47F6VMA68019
21445	Plow Truck, 1987 Ford L8000	6517	QFDYK8OU7HVA67526
25566	Fuel Truck	9930	1FV6HFBB1SL653608
25569	Fuel Truck	9928	JW6HCFIB4JK000246
27648	Truck, 2008 Ford F350 Pickup	6719	1FTWF31548ED41761
28276	Truck, 2009 Toyota Tundra	6737	5TFBT541X9X015142
30320	JD 400 Articulating Dump Truck	9855	DW400DT604831
30958	2008 Ford F250	6659	1FTSW215X8EC69134
32545	2007 International 4300	6807	1HTMMAAN67H422908
32789	2006 Toyota Corolla	1527	2TIBR32E36C692844
21444	H2S Analyzer		2249
22202	Gas Pod for Analyzer		

22203	Sander		4685
22846	Jerome H2S Analyzer Model631-X		2312
23130	Honda Pressure Washer on trlr		4K1PT4C155K000439
24069	Isuzu Diesel Generator 120/240		
24985	Pressure Washer		
24986	Compressor		
24987	Welder-Power MIG 350MP package		V1061107395
24988	Welder 225A DC Welder		LG078260
24989	Plasma Cutter		3821963
25142	Shop Tools		
25143	5HP Light Duty Compressor		6004096
25144	2HP 24Gal Compressor IRSS3R2GM		
25452	Chain Hoist-5 ton Electric		
26331	Portable Litter Fence		
26686	Fisher plow-Extreme V plow		
30673	Hydraulic Jack		
30674	10' Swanson Sander		
34160	2007 JD 850J Dozer	9901*	T0850JX128632
34827	Sulfa Treat System		
904764	Forklift-1998 Cat GP25LPHP	9699	5AM92524
4442	Skid Steer, Bobcat 96 763	9025	512220170
6351	Articulated Truck, DumpTruck	9013	5TN00433
11003	All Terrain Vehicle, 95 Polaris	9212	2587809

12880	Wheel Loader, Cat 01 966G	9469	35W735
13821	Articulated Truck, CAT 95 D250	9013A	
14304	Grapple Bondine 3/2 Tines		
15449	Gas Blower		
16650	Welder on Service Truck #6404		
18069	D6R 1997 Caterpillar Dozer	9654	9PN00663
23680	Excavator, John Deere 270	9846	FF270CX702558
24008	Loader, John Deere 744	9854	DW744JX586551
24009	Crawler Dozer John Deere 850J	9837	T0850JX123883
24071	Trailer Mounted DAV System		
24670	Trimble GCS900v10 Dual MS980		T716/T605
24992	Emergency Response Trailer	71033	
25120	966 Bucket 5.25CY	9469*	
25145	Confined Space Trailer	71035	4U01C10176A029589
27067	80' Portable Spray Unit Trlr		
27793	Jack		
27966	2000 Cat 826G Compactor	9926	7LN552
27987	Somatex Bridge Crane		
27988	GPS System Trimble SN B900		
28385	Pro Heat Unit x3		
28480	Gideon Air Cleaner		
29668	2007 Fusion Machine		
30288	Bench Press		

30338	Radio Control System for Crane		
30367	Track Loader Cat 299c		JSP01105
30666	John Deere 850J Crawler Dozer	90131	1T0850JXJA0190710
30715	Plow/Forks for Track Loader		
30716	GPS System for JD850	90131*	
30934	Winter Tracks for Skidsteer		
30935	GPS Upgrade	90131**	
31705	2001 Johnston J4000 SP ST Swee	90165	1J9VM4H351C172058
31706	Receiver Board Assembly	90131***	
32069	Skidsteer Attachments		
34942	GPS Receiver Antennas	90131*****	
35554	Sulfa Treat Can x4		
36875	Thiopaq		
36743	GPS Upgrade Trimble		
8335	20YD, RO OPEN TOP		
19922	Router, WAN Interface card		S32396059
22681	Kronos Time Clock		
30339	Tables/Chairs-Conference Room		
	GEM Landfill Gas Monitor		
	Scale System		
29835	Block Heater		

SCHEDULE 2

34827 Sulfa Treat System
15449 Gas Blower
35554 Sulfa Treat Can x4

A-3

MEDEP NOVEMBER 6, 2023, LETTER "DETERMINATION OF ENVIRONMENTAL FEASIBILITY" PROPOSED PHASE II EXPANSION

SME
SEVEE & MAHER
ENGINEERS

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

November 6, 2023

Jeffrey Pelletier, Environmental Manager
NEWSME Landfill Operations, LLC
358 Emerson Mill Road
Hampden, ME 04444
(via e-mail)

Re: Juniper Ridge Landfill Expansion
Old Town, Maine
Determination of Environmental Feasibility

Dear Mr. Pelletier:

The Department has completed its review of the Preliminary Information Report ("PIR") for a proposed expansion of the Juniper Ridge Landfill, prepared by Sevee & Maher Engineers, dated August 2023. The PIR was submitted by NEWSME Landfill Operations, LLC on behalf of the State of Maine, via the Bureau of General Services in the Department of Administrative and Financial Services.

The PIR provided the information required by the *Solid Waste Management Rules*, 06-096 C.M.R. ch. 401, §1(E) (last amended April 6, 2015). Based on our review of the information provided, the Department has determined that the proposed expansion is environmentally feasible and that the prohibitive siting criteria of 06-096 C.M.R. ch. 401, §1(C)(2) have been met. This determination of environmental feasibility does not constitute the Department's approval of the expansion, the site, or any potential variance requests. This determination is the Department's concurrence with the applicant that the site warrants further investigation to determine its suitability and to further define the facility design.

Sincerely,

KAREN KNUUTI
Division of Materials Management
Bureau of Remediation and Waste Management
Eastern Maine Regional Office

Copy (via e-mail): William Longfellow, DAFS, BGS
Rhonda Forrester, SME
Kathy Tarbuck, Sean Dougherty, MDEP
David Russell, City of Old Town

2023_11_06 JRL DEF ats91467

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

website: www.maine.gov/dep

A-4

PROJECT OVERVIEW MEETING MINUTES

SME
SEVEE & MAHER
ENGINEERS

Responses to Questions asked at Project Overview Meeting #1

November 7, 2024, City of Old Town, Town Hall

Below are questions and answers provided at the first Public Overview Meeting held by BGS and NEWSME about the proposed Phase II Expansion of the Juniper Ridge Landfill in Old Town. Both questions and answers have been edited for brevity and clarity.

1. Is there/will there be a study on the increase of rats in the local communities?

There has not been and will not be a study on local rat populations. Due to the high number of eagles at the site, the rodent population at the landfill is well controlled. Follow up of rat complaints has generally found feeding of livestock or birds to be the attractant.

2. Is the PFAS treatment going to destroy or remove the PFAS compounds from landfill leachate?

Casella is a passive receiver of the per-and polyfluoroalkyl substances (PFAS) that are present in a wide range of consumer products, including those it receives for disposal. In Vermont, Casella is currently testing one of the nation's first on-site PFAS treatment systems at a landfill. As part of the expansion of the Juniper Ridge Landfill, Casella intends to build upon its experience in Vermont to design, install, and operate a system to treat landfill leachate for PFAS in Maine.

3. How is the landfill leachate collected?

Leachate is contained/collected within the landfill by the leachate collection system. This system consists of a layer of clay, a geosynthetic clay liner, an HDPE geomembrane, drainage sand, piping, and a geocomposite net material. With the help of the sand, piping, and geocomposite net, leachate is collected and directed to the cell sump area. From there it is pumped through duel contained piping to the on-site leachate storage tank. This will be covered more completely in the third meeting.

4. Is there an estimated volume of PFAS concentrate removed from the leachate?

As we all know, this is a new technology. The PFAS Treatment Plant is currently in the design stage. The volume of concentrate that will be removed from the leachate will be determined during the design. The third meeting (December 4, 2024) will have a more complete discussion of the leachate PFAS treatment currently being tested at the Vermont landfill.

5. Will the leachate be treated for PFAS when Cell 18 comes online?

Yes, as required by the Public Benefit Determinations, if the Phase II Expansion is approved and constructed, the PFAS treatment will be operational when waste disposal begins in the first cell (Cell 18).

6. Has there been a study of environmental impacts resulting from natural disasters?

Casella evaluated the potential impact from seismic events and finds that the landfill will be stable under any reasonably anticipated earthquakes. The landfill stormwater and leachate management structures are designed for the 24-hour, 25-year storm, as required by the Maine Department of Environmental Protection (MEDEP) Rules.

7. Why expand JRL and not another state-owned landfill?

The State owns three landfill properties in Maine. Juniper Ridge is the only operational site of the three. The Dolby Landfill in East Millinocket just received its final closure cap in 2024 and therefore has no additional capacity available. The Carpenter Ridge site is a parcel located west of exit 227 on Interstate 95. It was licensed with the MEDEP for future capacity needs, but no landfill has been constructed at this time.

8. Will there be more safeguards to prevent leachate spills or leaks with the increased leachate production from the expansion?

Yes, there will be an additional leachate storage tank to handle the increased leachate production from the landfill expansion.

9. Will the Community Host Agreement with Alton be dissolved?

No, the Community Host Agreement with Alton will be continued just as it is now.

10. What about dewatering the sludge?

The sludge is dewatered at each municipal wastewater treatment plant. There are currently two facilities under development in Maine that are intended to further dewater sludge, but neither is yet operating.

11. What fire prevention methods are available?

JRL has fire extinguishers in each piece of heavy equipment and at the site's buildings. An on-site water truck is available for use if needed. Hot loads are off-loaded in a specially designated area. Soil stockpiles are available to smother any smoldering materials or hot ashes. The entire site is non-smoking. Overnight security monitors the site after normal business for fires. Management is called if problems were to arise.

Responses to Questions asked at the Project Overview Meeting #2

November 21, 2024, Town of Alton, Town Hall

Below are questions and answers provided at the second Public Overview Meeting held by BGS and NEWSME about the proposed Phase II Expansion of the Juniper Ridge Landfill in Old Town. Both questions and answers have been edited for brevity and clarity.

1. Is Environmental Justice being discussed tonight?

These meetings are part of the response to Environmental Justice concerns. They are intended to provide the public with more detailed information about the Landfill Expansion and the opportunity to ask questions about the Expansion and provide any comments.

2. Why is there no public meeting on Indian Island?

The meetings are being held in Alton and Old Town because the Landfill is located in Old Town and borders the town of Alton.

3. Was the traffic increase expected 24 hours a day?

No. There will be a slight increase in traffic over 2023 volumes, but the increase will only occur during the operating hours of the landfill: Monday – Friday from 6:00 am – 5:00pm, and Saturday from 7:30am – 12:00pm. The site has seen similar traffic volumes in 2021 and 2022 to those projected for the expansion. At that time, the increase in traffic did not appear to cause any problems.

4. The last expansion Casella said traffic was not important, but now it is. Why the change?

Traffic was not a significant concern during the prior expansion, but it was analyzed, as required by MEDEP's Rules. Traffic was evaluated for the first expansion in the same manner and by the same consultant as is being conducted for the Phase II Expansion. We continue to believe that it is not a significant problem.

5. Are the trucks named in the traffic study trash trucks or are there more vehicles being looked at?

The traffic study included all vehicles entering and exiting the landfill. That includes construction vehicles and trucks hauling waste for disposal.

6. What day has the most traffic?

Tuesday has the most traffic.

7. Did Casella or the State consult with the Penobscot Nation on important cultural wildlife species?

As required for the permitting process, all five of Maine's tribes were asked if there were important cultural or archaeological features at the site. The Mi'kmaq and Maliseet responded that they do not have important features at the site. The two bands of the Passamaquoddy

responded that they defer to the Penobscot Nation. The Penobscot Nation has not responded, although multiple attempts have been made to contact them.

8. What is the expansion in yardage?

The Phase II Expansion is 11.9 million cubic yards.

9. Have migratory animals been looked at in the wetland habitats?

Yes, but impact to migratory species is not significant because the impacted areas are not a conducive habitat. The pools are small and overgrown with trees and vegetation making it difficult for migratory bird species to land and take off again.

11. What does it mean that one of the functions and values of wetlands is sediment/ toxic retention?

Wetlands provide multiple functions and values. One function is that they naturally retain sediment and toxins that may be attached to the sediment, primarily due to their location in the landscape. Evaluation of this and several other functions is a standard part of every wetland evaluation.

12. Who does the ground and surface water testing required by the MEDEP?

Sevee and Maher Engineers conducts the sampling, and the samples are sent to Maine Environmental Laboratory in Yarmouth, Maine, which is a private laboratory that is certified by the State. Some samples may be sent on to other certified laboratories, depending on the compound being tested.

13. Are the wetlands tested for PFAS contamination?

No, PFAS testing is not required as part of the wetland survey.

14. Where does construction material come from, and are those trucks considered in the traffic study?

The majority of aggregates used for construction comes from an abutting property with access internal to the JRL site, but some materials are transported from outside locations. All construction vehicles were included in the traffic study.

15. What is the effect of the landfill on the local eagle population?

According to wildlife biologists who have been to the site, JRL and the surrounding area has the highest concentration of bald eagles in Maine, thus the effect of the landfill has been to increase the local eagle population.

17. Has there been any investigation into the bioaccumulation of PFAS compounds in eagles?

No.

18. What are the gas readings on the Landfill Surface Scans?

Daily gas scans are used to determine if there are any areas of the working face of the landfill or the temporary cap that require repair. If any problems are found, the repair is the top priority for that day. Data from quarterly surface scans are included in the landfill's annual report and semi-annual air emissions report.

19. Does Casella have the trash cleaned up on Interstate 95?

Casella uses temporary hire employment to clean up any windblown litter on the Landfill Road, as well as the Bennoch Road from the landfill entrance to the on ramp for Interstate 95 South. (Also see Question 28, below)

20. What is the composition of the deodorizer used at JRL?

The deodorizer consists of three ingredients that are proprietary to the manufacturer.

21. Is more being done to control odor?

Yes, JRL will be further limiting the daily open area of waste and, as required by the Public Benefit Determination, will hire a consultant to conduct an odor study and recommend potential improvements.

21. What wastes create the most gases?

MSW bypass and biosolids contain organic material that produce methane during the decomposition process. CDD can contain gypsum which can create Hydrogen Sulfide gas when mixed with wet wastes.

22. Why not limit the amount of the biggest gas producing wastes?

If the Orrington incinerator and the Hampden processing facility come back online, the MSW bypass will be greatly reduced. JRL is the State's landfill and needs to take the solid waste and biosolids created in Maine that cannot go to another Maine landfill.

23. Why not use contaminated soils from land application of biosolids for ADC or bulking sludge?

Soil is not considered a viable bulking agent for sludge, and would not provide adequate structure to bulk the sludge. Removal of soils from land application sites would not improve the underlying groundwater, would leave farms without any topsoil, and has not been considered as a viable clean-up alternative.

24. Does Casella test residential wells?

Yes, Casella tests nearby residential wells upon request.

25. How long was the 2017 expansion supposed to last?

The 2017 expansion was expected to last 8-10 years. The first cell (Cell 11) was constructed in 2018 and the Phase I Expansion is expected to be full by early 2028.

26. Why do we need Casella? Why not another operator?

Casella is contracted to operate the Juniper Ridge Landfill until February 4, 2034, through Operating Services Agreement (OSA) with the State of Maine, Bureau of General Services. At the time the State put the contract out to bid, Casella was the only company to respond.

27. What happens if the DEP rejects the expansion?

If the Expansion Application is rejected, Casella will be forced to limit the amount of material being disposed of at JRL in order to satisfy the contractual obligations for capacity outlined in the OSA. Existing landfills in the state could not expand rapidly enough to handle the additional waste, and some are located on soft clay soils near residential areas, which limits their ability to expand for geotechnical and setback reasons. Maine residents would need to ship waste out of state, dramatically increasing trucking costs, and thereby increasing the overall waste disposal costs for the people of Maine.

28. Who does the public contact about issues regarding trucks entering the landfill? (tarps blowing around)

Casella maintains a telephone line 207-394-4376 to receive complaints from residents. The Maine State Police can also be contacted to report of an insecure load being transported to the landfill.

29. Can you check on the visual impacts on Kennedy Lane and Dolloff Road and see if screening would be possible?

Yes, this will be reviewed.

30. Is the Jay landfill a viable alternative?

The Jay landfill has permitted space equivalent to only about one year of the waste received at JRL. This space is a vertical expansion and therefore would not be able to economically landfill biosolids.

31. In the Public Benefit Determination approval, the state discusses minimal impacts to the groundwater from leachate.

There are no impacts to the groundwater from landfill leachate. The site has been monitored extensively for 35 years and is currently monitored at 81 locations. None of these monitoring points show water quality with characteristics resembling landfill leachate. This will be discussed further during Meeting #3.

Responses to Questions asked at the Project Overview Meeting #3

December 4, 2024, City of Old Town, Town Hall

Below are questions and answers provided at the third Public Overview Meeting held by BGS and NEWSME about the proposed Phase II Expansion of the Juniper Ridge Landfill in Old Town. Both questions and answers have been edited for brevity and clarity.

1. How deep were the tests pits that were dug during site selection?
   About 12 feet.

2. How is the Landfill hydraulically isolated?
   The groundwater from the landfill does not flow to the residential wells in the surrounding area.

3. Is there an underground water table beneath the landfill?
   There is groundwater beneath the landfill, but no recharge occurs below the base of the landfill. The groundwater beneath the landfill is not infiltrated due to the landfill liner system that contains and collects the leachate and the leachate pumps and piping infrastructure that transport the leachate from the landfill to the leachate holding tank.

4. How many ground water wells are you concerned with regarding contamination?
   There is no evidence of impact from landfill leachate to any of the monitoring wells.

5. What would be a problem with the groundwater that would require pumping?
   If testing of the monitoring wells were to show evidence of significant impact to the groundwater from the landfill, it is possible that pumping the monitoring well, and groundwater in the surrounding area would be required.

6. Is there infrastructure in place to pump groundwater?
   There is no infrastructure required or currently in place to pump groundwater at Juniper Ridge. The calculated time for leachate to travel from the landfill to any sensitive receptor such as the property line is at least six years, so there would be sufficient time to implement a remediation program in the unlikely event that one was required.

7. How many residential homes have drinking water supplied to them by Casella?
   Approximately 29 homes have drinking water supplied to them by Casella. This is provided as a courtesy, not because drinking water is impacted by the landfill.

8. If there were contaminated groundwater, the what happens to the contaminated groundwater after it is pumped?

If groundwater were significantly impacted, it would be collected and sent to an appropriate facility for treatment. Currently, there is no evidence of impact from landfill leachate in the groundwater.

9. How do you calculate the changes in flow rate of the groundwater over long periods of time?
   Engineers overseeing JRL state that the groundwater flow does not change substantially over time.

10. How close to the landfill does a resident have to be to get their drinking water tested?
    There is no hard-and-fast rule for how close a resident must be to have their drinking water tested, but in general this is done for close neighbors and abutters up to approximately a quarter mile away.

11. Are there any residential wells that show evidence of contamination?
    Per Casella, there are no residential wells that show evidence of any impact from the landfill.

12. Is there any water testing conducted below the outfall at the ND Paper Mill?
    Casella does not test at the wastewater treatment plant outfall.

13. How much testing is conducted by the MEDEP?
    The MEDEP does not conduct testing at the landfill. Sevee and Maher Engineers conducts the sampling, and the samples are sent to Maine Environmental Laboratory in Yarmouth, Maine, which is a private laboratory that is certified by the State. Some samples may be sent to other certified laboratories, depending on the compound being tested. This is consistent with most other on-site water testing in Maine.

14. When are residential wells tested? What are the testing parameters?
    Wells can be tested upon request from the residents, as discussed above. The testing parameters are the drinking water standards.

15. What is the purpose of the GCL?
    The Geosynthetic Clay Liner (GCL) is part of the liner system. It is placed under the 80 mil HDPE Geomembrane Liner within the 4-foot-thick Dual-Liner System. It consists of two layers of fabric with powdered bentonite clay in between. Bentonite is a type of clay that expands when it is wetted. Once the liner system is placed, the water contained in the soil components of the liner are transmitted through capillary action to the GCL, and the bentonite expands. Once expanded, it has an extremely low permeability and would help to contain any liquid from the landfill.

16. What is the life expectancy of this expansion?
    The landfill would reach full capacity in 2040 at current fill rates.

17. At Casella's landfill in Coventry, Vermont, what happens to the concrete that is mixed with the liquid containing the concentrated PFAS compounds after the foam fractionation process? Is it considered hazardous waste?

    The liquid containing concentrated PFAS compounds is encapsulated in concrete. The concrete is then wrapped in plastic and strategically placed within the landfill for disposal, where it can be protected from being broken by daily waste placement activities.

18. Who paid for the treatment system for the Coventry Landfill in VT?
    Casella paid for the treatment system at the Coventry Landfill.

19. Is Casella going to treat the leachate for PFAS if the expansion is denied?
    The PBD requires Casella to install a leachate treatment system for PFAS prior to beginning operation of the Phase II Expansion. If the Phase II Expansion were denied, Casella would reassess at that time.

Responses to Questions asked at the Project Overview Meeting #4

December 17, 2024, City of Old Town, Town Hall

Below are the questions and answers provided at the fourth Public Overview Meeting held by BGS and NEWSME about the proposed Phase II Expansion of the Juniper Ridge Landfill in Old Town. Both questions and answers have been edited for brevity and clarity.

1. What is depredation, in the context of seagulls at the landfill?
   Depredation is damage or loss caused by birds. Depredation includes agricultural damage, private property damage, threats to human health and safety, and threats to recovery of protected wildlife.

   A federal depredation permit authorizes one to capture or kill birds to help reduce damage to agricultural crops/livestock, private property, human health & safety (including at airports), and protect wildlife. A depredation permit is meant to be used with other non-lethal measures to help eliminate or significantly reduce the problem.

2. Where will the seagulls go if the deterrent measures are effective at JRL?
   The deterrent measures are designed to minimize the food source and roosts available at JRL, as well as adding bird scare equipment. This should make the landfill less attractive to the birds. While the birds may initially go to other nearby locations, since there is no other potential large food source nearby, they are expected to ultimately scatter to other more remote locations along the migration corridor where they will be less of a nuisance.

   Outside of JRL and the Old Town Municipal Airport, The Wildlife Hazards Site Visit (WHSV) Report conducted by Stantec identified 13 additional sites as potential attractants for hazardous wildlife within a 5-mile radius of the airport, or as potential gull roosting sites outside of the 5-mile radius.

   Two large concentrations of roosting gulls were observed during the WHSV with one flock observed on a small island on the Penobscot River near downtown Old Town, and the second at Perch Pond.

3. What happens to the seagulls after they have been culled?
   Regulations require that any animals culled as part of a depredation permit must be buried. Any gulls would be disposed of in the landfill.

4. Who is responsible for implementing the deterrents, and what is the cost?
   Casella is responsible for providing any vector deterrents at JRL.

5. What methods other than depredation is Casella proposing to manage seagulls?

Other methods to limit the impact of seagulls at JRL include minimizing open fact of the landfill to reduces access to food and the use of noisemakers, such as Zon guns, and the physical presence of JRL staff to scare birds away.

6. What is the size of the 25-year storm used to calculate the sizing for leachate collection infrastructure?
   The 24-hour 25-year storm used in the calculations at JRL is 4.9 inches as prescribed by the Maine Department of Environmental Protection (MEDEP) Chapter 500 rules for southern Penobscot County.

7. What safeguards are in place to ensure there is not a leachate outbreak caused by either mechanical failure or large storm events?
   The landfill cells are designed to drain by gravity down to the base of the cell and then pumped to the leachate storage tank through a series of pipes. The leachate storage tank was engineered with a capacity to store leachate flows from a 25-year storm event during a wet period and has at least 25% additional capacity without discharge of leachate. A second leachate tank will be added as part of the Phase II Expansion. The tank's secondary containment, which is designed to contain any leachate leaks from the leachate storage tank, is engineered to have 10% more capacity than the largest leachate storage tank.
8. Where are test points within the leachate collection system to check for possible failures (leaks)?
   The first place that a leak would be detected within the collection system would be from the pump stations. These pumps are monitored daily for flow volumes. Eight leak detection system sampling points and 18 underdrain sampling points will be checked monthly. Fifty-six monitoring wells around the site will be tested 3 times a year.

9. Was it methane or trash that was burning during the fire in 2023?
   The fire that broke out at JRL burned the waste in the landfill, not the landfill gas.

10. Why are flares for Casella's Thiopaq System and the flare for the Renewable Natural Gas Plant running at the same time?
    The Renewable Natural Gas (RNG) plant is in the process of being commissioned. Once commissioned, the gas will be directed primarily to the RNG facility to be turned into renewable natural gas and an put into the natural gas pipeline for reuse. The JRL flare will be kept as a backup in the event that the RNG plant cannot accept some or all of the landfill gas. At times both flares may need to run to ensure both emissions and odors onsite are controlled. The flare at the RNG Plant is designed to operate automatically when the plant has a shut down, is running at partial capacity, or if gas generated from the facility doesn't meet proper pipeline specifications and can't be sold.

11. What is the mitigation strategy for contaminated ground water wells?
    The exact details would depend on the circumstances, but the most likely approach would be to drill additional wells that would pump out the contaminated groundwater, which would be collected, and sent to an appropriate treatment facility.

12. Would Casella consider a warning siren for emergency situations?
    The use of a warning siren will not be considered, but Casella would consider the implementation of some other form of early notification system for emergency situations for immediate property abutters.

13. Will all PFAS compounds be eliminated with the new treatment system?
    There are thousands of PFAS compounds that have been created by manufacturers. Currently there are two PFAS compounds that are identified as hazardous by the U.S. Environmental Protection Agency (USEPA) and six PFAS compounds regulated under the drinking water standards by the MEDEP. There are currently no standards for PFAS in landfill leachate, so the treatment system will be standards that are yet to be established by the MEDEP during the licensing process for the Phase II Expansion, per the Public Benefit Determination.

A-5

PRELIMINARY NOTICE OF INTENT TO FILE/ NOTICE OF RIGHT TO INTERVENOR ASSISTANCE

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@sme-engineers.com
sme-engineers.com

July 29, 2025

BY CERTIFIED MAIL
Christian Pushor, Council President
Old Town City Council
265 Main Street
Old Town, ME 04468

Dear President Pushor:

This letter is intended to provide written notice to the City of Old Town (City) that the State of Maine Bureau of General Services (BGS), as the landfill owner, and NEWSME Operations LLC, as the landfill operator, are preparing to file an application with the Maine Department of Environmental Protection (MEDEP) to expand the Juniper Ridge Landfill located in Old Town, Maine.

Sevee & Maher Engineers, Inc. (SME) is transmitting this notification to you at the request of Casella and in accordance with Section 10 of the Host Community Compensation and Facility Oversight Agreement between the City, BGS, and Casella Waste Systems, Inc. (Casella), dated December 8, 2005. Section 10 requires that Casella provide the City with written notification at least 60 days prior to submission of an application for expansion to MEDEP.

Section 10 also requires that the parties meet within 30 days of receipt of written notification to discuss the proposed expansion and application. We will be reaching out to you shortly to schedule this meeting.

Attached is a copy of the Preliminary Notice to Municipal Officers for Phase II of the Juniper Ridge Landfill in Old Town, Maine that was mailed to the City on July 22, 2025. This notice met the requirement of 38 M.R.S.A. 1310-S 1-A as it relates to municipal notification.

Should you have any questions about this project, please do not hesitate to call me at 207.807.1882 or email me at bdp@smemaine.com.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Brian D. Pierce, P.E.
Principal/Chief Engineer

Enclosures

cc: Lane Gould (BGS)
Wayne Boyd (NEWSME)
Jeff Pelletier (Casella)
Dominique Dispiroto (MEDEP)

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
ADMINISTRATIVE & FINANCIAL SERVICES
BUREAU OF GENERAL SERVICES
77 STATE HOUSE STATION
BURTON M. CROSS BUILDING
111 SEWALL STREET, 4TH FLOOR
AUGUSTA, MAINE 04333-0077

DEPARTMENT OF
ADMINISTRATIVE & FINANCIAL SERVICES
KIRSTEN LC FIGUEROA
COMMISSIONER

BUREAU OF GENERAL SERVICES
BRIAN KEEZER
BUREAU DIRECTOR

July 22, 2025

Amy Jones, Board Chair
Town of Alton Board of Selectmen
3352 Bennoch Road
Alton, Maine 04468
By Certified Mail

Re: **Preliminary Notice to Municipal Officers**
Juniper Ridge Landfill Phase II Expansion

Dear Chair Jones,

This letter, pursuant to 38 M.R.S.A. §1310-S 1-A is to inform municipal officers of the Town of Alton that the Maine Bureau of General Services (BGS), as owner of the Juniper Ridge Landfill (JRL or Landfill), having an address of Department of Administrative and Financial Services, 77 State House Station, Augusta, ME 04333, and NEWSME Landfill Operations, LLC (NEWSME), as the landfill operator, having an address of 358 Emerson Mill Road, Hampden, ME 04444, are preparing to file an application with the Maine Department of Environmental Protection (Maine DEP/Department) to expand the Landfill, located in Old Town, Maine. The approximately 11.9 million cubic yard expansion will be located directly north of the currently permitted area and will be located on State-owned land. A plan depicting the proposed expansion area is attached as Figure 1. In accordance with State law, this Preliminary Notice of BGS' and NEWSME's intent to file the expansion application is provided to the municipal officers of the Town of Alton a minimum of 60 days prior to submittal of the expansion application to the Maine DEP.

Upon submittal of the application, you, as a municipal officer, will receive written notice, and notice will be published in the Bangor Daily News, a newspaper of general circulation in the Old Town/Alton area.

When a state-owned solid waste disposal facility accepts special waste, as JRL does, the Maine DEP is required to hold an adjudicatory public hearing on the application for expansion in the municipality where the facility is located, if requested by a resident or a property owner. This requirement is set out in 38 M.R.S.A. §1310-S (2).

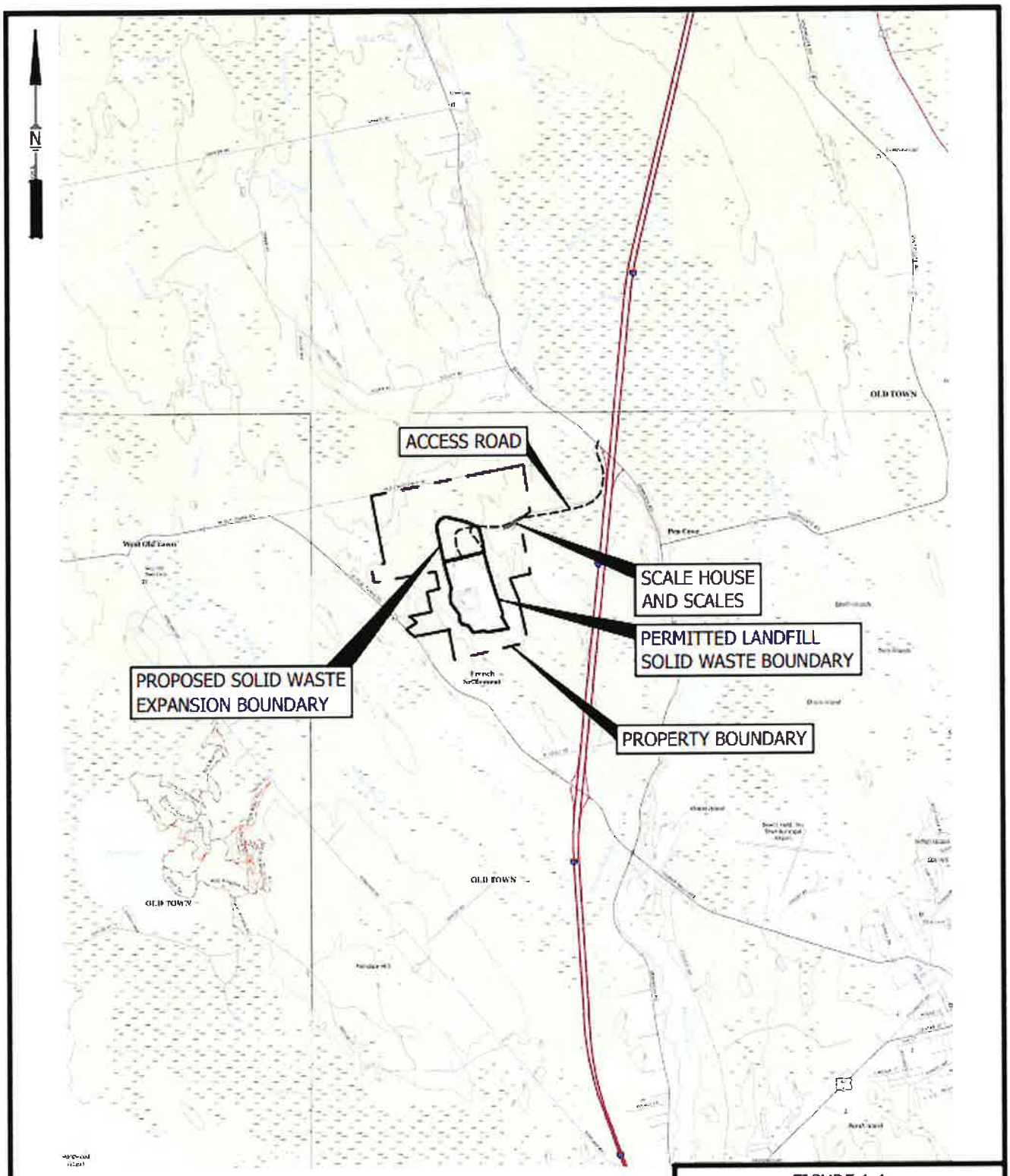
The municipal officers of a municipality in which a proposed solid waste facility is to be located

may choose to apply for "municipal intervenor status" and to seek grants in an amount not exceeding $50,000 in support of direct, substantive participation in the landfill expansion application proceeding before the Department. Such a request must be filed within 60 days of this notification, or the municipality will be deemed to have waived the right to request the municipal intervenor grant.

Should you have any questions about this project, please do not hesitate to call me at (207) 624-7345 or email me at Lane.Gould@Maine.gov.

Sincerely,

Lane Gould, Landfill Manager, Bureau of General Services



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE
OLD TOWN, MAINE-2021

FIGURE 1-1
SITE LOCATION
PUBLIC BENEFIT DETERMINATION
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

NOT TO SCALE

DWG: SITELOC LMN: SITELOC-EXPANSION CTB: SME-STD.CTB REV: 10/24/2023

SME
SEVEE & MAHER
ENGINEERS

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
ADMINISTRATIVE & FINANCIAL SERVICES
BUREAU OF GENERAL SERVICES
77 STATE HOUSE STATION
BURTON M. CROSS BUILDING
111 SEWALL STREET, 4TH FLOOR
AUGUSTA, MAINE 04333-0077

DEPARTMENT OF
ADMINISTRATIVE & FINANCIAL SERVICES
KIRSTEN LC FIGUEROA
COMMISSIONER

BUREAU OF GENERAL SERVICES
BRIAN KEEZER
BUREAU DIRECTOR

July 22, 2025

Christian Pushor, Council President
Old Town City Council
265 Main Street
Old Town, Maine 04468
By Certified Mail

Re: **Preliminary Notice to Municipal Officers**
Juniper Ridge Landfill Phase II Expansion

Dear President Pushor,

This letter, pursuant to 38 M.R.S.A. §1310-S 1-A is to inform municipal officers of the City of Old Town that the Maine Bureau of General Services (BGS), as owner of the Juniper Ridge Landfill (JRL or Landfill), having an address of Department of Administrative and Financial Services, 77 State House Station, Augusta, ME 04333, and NEWSME Landfill Operations, LLC (NEWSME), as the landfill operator, having an address of 358 Emerson Mill Road, Hampden, ME 04444, are preparing to file an application with the Maine Department of Environmental Protection (Maine DEP/Department) to expand the Landfill, located in Old Town, Maine. The approximately 11.9 million cubic yard expansion will be located directly north of the currently permitted area and will be located on State-owned land. A plan depicting the proposed expansion area is attached as Figure 1. In accordance with State law, this Preliminary Notice of BGS' and NEWSME's intent to file the expansion application is provided to the municipal officers of the City of Old Town a minimum of 60 days prior to submittal of the expansion application to the Maine DEP.

Upon submittal of the application, you, as a municipal officer, will receive written notice, and notice will be published in the Bangor Daily News, a newspaper of general circulation in the Old Town/Alton area.

When a state-owned solid waste disposal facility accepts special waste, as JRL does, the Maine DEP is required to hold an adjudicatory public hearing on the application for expansion in the municipality where the facility is located, if requested by a resident or a property owner. This requirement is set out in 38 M.R.S.A. §1310-S (2).

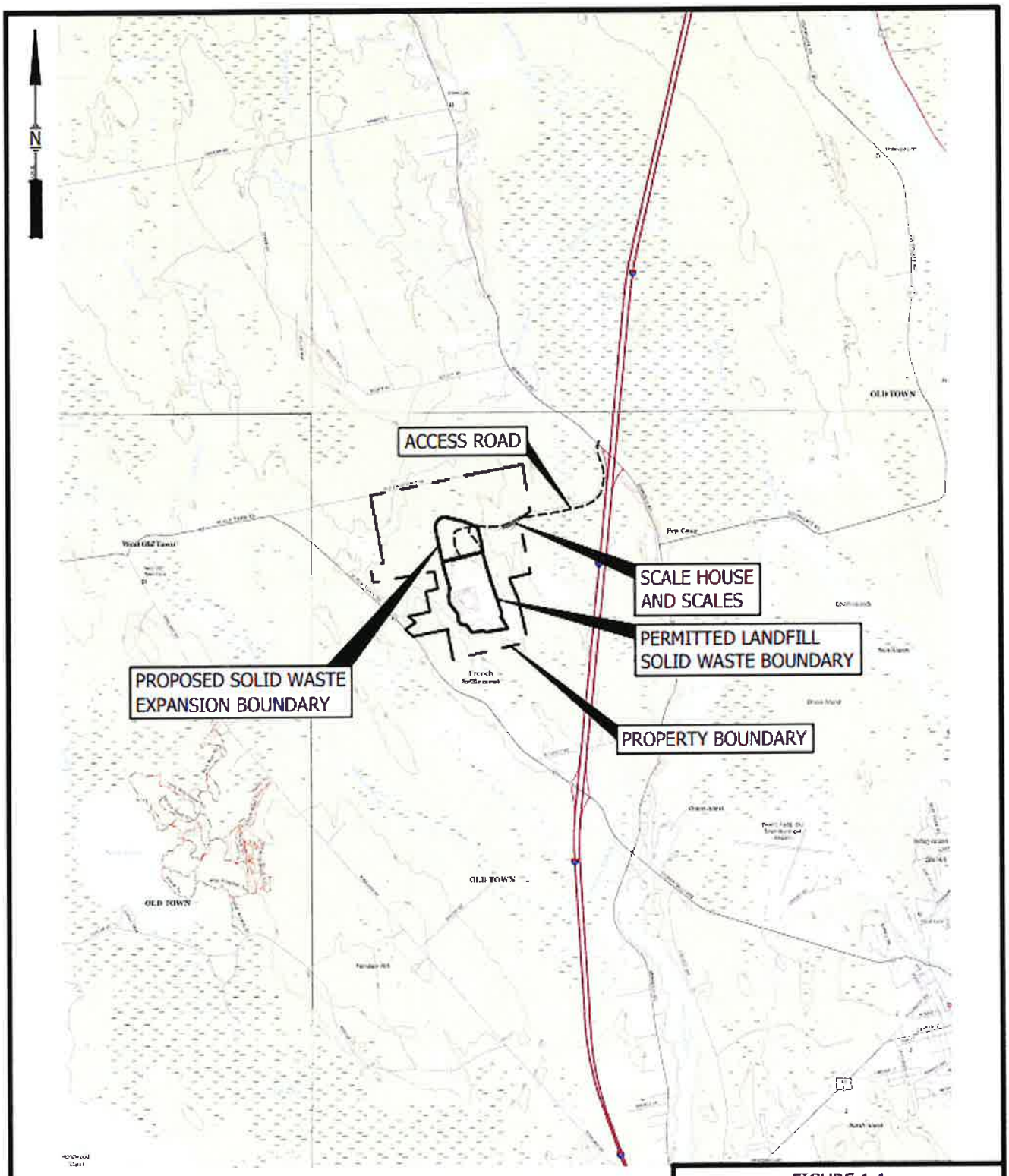
The municipal officers of a municipality in which a proposed solid waste facility is to be located

may choose to apply for "municipal intervenor status" and to seek grants in an amount not exceeding $50,000 in support of direct, substantive participation in the landfill expansion application proceeding before the Department. Such a request must be filed within 60 days of this notification, or the municipality will be deemed to have waived the right to request the municipal intervenor grant.

Should you have any questions about this project, please do not hesitate to call me at (207) 624-7345 or email me at Lane.Gould@Maine.gov.

Sincerely,

Lane Gould, Landfill Manager, Bureau of General Services



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE
OLD TOWN, MAINE-2021

FIGURE 1-1
SITE LOCATION
PUBLIC BENEFIT DETERMINATION
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

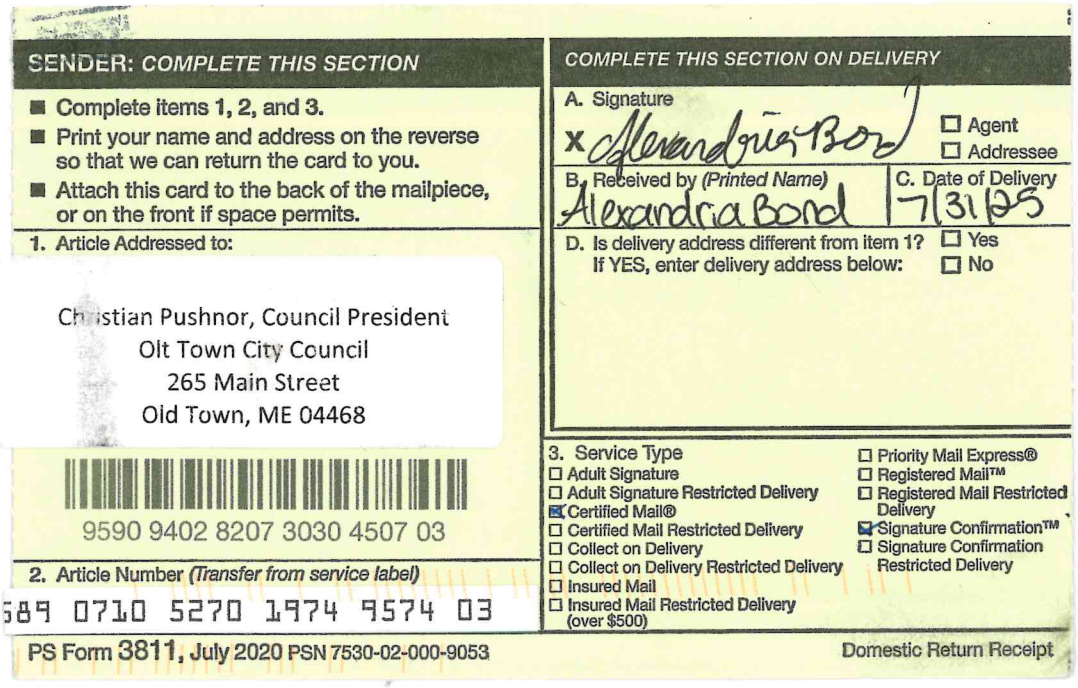
NOT TO SCALE

DWG: SITELOC LMN: SITELOC-EXPANSION CTB: SME-STD.CTB REV: 10/24/2023

SME
SEVEE & MAHER
ENGINEERS

Phone: (207) 624-7314 TTY Relay: 711 Fax: (207) 287-4039
www.maine.gov

Delivery Notice - Old Town Host-Benefit Preliminary Notice Letter



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Christian Pushnor, Council President
Olt Town City Council
265 Main Street
Old Town, ME 04468

9590 9402 8207 3030 4507 03

2. Article Number (Transfer from service label)

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- ☐ Insured Mail Restricted Delivery (over $500)
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- ☐ Signature Confirmation Restricted Delivery

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1. Article Addressed to:

City of Old Town
Attn: Christian Pushor, City Council President
265 Main Street
Old Town, ME, 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Karey Kenston ☐ Agent ☐ Addressee

B. Received by (Printed Name) Karey Kenston
C. Date of Delivery 07/29/15

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
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Attn: Christian Pushor, City Council President
265 Main Street
Old Town, ME, 04468

Delivery Receipt - Old Town Host-Benefit Preliminary Notice Letter

A-6

PUBLIC INFORMATION MEETING DOCUMENTATION

SME
SEVEE & MAHER
ENGINEERS

Bangor Publishing Company
1 Merchants Plaza
Bangor, ME 04401
207.990.8246 Phone / fax
accountsrec@bangordailynews.com
Tax ID: 01-0024570

Invoice

#INV367320
9/23/2025

Bill To

Bureau of General Services
State Of Maine Acct
77 SHS
Augusta ME 04333

TOTAL

$406.80

Due Date: 10/23/2025

Terms	Due Date	PO #	Product	Description
Net 30	10/23/2025		Classifieds	Sept. 29 Mtg., BDN, Sept. 19, 20

Quantity	Item	Options	Run Date	Amount
1	**Legal Notices Digital new**		9/19/2025	$0.00
1	**Print Ad Legal Notice** Please take notice that the Bureau of General Services (BGS), c/o Department of Administrative and F		9/19/2025	$203.40
1	**Print Ad Legal Notice** Please take notice that the Bureau of General Services (BGS), c/o Department of Administrative and F		9/20/2025	$203.40

Subtotal	$406.80
Total	$406.80

BGS ~ BANGOR PUBLISHING CO.
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Inv#367320
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LG 10/6/2025

Brian Key 10-6-25
Brian Keezer

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AMOUNT ENCLOSED

$ 406.80

To pay by credit card, please call 207.990.8246.

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Invoice Number:	#INV367320
Invoice Date:	9/23/2025
Date Due:	10/23/2025
Total Due:	$406.80

Bureau of General Services
State Of Maine Acct
77 SHS
Augusta ME 04333

Bangor Publishing Company
PO Box 1329
Bangor ME 04402-1329

RECEIVED
SEP 30 2025

Legal Notices

NOTICE OF PUBLIC INFORMATIONAL MEETING

Please take notice that the Bureau of General Services (BGS), c/o Department of Administrative and Financial Services, 111 Sewall Street, State House Station #77, Augusta, ME 04333-0077, and NEWSME Landfill Operations LLC (NEWSME), 358 Emerson Mill Road, Hampden, Maine 04444, will hold a public information meeting on September 29th at 6:00pm at the Old Town City Council Chambers, 265 Main Street in Old Town, Maine. The purpose of the public informational meeting will be to discuss BGS's and NEWSME's plan to file:

(1) a Solid Waste Facility License Application with the Maine Department of Environmental Protection (DEP) to expand the existing Juniper Ridge Landfill solid waste boundary in Old Town by approximately 57 acres on BGS-owned land, and

(2) a Tier 3 wetlands alteration application for filling approximately 3.75 acres of freshwater wetlands in connection with the proposal to expand the landfill.

The applicants will discuss the project's anticipated environmental impacts, inform the public about opportunities for public comments, and seek public input. The Solid Waste Facility License Application will be processed under Maine's Waste Management Act, 38 M.R.S. § 1301 et seq., and regulations promulgated thereunder. The wetlands alteration will require a permit pursuant to Maine's Natural Resources Protection Act (NRPA), 38 M.R.S. § 480-A through 480-HH, and regulations promulgated thereunder, a Section 404 Army Corps permit pursuant to 33 U.S.C. § 1344, and a Section 401 water quality certification pursuant to 33 U.S.C. § 1341. The DEP applications also will be processed under DEP's Chapter 2 Rules Concerning the Processing of Applications.

For more information about this meeting please contact Lane Gould, Landfill Manager at (207) 624-7345 or Lane.Gould@maine.gov

Sept. 19, 20, 2025

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September 20, 27, 2025

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NOTICE OF PUBLIC INFORMATIONAL MEETING

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For more information about this meeting please contact Lane Gould, Landfill Manager at (207) 624-7345 or Lane.Gould@maine.gov

Sept. 19, 20, 2025

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Karen Bertolino & Thomas Dunn
579 West Old Town Road
Old Town, ME 04468

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Karen Bertolino & Thomas Dunn
579 West Old Town Road
Old Town, ME 04468

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X Karen M Bertolino ☐ Agent ☐ Addressee

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Town of Old Town
265 Main Street
Old Town, ME 04468

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X ☐ Agent ☐ Addressee

B. Received by (Printed Name) Radie Streeter
C. Date of Delivery 09.22.25

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Greg & Evlynn Wallace
526 West Old Town Road

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1. Article Addressed to:

Greg & Evlynn Wallace
526 West Old Town Road
Old Town, ME 04468

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A. Signature
X Gregg P. Wallace ☐ Agent ☐ Addressee

B. Received by (Printed Name) Gregg P. Wallace
C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
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Robyn Emmons
488 West Old Town Road
Old Town, ME 04468

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1. Article Addressed to:

Robyn Emmons
488 West Old Town Road
Old Town, ME 04468

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7091

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A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) Robyn Emmons
C. Date of Delivery 9/24/25

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SSR LLC
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Stillwater, ME 04489-0435

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1. Article Addressed to:

SSR LLC
PO Box 435
Stillwater, ME 04489-0435

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Scott Bergquist
497 West Old Town Road
Old Town, ME 04468

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1. Article Addressed to:

Scott Bergquist
497 West Old Town Road
Old Town, ME 04468

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7121

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A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) Scott E. Bergquist
C. Date of Delivery 9/23/25

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

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Kevin & Sandilynn Daniel
439 West Old Town Road
Old Town, ME 04468

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1. Article Addressed to:

Kevin & Sandilynn Daniel
43[illegible] West Old Town Road
Old To[illegible]n, ME 04468

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A. Signature
X [signature] ☐ Agent ☒ Addressee

B. Received by (Printed Name) Sandy Daniel
C. Date of Delivery 9/23/25

D. Is delivery address different from item 1? ☐ Yes
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4. Restricted Delivery? (Extra Fee) ☐ Yes

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Herbert Robertson Jr
163 Clewleyville Road
Eddington, ME 04428

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1. Article Addressed to:

Herbert Robertson Jr.
163 Clewleyville Road
Eddington, ME 04428

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) Jennifer Robertson
C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

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☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7152

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7169

Harry & Laura Sanborn
2845 Bennoch Road
Alton, ME 04468

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- Print your name and address on the reverse so that we can return the card to you.
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1. Article Addressed to:

Har[illegible]and Laura Sanborn
28[illegible] Bennoch Road
[illegible]on, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name)
C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
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☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

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Second Chance Holdings, LLC
74 Upper Dedham Road
Holden, ME 04429

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Second Chance Holdings, LLC
74 Upper Dedham Road
Holden, ME 04429

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☒ Agent ☐ Addressee

B. Received by (Printed Name) Laurie Turner C. Date of Delivery SEP 24 2025

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

HOLDEN MAINE 04429 SEP 24 2025 USPS

3. Service Type
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☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7176

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7220

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Postage $
Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Harry & Tammy Feero
1118 Southgate Road
Argyle, ME 04468

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Harry & Tammy Feero
1118 Southgate Road
Argyle, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) Tammy Feero C. Date of Delivery 9/26/25

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7220

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7275

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Postage $
Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Anthony & Cindy Madden
PO Box 499
Milford, ME 04461

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Anthony & Cindy Madden
PO Box 499
Milford, ME 04461

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7275

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7299

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Restricted Delivery Fee (Endorsement Required)
Postmark Here

Town of Alton
3352 Bennoch Road
Alton, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION
- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Town of Alton
3352 Bennoch Road
Alton, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7299

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7336

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Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Shana McLaughlin
181 Moondance Lane
Summerville, SC 29483

PS Form 3800, August 2006 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION
- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Shana McLaughlin
181 Moondance Lane
Summerville, SC 29483

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery
T. WILSON 9/23

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7336

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7404

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Restricted Delivery Fee
Postmark Here

Charles Leithiser
394 Fourth Street
Old Town, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION
- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Charles Leithiser
394 Fourth Street
Old Town, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery
CHARLES B LEITHISER 9/23/25

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7404

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7411

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Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Ted Shina
769 West Old Town Road
Old Town, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Ted Shina
769 West Old Town Road
Old Town, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery 9/22

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7411

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7435

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Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Ralph Leonard
96 Sargent Drive
Old Town, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Ralph Leonard
96 Sargent Drive
Old Town, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery 9-22-25

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7435

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 6995

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Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

City of Old Town
attn: William Mayo City Manager
265 Main Street
Old Town, ME 04468

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

City of Old Town
attn: William Mayo City Manager
265 Main Street
Old Town, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery 09.22.25

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 6995

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

7014 0150 0001 1003 7442

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Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

PS Form 3800, August 2006 See Reverse for Instructions

Chuck Lorring Jr.
12 Wabanaki Way
Indian Island, ME 04468

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Chuck Lorring Jr.
12 Wabanaki Way
Indian Island, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7442

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7022

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Restricted Delivery Fee (Endorsement Required)
Postmark Here

PS Form 3800, August 2006 See Reverse for Instructions

Laurent & Barbara Beauregard
273 Washington Street
Brewer, ME 04412

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Laurent & Barbara Beauregard
273 Washington Street
Brewer, ME 04412

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) LAURENT J. BEAUREGARD C. Date of Delivery 9/22/25

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7022

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

7014 0150 0001 1003 7190

U.S. Postal Service™
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Restricted Delivery Fee (Endorsement Required)
Postmark Here

PS Form 3800, August 2006 See Reverse for Instructions

ABS Transport LLC
2894 Bennoch Road
Alton, ME 04468

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

ABS Transport LLC
2894 Bennoch Road
Alton, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7190

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7459

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Postage $
Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Laura Sanborn, Chair
Juniper Ridge Landfill Advisory Committee
2845 Bennoch Road
Alton, Maine 04468

PS Form 3800, August 2006 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Laura Sanborn, Chair
Juniper Ridge Landfill Advisory Committee
2845 Bennoch Road
Alton, Maine 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7459

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7398

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Postage $
Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Josh Paul
12 Wabanaki Way
Indian Island, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Josh Paul
12 Wabanaki Way
Indian Island, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7398

PS Form 3811, July 2013 Domestic Return Receipt

BUREAU OF GENERAL SERVICES
77 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0077

CERTIFIED MAIL™

7014 0150 0001 1003 7206

FIRST-CLASS

US POSTAGE™ PITNEY BOWES
ZIP 04330
02 7W
$ 010.44⁰
0008029656 SEP 18 2025

N5 4

[redacted] Tasanee Lolonga
157 Massapaug A[redacted]
Dallas, GA 301

RECEIVED
SEP 30 2025

NIXIE 326 DE 1 0009/25/25
RETURN TO SENDER
NO SUCH STREET
UNABLE TO FORWARD
BC: 04333 *3084-08580-19-43

NSS
30132$9999

7014 0150 0001 1003 7039

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Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Robert Hall
631 West Old Town Road
Old Town, ME 04468

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Robert Hall
631 West Old Town Road
Old Town, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Robert Hall ☐ Agent ☐ Addressee

B. Received by (Printed Name) Robert HALL
C. Date of Delivery 9-23-25

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7039

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

7014 0150 0001 1003 7268

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Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Charles Tringale
268 Park Street
Medford, MA 02155

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Charles Tringale
268 Park Street
Medford, MA 02155

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7268

PS Form 3811, July 2013 Domestic Return Receipt

7014 0150 0001 1003 7305

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Certified Fee
Return Receipt Fee (Endorsement Required)
Restricted Delivery Fee (Endorsement Required)
Postmark Here

Kenneth Gray
PO Box 357
Old Town, ME 04468

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Kenneth Gray
PO Box 357
Old Town, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X ☐ Agent ☐ Addressee

B. Received by (Printed Name) Kenneth F Gray
C. Date of Delivery 9-23-25

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail® ☐ Priority Mail Express™
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ Collect on Delivery

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number (Transfer from service label) 7014 0150 0001 1003 7305

PS Form 3811, July 2013 Domestic Return Receipt

PUBLIC INFORMATION MEETING FACT SHEET
PHASE II EXPANSION
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE
SEPTEMBER 29, 2025

PROJECT OVERVIEW

The Phase II Expansion project (Expansion) is an expansion of the existing Juniper Ridge Landfill (JRL) in Old Town proposed by the Maine Bureau of General Services and NEWSME Landfill Operations, LLC (NEWSME). The Expansion will be located north of and adjacent to JRL within the approximately 780-acre parcel of land owned by the State of Maine, as depicted on the attached figure. The Expansion's solid waste footprint will be about 57 acres, with the total facility site, including the landfill and supporting site infrastructure (e.g., access roads, stormwater management ponds, and tank area development) being approximately 72 acres. The development of the Expansion will be phased in a manner similar to the existing facility, with a total of five landfill cells, built one by one, as needed. Construction of the first cell will need to begin during the 2027 construction season to be available for use in 2028.

The Expansion will provide approximately 11.9 million cubic yards of disposal capacity as approved in the Maine Department of Environmental Protection (MEDEP) Public Benefit Determination, which was issued on October 2, 2024 (#S-020700-W5-CV-N). The Expansion design utilizes the site's low permeability native till soils, excellent hydrogeologic setting, and design components to limit potential adverse impacts to the surrounding environment and allow the performance of the Expansion to be monitored separately from the existing facility. The Expansion will have two liners (a primary and a secondary), a leak detection system, leachate and gas collection systems, and intermediate and final cover systems. Leachate and landfill gas generated by the Expansion will be contained and collected by these systems. One foot of compacted till will be installed directly below the secondary liner to provide a uniform low hydraulic conductive soil layer under the secondary liner. A granular underdrain collection system will be installed under about 36.2 acres of the Expansion where the landfill base is located below the site's water table. The Expansion's final waste elevation is 385 feet-NVGD, which is five feet less than the licensed elevation of the existing landfill facility. Intermediate and final cover will be placed in a sequential manner over the landfill cells over the life of the facility. The covering sequence will include areas of both the Expansion and existing landfill facility. The Expansion will be developed over an anticipated 10- to 12-year life span, and will have five operational cells, each having approximately two years of capacity.

The same types of waste materials currently disposed of within the existing landfill cells will be disposed of in the Expansion cells. These materials include construction and demolition debris, municipal solid waste ash, wood biomass ash, biosolids and miscellaneous sludges, contaminated soil, oversized bulky waste, bypass municipal solid waste, and other special wastes. The Expansion will only accept waste generated within the State as defined by State Title 38 Chapter 1303-C Section 40-A.

REQUIRED FEDERAL, STATE, AND LOCAL LICENSES AND PERMITS

The permits/authorizations listed below are likely required to construct the Expansion:

- A Solid Waste Facility License from the MEDEP pursuant to Title 38 M.R.S. §§ 1301 to 1310-AA and 06-096-CMR 400, 401, and 405 of the Maine Solid Waste Management Rules;
- Tier 3 Natural Resources Protection Act permit from the MEDEP pursuant to Title 38 M.R.S. §§ 480-A to 480-EE and 06-096 CMR 310 and 335;
- A Section 401 Water Quality Certification from the MEDEP pursuant to the Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. § 1341;
- An Individual Permit from the U.S. Army Corps of Engineers pursuant to Section 404 of the Clean Water Act, 33 U.S.C. § 1344;
- Notice of Intent to Comply with the Maine Construction General Permit for Stormwater pursuant to Title 38 M.R.S. § 413 and 06-096 CMR 529(2)(a); and
- Solid Waste Permit Pursuant to City of Old Town Ordinance, Solid Waste Facilities Ordinance Chapter 24.

SITING CRITERIA

Traffic. The total truck traffic associated with the operation of the Expansion is expected to average about 187 trips per day. Traffic patterns associated with the Expansion will not vary significantly from the current patterns. The primary waste haul route to JRL is along I-95 to the Route 16 (Bennoch Road) interchange, then Route 16 west to the JRL site access road. The JRL site access road from Route 16 is located approximately 0.1 mile west of the I-95 interchange. As is the case today, a relatively small percentage of the trucks from the Expansion may choose not to use I-95; however, JRL requests that truckers use I-95 whenever possible. The site access roads and the new internal site access roads allow for continuous uninterrupted traffic movement without posing a danger to pedestrians or other vehicles.

Setbacks and Buffers. The Expansion will be buffered from surrounding land uses by existing natural vegetation. The approximate setback distances to the surrounding land uses are summarized on the following table:

Setbacks to:	MEDEP Regulation	Actual Proposed
Prohibitive Siting Criteria		
Class AA or Class SA waters	1,000 feet	>2 miles
Significant sand and gravel aquifer	300 feet	1 mile
Fault displaced in Holocene time	200 feet	None identified on 780-acre parcel. Nearest Mapped Fault approximately six miles northeast of the site.
Restrictive Siting Criteria		
Nearest public road	300 feet	3,020 feet
Property boundary	300 feet	513 feet
Nearest residence	1,000 feet	1,760 feet
Stratified sand and gravel deposit	100 feet	1,800 feet
Classified surface water body	100 feet	1,580 feet
Water supply spring or well	1000 feet	1,400 feet
Performance Standards		
Airport	10,000 feet	>15,000 feet

EXISTING USES AND SCENIC CHARACTER

Noise. Estimates of the Project's noise levels for a future operating condition based on measured sound levels from mobile sources at the existing landfill, the Gas Treatment Building, the Renewable Natural Gas (RNG) Facility, and the proposed PFAS treatment system were calculated using the CadnaA sound level calculation software which uses the ISO 9613-2:1996 international standard for sound propagation. The daytime and nighttime hourly sound level standards of 60 dBA and 50 dBA, respectively, will be met at the project protected locations.

Visual Impacts. No "public viewing areas," as defined by the Solid Waste Rules, lie within 2,000 feet of the proposed Expansion. If the public viewing areas were extended to seven miles from the project (far past what is required by the Rules), the project is visible from Pushaw Lake, but views of the project from the Penobscot River, Stillwater River, and Pushaw Stream are unlikely due to topography and forest vegetation. Vehicular views that may have visual connection to the landfill are not regarded by MEDEP standards as "public viewing areas." Vehicles have a view of the landfill for an approximately 0.8-mile stretch on I-95 near the Alton Bog which equates to less than a minute at the posted speed of 75 mph. Vehicles traveling Rt. 43 and Rt. 16 are either visually screened and buffered or have infrequent and intermittent views. Therefore, the proposed Expansion will not have an unreasonable adverse effect on existing uses and scenic character in the area.

Air Quality. The Expansion will utilize an active gas collection system, and landfill covering techniques to contain and control landfill gas emissions. Landfill gas collected will either be combusted in one of the facility's flares or converted to renewable natural gas at the RNG facility. Both these facilities are licensed by the MEDEP. NEWSME has policies and procedures to control fugitive dust. These procedures include paving the primary access roads, use of water spray trucks to wet secondary roads during dry weather months, and use of a road sweeper to minimize dirt buildup on paved roadways.

Odor. There are three potential sources of odor associated with the Expansion: incoming wastes; leachate transport and storage; and landfill related gases. NEWSME has an active program to manage the above sources of landfill-related odors to prevent off-site migration of odor sources, and this program will continue with the Expansion.

Surface Water Quality. The Expansion design incorporates several features to protect the quality of surface water leaving the site and to prevent flooding. First, the secure nature of the Expansion design allows any precipitation that comes in contact with the waste to be collected and treated as leachate. Second, surface water management for the Expansion, which addresses clean surface water runoff from covered portions of the landfill and outside of the operational areas of the Expansion, was developed based on the four objectives outlined in the "Maine Erosion and Sediment Control BMPs" (BMP-MEDEP, 2003): effective drainage, flood prevention, erosion control, and water quality control. The BMPs incorporated in the design to protect water quality include a stormwater detention basin and stone check dams within on-site ditches.

Natural Resources. Despite efforts to avoid and minimize wetland impacts, the Expansion will fill approximately 3.75 acres of freshwater wetlands. The wetland fills will occur in 12 different wetlands located within the landfill footprint and perimeter dike footprint. One 0.31-acre area of wetland fill is considered Wetlands of Special Significance (WOSS) as defined by the Natural Resources Protection Act (NRPA) because it is within a wetland complex that contains a Significant Vernal Pool (SVP).

A total of nine vernal pools were identified in the vicinity of the Expansion area. Two vernal pools, located outside the Expansion's solid waste footprint, meet the criteria to be considered an SVP. Expansion development will not directly impact any of the vernal pools, nor will it directly impact the SVPs surrounding 250-foot critical terrestrial habitat areas.

Of the nine vernal pools, seven met the definition of a vernal pool as provided by the US Army Corps of Engineers (ACOE) Maine General Permit (GP). The other two pools do not support indicator species and therefore do not meet the Maine GP definition of vernal pools and are not regulated by the ACOE. The compensation plan will meet the criteria established by the MEDEP and ACOE related to compensation for non-WOSS and WOSS wetland impacts.

Erosion Control. The soils located within the Expansion area are suitable for the nature of the proposed development. The planned erosion control measures that will be implemented during construction and operation of the Expansion will limit unreasonable erosion of on-site soils. The design and implementation of all erosion control measures have and will be conducted in accordance with the "Maine Erosion and Sediment Control BMP Manual" (BMP-MEDEP, 2016). A comprehensive Erosion and Sedimentation Control Plan (ESCP) has been developed in accordance with the BMPs. The ESCP describes the project location and watersheds, the proposed construction activities, existing and proposed drainage structures, design calculations, temporary, permanent, and standard erosion control measures to protect soils from

erosion, and maintenance and inspection of erosion control features to ensure they are functioning as designed.

No Unreasonable Risk that a Discharge to Significant Groundwater Aquifer Will Occur. The nearest mapped sand and gravel aquifer is located approximately one mile east of the Expansion. There are no stratified sand and gravel deposits mapped by Maine Geological Survey within the JLR parcel. Therefore, the Expansion does not overlie or fall within 300 feet of a significant sand and gravel aquifer. These evaluations demonstrate that the Expansion, with its redundant secure liner systems, and site setting, poses no unreasonable risk to a significant groundwater aquifer or other potential sensitive receptors.

Utilities. The Expansion will not have any unreasonable adverse effect on existing site or municipal utilities. The existing sanitary wastewater disposal systems located adjacent to the facility's maintenance building, at the scale house, and near the Gas Treatment and RNG plants, will continue to be used by on-site landfill personnel. There are no additional sanitary wastewater disposal needs for expansion of the landfill. Water supply needs for the Expansion (i.e., for dust control, leachate pipe cleaning, etc.) will continue to be met by the water supply sources for the existing facility. Casella is currently designing a per- and polyfluoroalkyl substances (PFAS) treatment system for site leachate and, as a condition to the Expansion, will use this system to treat site leachate prior to transportation for disposal at ND Paper's Mill Wastewater Treatment Plant in Old Town. One 0.92-million-gallon (MG) leachate above-ground storage tank (AST) currently exists at the site and an additional 0.92-MG AST will be constructed while the first cell of the Expansion is constructed in 2027. In addition to the proposed leachate AST noted above, NEWSME is currently designing a PFAS treatment system for leachate that includes a 0.5-MG AST for treated leachate storage. The Expansion will be served by the existing three-phase, 480-volt-power service that enters the site along the existing site access roadway. As part of this project, this line will be extended to provide three-phase 480-volt power to Expansion pump stations on the east side of the landfill.

Flooding and Stormwater Management. The Expansion will not unreasonably cause or increase flooding on-site or on adjacent properties, nor will it create an unreasonable flood hazard. The Expansion is not located in a 100-year floodplain. As part of the design of the Expansion, post-development flow from a 25-year/24-hour storm event will be limited to pre-development levels by use of stormwater detention ponds.

PUBLIC PARTICIPATION IN THE LICENSING PROCESS

Public comment on the application is accepted by MEDEP during the application processing period. The processing period is from the time the application is accepted by the MEDEP as complete through the date the application is decided by the MEDEP.

If a person is interested in the project, they can contact Dominique DiSpirito, the MEDEP project manager, at 207.441.0732 or Dominique.dispirito@maine.gov to be added to a list of Interested Persons. People on

the list of Interested Persons will receive a copy of the draft license when/if it is issued. A draft license will be issued by the MEDEP and will be made available for public comment. When/if a final license decision is issued, interested parties will get a copy of the final decision and a notice of appeals rights.

The following are links to both the Juniper Ridge Landfill web sites as a source of updated information related to the project:

- www.maine.gov/dep/waste/juniperridge/
- www.maine.gov/dafs/bgs/maines-state-owned-landfills/juniper-ridge-landfill

DEP INFORMATION SHEET

Public Participation in the Licensing Process

Date: April 2018 **Contact: (207) 287-7688**

SUMMARY

Maine law charges the Commissioner of the Department of Environmental Protection (DEP) with evaluating license applications for many different activities that affect Maine's environment. Individuals and legal entities may participate at various points during license application processing. Individuals must recognize that the Commissioner's charge may, under certain circumstances, be overtaken by the Board of Environmental Protection (Board). This INFORMATION SHEET, in conjunction with consulting statutory and regulatory provisions referred to in this document, will assist with your understanding of the potential opportunities for participation in the Commissioner's process; other specific provisions that apply to the Board are not addressed in this INFORMATION SHEET. A failure to participate during the licensing process will result in a person's only option for influence over that decision being the filing of an appeal. DEP's *Rules Concerning the Processing of Applications and Other Administrative Matters (Chapter 2)*, 06-096 C.M.R. ch. 2, was promulgated, in part, to provide guidance on this process.

1. **PUBLIC ACCESS TO INFORMATION**. Records submitted to DEP are generally available to the public under Maine's Freedom of Access Act, 1 M.R.S. §§ 400-414. Other than portions claimed to be confidential by law when submitted to DEP, all license application materials are readily available for review and copying at our offices in Augusta, Portland, Bangor, and Presque Isle.

2. **PUBLIC NOTICE**. Maine law requires applicants to publicly make known their intent to submit an application to DEP. It is the responsibility of an individual who is interested in following or participating in the license decision-making process to act after seeking out that notice or, if you are an abutter, to act when noticed directly by mail.

    A. **Public Informational Meetings**. Informational meetings are held by persons prior to submitting a licensing application to DEP for the purpose of informing the public about an anticipated project. These meetings are held at a location near to a proposed project and are by design open to the public. Abutters to the anticipated project location receive notice in the mail of the meeting time and location, and notice is also published in newspapers serving the area of the project.

    B. **Application Filing**. Prior to filing an application with DEP, abutters to the project location receive notice in the mail of the anticipated filing date, and it is also published in newspapers serving the area of the project.

3. **INTERESTED PERSONS**. Individuals can acquire materials submitted to DEP, attend public informational meetings, request that a public hearing be held on a filed application and provide comments on an application or a draft decision.

    A. **Maximum Participation**. Participation in a DEP licensing decision to the maximum extent possible requires a person to submit a written request stating his or her desire to acquire material related to an application. The individuals who do are known as "interested persons." Once a request is filed, interested persons will be provided with the opportunity to inspect and copy materials on file at DEP; they also receive direct notice of public information, pre-application and pre-submission meetings, and public hearings. The timing of an interested person's request to be part of the process will determine the number of events potentially available to him or her.

B. Public Informational Meetings. Informational meetings are held to inform the public about environmental impacts that are anticipated from a project. Interested persons may ask questions at such a meeting. Questioners should be aware that answers may not be available during the meeting.

C. Pre-application and Pre-Submission Meetings. DEP often meets with potential applicants to identify regulatory and processing issues that need consideration. Pre-application and pre-submission meetings will typically not be attended by interested persons, in part because such a meeting is not, by law, a "public proceeding" freely open to attendance under Maine's Freedom of Access Law. Although the decision to allow individuals other than an applicant to attend is DEP's to make, interested persons invited to attend such a meeting should expect only to observe, since public input cannot be received at this time in the licensing process.

D. Application Comments. Interested persons and any other member of the public may submit written comments, including technical information, at any time during the course of an application's processing. It is in that person's interest to submit information early in the process in order to ensure adequate time for consideration by the DEP staff member evaluating the application.

E. Draft Order Comments. Interested persons will receive the Commissioner's draft licensing decision at least five (5) working days prior to final action. Written comments may be submitted on that draft decision. Reasonable notice of when the Commissioner anticipates issuing a final decision on the draft order will also be provided to interested persons.

F. Public Hearing Requests. People may request that a public hearing be held on a filed application within 20 days after its acceptance as complete for processing by DEP. Such a request must satisfy requirements found in Section 7 of Chapter 2. The Commissioner will typically order that a hearing be held where credible conflicting technical information appears to exist regarding a licensing criterion.

ADDITIONAL INFORMATION

If you have questions or need additional information on the appeal process, contact DEP by calling (207) 287-7688. All Maine DEP rules and laws are available via the internet by following the links provided at: http://www.maine.gov/dep/.

NOTE: DEP provides this INFORMATION SHEET for general guidance only; it is not intended for use as a legal reference. Maine law governs every citizen's rights.

CERTIFICATION

By signing below, the Applicants, Bureau of General Services and NEWSME Landfill Operations, LLC, certify that:

1. A Public Informational Meeting was held on September 29, 2025, at the Old Town City Council Chambers, in accordance with Chapter 2, Section 13, Rules Concerning the Processing of Applications. Notice of the meeting was sent by certified mail to abutters, to the municipal offices of Old Town and Alton and to the Penobscot Indian Nation, at least 10 days prior to the meeting. Notice of the meeting was also published once in the Bangor Daily News at least seven days prior to the meeting.

2. Approximately 50 members of the public attended the Public Information Meeting.

3. A narrative responsive to any significant issues relevant to licensing criteria that were raised at the meeting is attached as Exhibit A.

BUREAU OF GENERAL SERVICES

By: Lane Gould

It's: Landfill Manager

Date: 11/17/2025

NEWME LANDFILL OPERATIONS, LLC

By: Wayne Boyd

Its: General Manager

Date: 11/19/25

PUBLIC MEETING CERTIFICATION EXHIBIT A

SME
SEVEE & MAHER
ENGINEERS

Public Information Meeting on JRL Landfill Expansion Application
Old Town City Council Chambers September 29, 2025
Public Comments and Response

1. **Are there maps that look at groundwater flows?**
   There are maps that show groundwater flows at the landfill. The site assessment report in Volume II of the Application will contain the hydrogeologic information required by the solid waste rules for a landfill expansion and demonstrates that no unreasonable risk of a discharge to a significant groundwater aquifer exists.
2. **How are the liner sections connected?**
   Geomembrane panels are welded together using fusion or extrusion methods. Each welded seam is then tested by the geomembrane installer under the oversight of a third-party quality assurance technician.
3. **Where do the sand, gravel, and clay come from? Is it sourced on site?**
   Some of the clay is sourced from a privately owned, adjacent property, but sand and gravel are hauled from another location off site.
4. **Is the sand reused or virgin material?**
   The sand is virgin material.
5. **Why wouldn't we apply the clay layer throughout the new liner system, and not just the augmented areas?**
   The liner system will incorporate a continuous clay layer throughout the entire primary liner system. The augmented areas of the secondary liner will get an additional layer of clay where the time travel to sensitive receptors is less than 6 years, which is the requirement of the solid waste rules. A sensitive receptor is defined in the Maine DEP Solid Waste Rules, chapter 400, which states: "'Sensitive receptor' means public and private water supply aquifers and wellhead protection zone; public and private drinking water supplies; significant ground water aquifers and primary sand and gravel recharge areas; sand and gravel deposits; and Class AA, A, and B surface water bodies and great ponds." The travel time to sensitive receptors in the remaining expansion area has a travel time longer than the 6-year requirement without the additional clay.
6. **If clay is better than till, why use till instead of clay for secondary liner system soil?**
   The till-based secondary liner system will meet the travel time requirements without the use of the additional clay. In addition to this, the volume of clay borrows in the adjacent borrow area is finite and when it is depleted, clay borrow will likely be trucked to the site on public roads. Using till barrier soil from an adjacent private property for the majority of the secondary liner will allow construction of the system while limiting trucking on public roads.

7. **Will Casella be testing residential drinking water?**
   Casella tests abutting residential wells upon request.
8. **What water quality testing will be done for the abutters to ensure PFAS testing is addressed?**
   Casella will be testing private water supplies for PFAS in accordance with 38 M.R.S. §1310-N(10-B).
9. **What is the life expectancy for the landfill liner system?**
   The landfill liner system is constructed to meet the requirements of MEDEP rules and utilizes both synthetic and natura (clay/till) materials to protect human health and the environment.

   Synthetic liner materials are made from high density polyethylene (HDPE) overlying a geosynthetic clay liner composed of dried clay and geotextile. Expected temperatures at the HDPE liner system are 70 to 80 degrees Fahrenheit (F). At this temperature, we anticipate the life expectancy of the primary geomembrane to be somewhere between 150 to 400 years. Natural materials utilized in the design include a 12-inch-thick clay barrier soil layer placed directly below the synthetic liners.

   Along with the primary liner system, a secondary liner system will also be incorporated. The secondary liner system also uses both synthetic (HDPE liner only) and natural soil materials, oriented similarly to the primary liner system described above.
10. **What are the negative effects to high temperatures in the landfill on the geosynthetic materials in the liner system?**
    Geomembrane liner physical properties can be impacted by high temperatures. Leachate at the landfill was recently measured to be between 70- and 80-degrees F. Because leachate flows over the geomembrane, its temperature is about the same as the geomembrane liner. This temperature is reasonable and much lower than the liner's melting point, which is between 248- and 338-degrees F.
11. **Why expand the landfill if it will increase leachate generation?**
    The landfill is being expanded to provide disposal capacity for the State of Maine. Once filled, cells will be permanently closed in accordance with State law and DEP Rules, which are detailed in the Operations Manual. Cell construction and cell cover projects will alternate years. As an example, if a new cell is built in 2027, then a cover project will occur in 2028.

Leachate produced at the facility was on average between 15 and 26.5 million gallons a year over the past five years, and during the planned expansion, it is expected to be between 10 and 27 million gallons a year as continued construction of final cover at the landfill is anticipated during the future expansion.

12. **What happens to the PFAS compounds that are removed from the landfill leachate after the treatment process?**

    PFAS treatment systems and technologies are still being evaluated. The disposal of concentrated PFAS compounds will be a component of the treatment system that is approved by the Maine Department of Environmental Protection (DEP) per the Public Benefit Determination (PBD).

13. **Will the PFAS treatment system be operational before the landfill expansion?**

    The PBD requires that the PFAS treatment system be operational prior to opening Cell 18 for accepting waste.

14. **Who issues the permits needed for landfill expansion?**

    Permits will be required from the DEP, U.S. Army Corps of Engineers, and City of Old Town.

15. **Why don't we take all the money that will go to the expansion, close JRL and start something new that is not in a watershed and use the remaining time left under the current expansion to allow for communities to increase recycling and composting rates to reduce the amount of waste being landfilled?**

    This question will be answered in multiple parts.

1. The State does not fund the construction of Juniper Ridge Landfill. The Operating Services Agreement (OSA) requires that Casella bears "all costs, expenses, and liabilities associated with the operation and maintenance of the Landfill," including construction of any future expansion.
2. When the initial search for a landfill site was conducted for the James River Paper Company in 1988, 58 sites were reviewed, and it was concluded that Juniper Ridge was the best site for the landfill.
3. Maine already has laws to encourage recycling and waste reduction, but as a state, we are a long way from reaching those goals.

   The 2024 Maine Materials Management Plan from the DEP states:
   "Maine's laws have established specific recycling and waste reduction goals including:

   • 38 M.R.S. § 2132(1) A goal to recycle or compost 50% of the MSW tonnage generated each year within the State by January 1, 2021.

- 38 M.R.S. § 2132(1-B) A goal to reduce the statewide per capita disposal rate of MSW tonnage to 0.55 tons disposed per capita by January 1, 2019, and to further reduce the statewide per capita disposal rate by an additional 5% every 5 years thereafter. This incremental goal of reducing waste by 5% every 5 years provides a mechanism to measure progress at the municipal level.
- 38 M.R.S. § 2133(1-A) Municipal responsibilities for meeting the goals above. Municipalities are not required to meet the state recycling goal in 38 M.R.S. § 2132, but they must demonstrate reasonable progress toward that goal, and the DEP shall determine reasonable progress. While reasonable progress is not specifically defined in statute, the DEP notes that the goals set in statute are used as criteria for determining progress.

Maine's combined MSW, CDD, and organics recycling rate was 24.46% (less than half of the goal set for 2021).
Maine's per capita disposal rate is 3.8 tons (almost 7 times the goal set in statute).
The changed economics of recycling have caused many municipalities in Maine to consider curtailing or eliminating their programs. Some communities have faced steep increases in costs for recycling services from private sector companies. When these costs are greater than the cost of disposal some are opting to suspend recycling services, at least until recycling is less costly than disposal."

"More waste is being generated in Maine despite our collective efforts to reduce, reuse, and recycle, which leads to a need for landfill space. Even if everyone reduces, reuses, composts, and recycles, and even if … processors are running all the time, we still need landfills to handle certain waste streams. A new landfill could probably not as a practical matter be sited, permitted, and developed in time and BGS has an obligation to the entire state (because private landfills are banned) to ensure that this capacity exists."

16. **How is "unreasonable risk" to groundwater evaluated and defined?**

Unreasonable risk is evaluated through assessment of the proposed site and surrounding areas including classified surface waters, significant sand and gravel aquifers, and fractured bedrock aquifers that could be affected by the proposed facility during normal operations or in the event of unforeseen events including the failure of engineered barriers to ground water flow.

Maine Revised Statute Title 38 Chapter 1310-N(A-2) indicates that the Department may not issue a license for a solid waste disposal facility if it finds that the facility overlies a significant sand and gravel aquifer; poses an unreasonable threat to the quality of a significant sand and gravel aquifer that it does not overlie; or poses an unreasonable threat to an underlying fractured bedrock aquifer.

17. **What happens if contamination is detected in the groundwater?**

    The exact details would depend on the circumstances, but the most likely approach would be to drill additional wells that would pump out the contaminated groundwater, which would be collected, and sent to an appropriate treatment facility.

18. **Who does the water quality monitoring?**

    Samples are collected by Sevee and Maher Engineers, Inc., and the samples are sent to Maine Environmental Laboratory in Yarmouth, Maine, which is a private laboratory that is certified by the State. Some samples may be sent to other certified laboratories, depending on the compound being tested. This is consistent with most other on-site water testing in Maine.

19. **Are there a lot of fugitive methane emissions that are not captured by the landfill gas collection system?**

    Juniper Ridge Landfill has one of the highest collection efficiencies of greenhouse gas emissions, when compared to other operating landfills in the Northeastern US. Approximately 85% of emissions were captured in 2024 as reported on page 4, paragraph 7 of the 2025 Sanborn, Head & Associates United States Environmental Protection Agency (USEPA) Combined Air Emissions Reporting System (CAERS) emissions inventory for the Juniper Ridge Landfill (JRL) in Old Town, Maine. The CAERS emissions inventory presented in the report is an estimate of air pollutant emissions required by Chapter 137 of the Maine Department of Environmental Protection (Maine DEP) regulations and JRL's Part 70 Air Emissions License. These efforts are achieved by the use of a robust collection system that exceeds MEDEP requirements, and incorporates a large amount of temporary geomembrane cover, utilized until final cover systems are installed**.**

20. **What chemicals are used in the spray on deodorizer?**

    The deodorizer is iodine-based and consists of ingredients and ratios that are proprietary to the manufacturer. Similar deodorizers are used at other landfills across USA. Both chemical manufacturers report that their deodorizing product is non-toxic and is not expected to bio-accumulate. See question #24 for more information.

21. **Are there any plans to improve the Odor Management Plan?**

    Yes, JRL will be further limiting the daily open area of waste and, as required by the Public Benefit Determination, will hire a consultant to conduct an odor study for recommended potential improvements.

22. **Is there any monitoring for airborne PFAS compounds?**

    PFAS compounds are not included in the Air Quality Monitoring Program required by DEP.

23. **Have effects of climate change been considered?**

    Yes. The proposed expansion design keeps all development outside the 100-year flood limits as established by the Federal Emergency Management Agency (FEMA) in 2023 and uses storm intensity provided by the National Oceanic and Atmospheric Administration (NOAA) to predict stormwater flows. Sevee & Maher Engineers utilized precipitation, temperature, and solar radiation data collected from Bangor, Maine, spanning the years 2009 through 2023 as input for the Hydrologic Evaluation of Landfill Performance (HELP) model. This approach incorporated the most recent 15 years of readily available data to assess the effectiveness of landfill liner systems, providing a current evaluation of their performance.

24. **Are there any studies on environmental impacts resulting from the use of deodorizers?**

    We are not aware of studies on environmental impacts related to the deodorizers used at the landfill facility. Both chemical manufacturers report that their deodorizing product is non-toxic, not expected to bio-accumulate, and that the products have been reviewed and have been approved by industrial hygienists for major waste handlers and municipalities around the USA. In addition to this, in the past the Safety Data Sheet confirmed that, in its dilute form, the chemical is not classified as hazardous by OSHA.

25. **What about waste that has blown/fallen out of loads along Interstate 95 and the Bennoch Rd?**

    Casella uses temporary hired employment to clean up any windblown litter on the Landfill Road, as well as the Bennoch Road from the landfill entrance to the on ramp for Interstate 95 South.

26. **What does maximizing depredation mean?**

    Maximizing depredation means culling the maximum number of gulls allowed under the permit.

    NEWSME currently maintains a depredation permit, which allows for the culling of up to 200 herring gulls (Larus smithsonianus), 100 ring-billed gulls (Larus delawarensis), and 25 great black-backed gulls (Larus marinus) per year. NEWSME provided records of depredation events since 2022; the greatest number of gulls killed was in the fall each year. Additionally, the permitted limit of euthanized gulls was not met in any year from 2022-2024 (Table 1). Once culled, gulls are buried within the landfill.

Table 1. Number of gulls euthanized by species from 2022-2024 under depredation permit number MB670894-0 at Juniper Ridge Landfill.

Species	Gulls Euthanized by Species			Depredation Permit Limit
	2022	2023	2024	
Herring Gull	143	135	104	200
Ring-Billed Gull	21	70	50	100
Great Black-Backed Gull	4	0	1	25

27. Define the hazing techniques, and do the audible techniques violate noise ordinances?

Hazing techniques under the USDA depredation permit refers to non-lethal methods used to deter wildlife from causing damage to crops or property. This can include techniques such as noise making, visual deterrents, human presence, or other strategies aimed at encouraging animals to leave an area without harming them.

JRL uses both hazing techniques and a depredation permit to discourage gull activity.

Recommendations for JRL by the consulting wildlife biologists at Stantec include:

- Reducing the area of non-covered, open waste;
- Restricting work to one area of the landfill at a time;
- Continuing to hold a depredation permit and increase efforts to reach the quota in the permit;
- Installing bird roosting deterrents (e.g., Bird Barrier Daddi Long Legs) on suitable perching areas;
- Installing non-lethal auditory hazing devices (e.g., zon gun);
- Conducting additional site visits (to include sunrise and sunset) to assess gull abundance at JRL in winter and spring.

MEDEP rules define sound level limits as one-hour equivalent sound levels, essentially the average sound level over a 1-hour period. Transient sound events do impact the equivalent sound level, but very brief impulse sounds like the proposed auditory hazing devices would not impact the average sound level enough to violate applicable noise ordinances.

28. What is the depredation procedure?

A federal depredation permit authorizes one to capture or kill birds to help reduce damage to agricultural crops/livestock, private property, human health & safety (including at airports), and protect wildlife. A depredation permit is used with other,

nonlethal measures to help eliminate or significantly reduce the problem. Regulations require that any animal culled as part of a depredation permit must be buried. Any gulls would be disposed of in the landfill, with a record of the total number of birds by species that were culled during that calendar year reported annually to the U.S. Fish & Wildlife Service.

29. **How are the questions recorded and responded to?**

    The meeting was recorded through the Zoom platform, along with physical notes taken during the meeting. A question list with formal responses will be created in Microsoft Word format. All video recordings, questions and responses will be published to the Bureau of General Services Juniper Ridge Landfill web page.

30. **Is the plan to close JRL after this proposed expansion?**

    There are no current plans for future expansion of JRL beyond the Phase II Expansion. BGS is still evaluating future solid waste disposal options.

31. **What percentage of landfill gas is flared off vs. being utilized by the Renewable Natural Gas (RNG) Facility?**

    To date, the RNG Facility is still operating at a limited capacity until remaining permits/approvals are granted. Once granted, the remaining infrastructure will be installed, and it is expected that the RNG Facility will be able to process roughly 3,200 standard cubic feet per minute of landfill gas into renewable natural gas. This is nearly all the gas currently produced at JRL. Any additional gas and/or gas unable to be processed by the RNG Facility, will be destructed through the use of the JRL on-site flare.

32. **Are there plans for solar or wind projects on the closed cells?**

    The closed landfill would be challenging and no plans for solar or wind projects are being considered at this time.

33. **Was the "lack of historical significance" criteria met by a direct response from the tribes, or a lack of response, and are those records in the PBD documents?**

    As required for the permitting process, all five of Maine's tribes were asked if there were important cultural or archaeological features at the site. The Mi'kmaq and Maliseet responded that they do not have important features at the site. The two bands of the Passamaquoddy responded that they defer to the Penobscot Nation. In January 2025 the Penobscot Nation responded with a declaration indicating their on-going cultural and historic resource concerns associated with the Juniper Ridge Landfill. A second response was received from the Penobscot Nation in February 2025 indicating that the project appeared to have no impact on a structure of or site of historic, architectural, or archaeological significance to the Penobscot Nation. Those correspondences can be found in the Expansion Application.

34. Is the State looking into whether or not there is sufficient bulky waste generated "in-state" to manage the wet waste?

The State of Maine Department of Administrative and Financial Services, Bureau of General Services (BGS), contracted with TRC Companies, Inc. (TRC) to complete the Study for Evaluating Availability of Traditional and Alternative Bulking Agents Originating within the State of Maine which has the following objectives:

1. Evaluate the type/quantity of bulking agents needed to safely dispose of the WWTP biosolids produced in the State within solid waste landfills in Maine; and
2. Evaluate whether sufficient and consistent amounts of bulking agent originating in Maine are available to support continued acceptance of the current levels of municipal biosolids and other wet wastes at the Juniper Ridge Landfill and other solid waste landfills in Maine after July 1, 2025.

Key Takeaways from The TRC Report

- Materials proposed for bulking biosolids are waste materials that currently have no other purpose.
- Biosolids material quantities do not vary greatly throughout the year, causing the need for consistent availability of bulking materials to ensure year-round landfill stability
- There is a finite quantity of CDD available within the State of Maine for use in landfills as a bulking agent and for diversion to processing facilities for recycling. The rate of CDD availability is variable, based on the season and the strength of the economy which drives new construction as well as redevelopment.
- Based on TRC's review of the waste quantities disposed of and processed within the state, the bulking properties of the available wastes, and the reduced and unpredictable availability of CDD and its processing residuals, further reduction of the quantity of CDD and its residuals available for disposal at JRL (and other landfills that accept biosolids) will be detrimental to the stability of the landfills as they are currently operated especially during winter months.
- Without an adequate volume of waste materials for bulking, landfills currently accepting biosolids would be forced to source alternative materials that have not been historically accepted at landfills, like clean wood materials and gravel, in order to maintain current operational geometry and available capacity. These materials are all resources used in the construction industry in Maine for development of new roads, land development, etc.

Should landfills rely upon these materials for bulking, not only is landfill capacity being consumed by non-waste materials but additional borrow sources/ gravel pits would need to be identified and developed, potentially leading to further land disturbance. The need to obtain these materials will increase the cost of operations at the landfills and therefore likely increase the disposal fees charged to municipal WWTPs for biosolids at landfills.

A link to that report is included: Study TRC Bulky Waste Report .pdf

It is important to note that the State cannot prevent private companies from importing waste to or exporting waste from Maine. JRL can only accept waste generated within the State, as defined in state statute.

Through Public Law 2025, chapter 373, the legislature recognized that there were insufficient volumes of materials, defined as "waste generated in Maine" currently available to safely bulk biosolids for landfill disposal and allowed for acceptance of limited volumes of excess bulking material through July 1, 2028, to support disposal of biosolids in a state-owned landfill.

Public Law 2025, chapter 373, amends Public Law 2023, chapter 283, section 2, which provided that for the period ending July 1, 2025, if in any 12-month period the total weight of the residue generated by a solid waste processing facility and disposed of or otherwise placed in a solid waste landfill exceeds the total weight of the solid waste initially generated within the State that was processed by the facility in that 12-month period, such excess residue, not to exceed 25,000 tons in that 12-month period, is deemed to be waste generated within the State as long as that excess residue is composed of oversized bulky waste and is disposed of or otherwise placed in a state-owned solid waste landfill. Any other excess residue generated by the facility in that 12-month period is deemed not to be waste generated within the State.

The bill amends Public Law 2023, chapter 283, section 2 in the following ways.

1. It removes the provision that any other excess residue generated by the facility in that 12-month period is deemed not to be waste generated within the State.
2. It provides that the excess residue associated with the processing of oversized bulky waste that is used as alternative daily cover is deemed to be waste generated within the State.
3. It changes the end date of the period that the law is applicable to July 1, 2028.
4. It makes the changes retroactive to June 23, 2023.

35. **Is there any anticipation that there will be less wet waste going to JRL once the sludge dryer at the Crossroads Landfill comes online?**

While the Crossroads Landfill has a sludge dryer with estimated capacity to handle the majority of Maine's biosolids, it is not yet operational and is a privately owned facility. BGS has no authority to direct waste to the Crossroads Landfill for disposal. Any new waste entering the Crossroads Landfill would be at the discretion of the owner, and may require approval from the Maine DEP.

36. **There are claims that there will be less waste, but more traffic as a result of the expansion. Please explain the discrepancy.**

There will be a slight increase in traffic compared to the traffic observed in 2023. Traffic analysis conducted by Gorrill Palmer indicates that expansion is expected to increase by about 10 trucks per day during working hours, primarily because the amount of solid waste generated in Maine is slowly increasing.

37. **What has the State done to take an environmentally proactive approach to solid waste management?**

Response was drafted in consultation w/ Maine DEP:

DEP is tasked with updating Maine's Waste Management and Recycling Plan, Waste Generation and Disposal Capacity Report, and Product Stewardship Report at varying frequencies. These reports collectively outline Maine's waste reduction, recycling, and diversion goals; an assessment of existing and potential disposal, processing, and material recovery facility capacity; suggestions regarding improvements to Maine's waste management systems; and recommendations for new stewardship programs to increase recycling and materials recovery. Solid waste management in Maine is complex, and Maine has both a shortage of disposal options as well as access limitations to recycling or composting programs depending on the specific area. DEP has established several programs to increase waste diversion and recycling including, but not limited to, the following:

(a) Solid Waste Division Grants – Since 2015, DEP has provided grants to public and private entities with proposals for waste diversion. Since its inception, more than 90 projects have been funded with more than $1.7 million in grants awarded.

(b) Spearheading both a waste characterization study and food loss and waste generation study to strategically plan for addressing food loss and waste by better characterization.

(c) Implementing a stewardship program for packaging requiring producers to pay for the recycling of their materials thereby decreasing the burden on municipalities that participate in the program.

(d) Implementing Maine's stewardship programs for beverage containers, lead-acid batteries, rechargeable batteries, mercury auto switches, mercury thermostats, electronic waste, cellular telephones, mercury-added lamps, architectural paint, and pharmaceuticals as well as bans of single-use plastic bags and certain polystyrene foam products. See also https://www.maine.gov/dep/sustainability/index.html.

38. Are we working on a future site?

BGS is looking into options for future solid waste disposal capacity for the State of Maine, but the siting, design, permitting, and construction can take years to complete.

39. There are multiple technologies available for solid waste management. Why can't Maine be an alternative waste management state similar to Maine being an alternative energy state?

Response was drafted in consultation w/ Maine DEP:

Maine is a large state with limitations in transportation infrastructure and waste management and recycling infrastructure, making management of solid waste complex. Maine law requires each municipality to provide solid waste disposal services for domestic and commercial solid waste generated within their municipality and municipalities often look for the most cost-effective option. Generally speaking, landfilling is the most cost-effective alternative in Maine depending on the availability and ease of recycling and diversion opportunities, although Maine's new stewardship for packaging program will soon make recycling more affordable for participating municipalities. DEP continues to work with the Maine Legislature to find solutions to Maine's solid waste infrastructure limitations, research alternatives to waste disposal, communicates with other states, works with waste processing and incineration facilities, and provides significant education and outreach.

40. How is the state classifying PFAS/PFOS/PFOA for the purposes of disposal?

Response was drafted in consultation w/ Maine DEP:

For the purposes of disposal, PFAS-impacted solid waste can be disposed in a DEP-licensed special waste landfill according to the facility's specific operating manual.

A-7

PUBLIC NOTICE OF INTENT TO FILE APPLICATION

SME
SEVEE & MAHER
ENGINEERS

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
ADMINISTRATIVE & FINANCIAL SERVICES
BUREAU OF GENERAL SERVICES
77 STATE HOUSE STATION
BURTON M. CROSS BUILDING
111 SEWALL STREET, 4TH FLOOR
AUGUSTA, MAINE 04333-0077

DEPARTMENT OF
ADMINISTRATIVE & FINANCIAL SERVICES
ELAINE CLARK
ACTING COMMISSIONER

BUREAU OF GENERAL SERVICES
BRIAN KEEZER
BUREAU DIRECTOR

Legal Notice
Public Notice of Intent to File

Please take notice that the Bureau of General Services (BGS), c/o Department of Administrative and Financial Services, State House Station #77, Augusta, Maine 04333-0077, Lane.Gould@maine.gov (tel. 207-624-7345), as owner, and NEWSME Landfill Operations, LLC (NEWSME), 358 Emerson Mill Road, Hampden, Maine 04444, brayback@pierceatwood.com (tel. 207-791-1100), as operator, are intending to file the following applications with the Maine Department of Environmental Protection (DEP or Department) on or about November 21, 2025:

(1) A Solid Waste Facility License Application pursuant to Maine's Waste Management Act, 38 M.R.S. § 1301 through 1319-Y and the applicable sections of the Maine Solid Waste Management Rules, 06-096 CMR Chapters 400 through 419, and
(2) A Tier 3 wetlands alteration application pursuant to 38 M.R.S. § 480-A through 480-HH, and regulations promulgated under NRPA, and Section 401 water quality certification request pursuant to 33 U.S.C. § 1341. The applications also will be processed under DEP Chapter 2 Rules Concerning the Processing of Applications.

The applications are for (1) an expansion of the Juniper Ridge Landfill located in Old Town, Maine on BGS-owned land and for (2) filling approximately 3.75 acres of freshwater wetlands in connection with the proposal to expand the landfill. The Juniper Ridge Landfill is owned by the State of Maine and operated by NEWSME Landfill Operations, LLC. The facility mailing address is 2828 Bennoch Road, Old Town, Maine 04468.

The applications and supporting documentation will be available for review at the Bureau of Remediation and Waste Management (BRWM) at the Department regional office below, during normal working hours. A copy of the applications and supporting documentation may also be seen at the municipal offices of the City of Old Town, located at 265 Main St., Old Town, ME, 04468, the Town of Alton, located at 3352 Bennoch Rd., Alton, ME 04468 ME and at the Penobscot Indian Nation, located at 12 Wabanaki Way, Indian Island, ME 04468.

A request for the Board of Environmental Protection to assume jurisdiction over the applications or a request for a hearing on the applications must be submitted to the Department in writing no later than 20 days after the applications are accepted as complete for processing. The request must indicate the interest of the person filing the request and specify the reasons why a hearing is warranted.

Public comments on the applications may be provided to the Department and will be accepted throughout the processing of the applications. Send all correspondence pertaining to the solid waste license application by email to Dominique Dispirito at (Dominique.DiSpirito@maine.gov) (tel. 207-441-0732), or by regular mail to: Maine Department of Environmental Protection, Eastern Maine Regional Office, 106 Hogan Road, Suite 6, Bangor, ME 04401 . Send all correspondence pertaining to the NRPA application by email to Madison.Bangs@maine.gov or by regular mail to: Maine Department of Environmental Protection, Eastern Maine Regional Office, Bureau of Land and Water Quality, 106 Hogan Road, Bangor, Maine 04401, (Tel: 207-446-1733).

Legal Notices

PUBLIC NOTICE OF INTENT TO FILE

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November 18, 2025

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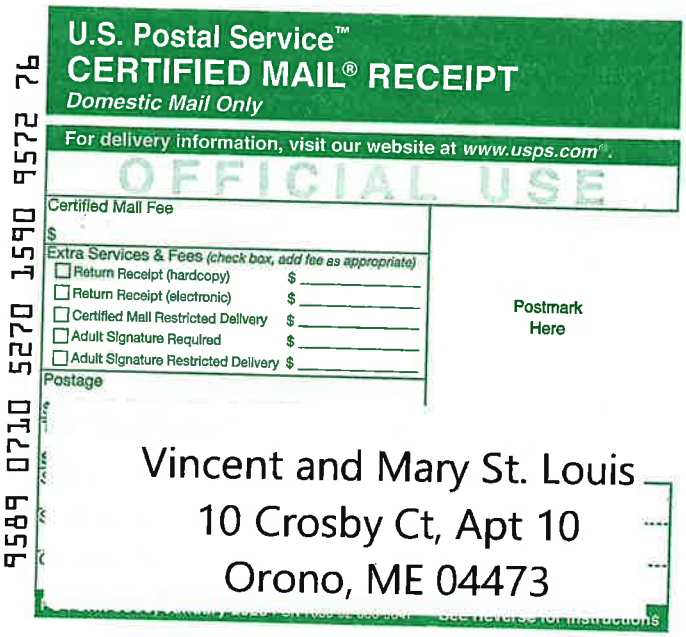
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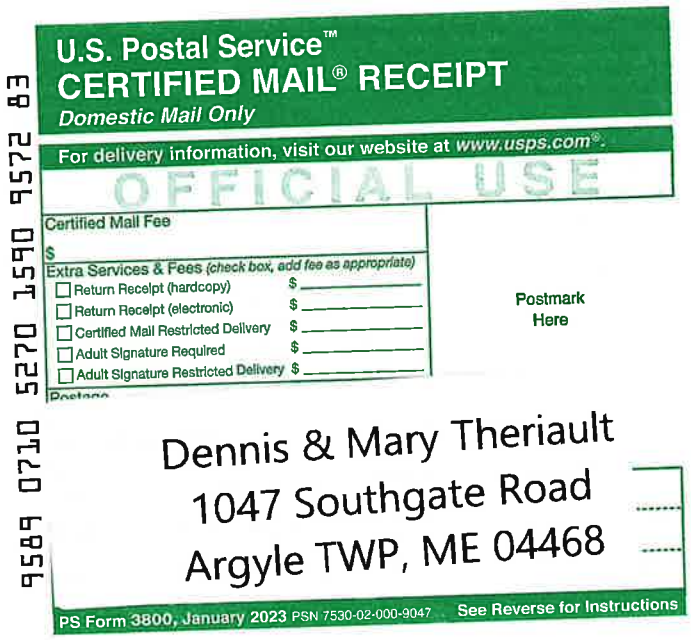
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Town of Alton
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Anthony & Cindy Madden
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Milford, ME 04461

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Win & Nancy Chaiyabhat
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Scarborough, ME 04070

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Jesse Pekkala
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Telluride, CO 81435

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Tasanee Lolonga
157 Massapaug Avenue
N. Easton, MA 02356

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Harry & Tammy Feero
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Argyle, ME 04468

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State of Maine
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Herbert Robertson Jr.
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Angela Cyr
449 West Old Town Road
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SSR LLC
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Scott Bergquist
497 West Old Town Road
Old Town, ME 04468

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Robyn Emmons
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University of Maine System
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Cassandra Goodspeed
519 West Old Town Road
Old Town, ME 04468

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Raymond Perkins
55 Old Brooklyn Turnpike
Windham, CT 06280
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Robert Hall
631 West Old Town Road
Old Town, ME 04468
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Karen Bertolino & Thomas Dunn
579 West Old Town Road
Old Town, ME 04468
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Laurent & Barbara Beauregard
273 Washington Street
Brewer, ME 04412
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SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@sme-engineers.com
sme-engineers.com

DELIVERY RECEIPT FORM

Project: Juniper Ridge Landfill – Phase II Expansion

Submittal: Application Package (TOWN OF ALTON)

Date of Delivery: Nov. 20th 2025

Delivered To: Kathy Deans

Delivered By: Liz Tetu

Item	Title	Format	Quantity
Volume I	Maine Solid Waste Management Rules	Hard Copy	1
Volume II	Site Assessment Report	Hard Copy	1
Volume III	Design Report	Hard Copy	1
Volume IV	Operations Manual	Hard Copy	1
Volume V	Natural Resources Protection Act and Section 404 – Clean Water Act	Hard Copy	1
Drawings	Full-Size Rolled Set of Drawings	Rolled Sheets	1

Acknowledgment of Receipt

I acknowledge receipt of the above-listed documents related to the Juniper Ridge Landfill Phase II Expansion Application.

Recipient Name: Kathy Deans

Signature: _____

Date: _____

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@sme-engineers.com
sme-engineers.com

DELIVERY RECEIPT FORM

Project: Juniper Ridge Landfill – Phase II Expansion

Submittal: Application Package (CITY OF OLD TOWN)

Date of Delivery: Nov. 20th 2025

Delivered To: Laura Engstrom

Delivered By: Liz Tetu

Item	Title	Format	Quantity
Volume I	Maine Solid Waste Management Rules	Hard Copy	1
Volume II	Site Assessment Report	Hard Copy	1
Volume III	Design Report	Hard Copy	1
Volume IV	Operations Manual	Hard Copy	1
Volume V	Natural Resources Protection Act and Section 404 – Clean Water Act	Hard Copy	1
Drawings	Full-Size Rolled Set of Drawings	Rolled Sheets	1

Acknowledgment of Receipt

I acknowledge receipt of the above-listed documents related to the Juniper Ridge Landfill Phase II Expansion Application.

Recipient Name: Kavey Kenister

Signature: Kavey Kenister

Date: 11.20.2025

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@sme-engineers.com
sme-engineers.com

DELIVERY RECEIPT FORM

Project: Juniper Ridge Landfill – Phase II Expansion

Submittal: Application Package (PENOBSCOT NATION)

Date of Delivery: NOV. 20th 2025

Delivered To: Linda Socoby

Delivered By: Liz Tetu

Item	Title	Format	Quantity
Volume I	Maine Solid Waste Management Rules	Hard Copy	1
Volume II	Site Assessment Report	Hard Copy	1
Volume III	Design Report	Hard Copy	1
Volume IV	Operations Manual	Hard Copy	1
Volume V	Natural Resources Protection Act and Section 404 – Clean Water Act	Hard Copy	1
Drawings	Full-Size Rolled Set of Drawings	Rolled Sheets	1

Acknowledgment of Receipt

I acknowledge receipt of the above-listed documents related to the Juniper Ridge Landfill Phase II Expansion Application.

Recipient Name: Linda Socoby

Signature: Linda Socoby

Date: 11-20-25

A-8

CERTIFICATE OF GOOD CORPORATE STANDING

SME
SEVEE & MAHER
ENGINEERS

State of Maine

Department of the Secretary of State

I, the Secretary of State of Maine, certify that according to the provisions of the Constitution and Laws of the State of Maine, the Department of the Secretary of State is the legal custodian of the Great Seal of the State of Maine which is hereunto affixed and of the records of formation, amendment, and cancellation of limited liability companies and annual reports filed by the same.

I further certify that NEWSME LANDFILL OPERATIONS LLC is a duly formed limited liability company under the laws of the State of Maine and that the date of formation is September 18, 2003.

I further certify that said limited liability company has filed annual reports due to this Department, and that no action is now pending by or on behalf of the State of Maine to forfeit the certificate of formation and that according to the records in the Department of the Secretary of State, said limited liability company is a legally existing limited liability company in good standing under the laws of the State of Maine at the present time.

In testimony whereof, *I have caused the Great Seal of the State of Maine to be hereunto affixed, given under my hand at Augusta, Maine, this thirty-first day of January 2025.*

Shenna Bellows

Shenna Bellows
Secretary of State

Authentication: 8009774

A-9

PUBLIC BENEFIT DETERMINATION ORDER

SME
SEVEE & MAHER
ENGINEERS

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

STATE OF MAINE,	)	PUBLIC BENEFIT
DEPARTMENT OF ADMINISTRATIVE AND FINANCIAL	)	DETERMINATION
SERVICES, BUREAU OF GENERAL SERVICES	)	
OLD TOWN, PENOBSCOT COUNTY, MAINE	)	
JUNIPER RIDGE LANDFILL EXPANSION	)	
S-020700-W5-CV-N	)	
(APPROVAL WITH CONDITIONS)	)	

Pursuant to the provisions of the *Maine Hazardous Waste, Septage, and Solid Waste Management Act*, 38 M.R.S. §§ 1301 through 1319-Y; *Solid Waste Management and Recycling*, 38 M.R.S. §§ 2101 through 2236; the *Maine Solid Waste Management Rules: General Provisions*, 06-096 C.M.R. ch. 400 (last amended February 9, 2021); and the *Maine Solid Waste Management Rules: Landfill Siting, Design, and Operation,* 06-096 C.M.R. ch. 401 (last amended April 12, 2015), the Department of Environmental Protection ("Department") has considered the application of the STATE OF MAINE, acting through the Department of Administrative and Financial Services, Bureau of General Services ("BGS" or "the applicant") with its supportive data, staff summary, agency review comments, and other related materials on file and FINDS THE FOLLOWING FACTS:

1. APPLICATION SUMMARY

A. Application: BGS has applied for a determination of public benefit for a proposed expansion of the Juniper Ridge Landfill in Old Town.

B. History: The following history is a summary and does not include all licensing actions:

(1) On July 28, 1993, James River Paper Company, Inc. was issued a license to construct and operate a 68-acre secure landfill, known as the West Old Town Landfill, to dispose of the James River Paper Company's pulp and papermaking residuals (Department Order S-020700-7A-A-N).

(2) On August 25, 1997, James River Paper Company, Inc. changed its legal name to Fort James Operating Company; this name change did not necessitate a license transfer. On October 21, 2003, the Department issued conditional approval for the transfer of licenses for the West Old Town Landfill, from the Fort James Operating Company to the State of Maine, State Planning Office ("SPO") (Department Orders S-020700-WR-M-T

and L-019015-TH-C-T), with the transfer effective on the sale date of February 5, 2004.

(3) On February 5, 2004, the State of Maine, acting by and through the SPO, and Casella Waste Systems, Inc. ("Casella") entered into an Operating Services Agreement ("OSA") for the operation of the West Old Town Landfill.

(4) On April 9, 2004, the Department approved an amendment application (Department Order S-020700-WD-N-A) for a vertical increase in the final elevation of the landfill and the disposal of additional waste streams. The license was subsequently affirmed by the Board of Environmental Protection ("Board") on October 21, 2004.

(5) In 2006, the West Old Town Landfill became known as the Juniper Ridge Landfill ("JRL").

(6) On January 31, 2012, the Department issued a partial approval of SPO's application for determination of public benefit for an expansion. The Department approved a 9.35-million-cubic-yard expansion finding that the entire proposed 21.9-million-cubic-yard expansion was not needed to meet the immediate or short-term solid waste disposal capacity needs of the State.

(7) Pursuant to P.L. 2011, ch. 655, § GG-69, on July 1, 2012, BGS, within the Department of Administrative and Financial Services ("DAFS") became the state agency acting as the owner and licensee of JRL. The Department of Economic and Community Development was the manager of JRL, although BGS assumed the manager role in 2020. NEWSME Landfill Operations, LLC ("NEWSME"), a wholly owned subsidiary of Casella, operated the landfill for the State of Maine, acting through BGS.

(8) On June 1, 2017, the Board approved the construction and operation of a 9.35-million-cubic-yard expansion at JRL (Board Order S-020700-WD-BI-N, hereafter "expansion license") in a phased manner, designated as Cells 11 through 16.

(9) Cells 11, 12, 13, 14, and 15 of the expansion have been constructed and are operational. Department approval for the specific design of Cell 11

was incorporated in the expansion license. The approval of the design specifics of Cell 12 was issued April 30, 2020 (Department Order S-020700-WD-CB-C). During the design of Cell 12, the expansion cell layout was changed; initially, the expansion was to be constructed in 6 cells, 11-16, but it was revised to be constructed in 7 cells, 11-17, with no change to the overall expansion footprint or fill height. Approval of the subsequent cell design specifics occurred as follows: Cell 13 was approved May 25, 2021 (Department Order S-020700-WD-CL-C), Cell 14 was approved April 15, 2022 (Department Order S-020700-WD-CP-C), Cell 15 was approved April 27, 2023 (Department Order S-020700-WD-CR-C); and Cell 16 (Department Order S-020700-WD-CU-C) was approved June 26, 2024. Cell 16 is currently under construction.

C. Summary of Proposal: BGS proposes to expand JRL by approximately 61 acres, to provide 11.9 million cubic yards of additional capacity. At the most recent 5-year fill rate average of 860,771 tons or 1,049,721 cubic yards, this would provide approximately 11.3 additional years of use. The expansion would continue to accept construction and demolition debris ("CDD"), oversized bulky waste ("OBW"), residue from CDD processing facilities located in Maine, bypass municipal solid waste ("MSW") from Maine incinerators and the Municipal Waste Solutions ("MWS") waste processing facility in Hampden, wastewater treatment plant sludge, ash, and a variety of other in-state non-hazardous solid wastes.

The application for a determination of public benefit ("Application") was submitted to the Department on June 10, 2024 and was accepted for processing on June 24, 2024. Pursuant to 38 M.R.S. § 1310-AA(2) and 06-096 C.M.R. ch. 400, § 5(G), the Department shall issue a decision within 60 days of receipt of the Application. In an August 13, 2024 letter, the Department requested a 30-day extension to this timeframe. The Department's request was granted in an August 13, 2024 letter from the applicant. The Department requested additional information on the Application in a July 30, 2024 letter. In an August 8, 2024 letter, the applicant provided a response to the Department's request.

2. APPLICABLE LAW

38 M.R.S. § 1310-AA and 06-096 C.M.R. ch. 400, § 5 establish the process and standards to be used in determining whether a proposed new or expanded solid waste

disposal facility provides a substantial public benefit. The process and relevant standards follow.

A. Process: The law requires the Commissioner to consider the state waste management and recycling plan required under 38 M.R.S. § 2122 ("State Plan"), written information submitted in support of the Application and any other written information the Commissioner considers relevant. The most recent version of the State Plan is the *Maine Materials Management Plan: 2024 State Waste Management and Recycling Plan Update and 2022 Waste Generation and Disposal Capacity Report*, dated January 2024. The law also requires the Commissioner to hold a public meeting in the vicinity of the proposed facility to take public comments, to consider those comments in making the determination, and to accept written public comment during the course of processing the Application.

B. Standards: In order for the Commissioner to find that the proposed landfill expansion provides a substantial public benefit, the applicant must demonstrate to the Commissioner that the proposed facility:

- Meets the immediate, short-term, or long-term capacity needs of the state. "Immediate" is defined as within the next 3 years; "short-term" is within the next 5 years; and "long-term" is within the next 10 years. The Commissioner shall consider relevant local and regional needs as appropriate and the regional nature of the development and use of disposal capacity due to transportation distances and other factors;
- Is consistent with the state waste management and recycling plan and promotes the solid waste management hierarchy ("waste hierarchy");
- Is not inconsistent with local, regional, or state waste collection, storage, transportation, processing, or disposal; and
- Is not inconsistent with ensuring environmental justice for the community in which the facility or expansion is proposed.

3. TITLE, RIGHT OR INTEREST

06-096 C.M.R. ch. 400, § 4(A) requires an applicant to demonstrate to the Department's satisfaction sufficient title, right or interest in all of the property which is proposed for development or use. The Application includes a copy of the deed for the property, which is recorded in Book 9188, Page 152 of the Penobscot County Registry of Deeds. Casella Waste Systems' subsidiary, NEWSME Landfill Operations, operates the landfill under

the terms of the OSA with the State of Maine. The Department finds that BGS has demonstrated sufficient evidence of title, right or interest in the property, as required by 06-096 C.M.R. ch. 400, § 4(A).

4. PUBLIC PARTICIPATION

A. Notice of Intent to File: 06-096 C.M.R. ch. 400, § 5(F)(1) requires public notification prior to filing an application for determination of public benefit. A notice of Intent to File the Application was published in the Bangor Daily News on June 7, 2024. A copy of the notice was sent by certified mail to abutters, the Town of Alton, the City of Old Town, the Penobscot Indian Nation, and the Juniper Ridge Landfill Advisory Committee members. The Department finds that the public notifications complied with the requirements in 06-096 C.M.R. ch. 400, § 5(F)(1).

B. Public Meetings: 38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(F)(1) require that the Commissioner hold a public meeting in the vicinity of the proposed expansion to receive public comments regarding the Application. The Commissioner held an in-person public meeting in Orono, Maine on July 16, 2024, from 1:00 pm to 3:00 pm and 5:30 pm to 7:30 pm with the option to attend, but not give comment, virtually. Notice of the meeting was published in the Bangor Daily News on July 3, 2024, and posted on the Department's website, with interested parties notified by electronic mail. Comments were received orally and in writing at the meeting. The meeting was recorded, and a video and transcript posted on the Department's website. Based on a request from a commenter, a virtual-only public meeting was held on July 26, 2024, at 9:00 am, to accept remote public comments. Notice of the virtual meeting was published in the Bangor Daily News on July 12, 2024, posted on the Department's website, and sent to interested parties by electronic mail. The virtual meeting was also recorded, and the video and transcript posted on the Department's website. The Department finds that a public meeting was held as required by 38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(F)(1).

C. Public Comment: 38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(F)(1) require that the Department accept public comments during the course of processing the Application. Public comments have been received throughout the course of processing the Application. In addition to comments received at the public meetings, comments were submitted to the Department by electronic mail. The comments received in writing and by electronic mail have been posted on the

Department's website. Those commenting include people living near the project site, people living elsewhere in Maine, members of the Penobscot Indian Nation, local legislators, the City of Old Town, and people representing or associated with the following organizations: Conservation Law Foundation, Slingshot, Maine Climate Action Now, Maine Water Environment Association, Community Water Justice, Don't Waste ME, Defend Our Health, Friends of the Harriet L. Hartley Conservation Area, Upstream Watch, the Sierra Club, First Light, ecomaine, and the Houlton Water Company.

Issues raised by commenters included, but were not limited to, the following concerns: the Department's review may not be objective, considering statements in the State Plan, dated January 2024; landfill expansion does not support the waste hierarchy and encourages disposal; landfill space has been consumed by out-of-state waste; it is premature to expand landfill capacity with the future of the Orrington waste-to-energy incinerator, Hampden waste processing facility, and treatment plant sludge management options being unclear; the State has failed to provide non-landfill options for waste management; there is insufficient incentive for people to reduce, reuse, or recycle waste and a financial incentive to landfill it; landfill leachate receives insufficient treatment prior to discharge; exposure of the public to odors, pollutants released during landfill fires, and leachate constituents discharged to the Penobscot River are inconsistent with environmental justice; the facility has changed from a landfill supporting residual disposal from a local pulp and paper mill to a facility accepting a wide variety of wastes from the entire State and other New England states with limited input from the host community and others; the application process does not provide for meaningful public involvement; duration and quantity of MSW bypass should be limited; it makes sense to expand an existing landfill rather than to place one in an unspoiled location elsewhere; and, the landfill expansion is needed to provide time for development and funding of infrastructure to support policies developed by the State.

The Department finds that public comments have been accepted and considered as required by 38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(F)(1).

D. Draft License Decision Comment Period: In accordance with 06-096 C.M.R. ch. 2, § 18,[1] a draft Public Benefit Determination was made available for a five-

[1] 06-096 C.M.R. ch. 2, § 2(B) does not apply to this public benefit determination. To the extent the Department consulted the rule, it did so for guidance only.

working-day comment period on September 13, 2024, through notification to the applicant, the Town of Alton, the City of Old Town, the Penobscot Indian Nation, Juniper Ridge Landfill Advisory Committee members, and interested persons. The draft Public Benefit Determination was also posted on the Department's website. In response to a request from the public, the Department sought concurrence from the applicant, on September 17, 2024, to provide an additional week for public comment and an additional 3 business days for Department review. The applicant agreed to this request on September 19, 2024. In addition to the topics described in Finding of Fact 4.C above, issues raised included, but were not limited to, the following: Casella should be required to install a sludge dryer at the landfill; there should be a limit on annual capacity used; there should be a limit on the quantity of CDD processing fines accepted; MSW bypass that has been continuing for a lengthy period of time should no longer be considered bypass; JRL should use tarps, biologically active soil, or soil from agronomic sludge utilization sites as daily cover material instead of alternative daily cover ("ADC") or virgin soil; additional continuous air monitors should be installed in the vicinity of JRL and Indian Island; a public alert warning system or siren should be established; and landfill capacity for sludge is needed because the few solutions that might marginally lower municipal sludge volumes would require financial investments out of reach of small utility districts.

5. CAPACITY NEEDS

38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(1) require the applicant to demonstrate that the proposed facility meets immediate, short-term, or long-term capacity needs of the State. 38 M.R.S. § 2124-A requires the Department to report to the Legislature regarding statewide generation of solid waste, statewide recycling rates, and available disposal capacity for solid waste. The State's capacity needs are projected in the most recent update of the State Plan.

A. Requested Capacity: JRL is expected to exhaust its permitted capacity in 2028, if disposal continues at current rates. BGS requests an expansion providing additional capacity of 11.9 million cubic yards, which would add 11.3 years of landfill life, using JRL's annual waste acceptance average over the most recent 5-year period, and assuming a compaction rate of 0.82 tons of waste per cubic yard. JRL currently accepts waste from all areas of the State of Maine, and disposes of approximately 52% of the waste landfilled in Maine. JRL also accepts nearly 90% of the wastewater treatment plant sludge disposed in Maine. The landfill provides a disposal location for residues from the Orrington waste-to-energy

incinerator, bypass MSW from all three Maine waste-to-energy incinerators, and bypass MSW from some of the municipalities under contract with the Municipal Waste Solutions (MWS) waste processing facility under a waste swap agreement with the Crossroads Landfill in Norridgewock. The landfill is located between an active commercial landfill in Norridgewock and an active landfill in Fort Fairfield licensed to accept MSW, CDD, and some special wastes.

The proposed expansion would provide for acceptance of the same types of wastes that are currently accepted, which include in-state CDD, OBW, residues from processing CDD, front end processing residue from waste-to-energy incinerators, bypass MSW, wastewater treatment plant sludge, and various non-hazardous special wastes. Based on waste volume information in the JRL annual reports, the average quantities of the major categories of waste received at JRL from 2020 through 2023 were: 38% CDD, 25% bypass MSW, 10% wastewater treatment plant sludge (both municipal and industrial), 9% OBW, 9% CDD processing fines, 4% miscellaneous waste, and 3% ash. In response to a question from the Department, the applicant calculated that if the Maine Regional Conversion Facility, LLC sludge dryer and the anticipated Brunswick AD, LLC anaerobic digester expansion projects are successful, sludge deliveries to the landfill may be reduced by 90%, in which case the proposed expansion would provide approximately 13 years of capacity.

Because the landfill accepts nearly 90% of the municipal wastewater treatment plant sludge disposed in Maine, and the licensed capacity is expected to be filled in 2028, the Application references a conclusion in the *Analysis of Sludge and State-Owned Landfills as Public Utilities Report*, dated January 2024 ("Biosolids Report") that additional disposal capacity will be needed for wastewater treatment plant sludge as soon as 2028, and thus the expansion would meet Maine's short-term need for capacity for wastewater treatment plant sludge.

The Application further concludes that an expansion of JRL is necessary to prevent a shortfall of disposal capacity for all wastes in less than 10 years based on a set of assumptions: the State's recycling rate is consistent; waste generation continues to increase at approximately 5.6% per year; the quantity of waste exported from Maine remains consistent; the Maine Waste to Energy and ecomaine waste-to-energy incinerators continue operation at the current rates; the MWS waste processing facility in Hampden sends 30% of its contracted waste to landfills; the Orrington facility incinerates 50% of its contracted waste in 2025 and 60% thereafter; municipally operated landfills do not change significantly;

and the Crossroads Landfill in Norridgewock could not handle all of the State's landfill needs. With these assumptions and based on calculations presented by the applicant a shortfall of landfill disposal capacity for all wastes will occur in less than 10 years, and therefore the expansion is needed to meet Maine's long-term capacity needs for all wastes.

B. Department Review: The Department considered the State Plan, the *Maine Solid Waste Generation and Disposal Capacity Report for Calendar Years 2020 & 2021*, dated January 2023 ("Biennial Report"), the Biosolids Report, the Application and other supporting information, recent facility annual reporting information, and public comments during review of the Application.

As noted in the Application, there are currently eight licensed landfills in Maine, in addition to JRL, that accept MSW, bypassed MSW, CDD and special waste. Four of these landfills (Bath, Hatch Hill in Augusta, Tri-Community in Fort Fairfield, and Presque Isle[2]) are municipally owned and primarily accept waste from the area municipalities. As stated in the Biennial Report, these landfills had 2,303,572 cubic yards of capacity remaining as of December 31, 2021, about two-thirds of which is capacity in Aroostook County. Two landfills, ecomaine (in Scarborough and South Portland) and Lewiston, accept primarily ash from associated or nearby waste-to-energy incinerators. These landfills had 1,328,969 cubic yards of capacity as of December 31, 2021. The Crossroads Landfill in Norridgewock is a commercial landfill accepting waste from a wide service area, and had 8,533,231 cubic yards of capacity available as of December 31, 2021. The remaining licensed landfill is the State-owned Carpenter Ridge Landfill, which has not yet been developed. Carpenter Ridge Landfill has a licensed capacity of 1,800,000 cubic yards and is licensed to accept only special waste. Nineteen additional municipally owned small landfills accept wood wastes and CDD, and seven generator-owned landfills accept wastes only from the generators. As stated in the JRL annual report, the landfill had 6,332,172 cubic yards of capacity remaining as of December 31, 2021. By the end of 2022, available capacity of the nine landfills combined was approximately 17,792,907 cubic yards. Based on 2023 annual reports, available capacity of the nine landfills combined at the end of 2023 was 15,951,479 cubic yards.

[2] The Presque Isle Landfill is currently inactive as its owner, Aroostook Waste Solutions, has transitioned operations to its landfill in Fort Fairfield; however, available capacity remains in Presque Isle and will be used once operations in Fort Fairfield have ceased.

The State Plan reported that 1,547,594 tons of MSW and CDD (including CDD used as ADC) was placed in landfills in 2022, including the 8 currently licensed and operating landfills described above and 19 smaller municipally owned landfills. Review of annual report information for 2023 for only the 8 currently licensed and operating landfills described above showed 1,507,497 tons of waste received (assuming ecomaine's ash landfill received waste at its 5-year average rate). Over the time period from 2018 to 2022, JRL accepted approximately 52% of the landfilled waste; Crossroads Landfill accepted approximately 27%, Hatch Hill Landfill in Augusta accepted approximately 5%, two Aroostook County landfills (in Presque Isle and Fort Fairfield) accepted approximately 5%, and municipally owned landfills accepted the remaining 11%. The 2024 State Plan analyzed licensed disposal capacity at the three waste-to-energy incinerators and licensed landfill capacity for the larger landfills in the State. The waste-to-energy incinerators accepted approximately 44% of the MSW disposed in Maine; the remaining 56% was landfilled. A minor percentage of CDD generated in Maine is disposed at small municipally owned facilities, but the majority must be managed at a processing facility or landfilled.

In addition to receiving bypass MSW, waste-to-energy incinerator residue, processing facility residue, and wastewater treatment plant sludge, JRL accepts CDD and special waste from sources that include: municipal transfer stations; municipal bulky waste collection events; commercial waste haulers providing disposal services; construction debris from new developments; remediation projects; disaster cleanups; and individuals who generate waste such as debris from home renovations. JRL's location meets local and regional needs for a disposal location for these wastes. With the exception of Crossroads Landfill, the other existing landfills are either not available for use by the generators currently using JRL or, in the case of the Aroostook County landfills, not a viable option due to transportation distances. JRL has been used as the location for disposal of some of the bypass MSW from the MWS processing facility in Hampden because of transportation distances, efficiency, and logistical challenges. MWS contracted with Crossroads Landfill for disposal of waste generated by its members from the effective date of contracts until facility startup ("bridge waste"), bypass, and residue, but the location of Crossroads Landfill made it difficult for some municipalities utilizing curbside collection to complete a collection route and still have time to travel to Crossroads Landfill for disposal before it closed for the day. Other municipalities would have travelled past JRL to go to Crossroads Landfill.

Regarding available licensed capacity, the information in the Application is consistent with the State Plan. As noted in the Application, the State Plan concluded that expansion of JRL would be needed to ensure adequate disposal capacity for the entire State for the next 10 years. The Department determined, after review of the State Plan and landfill annual reports, that the State Plan's conclusion is still valid.

Uncertainties regarding the quantity of bypass MSW needing landfill disposal (depending on future status of the Orrington waste-to-energy incinerator and MWS processing facility), quantity of municipal wastewater treatment plant sludge needing disposal (depending on startup of and sources of sludge for the new Maine Regional Conversion Facility, LLC sludge dryer, possible restart of the Brunswick AD, LLC anaerobic digester in Brunswick, and availability of bulking material for sludge at JRL) and possibility of legislative initiatives make prediction of future disposal capacity needs challenging. Many of the public comments received stated that too much landfill space has been consumed by waste originating in other states. Others commented that the amount of CDD should be reduced or more should be recycled. Current statute allows placement of a certain amount of waste from a processing facility located in Maine that accepts waste from out-of-state. Unless the statute is revised, JRL may legally accept a certain amount of residues from in-state CDD processing facilities. The Application states that JRL needs OBW from CDD processing facilities to bulk the increased quantity of wastewater treatment plant sludge being landfilled, and needs the processing fines in order to avoid using virgin soil material for daily cover. Casella has used more virgin soil in 2022 and 2023, when the quantity of processing fines decreased. The Department notes that JRL's daily cover, as a percentage of the total waste received, appears reasonable in comparison to similar landfills in Maine. Discounting the space consumed by CDD processing fines used as ADC, since the space would otherwise be consumed mostly by virgin soil (the other materials approved as ADC are a small percentage of the total waste received, and are not always available), approximately 6% of landfill space (average from 2020 through 2023) has been used by OBW that originated out-of-state. In contrast, approximately 38% of landfill space (average from 2020-2023) has been used for disposal of CDD originating in Maine. Data from the two CDD processing facilities operating in Maine are an indication that the recyclable content of the mixed CDD they receive is very low. Reducing the amount of CDD generated in Maine and requiring generators to separate CDD components at the site of generation is beyond the ability of the operator of JRL to control. Commenters expressed the concern that, if the landfill capacity is

increased, the incentive to find ways to reduce the volume of waste being disposed will disappear until the next capacity shortfall. Licensing and construction of landfill capacity can take three years or more to complete, so planning must begin well in advance of when capacity is needed. During this time, changes in waste management methods, pricing, and availability of alternatives to landfills can change, but it would be irresponsible to ignore the current projected capacity need. Moreover, the Department has already begun working toward alternative methods for diverting waste from landfills through its numerous product stewardship programs including the new extended producer responsibility for packaging program anticipated to be in full implementation in 2027. The State Plan acknowledges that, even with an expansion of JRL, waste disposal capacity will be limited in 15 years.

C. Findings: The Department finds that in consideration of the State Plan, expansion of JRL meets short-term and long-term capacity needs of the State, as required by 38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(1). The Department further finds that adding 11.9 million cubic yards of capacity is reasonable, considering the amount of time it takes to license new or expanded disposal capacity or waste processing facilities, uncertainty surrounding waste management options in the Eastern Maine region, uncertainty surrounding the future municipal wastewater treatment plant sludge management options, the fact that waste generation rates fluctuate but as noted in the State Plan, per capita waste generation appears to be increasing, the need to support waste-to-energy incinerators and disposal needs of the Eastern Maine region, and the lack of existing infrastructure to increase waste diversion.

6. CONSISTENCY WITH STATE WASTE MANAGEMENT PLAN AND HIERARCHY

38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(2) require the applicant to demonstrate that the proposed expansion is consistent with the State Waste Management and Recycling Plan and to promote the Solid Waste Management Hierarchy. The State Plan is based on the waste hierarchy established in 38 M.R.S. § 2101 and the State's goals for recycling, composting, and waste reduction established in 38 M.R.S. § 2132. The waste management hierarchy establishes priorities for the State to use when making solid waste management decisions. The hierarchy, from highest to lowest priority is as follows: reduction of waste (in amount and toxicity) at the source; reuse of waste; recycling of waste; composting of biodegradable waste; processing of waste to reduce the volume needing land disposal, including incineration; and land disposal of waste. The State's goals are to recycle or compost at least 50% of the MSW tonnage by January 1,

2021; to reduce the per capita disposal rate to 0.55 tons per person per year by January 1, 2019, with further reduction of 5% every 5 years thereafter; and for municipalities to demonstrate reasonable progress toward these goals. The State Plan described several studies that have been or are being undertaken to understand and characterize waste streams; the results will be used for future solid waste management planning. In the meantime, the State Plan includes some strategies for consideration, including but not limited to the following: use of subsidies, tax incentives, low-interest loans, and "pay as you throw" programs to increase waste diversion; increasing participation in product stewardship programs; encouraging municipal efforts through education, cooperative work, and publicizing waste diversion grant opportunities and future extended producer responsibility reimbursement; and encouraging regionalization.

A. Application Discussion: The Application and supporting documents describe a number of actions and programs to demonstrate that expansion of the landfill is consistent with the State Plan and promotes the waste management hierarchy.

(1) Landfill gas at JRL has been flared, but Casella, with an energy partner, developed a renewable natural gas facility that converts landfill gas to biogas. The biogas will eventually be directed to a natural gas pipeline; currently the gas is compressed and trucked, while awaiting extension of the gas line.

(2) Casella operates a single sort recycling facility in Lewiston and a commercial recycling facility in Scarborough, and provides brokerage operations; over 93,000 tons per year of recyclables are managed through these programs. JRL's 2023 annual report states that 101 tons of residue from the Casella operated single sort recycling facility was delivered to the Maine Waste to Energy waste-to-energy incinerator. Additional residue and trash from the Casella operated single sort recycling facility disposed at JRL totaled 8,239 tons. Casella provides recycling capability for traditional recyclable materials (paper, plastics, glass, cans) at 11 out of 15 Casella-owned or operated transfer stations and provides curbside collection of or drop-off locations for recyclables in 39 municipalities. Casella states that 3,251 businesses in Maine participate in its single sort recycling program.

(3) Casella also collects and manages universal waste, electronic waste, and tires at most of its owned or managed transfer stations. Metals are accepted for recycling at all of its owned or operated transfer stations.

Four of its transfer stations collect wood separately; wood waste processed from two of them is used for alternative daily cover or other landfill use, and the other two send wood waste to other processors.

(4) Casella manages 15,000 to 30,000 tons per year of residuals for agronomic utilization, including seaweed residual, wood-fired boiler ash, and paper mill lime wastes.

(5) Casella provides education and outreach for recycling customers through its website, at schools, businesses, and community events; with student internships focused on recycling education; and with a mobile recycling application ("app") that it has deployed to six communities so far, with plans to deploy to additional municipalities. Casella worked with one large municipality to perform recycling audits and bin tagging to reduce contamination in recycling, and is willing to work with other interested towns.

(6) Casella's August 9, 2024 response to the Department states that it intends to initiate a mattress recycling program in Maine in 2025.

B. Department Review: A solid waste disposal facility must show that waste has been reduced, reused, recycled, composted, and/or processed to the maximum extent practicable prior to landfilling. The greatest amount of waste must be handled through means as high on the hierarchy as possible without causing unreasonable increases in facility operating costs or unreasonable impacts on other aspects of facility operation.

The Application demonstrates that Casella has existing programs in place to reduce and reuse waste and to encourage recycling at the facilities it owns and, to a lesser extent, facilities it operates for municipalities, including single sort recycling, commercial recycling, universal waste and electronic waste recycling, metal recycling, tire recycling, agronomic utilization of residuals, wood waste recycling, and converting landfill gas to renewable natural gas. The categories of waste accepted by the landfill in the greatest volumes in recent years have been bypass MSW, CDD, residue from CDD processing facilities, and wastewater treatment plant sludge. Casella cannot control the amount of MSW that is bypassed from waste-to-energy incinerators or the Hampden waste processing facility. The volumes of CDD delivered to the landfill from non-Casella haulers or transfer stations not owned or operated by Casella similarly are beyond

Casella's control to sort or reduce. The Department anticipates that the volume of CDD processing residue from Maine's largest CDD processing facility delivered to JRL for disposal will be reduced in accordance with 38 M.R.S. § 1310-N(5-A) which requires this processing facility to reuse or recycle at least 50% of its processing debris through methods other than placement in a solid waste landfill by July 1, 2028. The quantities of wastewater treatment plant sludge delivered to the landfill are generated by municipalities and industries after passing through the treatment plants' dewatering processes. If Casella were to refuse to accept the treatment plant sludge due to its moisture content, or to require the generators to dry it further, this would increase the burden on municipalities and require time to develop and implement a solution. As noted in the Application, landfill space will still be required for sludge when drying or anaerobic digestion facilities are not operating due to planned maintenance or malfunction events. However, the Department recognizes that new facilities may become operational in the future to reduce the volume of wastewater treatment plant sludge either by drying or anaerobic digestion. For example, Maine Regional Conversion Facility, LLC expects to have their proposed sludge dryer operational in late 2025. This facility is expected to reduce sludge volumes by approximately 75%. Reduction in volume of waste is one of the priorities in Maine's solid waste management hierarchy.

The Department finds that expansion of the JRL as proposed by BGS is consistent with the State Plan and promotes the solid waste management hierarchy as required by 38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(2), provided:

- Casella submits a report to the Department detailing its plans and schedule for implementing the mattress recycling program within six months of the date of this Order;
- Casella continues to expand deployment of its mobile recycling app, and includes information in each landfill annual report regarding where the app has been deployed;
- Casella includes a discussion in each landfill annual report regarding Casella's work to encourage and assist towns to engage in all possible recycling and diversion activities; and
- Casella evaluates, and submits the evaluation in each annual report, the availability and capacity of regional facilities in Maine to reduce the volume of municipal wastewater treatment plant sludge prior to landfilling at JRL. The evaluation should include recommendations to further reduce the volume of sludge prior to landfilling.

7. NOT INCONSISTENT WITH LOCAL, REGIONAL, OR STATE WASTE COLLECTION, STORAGE, TRANSPORTATION, PROCESSING, OR DISPOSAL

38 M.R.S. § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(3) require the applicant to demonstrate that the proposed expansion is not inconsistent with local, regional, or state waste management.

Casella provides collection and/or recycling services to approximately 60 municipalities, including curbside collection, drop-off locations, transfer stations, and brokerage services for recyclables, consistent with local, regional, and statewide collection practices. JRL is located centrally and is accessible to many municipalities. Vehicles performing curbside collection have time to complete their route and go to the landfill on the same day. A large part of Maine is within 50 miles of the landfill; it is close to Bangor, the second largest city in the state, and nearly the entire state is within 150 miles, so the landfill meets local, regional, and statewide needs. Tipping fees at the landfill are capped in accordance with the OSA, and are subject to annual adjustment in accordance with the consumer price index. The not-to-exceed tipping fees for bypass MSW are slightly above the average and median cost of MSW disposal stated in the State Plan. The CDD tipping fees are a little lower than the average and median cost stated in the State Plan. The landfill provides a disposal location for special wastes that require disposal in a secure landfill. The landfill supports existing processing facilities and waste-to-energy incinerators in the state by providing a disposal location for bypassed waste and residues that require landfilling.

The landfill has existed as a State-owned landfill for 20 years, and was purchased by the State to provide for disposal capacity for nonhazardous waste generated within the state. The landfill continues to accept wastes similar to those it has accepted over the past 20 years, although the 2017 expansion limited acceptance of MSW to bypass from Maine waste-to-energy incinerators and the MWS processing facility, and the quantity of sludge accepted as a percentage of the waste stream has increased in recent years. Continued operation of the landfill in a manner similar to which it has been operated is consistent with past waste management practices in the state.

The Department finds that the proposed expansion is not inconsistent with local, regional, or state waste collection, storage, transportation, processing, or disposal, as required by 38 M.R.S. § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(3).

8. NOT INCONSISTENT WITH ENSURING ENVIRONMENTAL JUSTICE

38 M.R.S. § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(5) require the applicant to demonstrate that the proposed project is not inconsistent with ensuring environmental justice for the community in which the facility is proposed. Environmental justice is defined as the right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment regardless of ancestry, class, disability, ethnicity, income, national origin, or religion. Environmental justice includes the equal protection and meaningful involvement of all people with respect to the development, implementation, and enforcement of waste management laws, regulations, and licensing decisions.

Based on EPA's Environmental Justice Screening and Mapping Tool (Version 2.3), Indian Island and the Penobscot River to just above the Mattaseunk Dam is part of a block group identified as a Designated Disadvantaged Community according to EPA Justice40 criteria (designated for energy, health, and American Indian Reservation Lands) and EPA Inflation Reduction Act ("IRA") Data 2.0 criteria. The tract of land where JRL is located is identified as disadvantaged according to EPA IRA Data 1.0. There are 20 disadvantaged tracts in Penobscot County and 127 disadvantaged tracts in Maine according to EPA Justice40 criteria.

Based on environmental justice indicators, the block group that includes Indian Island is above the 95th percentile when compared to state data for several indexes including wastewater discharge,[3] hazardous waste proximity,[4] underground storage tanks,[5] and toxic releases to air.[6] Within the 19.36-square-mile block, 7 regulated sites (1 water discharger and 6 brownfields) report data to EPA. For the block group that includes JRL, there are 2 environmental justice indexes (toxic releases to air and wastewater discharge)

[3] The environmental burden indicator for wastewater discharge measures how much relative risk there is of being exposed to pollutants from wastewater that flows into rivers or other bodies of water downstream.
[4] The environmental burden indicator for hazardous waste proximity measures how close people might live to a facility that handles hazardous waste.
[5] The environmental burden indicator for underground storage tanks measures how many underground storage tanks and release sites are near where people live. This indicator is based on the sum of tanks and releases within a 1,500-foot buffered block group.
[6] The environmental burden indicator for toxic releases to air measures the average annual chemical concentrations in air weighted by the toxicity of each chemical. This indicator includes chemicals covered by EPA's Toxics Release Inventory (TRI) Program.

that are in the 50th to 80th percentile range when compared to state data. There are no environmental justice indicators at higher percentiles. As part of this block group, there is one regulated water discharger and two regulated air polluters that are required to report data to EPA.

The Penobscot River Basin is the longest river system located entirely within Maine and is New England's second largest river basin located entirely within the region. The Penobscot Indian Nation, a federally recognized tribe, which is based on Indian Island near Old Town, has deep connections to the land and waterways of the Penobscot River. The Penobscot River is considered the heart of the Penobscot culture and is relied on for food, drinking water, transportation, and other cultural facets. The West Branch and mainstem receive wastewater discharges from five pulp and paper mill outfalls, one of which is ND OTM, LLC in Old Town. ND OTM, LLC is licensed under Maine Pollutant Discharge Elimination System permit #ME0002020 and Maine Discharge License #W002226-5N-S-M. In 2023, 26,531,525 gallons of landfill leachate from JRL were generated and hauled off-site for treatment at the ND OTM, LLC wastewater treatment facility.

Based on the Department's draft *2024 Integrated Water Quality Report*, a total of seven segments on the mainstem of the Penobscot River from the confluence of the East and West Branches to Reeds Brook in Hampden and the West Branch Penobscot River between Millinocket Stream and East Branch Penobscot River are listed as impaired for aquatic life. Maine has established safe eating guidelines for fish from the Penobscot River below Lincoln of no more than one to two meals per month of any fish species based on testing for PCBs, dioxins, and DDT.

A. Per- and Polyfluoroalkyl Substances: Per- and Polyfluoroalkyl Substances ("PFAS") are a group of manufactured chemicals that have been used in industry and consumer products since the 1940s. There are thousands of different PFAS, some of which have been more widely used and studied than others. Many PFAS are known to break down very slowly and can bioaccumulate in people, animals, and the environment over time. Several commenters expressed concern over PFAS in JRL's landfill leachate and in the discharge from ND OTM, LLC's wastewater treatment facility, where JRL leachate is treated, to the Penobscot River.

Based on data reported to the Department pursuant to P.L. 2021, ch. 641, the Sum of 6 PFAS[7] (PFOA, PFOS, PFHxS, PFNA, PFHpA, and PFDA) from samples taken at Outfall 001-A at ND OTM, LLC ranged from a low of 11 parts per trillion ("ppt") in March 2023 to a high of 311 ppt in September 2023. The Sum of 6 PFAS from an October 2023 landfill leachate sample from JRL was approximately 2,920 ppt. The lowest Sum of 6 PFAS concentration was 410 ppt from a December 2021 sample. ND OTM, LLC's wastewater treatment facility does not specifically include treatment for PFAS.

B. Environmental Monitoring at JRL: As part of the facility's environmental monitoring plan, the applicant monitors 50 groundwater monitoring wells, 5 surface water monitoring locations, 5 pore-water monitoring locations, 2 stormwater monitoring locations, 13 underdrain monitoring locations, 7 leak detection monitoring locations, and 1 leachate monitoring location. The applicant also conducts monitoring for landfill gas within manholes and groundwater monitoring wells, and at underdrain, leak detection, and leachate collection locations. Four locations just beyond the property boundary are also monitored for hydrogen sulfide. The facility operates a sulfur removal system to remove total reduced sulfur compounds, primarily hydrogen sulfide, from the landfill gas prior to flaring.

Based on the Department's most recent review of JRL's annual monitoring report, the Department concluded that "[g]roundwater, surface water, porewater, underdrain and leak detection monitoring results continue to show minimal evidence of impact from landfill leachate." Further, the Department noted that groundwater monitoring locations that exhibit low concentrations of certain landfill indicator parameters (i.e., chloride) appear to be affected by site-related maintenance and construction activities rather than leachate from the landfill.

C. Air Quality and Landfill Odor: As part of landfill operations, the applicant conducts daily odor surveys around the active waste areas, continuous hydrogen sulfide monitoring with stationary monitors, and quarterly methane emission surface scans on the landfill intermediate cover. Through surface scan monitoring, improvements are made to ensure the effectiveness of the intermediate cover and active gas collection and control system. If a hydrogen

[7] The Department reported the Sum of 6 PFAS in its November 2023 wastewater effluent monitoring summary report which includes the compounds used in Maine's current interim drinking water standards. However, Maine does not have any standards or screening levels for wastewater effluent or landfill leachate. The use of the Sum of 6 PFAS in this paragraph is for ease of reference only.

sulfide monitor detects hydrogen sulfide over 15 parts per billion ("ppb"), the scale house is automatically alerted, and scale house staff report the detection to landfill supervisory staff. If there is a detection over 30 ppb, the Old Town code enforcement officer is to be notified. These action levels were established during licensing of the landfill expansion in 2017, based on the recommendation of Old Town's consultant. For comparison purposes, the Department's acute ambient air guidelines include a level of 30 ppb (30-minute rolling average) for hydrogen sulfide. Based on JRL's 2023 Annual Report, JRL received a total of 49 odor complaints; 44 were confirmed as likely coming from the landfill. During 2023, there were 20 hydrogen sulfide readings from the monitors that were above 15 ppb. Of these, none were above 30 ppb. While the odor threshold for hydrogen sulfide is variable, hydrogen sulfide can become noticeable at approximately 10 ppb. Several comments were received about odor from JRL and impacts to the enjoyment of property.

JRL's Operations Manual includes an Odor Control Plan and Odor Complaint Management and Response Plan. The Odor Control Plan outlines specific provisions to control and mitigate the off-site migration of odors associated with landfill operations including the placement of daily cover, minimizing the active waste area, use of an odor neutralizer spray at the working face and on waste within incoming waste loads, and the use of a perimeter odor misting system during warmer months. As each landfill cell is filled and cover is placed, a series of lateral gas collection pipes is installed to control fugitive landfill gas emissions which could result in landfill odors. Vertical landfill gas extraction wells are installed once certain waste grades are reached. Once extracted, landfill gas is either compressed and trucked off-site while awaiting extension of a natural gas pipeline or combusted with on-site flares.

Based on air quality complaints received pertaining to the landfill, the Department's Bureau of Air Quality installed a dedicated hazardous air pollutant sampler in November 2023 to collect 24-hour samples and a particulate matter sensor at a residence near the entrance to JRL in Old Town. Data evaluated to date do not show any exceedances of the Department's acute ambient air guidelines. The Department will be installing a dedicated continuous hydrogen sulfide monitor in the near future. It is the Department's understanding that the Penobscot Indian Nation received funding from the U.S. Environmental Protection Agency to purchase a hazardous air pollutant sampler to operate on Indian Island.

D. Community Notification: The Department received several comments relating to the lack of real-time information available to the public during events such as the May 2023 landfill fire. The applicant maintains a dedicated website devoted to State-owned landfills and JRL which includes notices of public meetings, information about PFAS, various monthly reports, annual reports, and operating services agreements. Monthly reports include information about significant construction and operational activities; licenses applied for, received, or renewed; volume of leachate transported for disposal; volume of landfill gas flared; and quantity and origin of wastes received. A summary of complaints received including the nature and location of the complaint, wind direction and speed at the time of the complaint, hydrogen sulfide monitoring data, and information about whether the complaint was confirmed to be landfill related and its resolution is also provided on a monthly basis and posted on the applicant's website. Reports for the current month are posted in the following month.

E. Department Finding: The Department finds that expansion of JRL is not inconsistent with ensuring environmental justice for the community in which the facility is proposed, as required by 38 M.R.S. § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(5), provided that if a license is issued for the construction and operation of the expansion:

(1) Casella designs and installs a Department-approved system for the treatment of landfill leachate for PFAS prior to expansion operations and submits an implementation schedule with tasks to the Department for review and approval to meet this timeframe. The schedule should be submitted to the Department within 90 days of issuance of this public benefit determination;

(2) Casella pays for all applicable costs associated with a third-party odor consultant, working on behalf of the Department, to complete an odor analysis of the landfill and surrounding area, including evaluation of historical air quality sampling results, odor complaint history, field investigation, and recommended actions, to be submitted to the Department for review;

(3) Casella conducts two additional surface scans per year, during periods of low barometric pressure, if possible, of the landfill intermediate cover using a Department-approved method, to determine if there are fugitive

landfill gas emissions and conducts repairs of the cover material accordingly; and

(4) The applicant establishes a system to inform the public about significant landfill events in near real time such as through a website or other means as approved by the Department.

BASED on the above Findings of Fact and subject to the Conditions listed below, the Department makes the following CONCLUSIONS:

1. BGS has demonstrated sufficient evidence of title, right or interest in the property, as required by 06-096 C.M.R. ch. 400, § 4(A).

2. A public meeting was held and public comments were accepted and considered as required by 38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(F)(1).

3. Expansion of JRL as proposed by BGS meets short-term and long-term capacity needs of the State, as required by 38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(1).

4. Expansion of JRL as proposed by BGS is consistent with the State Plan and promotes the solid waste management hierarchy as required by 38 M.R.S § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(2), provided that Casella submits a report to the Department detailing its plans and schedule for implementing the mattress recycling program within 6 months of the date of this Order and, if a license is issued for the construction and operation of the expansion:

   - Casella continues to expand deployment of its mobile recycling app, and includes information in each landfill annual report regarding where the app has been deployed;
   - Each landfill annual report includes a discussion regarding Casella's work to encourage and assist towns to engage in all possible recycling and diversion activities; and
   - Casella evaluates, and submits the evaluation in each annual report, the availability and capacity of regional facilities in Maine to reduce the volume of municipal wastewater treatment plant sludge prior to landfilling at JRL. The evaluation should include recommendations to further reduce the volume of sludge prior to landfilling.

5. The proposed expansion is not inconsistent with local, regional, or state waste collection, storage, transportation, processing, or disposal, as required by 38 M.R.S. § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(3).

6. The proposed expansion is not inconsistent with ensuring environmental justice for the community in which the expansion is proposed, as required by 38 M.R.S. § 1310-AA and 06-096 C.M.R. ch. 400, § 5(E)(5), provided that if a license is issued for the construction and operation of the expansion:

    - Casella designs and installs a Department-approved system for the treatment of landfill leachate for PFAS prior to expansion operations and submits an implementation schedule with tasks to the Department for review and approval to meet this timeframe. The schedule should be submitted to the Department within 90 days of issuance of this public benefit determination;
    - Casella pays for all applicable costs associated with a third-party odor consultant, working on behalf of the Department, to complete an odor analysis of the landfill and surrounding area, including evaluation of historical air quality sampling results, odor complaint history, field investigation, and recommended actions, to be submitted to the Department for review;
    - Casella conducts two additional surface scans per year during periods of low barometric pressure, if possible, of the landfill intermediate cover, using a Department-approved method to determine if there are fugitive landfill gas emissions and conducts repairs of the cover material accordingly; and
    - The applicant establishes a system to inform the public about significant landfill events in near real time such as through a website or other means as approved by the Department.

THEREFORE, the Department APPROVES the above noted application of the STATE OF MAINE, acting through the Department of Administrative and Financial Services, Bureau of General Services, SUBJECT TO THE FOLLOWING CONDITIONS, and all applicable standards and regulations.

1. The Standard Conditions of Approval, a copy attached as Appendix A.

2. The invalidity or unenforceability of any provision, or part thereof, of this Order shall not affect the remainder of the provisions or any other provisions. This Order shall be

construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

3. Within 6 months of the date of this Order, Casella shall submit a report to the Department detailing its plans and a schedule for implementing the mattress recycling program.

4. If a license is issued for the construction and operation of the expansion:

   A. Casella shall continue to expand deployment of its mobile recycling app, and include information in each landfill annual report regarding where the app has been deployed;

   B. Casella shall include in each landfill annual report a discussion regarding their work to encourage and assist towns to engage in all possible recycling and diversion activities; and

   C. Casella evaluates, and submits the evaluation in each annual report, the availability and capacity of regional facilities in Maine to reduce the volume of municipal wastewater treatment plant sludge prior to landfilling at JRL and, include recommendations to further reduce the volume of sludge prior to landfilling;

   D. Casella designs and installs a Department-approved system for the treatment of landfill leachate for PFAS prior to expansion operations;

   E. Casella pays for all applicable costs associated with a third-party odor consultant, working on behalf of the Department, to complete an odor analysis of the landfill and surrounding area, including evaluation of historical air quality sampling results, odor complaint history, field investigation, and recommended actions, to be submitted to the Department for review and approval;

   F. Casella conducts two additional surface scans per year during periods of low barometric pressure, if possible, of the landfill intermediate cover, using a Department-approved method to determine if there are fugitive landfill gas emissions and conduct repairs of the cover material accordingly; and

   G. The applicant establishes a system to inform the public about significant landfill events in near real time such as through a website or other means as approved by the Department.

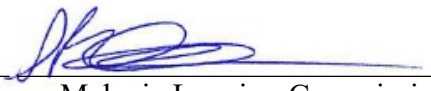
STATE OF MAINE	25	PUBLIC BENEFIT
DEPARTMENT OF ADMINISTRATIVE AND FINANCIAL	)	DETERMINATION
SERVICES, BUREAU OF GENERAL SERVICES	)	
OLD TOWN, PENOBSCOT COUNTY, MAINE	)	
JUNIPER RIDGE LANDFILL EXPANSION	)	
S-020700-W5-CV-N	)	
(APPROVAL WITH CONDITIONS)	)	

5. Within 90 days of the issuance of this public benefit determination, Casella shall submit an implementation schedule with tasks to detail how they intend to design and install a Department-approved system for the treatment of landfill leachate for PFAS prior to expansion operations, if a license approval is issued for the expansion.

DONE AND DATED AT AUGUSTA, MAINE, THIS 2nd DAY

OF October, 2024.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY:  *for*
Melanie Loyzim, Commissioner

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURE

Date of initial receipt of application: June 10, 2024
Date of application acceptance: June 24, 2024

Date filed with the Board of Environmental Protection:

XKK92656

FILED

OCT 2, 2024

State of Maine
Board of Environmental Protection

STANDARD CONDITIONS TO ALL SOLID WASTE FACILITY LICENSES

STRICT CONFORMANCE WITH THE STANDARD AND SPECIAL CONDITIONS OF THIS APPROVAL IS NECESSARY FOR THE PROJECT TO MEET THE STATUTORY CRITERIA FOR APPROVAL. VIOLATIONS OF THE CONDITIONS UNDER WHICH A LICENSE IS ISSUED SHALL CONSTITUTE A VIOLATION OF THAT LICENSE AGAINST WHICH ENFORCEMENT ACTION MAY BE TAKEN, INCLUDING REVOCATION.

1. **Approval of Variations from Plans.** The granting of this approval is dependent upon and limited to the proposals and plans contained in the application and supporting documents submitted and affirmed by the license. Any consequential variation from these plans, proposals, and supporting documents is subject to review and approval prior to implementation.

2. **Compliance with All Applicable Laws.** The licensee shall secure and comply with all applicable federal, state, and local licenses, permits, authorizations, conditions, agreements, statutes, regulations, and orders prior to or during construction and operation, as appropriate.

3. **Compliance with All Terms and Conditions of Approval.** The licensee shall submit all reports and information requested by the Department demonstrating that the licensee has complied or will comply with all terms and conditions of this approval. All preconstruction terms and conditions must be met before construction begins.

4. **Transfer of License.** The licensee may not transfer the solid waste facility license or any portion thereof without approval of the Department.

5. **Initiation of Construction or Development Within Two Years.** If the construction or operation of the solid waste facility is not begun within two years of issuance or within 2 years after any administrative and judicial appeals have been resolved, the license lapses and the licensee must reapply to the Department for a new license unless otherwise approved by the Department.

6. **Approval Included in Contract Bids.** A copy of the approval must be included in or attached to all contract bid specifications for the solid waste facility.

7. **Approval Shown to Contractors.** Contractors must be shown the license by the licensee before commencing work on the solid waste facility.

8. **Background of key individuals.** A licensee may not knowingly hire as an officer, director or key solid waste facility employee, or knowingly acquire an equity interest or debt interest in, any person convicted of a felony or found to have violated a State or federal environmental law or rule without first obtaining the approval of the Department.

STANDARD CONDITIONS TO ALL SOLID WASTE FACILITY LICENSES

9. **Fees.** The licensee must comply with annual license and annual reporting fee requirements of the Department's rules.

ADDITIONAL STANDARD CONDITIONS FOR SOLID WASTE DISPOSAL FACILITIES

10. **Recycling and Source Reduction Determination for Solid Waste Disposal Facilities.** This condition does not apply to the expansion of a commercial solid waste disposal facility that accepts only special waste for landfilling.

The solid waste disposal facility shall only accept solid waste that is subject to recycling and source reduction programs, voluntary or otherwise, at least as effective as those imposed by State law.

11. **Deed Requirements for Solid Waste Disposal Facilities.** Whenever any lot of land on which an active, inactive, or closed solid waste disposal facility is located is being transferred by deed, the following information must be recorded in the Registry of Deeds:

A. The type of facility located on the lot and the dates of its establishment and closure.
B. A description of the location and the composition, extent, and depth of the waste deposited.
C. The disposal location coordinates of asbestos wastes must be identified.

DEP INFORMATION SHEET

Appealing a Department Licensing Decision

Dated: August 2021 **Contact: (207) 314-1458**

SUMMARY

This document provides information regarding a person's rights and obligations in filing an administrative or judicial appeal of a licensing decision made by the Department of Environmental Protection's (DEP) Commissioner.

Except as provided below, there are two methods available to an aggrieved person seeking to appeal a licensing decision made by the DEP Commissioner: (1) an administrative process before the Board of Environmental Protection (Board); or (2) a judicial process before Maine's Superior Court. An aggrieved person seeking review of a licensing decision over which the Board had original jurisdiction may seek judicial review in Maine's Superior Court.

A judicial appeal of final action by the Commissioner or the Board regarding an application for an expedited wind energy development (35-A M.R.S. § 3451(4)) or a general permit for an offshore wind energy demonstration project (38 M.R.S. § 480-HH(1)) or a general permit for a tidal energy demonstration project (38 M.R.S. § 636-A) must be taken to the Supreme Judicial Court sitting as the Law Court.

I. ADMINISTRATIVE APPEALS TO THE BOARD

LEGAL REFERENCES

A person filing an appeal with the Board should review Organization and Powers, 38 M.R.S. §§ 341-D(4) and 346; the Maine Administrative Procedure Act, 5 M.R.S. § 11001; and the DEP's *Rule Concerning the Processing of Applications and Other Administrative Matters* (Chapter 2), 06-096 C.M.R. ch. 2.

DEADLINE TO SUBMIT AN APPEAL TO THE BOARD

Not more than 30 days following the filing of a license decision by the Commissioner with the Board, an aggrieved person may appeal to the Board for review of the Commissioner's decision. The filing of an appeal with the Board, in care of the Board Clerk, is complete when the Board receives the submission by the close of business on the due date (5:00 p.m. on the 30th calendar day from which the Commissioner's decision was filed with the Board, as determined by the received time stamp on the document or electronic mail). Appeals filed after 5:00 p.m. on the 30th calendar day from which the Commissioner's decision was filed with the Board will be dismissed as untimely, absent a showing of good cause.

HOW TO SUBMIT AN APPEAL TO THE BOARD

An appeal to the Board may be submitted via postal mail or electronic mail and must contain all signatures and required appeal contents. An electronic filing must contain the scanned original signature of the appellant(s). The appeal documents must be sent to the following address.

Chair, Board of Environmental Protection
c/o Board Clerk
17 State House Station
Augusta, ME 04333-0017
ruth.a.burke@maine.gov

The DEP may also request the submittal of the original signed paper appeal documents when the appeal is filed electronically. The risk of material not being received in a timely manner is on the sender, regardless of the method used.

At the time an appeal is filed with the Board, the appellant must send a copy of the appeal to: (1) the Commissioner of the DEP (Maine Department of Environmental Protection, 17 State House Station, Augusta, Maine 04333-0017); (2) the licensee; and if a hearing was held on the application, (3) any intervenors in that hearing proceeding. **Please contact the DEP at 207-287-7688 with questions or for contact information regarding a specific licensing decision.**

REQUIRED APPEAL CONTENTS

A complete appeal must contain the following information at the time the appeal is submitted.

1. *Aggrieved status*. The appeal must explain how the appellant has standing to bring the appeal. This requires an explanation of how the appellant may suffer a particularized injury as a result of the Commissioner's decision.
2. *The findings, conclusions, or conditions objected to or believed to be in error.* The appeal must identify the specific findings of fact, conclusions of law, license conditions, or other aspects of the written license decision or of the license review process that the appellant objects to or believes to be in error.
3. *The basis of the objections or challenge.* For the objections identified in Item #2, the appeal must state why the appellant believes that the license decision is incorrect and should be modified or reversed. If possible, the appeal should cite specific evidence in the record or specific licensing criteria that the appellant believes were not properly considered or fully addressed.
4. *The remedy sought.* This can range from reversal of the Commissioner's decision on the license to changes in specific license conditions.
5. *All the matters to be contested*. The Board will limit its consideration to those matters specifically raised in the written notice of appeal.
6. *Request for hearing.* If the appellant wishes the Board to hold a public hearing on the appeal, a request for hearing must be filed as part of the notice of appeal, and it must include an offer of proof regarding the testimony and other evidence that would be presented at the hearing. The offer of proof must consist of a statement of the substance of the evidence, its relevance to the issues on appeal, and whether any witnesses would testify. The Board will hear the arguments in favor of and in opposition to a hearing on the appeal and the presentations on the merits of an appeal at a regularly scheduled meeting. If the Board decides to hold a public hearing on an appeal, that hearing will then be scheduled for a later date.
7. *New or additional evidence to be offered.* If an appellant wants to provide evidence not previously provided to DEP staff during the DEP's review of the application, the request and the proposed supplemental evidence must be submitted with the appeal. The Board may allow new or additional evidence to be considered in an appeal only under limited circumstances. The proposed supplemental evidence must be relevant and material, and (a) the person seeking to add information to the record must show due diligence in bringing the evidence to the DEP's attention at the earliest possible time in the licensing process; or (b) the evidence itself must be newly discovered and therefore unable to have been presented earlier in the process. Requirements for supplemental evidence are set forth in Chapter 2 § 24.

OTHER CONSIDERATIONS IN APPEALING A DECISION TO THE BOARD

1. *Be familiar with all relevant material in the DEP record.* A license application file is public information, subject to any applicable statutory exceptions, and is made accessible by the DEP. Upon request, the DEP will make application materials available to review and photocopy during normal working hours. There may be a charge for copies or copying services.

2. *Be familiar with the regulations and laws under which the application was processed, and the procedural rules governing the appeal.* DEP staff will provide this information upon request and answer general questions regarding the appeal process.
3. *The filing of an appeal does not operate as a stay to any decision.* If a license has been granted and it has been appealed, the license normally remains in effect pending the processing of the appeal. Unless a stay of the decision is requested and granted, a licensee may proceed with a project pending the outcome of an appeal, but the licensee runs the risk of the decision being reversed or modified as a result of the appeal.

WHAT TO EXPECT ONCE YOU FILE A TIMELY APPEAL WITH THE BOARD

The Board will acknowledge receipt of an appeal, and it will provide the name of the DEP project manager assigned to the specific appeal. The notice of appeal, any materials admitted by the Board as supplementary evidence, any materials admitted in response to the appeal, relevant excerpts from the DEP's administrative record for the application, and the DEP staff's recommendation, in the form of a proposed Board Order, will be provided to Board members. The appellant, the licensee, and parties of record are notified in advance of the date set for the Board's consideration of an appeal or request for a hearing. The appellant and the licensee will have an opportunity to address the Board at the Board meeting. The Board will decide whether to hold a hearing on appeal when one is requested before deciding the merits of the appeal. The Board's decision on appeal may be to affirm all or part, affirm with conditions, order a hearing to be held as expeditiously as possible, reverse all or part of the decision of the Commissioner, or remand the matter to the Commissioner for further proceedings. The Board will notify the appellant, the licensee, and parties of record of its decision on appeal.

II. JUDICIAL APPEALS

Maine law generally allows aggrieved persons to appeal final Commissioner or Board licensing decisions to Maine's Superior Court (see 38 M.R.S. § 346(1); 06-096 C.M.R. ch. 2; 5 M.R.S. § 11001; and M.R. Civ. P. 80C). A party's appeal must be filed with the Superior Court within 30 days of receipt of notice of the Board's or the Commissioner's decision. For any other person, an appeal must be filed within 40 days of the date the decision was rendered. An appeal to court of a license decision regarding an expedited wind energy development, a general permit for an offshore wind energy demonstration project, or a general permit for a tidal energy demonstration project may only be taken directly to the Maine Supreme Judicial Court. See 38 M.R.S. § 346(4).

Maine's Administrative Procedure Act, DEP statutes governing a particular matter, and the Maine Rules of Civil Procedure must be consulted for the substantive and procedural details applicable to judicial appeals.

ADDITIONAL INFORMATION

If you have questions or need additional information on the appeal process, for administrative appeals contact the Board Clerk at 207-287-2811 or the Board Executive Analyst at 207-314-1458 bill.hinkel@maine.gov, or for judicial appeals contact the court clerk's office in which the appeal will be filed.

Note: This information sheet, in conjunction with a review of the statutory and regulatory provisions referred to herein, is provided to help a person to understand their rights and obligations in filing an administrative or judicial appeal. The DEP provides this information sheet for general guidance only; it is not intended for use as a legal reference. Maine law governs an appellant's rights.

APPENDIX B

MATERIAL MANAGEMENT AND RECYCLING DOCUMENTS

B-1 MAINE MATERIAL MANAGEMENT REPORT
B-2 CASELLA SUSTAINABILITY REPORT
B-3 MATTRESS RECYCLING LETTER

SME
SEVEE & MAHER
ENGINEERS

MAINE MATERIALS MANAGEMENT REPORT

SME
SEVEE & MAHER
ENGINEERS

Report to the Joint Standing Committee on Environment and Natural Resources
131st Legislature, Second Session

Maine Materials Management Plan:

2024 State Waste Management and Recycling Plan Update and 2022 Waste Generation and Disposal Capacity Report

January 2024

Contacts

Carla Hopkins
Director, Division of Materials Management
207-446-4366
Carla.J.Hopkins@maine.gov

Brian Beneski
Supervisor, Recycling Programs
207-592-0248
Brian.Beneski@maine.gov

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 State House Station | Augusta, Maine 04333-0017
www.maine.gov/dep

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Executive Summary

38 M.R.S. § 2122, requires the Department of Environmental Protection ("Department") to update a Statewide Waste Management and Recycling Plan ("Plan") every five years. This update includes an analysis of, and a plan for, the management, reduction, and recycling of solid waste for Maine. While not required, this year's Plan also includes information about existing disposal capacity in order to plan for projected capacity needs. Information in this Plan includes the 2022 data normally included in the Waste Generation and Disposal Capacity Report (38 M.R.S. § 2124-A) which is not due again until January 15, 2026. While this Plan includes the key elements required by statute, many additional elements are included in this Plan to paint a broader picture of how solid waste is managed, handled, and disposed of in Maine. All of these factors combined are complicated and intertwined with geography, transportation and logistics, business and economics, and policy. This report evaluates some of those intertwined factors and also highlights steps that are being taken to better understand these complexities, and what the Department can do to enhance management of waste streams in Maine.

Maine is currently faced with difficult challenges regarding waste management, ranging from the sufficiency of long-term disposal capacity to infrastructure gaps and inconsistent access by Maine communities to programs such as recycling or composting. All of these challenges play an important role in Maine's ability to meet statutory goals of the solid waste management hierarchy including waste reduction and waste diversion. As a path forward to finding solutions to these challenges, multiple comprehensive assessments are currently underway that will provide significant insight into Maine's waste streams, the results of which will lend certainty and credibility to future planning efforts. These studies are described in greater detail within the Plan and include a comprehensive analysis of food loss and waste, the components of municipal solid waste and construction and demolition debris, and sludge capacity and management solutions. It is critical the comprehensive data from these studies allow for appropriate solutions to be identified for Maine's challenges.

The key takeaways from this Plan include the following:

- Maine is currently grappling with a shortage of waste disposal options for the Eastern Maine Region.
- The expansion of Juniper Ridge Landfill ("JRL") in Old Town will be necessary to ensure there is adequate capacity for the entire State of Maine over the next 10 years.
- Assuming an expansion of JRL takes place, Maine has between 15-20 years of capacity left for its statewide waste disposal (with the exception of Aroostook County which has about 40 years capacity remaining).
- To best manage the waste disposal capacity concerns the Department will plan for enhanced waste reduction and diversion programs as well as evaluate key infrastructure needs for waste disposal.
- Increases in waste disposal capacity for Maine will likely need to include expanding landfill space, full operation of incineration and waste processing facilities, and/or implementing new technologies to treat waste streams to either reduce volume or prevent the need for landfilling.

- Current assessments underway will help inform the Department of how to best enhance waste reduction and diversion programs. One of these assessments is complete, while the others are anticipated to be completed in 2024, 2025 and 2026.
- Implementation of the product stewardship program for packaging materials will play an important role likely beginning in 2026 in waste reduction and reuse, while simultaneously supporting recycling efforts at municipalities by 2027.

This Plan is based on the best available data at the time of its release, including input provided by the public, and other publicly available information. Prior to development of this Plan, the Department hosted a series of five regional stakeholder meetings seeking input for updating this Plan. The meetings were held from late June to early August of 2023 in Presque Isle, Machias, Orono, Augusta, and Portland. Meetings were accessible both in-person and remotely, ensuring all interested parties were able to participate. As a result, the Department received valuable feedback that is discussed in this Plan.

I. Introduction

This 5-year update to Maine's Materials Management Plan has been prepared in accordance with 38 M.R.S. § 2122, which states: "The department shall prepare an analysis of, and a plan for, the management, reduction and recycling of solid waste for the State." 38 M.R.S. § 2123-A requires that, "[t]he State Plan [to] include the following elements:

1. Waste characterization. The state plan must be based on a comprehensive analysis of solid waste generated, recycled and disposed of in the State. Data collected must include, but not be limited to, the source, type and amount of waste currently generated; and the costs and types of waste management employed including recycling, composting, landspreading, incineration or landfilling.

2. Waste reduction and recycling assessment. The state plan must include an assessment of the extent to which waste generation could be reduced at the source and the extent to which recycling can be increased.

3. Determination of existing and potential disposal capacity. The state plan must identify existing solid waste disposal and management capacity within the State and the potential for expansion of that capacity.

4. Projected demand for capacity. The state plan must identify the need in the State for current and future solid waste disposal capacity by type of solid waste, including identification of need over the next 5-year, 10-year and 20-year periods."

38 M.R.S. § 2122 also requires that each plan update must be based on the priorities and recycling goals established in 38 M.R.S. §§ 2101 and 2132 and must provide guidance and direction to municipalities in planning and implementing waste management and recycling programs at the state, regional and local levels. The Department published its initial statewide Materials Management Plan in January 2014, and updates it every 5 years to incorporate changes in waste generation trends, changes in waste recycling and disposal technologies, development of new waste generating activities and other factors affecting solid waste management.

The Department views this Plan as an opportunity to comprehensively evaluate and provide information regarding materials management throughout the state. Stakeholder meetings were convened in Presque Isle, Machias, Orono, Augusta, and Portland to assist in this Plan's development and content. Recordings and transcripts for the stakeholder meetings are available on the Department's Materials Management Plan for Solid Waste and Recycling webpage. The Department thanks all stakeholders who attended these meetings virtually or in person for their participation and input to this Plan.

Based on an analysis of current waste management practices in Maine and guided by Maine's Solid Waste Management and Food Recovery Hierarchies (see Appendix A), this 5-year update includes strategies and actions focused on:

1. Increasing waste reduction, food rescue, goods repair (electronics, clothing, furniture, etc.), and reuse initiatives;

2. Continued focus on increasing the diversion of organics from disposal;

3. Diverting materials from landfill disposal;

4. Exploring potential pathways to broaden the economic feasibility and appeal of materials recovery such as green jobs training programs or small business opportunities not yet widely developed in Maine; and

5. Evaluating strategic needs for expansion of waste disposal capacity (landfilling and incineration) and waste processing technologies.

This Plan highlights key challenges with meeting Maine's statutory solid waste disposal reduction and diversion goals and suggests areas of potential exploration and action to determine their suitability for implementation in Maine. Such action will require investments in additional waste management and recycling infrastructure.

II. Waste Generation and Characterization

A. Waste Generation

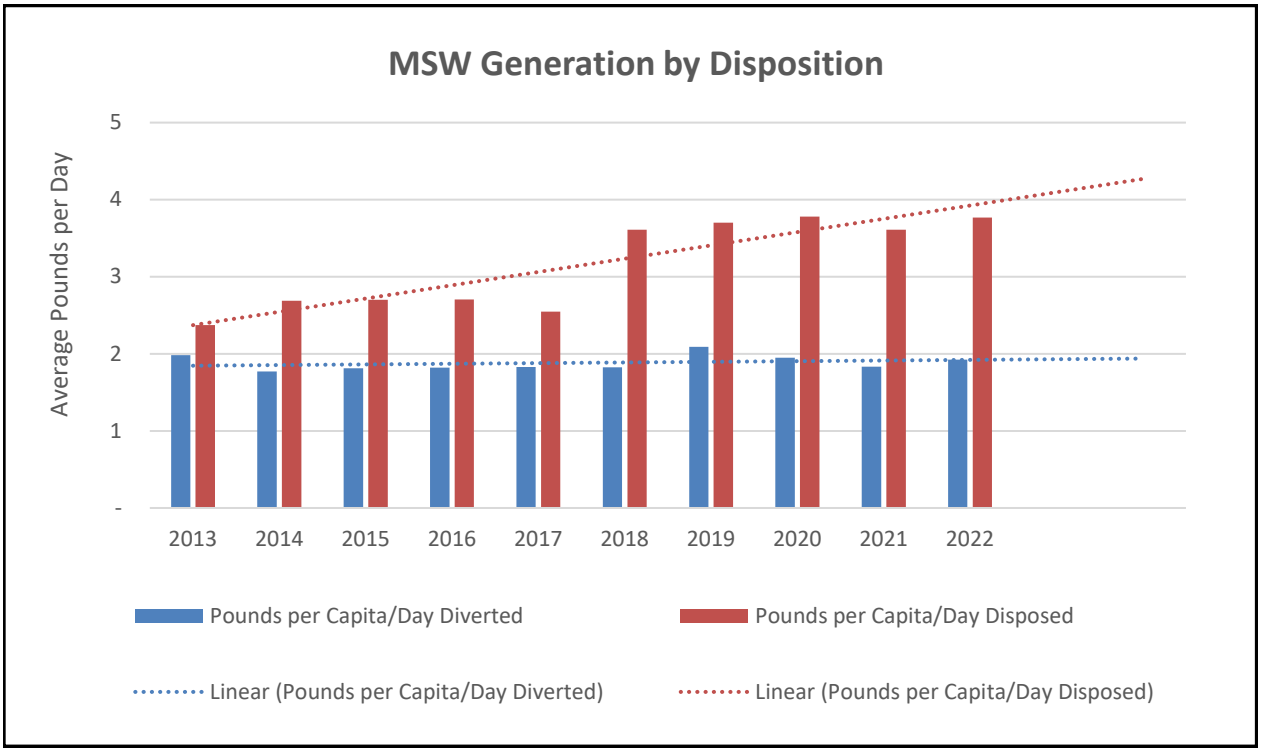
Solid waste, defined by 38 M.R.S. § 1303-C(29) as "useless, unwanted or discarded solid material with insufficient liquid content to be free-flowing," is generated by Maine's households and industrial, commercial, and institutional sectors. 38 M.R.S. § 1305 assigns responsibility for the management of the municipal solid waste ("MSW") to each municipality specifying that "[e]ach municipality shall provide solid waste disposal services for domestic and commercial solid waste generated within the municipality." As there is no specific guidance provided, each municipality chooses how to meet its own responsibility by managing MSW through a combination of municipal and commercial waste handling services, facilities, and systems. Industrial and institutional generators manage the solid waste they generate through their own privately-owned facilities or through contracting with commercial services. While this market-based approach has provided municipalities and other entities with control over how to manage their waste materials, it has become increasingly clear that market failures are contributing to systemic issues such as increased disposal; limited competition among service providers that can increase costs for municipalities; underdeveloped infrastructure, particularly for waste diversion programs; and pricing structures that strongly favor disposal over diversion across much of the state.

Every two years, the Department develops and submits a Waste Generation and Disposal Capacity Report ("WGDC Report") to the Joint Standing Committee on Environment and Natural Resources pursuant to 38 M.R.S. § 2124-A. The WGDC Report provides an overview of Maine's solid waste generation, diversion, and disposal activities during the previous two calendar years, and an evaluation of Maine's progress toward our waste reduction and recycling goals, some of the same reporting requirements for this Plan. It also includes a projection of the solid waste disposal needs of Maine for the next 5, 10, and 20 years, and how the fill rate at each solid waste landfill could affect the expected lifespan of that landfill. Recent years' WGDC reports can be found online at https://www.maine.gov/dep/publications/reports/index.html.

For the past several years, the WGDC report has been a biennial report. However, 38 M.R.S. § 2124-A was amended in 2023[1] to modify the frequency for the WGDC Report to an annual basis. Since reporting requirements for both reports are similar, the Department has combined the 2024 WGDC Report for the 2022 reporting year with this Plan.

Review of the WGDC Reports from the past several years shows that the amount of MSW disposed in Maine has been trending up, while diversion (including all tracked food rescue, animal feed, repair and reuse, recycling, composting, anaerobic digestion, etc., for which data is available[2]) has remained roughly constant although this data is limited. The per capita disposal and diversion rates are depicted in Figure 1 below.

Figure 1. Municipal Solid Waste Generation Per Capita

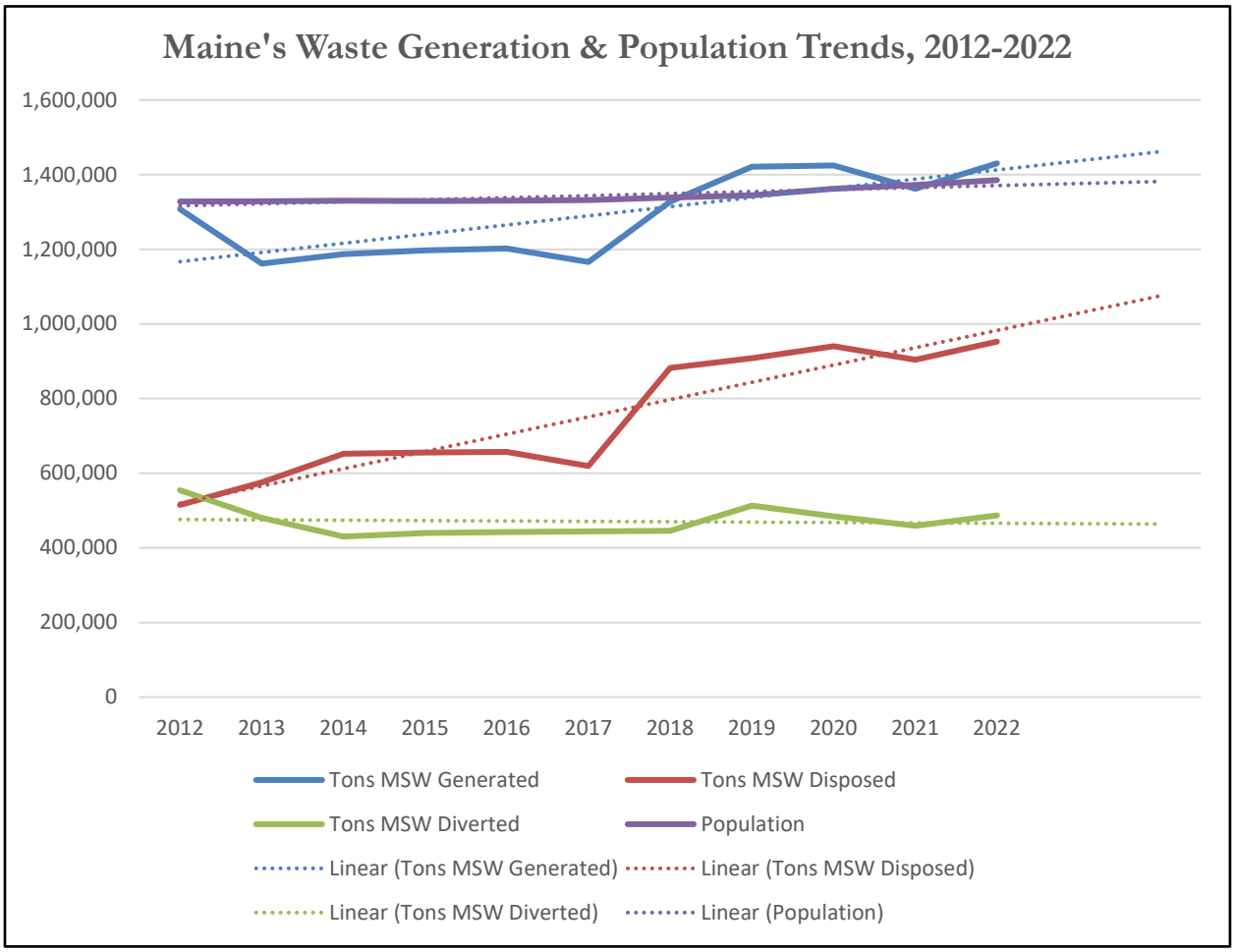


Maine's population is growing but the per capita data suggests that the increase in disposal tonnage is not simply a factor of increased population. As shown in Figure 2 below, Maine's disposal tonnage is trending upward faster than the population is growing, while tracked diversion activities remains flat. Subsequently, additional waste disposal capacity will be needed in the long-term, unless there is additional infrastructure in place as well as robust implementation of statewide diversion programs to recover recyclables and organics, and other materials that could

[1] 38 M.R.S. § 2124-A was amended in 2023 by L.D. 1172 – *An Act to Reestablish Annual Reporting on Solid Waste in Maine.* This law requires submittal of the WGDC Report on or before January 1, 2026 and annually thereafter.
[2] Data for food rescue, animal feed, and repair and reuse is extremely limited; this likely represents only a small subsection of the total quantity of material diverted through such activities.

be diverted from waste disposal. Systemic changes and infrastructure investments will be necessary to reverse this trend.

Figure 2. Waste Management and Population Trends 2012-2022[3]



B. Waste Characterization

1. Studying Waste in Maine

As described in more detail below, the Department is in the process of moving forward with several different studies to better characterize and understand waste streams in Maine. These studies will be utilized by the Department to assist in long-term waste management planning by providing a comprehensive understanding of the composition of waste currently being disposed. This will allow the Department to target majority components of the waste stream

[3] MSW disposed includes MSW incinerated, landfilled, and exported for disposal. It does not include MSW incinerator ash, which is a special waste that was included with MSW totals until 2018, when the Department decided to include that material with special waste totals. While incinerator ash is a residue of incinerating MSW, it is classified as a special waste ("SPW") in Maine.

for future reduction, diversion, recycling, composting, and anaerobic digestion, and reduce the overall amount of material requiring disposal. It will also aid in planning for the best management of the available space in our landfills and the capacity of Maine's other waste management facilities. Below is a discussion of each of the studies that will be providing critical information that will be necessary in the next phase of solid waste management planning for Maine.

a. General/All Waste Stream Study

The composition of waste generated in Maine and disposed in Maine's facilities can be quite varied. As an example, Table 1 presents the waste types disposed at the Juniper Ridge Landfill ("JRL") in Old Town. The sort categories for a waste characterization study being conducted (discussed later in this Report) on behalf of the Department in 2024 can be found in Appendix B.

Although the Department has not conducted a formal waste characterization study, the Department has evaluated the data provided by various waste management facilities in annual reports submitted to the Department. To supplement this evaluation, the Department is also in the process of contracting a comprehensive statewide audit called a Waste Characterization Study ("WC Study") to begin in 2024. The data gathered from this statewide WC Study will provide a baseline of data for Maine's waste streams and by sector to include the types, amounts and sources of materials generated and destined for disposal. In addition, the WC Study will provide the state with an improved understanding of the sources, content, and condition of construction and demolition debris ("CDD"). It is anticipated that this WC Study will be completed by the beginning of 2025. Funding for the WC Study was provided by the United States Environmental Protection Agency ("USEPA") Solid Waste Infrastructure for Recycling ("SWIFR") grant. This SWIFR grant program includes funding specifically to states for waste characterization studies. Once the WC Study is completed, it will be appended to this Plan and will include additional recommendations based on the study's findings.

Table 1. Summary of Wastes Accepted at Juniper Ridge Landfill in 2022

MSW & CDD Wastes	**Total (tons)**
Bypass MSW	276,619
CDD/MSW Processing Residue - OBW (Disposed of in the Original 2004 Permitted Footprint)	4,222
CDD/MSW Processing Residue - OBW (Disposed of in the Expansion Permitted Footprint)	74,950
CDD Processing Residue - Fines	73,689
Mixed CDD	332,290
Wood from CDD	147
Residue/Trash from Single Stream	7,064
Total MSW & CDD	**768,981**[4]
Special Wastes (SPW)	**Total (tons)**
Burn Pile Ash and/or Hot Loads Area Ash	239
Burnt Structure Debris/Ash	1,828
Catch Basin Grit & Street Sweeping	680
Coal, Oil & Multi-fuel Boiler Ash	4,259
Contaminated Soil & Debris	20,977
Industrial (Miscellaneous)	525
Industrial WWTP Sludge	15,888
Leather Scraps	70
Lime Mud/Grit	4,784
MSW Incinerator Ash	29,502
Municipal WWTP/POTW Sludge	78,383
Non-Friable Asbestos	561
Non-Hazardous Chemical Related	1,033
Oil Spill Debris	1,037
Polyethylene & Cellulose Trimmings	1,917
Pulp Mill Waste	751
Sandblast Grit	533
Spoiled Foods	458
Sulfur Scrubbing Residues	545
Water/Air Filtration Media	10
WWTP Grit Screenings	692
Total SPW	**164,672**

[4] Totals for Waste Types (MSW, CDD, and SPW) in Table 1 are based on adding the individual tonnages by material type and vary slightly from the table provided within Juniper Ridge Landfill's annual report most likely due to rounding.

b. Food Waste Stream Study

In addition to the WC Study, the Department is also conducting a Food Loss and Waste Generation Study ("FLWG Study") funded by a Climate Pollution Reduction Grant from USEPA[5], which will provide extensive insight into the locations, types, and quantity of food loss and waste, as well as the quality of that food, across the state. Information gathered from studies in other states and municipalities have shown that food scraps, food-related wastes, and other organic materials may comprise roughly 40% of Maine's solid waste stream and are for the most part suitable for diverting into higher and better uses in a range of activities from feeding hungry people or animals to being transformed into valuable soil amendments that may improve the health and vitality of agricultural land and soils.

To strategically plan for addressing food loss and waste, it is imperative that the Department gather reliable data on how much food is generated and wasted and how that waste is currently managed, as well as characterizing the quality of the surplus food to identify higher and better uses. The FLWG Study will provide comprehensive data on the quantity, quality, types, and sources of surplus food and food scraps currently generated by geographic location. Additionally, data collected will be broken down by generating sector and geographic location, providing a robust source of information about surplus food generation by entities such as grocers, farmers, restaurants, food pantries, schools and universities, prisons, hospitals, and other businesses generating food-related wastes. The data collected from this study will allow the Department to prepare an informed analysis, and a plan for moving food up the food recovery hierarchy within the entire State in an effort to mitigate hunger as well as reduce greenhouse gas emissions and conserve the energy, water and financial capital embedded in wasted food, with an added benefit of improving soil health by recovering nutrients and returning them to agricultural land and soils.

This assessment is the first phase in the state's movement towards developing a comprehensive plan for addressing food loss and waste in Maine. Initially, the results of this assessment will be used as the basis for an assessment of the greenhouse gas emissions impact from food loss and waste. This assessment will also be used as the baseline for an initial assessment of the current waste management infrastructure's ability to meet Maine's greenhouse gas emissions reduction goals and waste reduction and diversion goals and provide recommendations for infrastructure improvements.

c. Sludge/Biosolids Waste Stream Study

A significant issue that has come to the forefront in recent years which will likely influence multiple aspects of materials management from recycling to landfilling to organics management in the future is the presence of per- and polyfluoroalkyl substances ("PFAS"). Used in household products, industrial settings, and firefighting foam since

[5] In collaboration with the Governor's Office of Policy Innovation and the Future ("GOPIF"), which is passing grant funding through to the Department to conduct the FLWG Study.

the early 1950s, these chemicals are persistent and bioaccumulative in the environment.[6] The Maine Legislature has enacted a number of laws relating to PFAS including a ban on the land application, distribution or sale of sludge and sludge-derived products, effective August 2022[7], a ban on carpets, rugs, and fabric treatments with intentionally added PFAS, effective January 2023, as well as a ban on products with intentionally added PFAS effective January 2030.[8] Rulemaking is currently underway to prohibit PFAS in certain food service packaging.[9]

With the passage of the ban on the land application of sludge and sludge-derived products, this material is being almost exclusively driven toward Maine's landfills because there is a dearth of other options for economically viable disposal in both the state and region.[10] The physical nature of this material complicates landfill operations requiring the use of bulking material, sometimes at a high ratio, to provide landfill stability. The use and type of sludge bulking material is generally landfill-specific and can consist of various types of wastes like CDD (including bulky wastes), ash, and soil, although bulky wastes are preferred. Adding more wastes in the form of both sludge and bulking materials increases the overall rate at which Maine landfills will reach maximum capacity.

In response to the marked increase in municipal Wastewater Treatment Plant ("WWTP") sludge and associated bulking materials disposed in Maine starting in 2022, as well as challenges to landfill operations that occurred in early 2023, the Department, in collaboration with the Maine Water Environment Association ("MWEA"), commissioned a study to evaluate sludge management practices in Maine and make recommendations for the future. It is intended that this study will provide important information that may be useful for policy decisions moving forward. This study, An Evaluation of Biosolids Management in Maine and Recommendations for the Future, was completed on December 15, 2023. The study assesses current sludge generation rates, limiting factors at landfills (for example, limits on wet wastes and the need for bulking agents), uncertainty of future landfill capacity in Maine, and different types of sludge management strategies. The strategies recommended include volume reduction by dewatering, anaerobic digestion, thermal drying, as well as PFAS destruction technologies for piloting in Maine. The study also provides information relating to both costs and feasibility of each of the recommendations.

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[6] See EPA's guide to PFAS for more information: https://www.epa.gov/pfas/pfas-explained.

[7] See 38 M.R.S. § 1306(7).

[8] See 38 M.R.S. § 1614.

[9] See 32 M.R.S. § 1733(3-B).

[10] In March 2023, the Department investigated alternative outlets other than in-state landfill disposal for sludge generated from municipal WWTPs. It became clear that Maine had no other alternatives available within the state for disposal of this waste stream. Operators of Sewage Sludge Incinerators ("SSIs") and landfills in the entire northeast region had no additional capacity to take Maine's sludge. As a result, options remaining were to ship the waste stream to a company in New Brunswick, Canada to use to make sludge derived compost or to ship the waste to landfills as far away as Ohio or South Carolina. Sending to Canada proved to be the most economically viable outcome despite a steep rise in costs to WWTPs. More background information is available in this report An Evaluation of Biosolids Management in Maine and Recommendations for the Future.

As volume reduction and PFAS destruction strategies are developed and implemented for managing sludge, the need to rely solely on landfills for disposal will shift. Across the country, researchers are working on technologies that will allow for treatment and destruction of PFAS in several types of media including sludges.[11] Should any of these technologies become feasible to scale up and deploy in a cost-effective manner, the door might be reopened for a cautious return to agronomic utilization, with proper sampling and monitoring to ensure that the treated materials are safe for such use. Because these technologies are still in pilot phase, the return to agronomic utilization is likely several years in the future and will not provide a short-term solution for Maine's landfill capacity challenges. Until these technologies become economically viable and scaled to work in Maine, landfill capacity will need to be managed to include disposal of sludges and necessary bulking materials.

d. Packaging Material Waste Stream / Recycling Needs Assessment Study

38 M.R.S. § 2146 enacted in 2021, requires the Department to establish a new product stewardship program for packaging materials. The overall intent of the program is to reduce the amount of packaging from consumer products that go into the landfill and to provide a mechanism to compensate municipalities for handling these packaging materials. The legislature determined that a significant volume of waste going into landfills is in part due to the amount of packaging materials that are used in consumer products (and that are used in shipping of products by third party sellers). The intent of this new law was to create a new program using a producer responsibility model to incentivize producers to reduce the generation and use of unnecessary packaging materials, and thus lower the overall volume of these materials needing a place for waste disposal. Rules for this new program are currently being developed. As part of this program a statewide needs assessment for recycling will be conducted. This assessment will not be completed until the new program is in place and will likely be completed sometime after 2026. This study, which will be funded by producers of packaging, will provide valuable information regarding gaps in Maine's recycling programs with respect to packaging.

[11] See PFAS Disposal and Destruction Research | US EPA and DEP's website on Treatment and Disposal for PFAS - PFOA and PFOS, Maine Department of Environmental Protection.

2. Current Understanding of Maine's Waste Streams

This section of the report will focus on Maine's current understanding of its waste streams. As explained in Section 1, the Department is looking forward to amassing new information about its waste streams so that it can better plan into the future. Until information is obtained from the completed studies, the Department is relying on other sources of existing information including Annual Reports from waste disposal and waste processing facilities, Recycling Establishment Reports, and Municipal Recycling Progress Reports submitted to the Department.

a. Construction and Demolition Debris ("CDD")

Using the existing information listed above, the Department prepares a biennial WGDC Report outlining the waste generated and ultimately disposed of in Maine. Providing a delineation of waste by type and sector is beyond the statutory scope of the WGDC Report, however, the report provides a basic analysis of the following waste streams: MSW, CDD and similar material, SPW, and wood wastes. As shown in Figure 3 below, MSW comprises the majority of waste generated in Maine, followed by CDD, with other materials making up a smaller proportion of the overall waste managed. Also illustrated in the figure is the amount of material that landfill owners received for cover material and other uses by the landfill, which may include a wide variety of permitted materials, including CDD, processing residues from CDD, and other special wastes. As CDD is the second largest category of waste, this Plan will focus on its generation and disposal in more detail. Future addendums to this Plan will incorporate the results and recommendations of the WC Study and the FLWG Study once completed. Figure 3 below includes total Maine-generated wastes disposed within Maine landfills and incinerators, and wastes generated within Maine and exported to out-of-state landfills for disposal. Waste tonnage used as cover material is included as this material also takes up valuable space within landfills.

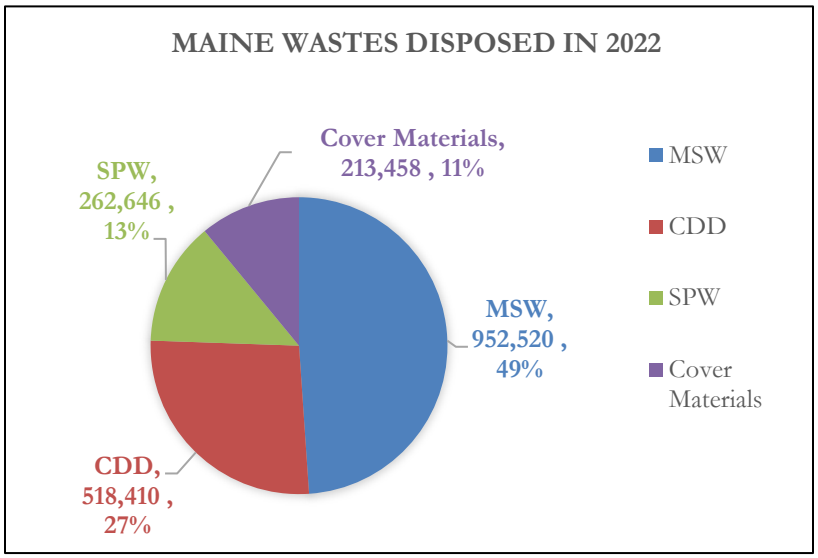
For comparison, while CDD makes up nearly 30% of Maine's waste stream, not including the significant amounts of cover material comprised of CDD, Vermont's 2018 waste characterization study showed that CDD makes up just 16% of its waste.[12] Like Maine, New Hampshire and Vermont are both in the process of conducting waste characterization studies that will be available in the beginning of 2025. Study results from Vermont and New Hampshire will provide a valuable and interesting comparison to the composition of Maine's waste stream.

Several facilities in Maine receive CDD or other wastes and process them to recover materials such as metal, wood chips, or plastics. After processing, much of the residue or waste that cannot be recovered is then sent to disposal facilities. Some of these

[12] See: https://dec.vermont.gov/sites/dec/files/wmp/SolidWaste/Documents/2018-VT-Waste-Characterization.pdf.

processing residues can be used for landfill cover and shaping, while some materials are not suitable for an alternate use within the landfill and must be managed as waste.

Figure 3. Maine Generated Wastes Disposed in 2022



Once processed by a Maine facility, any outgoing material from the facility is considered to be a waste generated within the state.[13] Processing facilities are required to be licensed by the Department. As permitted, these facilities may receive material from both within and outside of Maine as well as send disposal material to facilities within or outside of Maine.

As an example, Table 2 depicts the origin of material received by ReSource Waste Services of Lewiston LLC ("ReSource Lewiston") and WIN Waste Innovations in Eliot (formerly Aggregate Recycling Corporation), the two largest processing facilities in Maine by volume for 2022. The total amount of material sent to Maine landfills from these facilities in 2022 was 130,580 tons. Tables 3 and 4 specify the destinations of the materials leaving these facilities after processing. There are other smaller processing facilities that operate in a similar manner but are not highlighted here.

[13] Waste generated within the state is defined at 38 M.R.S. § 1303-C(40-A)(C).

Table 2. Origin of Materials Received at Large Maine CDD Processing Facilities in 2022

Facility	ME	MA	NH	CT	RI	Unknown[14]	Total
ReSource Lewiston (Tons)	36,563	87,991	40,123	-	-	-	164,677
% of Total	22%	53%	24%	-	-	-	-
WIN Waste Innovations (Tons)	11,586	6,279	18,552	2	501	20,083	57,003
% of Total	20%	11%	33%	0.004%	1%	35%	-
Total Tons by State	**48,149**	**94,270**	**58,675**	**2**	**501**	**20,083**	**221,680**
Overall % of Total	**22%**	**43%**	**26%**	**0%**	**0%**	**9%**	-

Table 3. ReSource Lewiston Material Disposition

	Recycling (Non-Landfill Use)	Landfill Use (shaping, grading, cover, etc.)	Maine Landfill Disposal	Total to Maine Landfill	Total Tons
Percent of Total Tons by Disposition	9%	44%	47%	91%	-
Amount from Maine[15] (Tons)	3,470	16,331	17,519	33,850	37,320
Proportional Amount from OOS[16] (Tons)	12,158	57,222	61,385	118,607	130,765
Total Tons	**15,628**	**73,553**	**78,904**	**152,457**	**168,085**

[14] These materials were received prior to when the facility began tracking the origin of received material.

[15] The proportional amount for Maine is based on the percent of waste materials received at the facility originally generated in Maine. For example, approximately 22% of the materials received at ReSource Lewiston was from Maine in 2022.

[16] The proportional amount for OOS ("Out-of-State") is based on the percent of waste materials received at the facility originally generated in another state. For example, approximately 78% of the materials received at ReSource Lewiston was from Massachusetts and New Hampshire in 2022.

Table 4. WIN Waste Innovations Material Disposition

	Recycling (Non-Landfill Uses)	Ash Landfill (Ground Cover) - Exported to MA	Maine Landfill Disposal	Total Tons
Percent of Total Tons by Disposition	3%	15%	81%	-
Proportional Amount from Maine[17] (Tons)	429	1,925	10,335	12,689
Proportional Amount from OOS[18] (Tons)	1,716	7,701	41,341	50,758
Total Tons	**2,145**	**9,626**	**51,676**	**63,447**

Materials diverted from a landfill by ReSource Lewiston's processing included 11,572 tons of various materials including CDD wood chips sent for particle board production, plastics, sheetrock, tires, and aggregate sent for fill or further processing. According to the Annual Report submitted to the Department by Resource Lewiston, 73,553 tons were sent to the JRL for shaping, grading, cover, or use in landfill venting systems in 2022. WIN Waste Innovations similarly accepted a larger quantity of materials from other states than from within Maine and sent a larger quantity of waste to Maine landfills than it received from within Maine, as shown in Tables 2 and 4. For example, WIN Waste Innovations received approximately 11,586 tons of waste from Maine in 2022, during which time the facility received approximately 25,334 tons from other New England states, and, prior to tracking the state from which material was received, took in about 19,235 tons of mixed construction and demolition debris and 848 tons of ground asphalt shingles for which the origins are unknown. WIN Waste Innovations took in approximately 57,003 tons of material in total and sent just over 50,000 tons of debris to Maine landfills, with the majority (46,457 tons) going to JRL. In some cases, the amount of outgoing waste or recyclable material reported for a calendar year may be greater than the amount accepted by a facility during that year due to materials that had been stored on-site from the previous year's activity.

b. Problematic Material[19]

Some wastes that are not present in the waste stream in large quantities are still challenging for waste handling, processing, and disposal facilities. These wastes are

[17] The proportional amount for Maine is based on the percent of waste materials received at the facility originally generated in Maine; for example, approximately 20% of the materials received at WIN Waste Innovations was from Maine in 2022.

[18] The proportional amount for OOS is based on the percent of waste materials received at the facility originally generated in another state; for example, approximately 80% of the materials received at WIN Waste Innovations was from Massachusetts and New Hampshire in 2022.

[19] Problematic materials are unwanted materials that are difficult to manage in household and commercial waste such as mercury-containing auto switches, thermostats, and bulbs; rechargeable batteries; and paint. These materials can be challenging to manage due, in part, to their chemical composition, fire potential, or detriment to the environment if spilled.

described in more detail in this section. Some of these waste types are managed through product stewardship programs in Maine, as described in the Department's Annual Product Stewardship Report. Other waste types in this category require more robust handling, processing and disposal measures. Once the WC Study has been completed, the Department may evaluate further whether any special measures should be taken for wastes that fall into this category.

i. Producer Responsibility Programs

Maine currently has product stewardship programs, which aid in diverting the following materials from disposal:

- Mercury auto switches (38 M.R.S. § 1665-A);
- Specific electronic devices (38 M.R.S. § 1610);
- Cell phones (38 M.R.S. § 2143);
- Mercury thermostats (38 M.R.S. § 1665-B);
- Mercury-added lamps (38 M.R.S. § 1672);
- Paint (38 M.R.S. § 2144);
- Rechargeable batteries (38 M.R.S. § 2165); and
- Pharmaceuticals (38 M.R.S. § 1612).

Maine is currently in the process of establishing an Extended Producer Responsibility Program for Packaging ("EPR Packaging Program") to meet the requirements set forth in 38 M.R.S. § 2146. It is anticipated that this program will begin operation in 2026 with municipalities receiving reimbursements for some of the costs related to handling packaging materials in 2027.

ii. Beverage Redemption Container Program

Maine has a returnable beverage container program pursuant to 38 M.R.S. §§ 3101 - 3119, which is a type of product stewardship program as it places some responsibility on entities other than consumers and municipalities to recover materials. All material collected as part of the returnable beverage container program is required to be recycled.

iii. Household Hazardous Waste ("HHW") and Waste Pesticides

In recent years, Department staff have noticed an increase in inquiries about Household Hazardous Waste ("HHW") and Waste Pesticides. HHW is a term used to describe any hazardous waste material excluded from identification as a hazardous waste by 06-096 C.M.R. ch. 850, § 3(A)(4)(vii) because it is generated by households, including single and multi-family residences, hotels and motels, bunkhouses, picnic grounds, and day-use recreational facilities. These materials are exempt from the precautionary handling requirements that apply to commercially generated hazardous waste. Many waste pesticides are banned from landfilling while some are not, meaning that some may be disposed of in a landfill.

Options to manage pesticides and other types of HHW are extremely limited in many regions of Maine. This results in more items being disposed of in Maine's landfills that could be diverted.

For waste pesticides, the Maine Board of Pesticides Control conducts a program each October to collect and properly dispose of banned and unusable pesticides from homeowners and farms. Pre-registration is required, registration numbers are limited, and collections are held at just four sites across the state one day per year, so the program, while important, is limited in scope and capacity.

For HHW, there are only two permanent collection sites open to all Maine residents; however, they are only open on a seasonal basis (not in winter) and are both located in the Southern part of the State (Lewiston and Portland). Disposal at these facilities is expensive and often inconvenient for many Maine residents.[20] While some municipalities provide one-day collection events for HHW, these are not consistent or routine, and due to the costs, many municipalities have ceased holding HHW collection events altogether.

iv. Consumer Electronic Products and Batteries

With the proliferation of consumer electronics, more electronic devices and batteries are making their way into the municipal waste stream, from laptop computers and tablets to vape pens. Many of these products are recycled through Maine's product stewardship program for electronic wastes. Non-covered products are likely to end up in the landfill or to be managed at a waste processing facility. The Department anticipates further information about these types of wastes in the upcoming WC Study and will also be addressing these wastes in the 2024 Product Stewardship Report.

III. Waste Reduction, Diversion, and Recycling Assessment

A. Laws Addressing Recycling and Diversion Goals

Maine has several relevant laws addressing recycling and waste diversion. 38 M.R.S § 2101 establishes a Solid Waste Management Hierarchy to be used as guiding principles in decision-making for the management of solid waste. 38 M.R.S. § 2101 sets forth an integrated approach to solid waste management with waste reduction as the highest priority, followed by reuse, recycling, composting, waste processing to reduce waste volume including waste-to-energy, and landfilling as the management option of last resort. 38 M.R.S. § 2101-B, the Food Recovery Hierarchy, provides additional guidance on the management of food waste within the context of the Solid Waste Management Hierarchy. It prioritizes reducing surplus food generation at the source, donating surplus food to feed hungry people, diverting food scraps for use as animal

[20] Fee structures vary from $3.50 per pound or $6.50 per gallon to $33-$40 per unit, depending on the facility and whether the person dropping materials off is part of a municipality that has arranged for reduced fees.

feed, composting of food scraps and diversion to waste utilization technologies to create fuels and recover energy, and finally, incineration or land disposal.

Additionally, Maine's laws have established specific recycling and waste reduction goals including:

- 38 M.R.S. § 2132(1) A goal to recycle or compost50% of the MSW tonnage generated each year within the State by January 1, 2021.

- 38 M.R.S. § 2132(1-B) A goal to reduce the statewide per capita disposal rate of MSW tonnage to 0.55 tons disposed per capita by January 1, 2019 and to further reduce the statewide per capita disposal rate by an additional 5% every 5 years thereafter. This incremental goal of reducing waste by 5% every 5 years provides a mechanism to measure progress at the municipal level.

- 38 M.R.S. § 2133(1-A) Municipal responsibilities for meeting the goals above. Municipalities are not required to meet the state recycling goal in 38 M.R.S. § 2132, but they must *demonstrate* reasonable progress toward that goal, and the Department shall *determine* reasonable progress. While reasonable progress is not specifically defined in statute, the Department notes that the goals set in statute are used as criteria for determining progress.

It is important to clarify that composting, anaerobic digestion, and any waste reduction, reuse, or recovery of materials to prevent them from becoming waste is considered a municipal diversion effort. For example, communities hosting repair cafés or annual yard sales may use the estimated diversion amounts from such events to support their traditional recycling program or other established municipal programs to divert materials from disposal. This information may be reported by a municipality in their Municipal Recycling Report.

38 M.R.S. § 2133(7) outlines reporting requirements for municipalities to provide data to the State for evaluating progress toward the goals outlined above. Municipalities are required to report biennially on forms provided by the Department, on their solid waste management and recycling practices. The biennial report must identify the options available to residents and businesses within the municipality for managing solid waste, including any provisions for the separate management of reportable recyclable materials and organic waste and the disposal of other MSW, including CDD.

B. Reducing the Amount of Waste Generated

The Department's 2019 Plan identified that market conditions for solid waste management in Maine created significant drivers that worked against managing wastes higher up Maine's Solid Waste Management Hierarchy. Today this is still true. Simply put, it is expensive to start up a program where specific waste materials are separated out from other waste streams for recovery, even if such a program has the potential to save money and conserve disposal capacity in the long run. Additionally, given the constraints for the Department as discussed later, landfilling material is still currently the less expensive option. Table 5 below outlines Maine's progress toward waste reduction goals.

Table 5. Assessment of Progress Towards Per Capita Waste Reduction Goal

Maine MSW Disposal vs. Goal	2022
Tons MSW Generated and Disposed	952,520
Pounds MSW Generated and Disposed	1,905,039,782
Population	1,385,340
Tons per Capita	0.69
Pounds per capita	1,375
Tons per Capita Disposal Reduction Goal	0.55
Tons per Capita Short of Goal	(0.138)
Pounds per Capita Short of Goal	(275)
Per Capita Pounds Disposed per Week	26
Per Capita Pounds Disposed per Day	3.8

It is important to distinguish between waste generation and waste disposal. Waste generation includes the generation of all waste materials, even materials that are diverted from disposal and managed through an alternate pathway such as recycling or composting. These materials are still a waste that has been generated and requires management, but there is significant potential to improve processes and provide economic incentives to recover the resources in waste. Managing waste sustainably reduces the extraction of virgin natural resources, and often the energy use and other impacts related to extraction, processing, and transport of natural resources to produce new products.[21]

When we dispose of an item, we may not consider the waste that was generated in that item's production, or the resources that were consumed to produce the item. A way to better grasp the complete impacts of our waste is to consider the full lifecycle of goods, from resource extraction, processing and energy and water use to emissions. For example, disposing of food is a waste of the resources that go into producing food, including agricultural land, water, pesticides, fertilizers, and energy. The production, transport, storage, and other management of food generates significant greenhouse gas emissions that are wasted when the food goes uneaten. Surplus food or food scraps that end up in landfills generate methane, a potent greenhouse gas.

Capturing surplus food and food scraps prior to entry into the disposal pathway provides an opportunity to reduce reliance on disposal options while providing Maine's communities with an opportunity to prevent hunger or reuse these valuable nutrients to enrich soil while reducing greenhouse gas emissions.

EPA's Waste Reduction Model ("WARM")[22] is a tool designed to compare waste management scenarios, such as landfill or incineration of materials versus recycling, composting, or anaerobic digestion, to determine the potential greenhouse gas emissions reductions, energy savings, and economic impacts from different waste management practices. The WARM tool can also be

[21] https://www.epa.gov/warm/basic-information-about-waste-reduction-model-warm.
[22] The WARM tool may be accessed online at https://www.epa.gov/warm.

used to compare diversion activities higher up the waste and food recovery hierarchies, including food rescue, reuse, and waste reduction. Using Maine-specific data and a high-level summary of 2022's diversion activities, Table 6 provides an estimate of the greenhouse gas emissions reductions related to Maine's statewide food rescue, recycling, composting, and anaerobic digestion activities.

The WARM tool provides the estimated greenhouse gas emissions reductions in Metric Tons of Carbon Dioxide Equivalents ("MTCO2E"), along with a simple equivalent measure to understand the environmental impact by translating the metric tons of carbon dioxide into the equivalent avoided emissions of passenger vehicles[23] driven for a year.[24]

Table 6. Estimated Greenhouse Gas Reductions Based on 2022 Diversion Activities

Diversion Pathway (Compared to Landfill Disposal)	Greenhouse Gas Emissions (MTCO2E) Reduction[25]	Equivalent Annual Passenger Vehicle Emissions	Tons of Material Diverted from Disposal	Greenhouse Gas Emissions (MTCO2E) Reduction Per Ton Diverted
Food Rescue[26]	16,082.26	3,414.49	3,829.75	4.20
Traditional Recyclables	526,858.83	111,859.62	188,061.20	2.80
Scrap Metal Recycling	1,110,367.07	235,746.72	251,975.14	4.41
Compost (Food/Yard Waste)	2,742.26	582.22	7,663.77	0.36
Anaerobic Digestion	11,561.46	2,454.66	21,520.57	0.54
Total/Average (per Ton)	**1,667,611.87**	**354,057.72**	**473,050.43**	**3.53**

Traditional recyclables included in the scenario above include typical household packaging and paper, such as cardboard, paper, glass, beverage containers, plastic jugs, tubs, and film, and metal cans. The "food waste" and "yard trimmings" categories were used to calculate emissions reductions related to composting. The "food waste" category was also used to model food rescue, with a 1-3% (used 2% as the average) loss rate factored in, as per the EPA WARM tool guidance. The food rescue tonnage data sources are limited, and this tonnage data comes from just a few large chain retailers for which information was readily accessible by the Department. It is likely the actual food rescue quantities are significantly greater. The food wastes diverted via

[23] Passenger vehicles are defined as 2-axle 4-tire vehicles, including passenger cars, vans, pickup trucks, and sport/utility vehicles. The WARM tool is based on average U.S. vehicle mileage of 11,520 miles per year and a weighted average fuel economy of 22.9 across all vehicle types. See EPA's reference page for details: https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references#vehicles.

[24] The WARM tool is not intended to be used as a Greenhouse Gas Emissions annual inventory tool as it reflects the full lifecycle of a waste. See the EPA Life-Cycle GHG Accounting Versus GHG Emissions Inventories fact sheet for details: https://www.epa.gov/sites/default/files/2016-03/documents/life-cycle-ghg-accounting-versus-ghg-emission-inventories10-28-10.pdf.

[25] Modeling in WARM is comparing diversion to landfill disposal.

[26] This includes food donation as well as animal feed donated to farms; uses that still resulted in the food being consumed rather than managed as waste.

anaerobic digestion include milk and brewery wastes, food waste, and other source-separated organics; the food waste category was also used to model their diversion in the WARM tool.

1. Recycling Assessment

Table 7 presents Maine's current recycling rate, including a breakdown of CDD and MSW disposition during 2022.

Table 7. MSW and CDD Disposition During 2022

Maine MSW Disposition	**Tons**
Maine MSW landfilled in state	515,474
Maine MSW disposed via waste-to-energy	382,609
Maine MSW disposed of out-of-state	54,437
Subtotal Maine MSW (exclusive of CDD) Disposed	**952,520**
Paper; cardboard; plastic, metal, and glass containers, textiles; and white goods recycled	188,061
Other MSW recycled (ferrous and non-ferrous scrap metal, and vehicle batteries)	255,142
Estimates for MSW reused (textiles, packaging, etc.)	9,523
Reported food rescue (food donation for human consumption)	3,565
Reported food rescue (animal feed)	1,223
Reported MSW composted (includes yard waste and food scraps, food processing waste; does not include backyard composting and <60 yds^3/month)	7,664
Anaerobic digestion (not including non-food commercial wastes such as de-icer, distillate or fats, oils, and grease)	21,521
Subtotal Maine MSW Reused, Rescued, Recycled & Composted/Digested	**486,698**
Total Maine MSW (exclusive of CDD)	**1,439,218**
Maine's MSW Recycling Rate (exclusive of CDD)	**33.8%**
Maine CDD Disposition	**Tons**
Mixed CDD disposed of in-state	505,282
Mixed CDD disposed of out-of-state	13,128
Processed CDD sent to a landfill for daily cover, shaping, and grading	76,664
Processed CDD recycled into new wood products	7,589
Processed CDD beneficially used as fuel	6,842
Subtotal Maine CDD recycled & beneficially used as fuel	14,431
Total CDD generated	609,506
Maine's CDD Recycling Rate (all non-landfill uses)	**2.37%**
Total MSW & CDD generated	2,048,723
Total MSW & CDD disposed (includes materials used in landfill for cover, shaping, and grading)	1,547,594
Total MSW, CDD, and organics recycled and composted (including wood waste used as fuel chips)	501,129
Maine's Combined MSW, CDD & Organics Recycling Rate	**24.46%**

The global economic impacts from changes in recycling policies discussed in our 2019 Plan[27] continue to have a lingering effect on recycling in the United States and across the world. Generally, recycling outlets continue to require higher quality bale specifications than in years past, which results in materials recovery facilities needing to invest more time and labor in sorting single-stream recycling to create bales of materials acceptable to available markets.[28]

The changed economics of recycling have caused many municipalities in Maine to consider curtailing or eliminating their programs. Some communities have faced steep increases in costs for recycling services from private sector companies. When these costs are greater than the cost of disposal some are opting to suspend recycling services, at least until recycling is less costly than disposal. As shown in Table 8 below, there is much greater variability and higher costs associated with recycling than with disposal fees for MSW or CDD.

Decreased market values have caused some towns that operate facilities which collect source-separated materials to stop collecting mixed plastics, redirecting this recycling stream to disposal. For example, in 2022 only 176 municipalities out of nearly 500 submitted recycling progress reports. Approximately 130 indicated that they offer some form of recycling program, but these vary greatly in terms of what materials can be recycled from a cardboard-only drop-off program to curbside recycling for commingled materials.

Table 8. Municipal Costs Reported for Recycling and Disposal

Cost Comparison Per Ton - Recycling vs. Disposal[29]				
	Recycling (Hauling)	**Recycling (Processing)**	**Disposal (MSW)**	**Disposal (CDD)**
Min	$55.00	$ -	$0.50	$17.00
Max	$900.00	$384.00	$225.00	$225.00
Median	$391.43	$85.00	$82.70	$95.86
Average	$440.80	$99.25	$86.90	$96.64

2. Current Diversion Programs

Maine has two programs that are specifically designed to assist with waste diversion; the Solid Waste Diversion Grant Program ("Waste Diversion Grant Program"), and the recently enacted EPR Packaging Program.

The Waste Diversion Grant Program provides grants to public and private entities to assist in the development, implementation or improvement of programs, projects, initiatives or activities designed to increase the diversion of solid waste from disposal in the State. The

[27] See the 2019 Plan update for additional information: https://www.maine.gov/dep/publications/reports/index.html.
[28] See: https://resource-recycling.com/plastics/2022/04/06/study-national-sword-increased-us-landfilled-plastic/.
[29] The majority of municipalities specified the tip fee per ton. For municipalities that did not specify, it is assumed that the amount they provided is the tip fee rather than the total cost.

Department offers these grants twice annually. The Department seeks proposals that will take advantage of regional economies of scale to increase organics management and recycling infrastructure in underserved areas of the state; promote waste reduction through reuse, repair and sharing economy initiatives (i.e., tool lending libraries or other equipment sharing programs); reduce wasted food through donation or other sharing initiatives; expand the types of materials managed through composting, recycling, and reuse; and address a statewide need.

The EPR Packaging Program's goal is to divert packaging material from disposal towards recycling and reuse. Producers of products will pay into a fund based on the amount and recyclability of packaging associated with their products. These funds will be used to reimburse municipalities for eligible recycling and waste management costs, make investments in recycling infrastructure, and help Maine citizens understand how to recycle. This program is currently in development and is expected to be operational in 2026 with the first payments to municipalities anticipated in 2027.

Aside from Maine's new EPR Packaging Program, most of the other product stewardship programs the Department administers handle waste materials that pose challenges for disposal rather than materials that make up a large portion of the waste stream. Not counting the EPR Packaging Program, there are currently eight active product stewardship programs administered by the Department.

Generally, the Department would benefit from a better understanding of municipal roadblocks to diversion programs and welcomes public feedback on the items below, which include comments received during the course of stakeholder meetings and written comments received for consideration in this Plan.

3. Steps to Assist with Waste Reduction and Increase Recycling Opportunities

The Department currently lacks in-depth knowledge about precisely what is in Maine's municipal solid waste stream, which makes it challenging to come up with an effective and comprehensive plan to divert waste materials by type. The statewide WC Study and FLWG Study will provide a great level of detail regarding what materials are being managed as waste, which will in turn allow the Department to prioritize materials for diversion.

IV. Determination of Existing and Potential Disposal Capacity

A. Increasing Need for Disposal Capacity

Over the past five years since the previous Plan update, Maine residents, businesses, and institutions have generated roughly 1,700,000 to nearly 1,900,000 total tons of waste per year, averaging approximately 1,790,000 tons for the five-year period. This accounts for all types of waste generated within the state, such as MSW, CDD, SPW, and cover materials that are often comprised of processed waste materials, and while necessary, still take up valuable landfill space (see Table 9). This total also includes waste generated within the state that was exported outside of Maine for disposal.

Table 9. Maine Generated Wastes

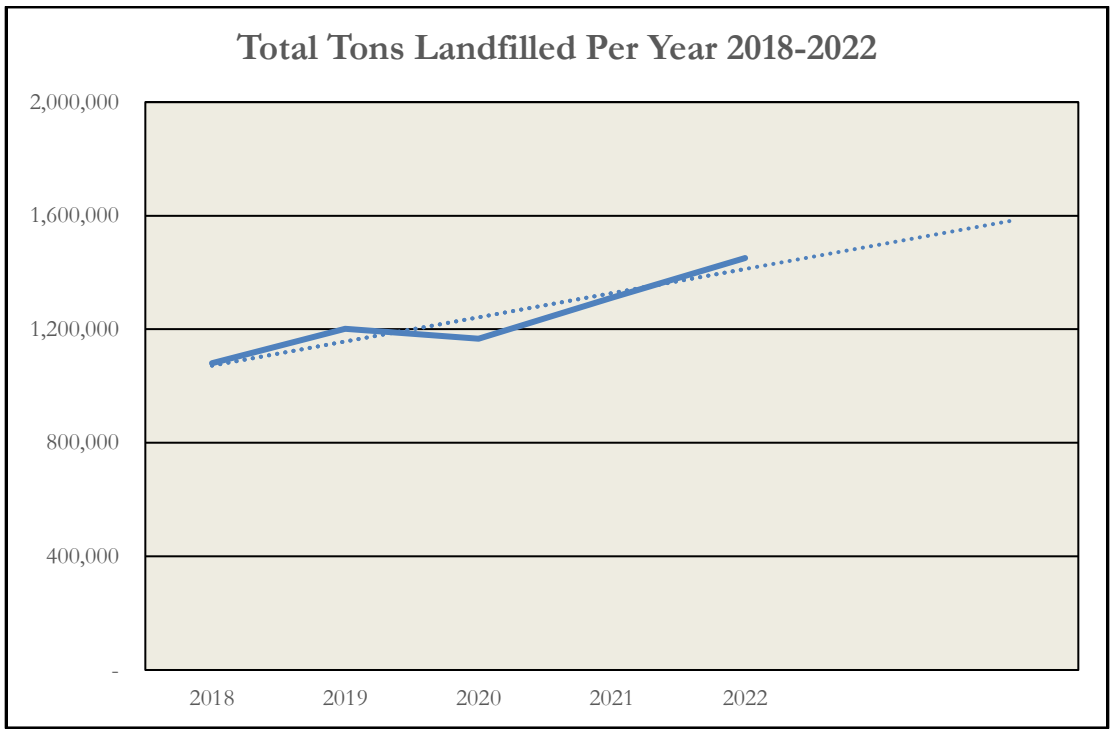
Year	MSW Landfilled[30]	MSW Incinerated	CDD Landfilled	SPW Landfilled	Cover Landfilled	Total Disposed
2018	388,629	434,652	485,362	244,706	145,128	1,698,477
2019	423,408	420,687	446,135	257,216	217,679	1,765,126
2020	498,013	441,804	461,299	308,309	153,665	1,863,089
2021	535,648	365,941	474,805	284,866	161,113	1,822,373
2022	569,911	382,609	518,410	262,646	213,458	1,785,505

The annual amount of waste generated within the state has increased by an average rate of 1.3% per year in the past five years, with a change of 5.1% when comparing 2018 to 2022. Using the year with the highest amount of waste generated during the past five years (2020) and the current rate of increase in waste generation (5.1%), the Department estimates that Maine will generate approximately 1,960,000 tons of waste in 2029, 2,060,000 tons in 2034, 2,160,000 tons in 2039, and 2,270,000 tons in 2049.

Since 2018, the total amount of waste landfilled, including the minimal amount of waste shipped to out-of-state landfills, has grown even more significantly by 34.28%. When comparing 2018 to 2022, the rate of increase was 7.8% annually. This is most likely due to several factors including: the idling of the waste-to-energy facility in Orrington; the idling of the Hampden waste processing facility, and the resultant shift of waste and recycling from those communities (as is discussed later in the report); the increase in WWTP sludge being landfilled due to the sludge land application ban; and the increase in CDD and other similar wastes being generated. Figure 4 reflects Maine-generated waste disposed in Maine landfills only.[31]

[30] This total includes Maine-generated MSW exported to landfills located in other states or Canada.
[31] This figure does not include out-of-state waste accepted at the Crossroads Landfill.

Figure 4. Total Tons of Material Landfilled in Maine from 2018-2022



Maine has eight landfills currently accepting MSW, three waste-to-energy incinerators, and one MSW waste processing facility (now called Municipal Waste Solutions). These facilities are briefly described below, including the average amount of waste received over the five-year period since the previous Plan was published.

Since generators and haulers will seek to find the most cost-effective disposal facility for their material, MSW is treated as a commodity by waste disposal facilities (including landfills and incinerators). Landfill operators will take into account market conditions for various wastes and their ability to use waste as cover material. Therefore, estimates of capacity or life beyond 5 to 10 years may not be accurate, as the volume of material accepted at a given facility can vary significantly from year to year as generators and haulers seek more cost-effective facilities and landfills change their operations. As transportation of waste is a significant factor in the overall cost of waste management, the locations and size of waste management facilities should be considered as a part of statewide waste management decision making. Figure 5 provides the location of these waste disposal facilities.

Figure 5. Landfills and Waste-to-Energy Facilities Accepting MSW in Maine

B. Current Waste Disposal and MSW Processing Facilities

1. Waste-to-Energy Facilities

There are three waste-to-energy incinerators in Maine: ecomaine in Portland, Mid-Maine Waste Action Corporation ("MMWAC") in Auburn, and the Garbage Recycling and Clean Energy facility ("GRACE")[32] in Orrington. However, the Orrington waste-to-energy facility hasn't incinerated waste since May 2023 and has bypassed significant amounts of waste due to maintenance issues over the past several years. It has instead been sending its waste for landfilling or storing it on-site. The GRACE facility will likely require significant investment to restart operations. All three waste-to-energy incinerators are licensed to accept both in-state and out-of-state waste. The total amount of waste accepted by these facilities in 2022 is shown in Table 10, and their annual licensed capacity in Table 11. The two operational waste-to-energy facilities are currently meeting their air quality emission standards and are being operated and maintained in accordance with applicable State laws, rules and Department licenses. Future capacity of these facilities is expected to remain stable, as currently licensed and constructed. As can be seen when comparing the charts, the two currently operating waste-to-energy facilities are operating at levels near their licensed capacity.

Table 10. 2022 Solid Wastes Managed by Maine's Waste-to-Energy Facilities by Origin

Facility	Maine MSW	Recycling Residue	Other Waste	Total Maine Tons	Out-of-State Waste (NH & MA)	Total Tons
ecomaine	183,654	3,2789	4,962	191,894	1,879	193,774
MMWAC	83,603	-	4,004	87,607	-	87,607
GRACE	98,162	-	4,946	103,108	547	103,655
Totals	**365,419**	**3,2789**	**13,912**	**382,609**	**2,426**	**385,035**

[32] GRACE purchased the Orrington Waste-to-Energy facility (formerly called Penobscot Energy Recycling Corporation) in November 2023.

Table 11. Available Licensed MSW Disposal Capacity at Maine's Waste-to-Energy Facilities

Waste-to-Energy Facilities	Annual Capacity	2020	2025	2030	2035
Tons/year					
MMWAC	70,000	70,000	70,000	70,000	70,000
ecomaine	170,000	170,000	170,000	170,000	170,000
GRACE[33]	310,000	210,000	210,000	210,000	210,000
Total Capacity	**550,000**	**450,000**	**450,000**	**450,000**	**450,000**

With the waste-to-energy facility in Orrington not currently operating, approximately 210,000 tons of capacity has been lost. The majority of this material has been diverted to the JRL. As will be discussed in more detail further in this Plan, efforts to restart the Orrington waste-to-energy facility are currently underway, which would reduce the volume of waste going to Maine landfills.

2. Landfills

There are eight landfills that are licensed and currently operating that accept MSW or "MSW bypass," which is defined as MSW originally destined for a facility but diverted due to temporary capacity issues (i.e., during maintenance activities). Of these eight, six are municipally owned, one is owned by the State but managed by a contracted operator, and one is commercially owned and operated (Waste Management Disposal Services of Maine, or "Crossroads Landfill"). Also, there are 19 smaller landfills operated by municipalities that accept wood waste and CDD, and a small secure landfill that in addition to wood waste and CDD accepts WWTP sludge and other special wastes. Additionally, two municipal landfills (Rockland and Mid-Coast Solid Waste Corporation landfill in Rockport) accepted MSW during their operational history but now only accept nominal amounts of CDD, and one (Rockland) is in the process of closing and will soon no longer accept any material.

There are approximately eight generator-owned landfills that are associated with a specific manufacturing facility which are licensed to take waste only from that facility. Since the wastes disposed at these generator-owned landfills are specific to those facilities, they are not discussed in the Plan.

The amount of material each landfill accepted annually since the previous Plan was published is detailed in Table 12. The eight landfills that accept MSW or MSW bypass are

[33] GRACE's original design capacity was 310,000 tons per year which is the capacity of its two boilers operating full time. In 2020, GRACE changed its boilers' operating time, resulting in an operational reduction in waste incineration capacity to 210,000 tons annually. It is unknown whether the new owners will operate at the design capacity of 310,000 tons/year once the facility is restarted and fully operational.

discussed below, with an average amount of material the landfill received annually during the last five years. It should be noted that of the eight landfills, two, JRL and Crossroads Landfill, receive the majority of material, JRL accepting 52% and Crossroads Landfill accepting 27% of the total amount of waste landfilled in Maine. Additionally, Crossroads Landfill, as a privately owned and operated commercial landfill, can and does accept waste from out of state. The total amount of waste managed at Maine's landfills for the past five years is shown in Table 12 and illustrated in the pie chart that is Figure 5. The amount of material disposed in these landfills since the 2018 report has grown by 34.28%.

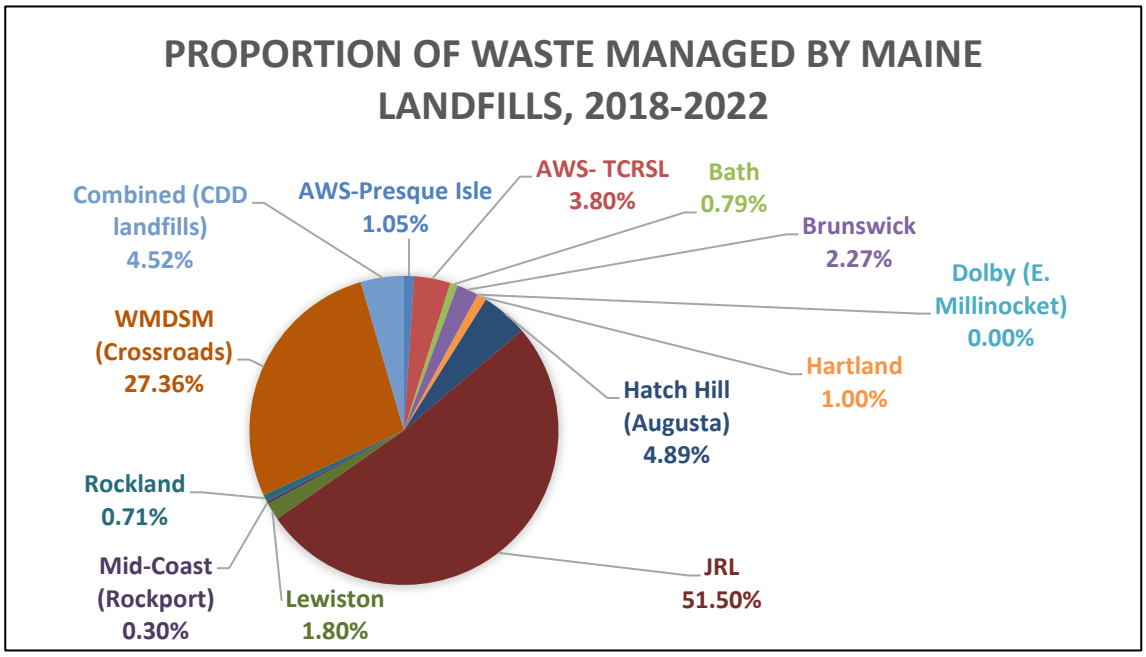
In most cases, the landfill capacity used and capacity remaining is calculated by the facility from annual physical surveys of the landfill. Therefore, capacity estimates include capacity that may have been gained by the landfill through settlement of previously disposed waste as well as capacity used by waste that was utilized as daily cover.

Landfills are frequently licensed to use a specific waste material as alternative daily cover ("ADC"). As examples, in 2020, 2021, and 2022, Crossroads Landfill used the following wastes as ADC: processed utility poles, crushed glass, CDD wood chips, ashes, contaminated soil, WWTP sludge, auto shredder fluff and some other special wastes. During the same three-year period, JRL used CDD fines and processing residues and wood as ADC. JRL is also licensed to use other wastes as ADC including ashes and contaminated soils. Some of the wastes suitable for cover, and other types of waste such as bulky wastes, are also utilized for stabilizing material like sludge. Table 12 outlines the total amount of all material that was received by these landfills for either disposal, use as ADC, or other useful purpose by the landfill. However, the ability to use material for landfill operations and for stabilizing sludge does require a more nuanced view of waste disposal. Since JRL received over 50% of material landfilled in Maine, JRL will be discussed later in more detail.

Table 12. Total Amount of Material Landfilled

Total Amount of Material Landfilled in Tons at Municipal, Commercial and State-Owned Landfills Includes MSW, CDD, and SPW (and ADC)					
	2018	2019	2020	2021	2022
AWS - Presque Isle	11,320	23,604	25,699	32,111	15,502
AWS - Fort Fairfield	41,087	29,139	37,080	31,079	47,381
Bath	8,585	7,578	5,389	15,859	23,412
Brunswick	24,580	25,062	3,966	458	-
Dolby (East Millinocket)[34]	-	-	-	416	-
Hartland	10,797	12,166	17,622	10,861	4,336
Hatch Hill (Augusta)	52,819	51,211	53,745	52,289	53,723
JRL (Old Town)	556,446	624,121	672,570	726,192	933,653
Lewiston	19,419	559	17,419	17,000	17,445
Mid-Coast (Rockport)	3,283	2,910	4,694	2,006	2,629
Rockland	7,642	1,712	6,069	18,260	1,288
WM Crossroads (Norridgewock)	295,621	370,203	263,265	332,038	301,175
Combined (CDD Landfills)	48,856	52,922	59,508	72,450	50,307
TOTAL	**1,080,456**	**1,201,187**	**1,167,026**	**1,311,015**	**1,450,850**

Figure 6. Maine Landfill Tonnage by Percent Managed



[34] Dolby is a state acquired landfill that served the papermills in Millinocket and East Millinocket that stopped accepting waste in 2021.

a. Hatch Hill, Augusta

The Hatch Hill Landfill is owned and operated by the City of Augusta. In addition to the landfill, the City of Augusta also operates a transfer station at the facility and operates as a regional solid waste facility for eight other communities. Over the past five years, Hatch Hill has received an average of approximately 52,757 tons of waste per year and is expected to reach its currently licensed capacity in approximately four to five years at current fill rates. The City of Augusta plans to apply for a vertical increase, which, at current fill rates, would provide an additional 12 to 15 years of capacity for approximately 500,000 tons of material. The City plans to submit this application to the Department in 2024 and hopes to begin construction in 2026. The City has also discussed the possibility of putting a cap on how much waste is landfilled annually if the vertical increase is constructed.

b. Presque Isle and Fort Fairfield Landfills

The Presque Isle and Fort Fairfield (formerly called Tri-Community Recycling & Sanitary Landfill) Landfills are both owned and operated by Aroostook Waste Solutions ("AWS"). AWS is operating the landfills in a manner that will reduce redundancy and provide AWS with waste disposal options for the next 40 years. Over the past five years, both landfills have received an average of approximately 29,400 tons of waste per year. The Presque Isle Landfill stopped receiving waste in 2023 and will be temporarily closed with an interim cover while AWS diverts all waste intended for landfilling to Fort Fairfield. At current waste generation rates, the Fort Fairfield Landfill is expected to provide AWS with disposal capacity until approximately 2041. After the Fort Fairfield Landfill reaches capacity, it will be permanently closed and AWS will reopen the Presque Isle Landfill, which is expected to provide an additional 17 years of disposal capacity.

c. Bath Landfill

The Bath Landfill is owned and operated by the City of Bath. It receives waste from Bath and 15 to 20 surrounding municipalities. It has received an average of 12,165 tons of material annually over the past five years, and at current fill rates is expected to reach capacity in approximately 21 years.

d. Lewiston Landfill

The Lewiston Landfill is owned and operated by the City of Lewiston. Although licensed to accept MSW, currently the Lewiston Landfill has chosen to only accept ash from the MMWAC in Auburn and smaller amounts of special waste such as grit and screenings from various sewage treatment facilities, crushed glass, and CDD. It has received an average of 14,368 tons of material annually over the past five years, and at current fill rates is expected to reach capacity in 33 years. The City of Lewiston has recently approached the Department to discuss the potential landfilling of sludge from

the Lewiston-Auburn Water Pollution Control Authority. The City intends this to be a contingency plan in case other disposal outlets are not available or feasible.

e. Crossroads Landfill, Norridgewock

The Crossroads Landfill in Norridgewock is owned and operated by Waste Management, a private company. As a privately owned and operated commercial landfill, it receives waste from outside Maine in addition to in-state waste. Over the past five years, Crossroads has received an average of approximately 312,460 tons of waste per year and was previously expected to reach constructed capacity in 2024. However, an expansion has recently been approved and Waste Management began using the expanded area in 2023. This expansion is expected to add approximately 7,757,000 cubic yards of additional capacity and expand the life of the landfill by 17 years.

f. Juniper Ridge Landfill, Old Town

The Juniper Ridge Landfill ("JRL") is owned by the State's Department of Administrative and Financial Services Bureau of General Services ("BGS") and is operated by Casella Waste Systems, a private company. JRL is licensed to accept MSW when it is bypassed ("MSW bypass") from the three Maine waste-to-energy incinerators and the Municipal Waste Solutions MSW waste processing facility in Hampden (discussed later in this report) and front-end processing waste generated by a waste-to-energy incinerator. It also accepts a variety of special wastes such as sludge, CDD and CDD processing residue, some of which it utilizes as daily cover and as a bulking agent for other wastes as discussed later in the report. It has received an average of 702,597 tons of material annually over the past five years. JRL has approximately five years of remaining capacity and has just initiated the licensing process for a proposed future expansion by submitting a Preliminary Information Report ("PIR").[35] JRL's history and waste disposal trends will be discussed in greater detail in Section IV(C) of this report.

g. ecomaine Landfill, Portland

In addition to its waste-to-energy incinerator, ecomaine operates a landfill for disposal of its incinerator ash. It previously received baled MSW before the incinerator began operation. A small portion of the landfill is used to temporarily store MSW during summer periods of higher waste generation, and the stockpiled MSW is then incinerated during periods of lower incoming waste volume. ecomaine occasionally sends MSW bypass to Crossroads or to JRL. The ash landfill has received an average of 46,832 tons of material over the past five years and is estimated to have over 50 years of capacity at current disposal rates.

[35] Required under 06-096 C.M.R. ch. 401, § 1(E).

3. MSW Processing Facility

Municipal Waste Solutions, LLC ("MWS") and the Municipal Review Committee, Inc. ("MRC") own an MSW processing facility in Hampden which is designed to process 650 tons per day of MSW from 115 municipalities that are part of the MRC. However, due to financial and technical issues that developed during construction and start-up, the facility only operated for a short period of time and has been idle since May of 2020, requiring the waste to be bypassed.

Until April 2018, MSW from the MRC municipalities was disposed at the waste-to-energy incinerator in Orrington. When construction of the waste processing facility was not completed by April 2018, MRC redirected the MSW from its member communities to the privately-owned Crossroads Landfill. MRC had negotiated an exclusive contract with Crossroads Landfill for the disposal of "bridge capacity" and bypass waste during construction, start-up, and initial operation of the facility, as applicable. Through a waste swap agreement that addressed logistical waste handling constraints to minimize waste transportation distances, some waste from the MRC communities was also diverted to JRL. Subsequent to this, some of this waste destined to be landfilled was also diverted to the waste-to-energy facility in Orrington to promote higher priority uses on the state's waste management hierarchy.

The waste from the MRC communities is still being bypassed to Crossroads Landfill or to JRL. Since April 2019 when the processing facility began accepting waste, some of the municipalities contracted to deliver their MSW to the Hampden waste processing facility began altering their recycling methods to utilize the Hampden facility's sorting process, reducing or eliminating recycling programs that separated out recyclable material from household trash. Since the recyclable portion of the waste was not collected separately or sorted out from the trash, it has been landfilled, although a small portion of recyclable material delivered to the Orrington waste-to-energy facility was pulled out from the mixed MSW before incineration.

The MRC formed Municipal Waste Solutions, LLC ("MWS") in 2022 for the purpose of purchasing the processing facility. It purchased the processing facility in 2022, and in 2023, sold 90% of the membership interest in MWS to Innovative Resource Recovery. MWS has been working on a plan for facility improvements and currently expects to restart the facility by early 2025. Until the MWS facility is fully operational for a complete calendar year, it will not be possible to assess whether the amount of bypass and processing residue resulting from its operations will significantly alter the amounts of solid waste destined for landfilling.

4. Materials Recovery Facilities

It should be noted that two materials recovery facilities ("MRFs") operate in Maine. A MRF is a facility that processes single stream recycling materials to be sold to end buyers. ecomaine operates a MRF in Portland, and Casella operates a MRF in Lewiston. These facilities are also an integral part of Maine's solid waste infrastructure.

C. Juniper Ridge Landfill's Role in Maine's Waste Disposal Arena

As shown in Figure 5 above, the State-owned Juniper Ridge Landfill has received slightly over 50% of all waste material landfilled in Maine since 2018. Given its significant role in waste management in Maine and the fact that it is a State-owned resource, the Department has provided the following information regarding its history and role in waste management for the State to assist with decision making.

P.L. 1989, Chapter 585, *An Act to Promote Reduction, Recycling and Integrated Management of Solid Waste and Sound Environmental Regulation* established a comprehensive framework for solid waste management in Maine. Included were provisions that established the Solid Waste Management Hierarchy, a ban on new commercial disposal facilities, public sector responsibility for ensuring disposal capacity for MSW, and state authority to develop and operate state-owned solid waste disposal facilities. These provisions were intended to provide the State with tools to encourage diversion of solid waste from landfilling and minimize the need for the development of additional landfill capacity.

Since the enactment of this law, the State has established ownership of three licensed landfills: the yet-to-be-developed Carpenter Ridge Landfill with a design capacity of 1.8 million cubic yards, the inactive Dolby Landfill in East Millinocket which is in the process of final closure, and JRL in Old Town. When obtained by the State, the licenses for each of these landfills were focused on providing disposal capacity for special wastes associated with the paper mills that operated them at the time. In April 2004, the State, acting through the State Planning Office, received a license amendment (Department License #S-020700-WD-N-A) that provided for the acceptance of additional waste types at JRL (then known as the "West Old Town Landfill" or "WOTL"), including: front-end process residue ("FEPR") from the then-owned PERC and the Maine Energy Recovery Company ("MERC") waste-to-energy incinerator in Biddeford (now closed); oversized bulky wastes ("OBW"); MSW bypass from any waste-to-energy incinerator located in Maine; CDD; ash from any waste-to-energy incinerator located in Maine; and water/wastewater treatment sludge. Finding of Fact 13 in that license states that "[t]he yearly quantity of solid waste to be accepted at the landfill is not expected to exceed 540,000 tons per year." This amount is inclusive of up to 50,000 tons per year of mill wastes from the Old Town papermill, 120,000 tons of FEPR and 70,000 tons of ash from two waste-to-energy incinerators (then operating PERC and MERC), and 190,000 tons of CDD. In December 2013, WOTL (now known as JRL) was licensed (Department License #S-020700-WD-BC-A) to accept up to 81,800 tons of non-bypass MSW generated in Maine into its existing permitted landfill area. This amendment was sought to provide a temporary alternative (through March 31, 2018) for disposal of MSW generated in municipalities that had been sending their MSW to the MERC facility in Biddeford prior to it ceasing operations in December 2012. In June 2017, the State, acting through BGS received approval for a 9.35-million-cubic-yard expansion. In 2018, the approval to accept up to 81,000 tons of non-bypass, in-state MSW was extended through March 31, 2020, to account for the near-term uncertainty in disposal capacity due to operational adjustments at the Orrington waste-to-energy facility and the delay of operations of the MSW waste processing facility in Hampden.

The data show significant changes in the types of waste being landfilled at JRL in 2022 compared with 2012. There has been a substantial drop in FEPR and MSW incinerator ash due

to the closure of the MERC facility and the curtailing of operation at the Orrington Waste-to-Energy facility, as well as industrial WWTP sludges and papermill wastes due to the closure of the papermills in Old Town and Lincoln. However, the fill rate at JRL has climbed due to significant increases in the disposal of MSW and more recently municipal WWTP sludge. For example, MSW increased from 729 tons in 2012 to 283,683 tons in 2022 and CDD[36] increased from 369,069 tons in 2012 to 485,298 tons in 2022. Likewise, the disposal of municipal WWTP sludge from 53,023 tons in 2018 to 94,271 tons in 2022 has also increased the fill rate at JRL. Although waste volumes fluctuate year-by-year, the overall trend is a marked increase in material accepted for disposal.

Much of the large volume of CDD landfilled at JRL comes from processing facilities located in Maine. Although 38 M.R.S § 1310-N(11) prohibits the disposal of waste generated from out of state directly into state-owned waste disposal facilities, it allows "waste generated within the State" to include "residue and bypass generated by incineration, processing and recycling facilities within the State," all of which may include waste originating from locations out of state before it gets to the processing/recycling/incineration facilities. Notably a significant amount of Maine's CDD originates in Massachusetts due to a ban on the disposal of CDD in Massachusetts.[37] This has resulted in a large volume of out-of-state CDD being processed by waste processing facilities in Maine with the processed fines being placed in the landfill as shaping, grading or alternative daily cover materials, and residual CDD being disposed of into JRL as in-state waste.

To better address the issue of JRL using up capacity to accept wastes that are not originally generated in Maine, the legislature enacted several requirements for processing facilities. First, the definition of "waste generated within the state" under 38 M.R.S. § 1303-C(40-A) was modified. Under this definition, the total weight of residue generated in a calendar year by a solid waste processing facility that is disposed of or otherwise placed in a solid waste landfill in that calendar year cannot exceed the total weight of the solid waste initially generated in state for processing at the facility. Any excess residue generated by that facility is not considered waste generated within the State. In addition, 38 M.R.S. § 1310-N(5-A)(B)(2) requires that all processing facilities that generate residue for disposal must recycle at least 50% of the CDD they accept. In doing so these facilities are allowed to count the following toward recycling: "reuse of waste as shaping, grading or alternative daily cover materials at landfills; aggregate material in construction; and boiler fuel substitutes." Once this 50% goal is met, the processing facility is then required to demonstrate that of the material characterized as recycled, at least 50% of it must have been recycled or reused "other than being placed in a solid waste landfill," unless the processing facility qualifies for specialized criteria allowing for alternative percentages under 38 M.R.S. § 1310-N(5-A)(B)(2)(a-e).

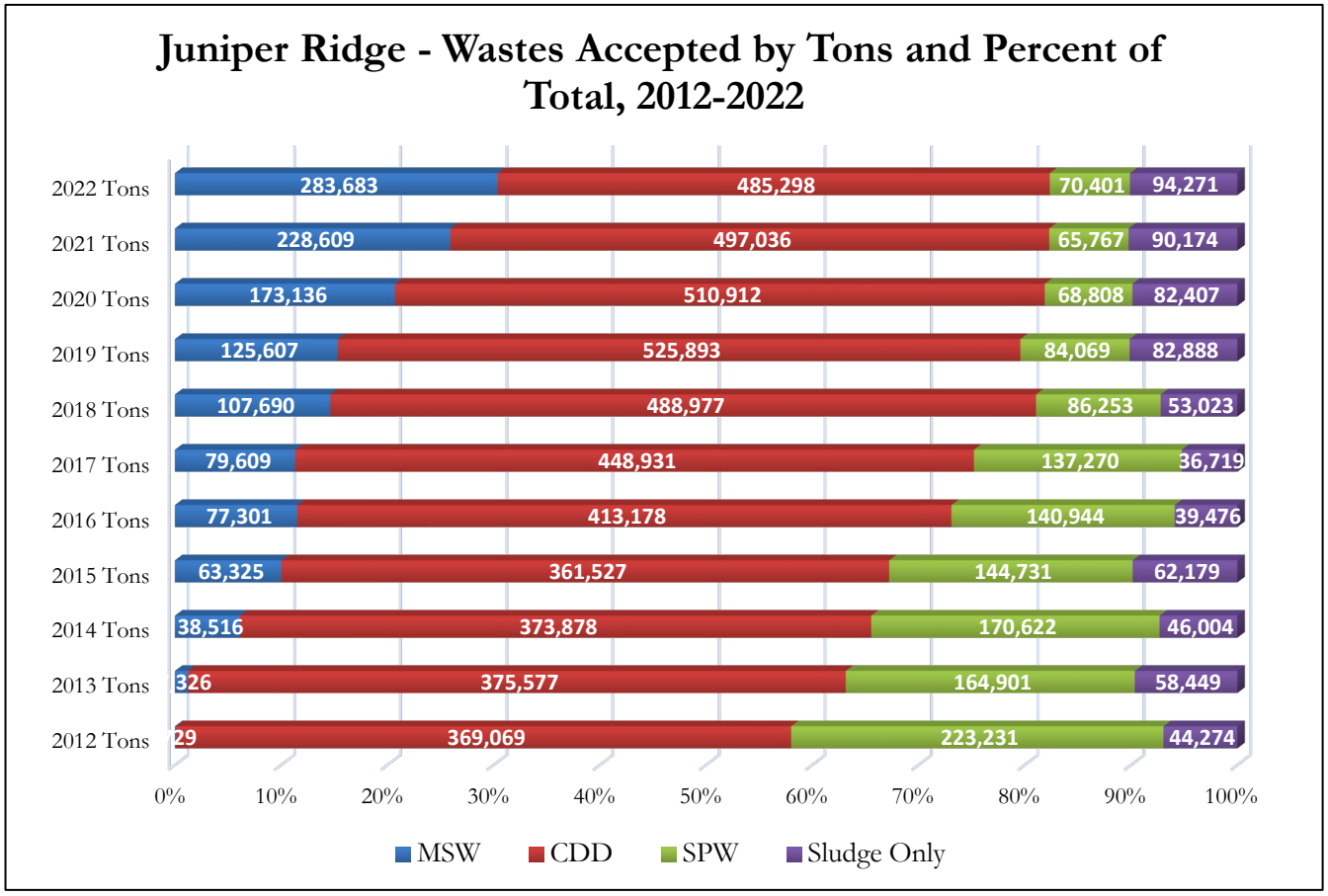
[36] These numbers may be higher than those reported in the past as they include a more complete array of construction and demolition debris and processing residues: OBW, wood, mixed CDD, CDD processing residue and fines, mixed MSW/CDD processing residue, and crushed glass.
[37] https://www.mass.gov/doc/frequently-asked-questions-construction-demolition-materials-waste-ban/download.

The discovery of PFAS in municipal WWTP sludges and other sludge-derived products banned from land application in Maine have made JRL the landfill of choice for final disposition of this material, which has had a significant impact in recent years on its capacity. Beginning in August 2022, most municipal WWTP sludge generated in Maine was disposed of at JRL. The physical nature of sludge makes landfill disposal challenging and can affect both the short-term and long-term stability of a landfill. Stabilizing materials need to be mixed with the sludge, adding an additional volume of material for disposal and taking up valuable landfill space. CDD, CDD residue and other similar material, and OBW have been utilized as bulking material for stabilization. These additional bulking materials compounded by sludge volumes have shortened the timeframe by which JRL is expected to reach its maximum capacity.

While Crossroads Landfill also takes sludge from Maine's WWTPs (albeit a smaller volume), it also has concerns about the quantity of sludge it takes in relation to moisture and the need for operational stability. As a result, Crossroads Landfill has determined the best path forward to maximizing capacity is to invest in sludge drying. Sludge can be dried to reduce its volume and its need for bulking agents for stability. On September 15, 2023, Crossroads Landfill submitted an application to the Department for a waste processing (sludge drying) facility which, if approved, will be licensed to receive approximately 200 tons of municipal WWTP sludge daily, greatly reducing the overall volume of this waste stream for disposal down to roughly 50 tons. The dried material will then be landfilled without the need for significant bulking materials. The proposed new facility is planned to run on heat pump technology and utilize the biogas generated at the nearby landfill, reducing the energy demand needed for processing sludge. This model, if successful could serve as a model or prototype for other facilities accepting WWTP sludge including other landfills. Investing in sludge dewatering facilities and/or focusing on PFAS treatment and destruction technology as identified in the Bureau of General Service's Study to Assess Treatment Alternatives for Reducing PFAS in Leachate from State Owned Landfills may be a far more sustainable option in the long run than continuing to landfill larger amounts of CDD in order to accommodate landfilling of sludge. The current trajectory of sludge and CDD disposal encourages the expansion and use of landfilling, and without alternative options, Maine's landfills will likely fill up more quickly than originally planned for.

The following figures provide an overview of waste material types received at JRL and how they have changed over the past 10 years. Figure 7 provides an outline of waste material types as a percentage of total waste received per year since 2012, Figure 8 provides an outline by tonnage received per year since 2012, and Figure 9 provides an overview of total amount of waste received by tonnage and percentage since 2012.

Figure 7 – Wastes Accepted at Juniper Ridge Landfill by Percent of the Total Accepted [38]



[38] While sludge is a special waste, this graph depicts it as its own category pulled out from the rest of the special waste (SPW) to show the sludge as a percent of the incoming wastes over time.

Figure 8. Wastes Accepted at Juniper Ridge by Tons and Type

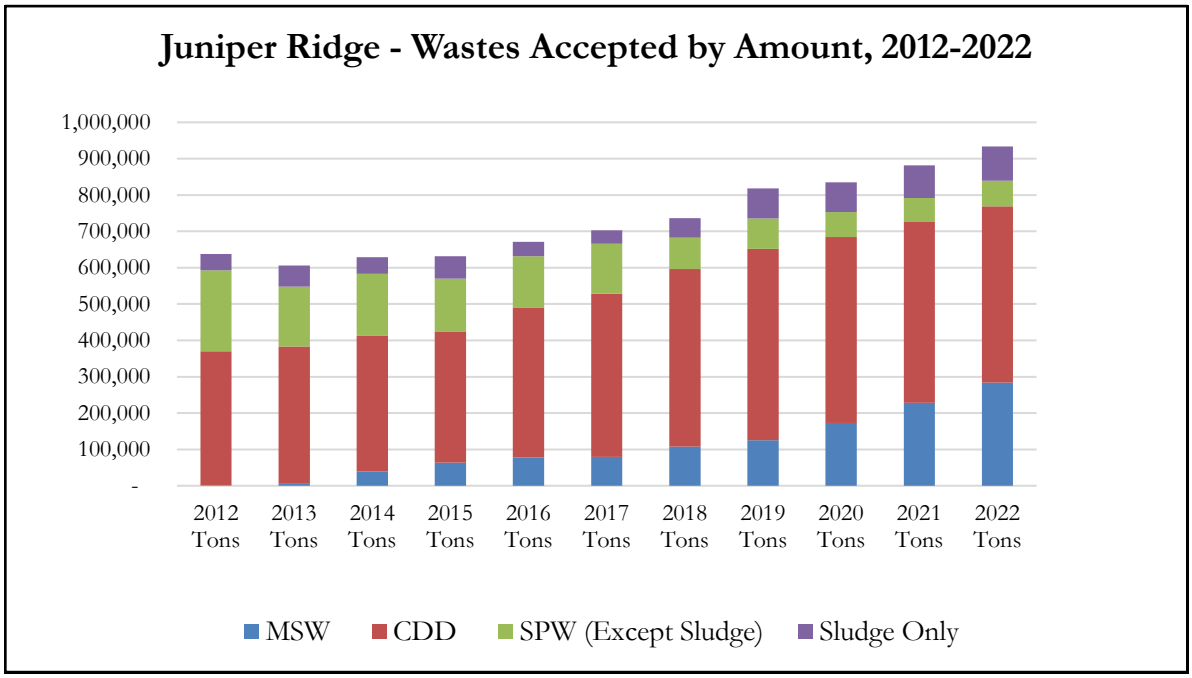
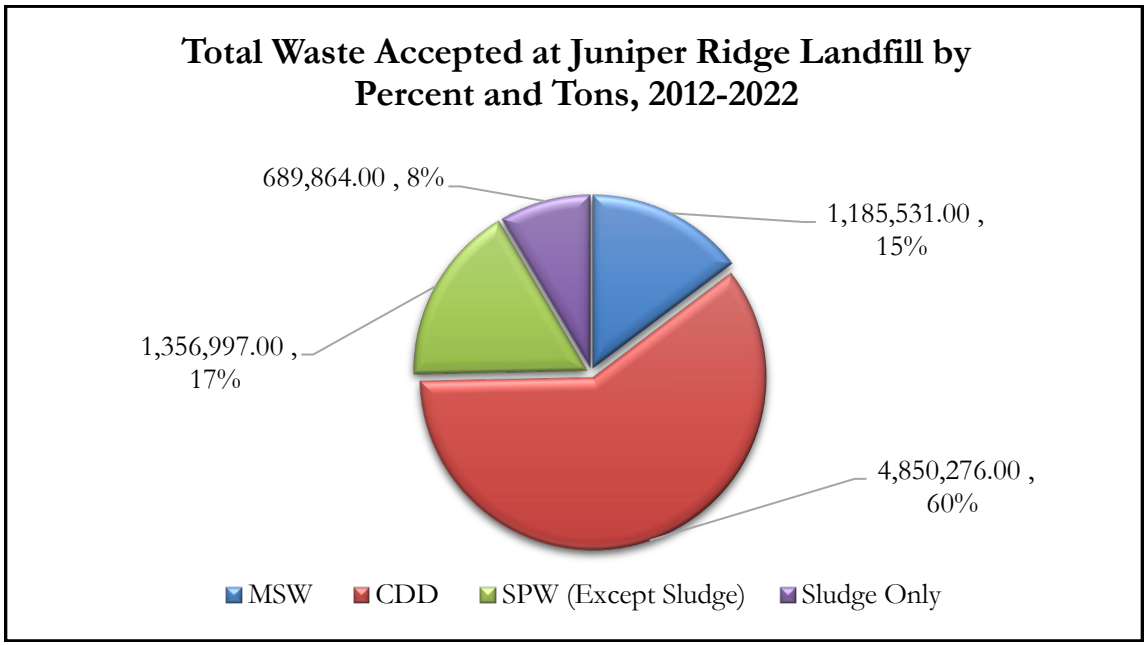


Figure 9. Total Tons Accepted at Juniper Ridge by Percent 2012-2022



While not intentional, JRL has in effect become Maine's fastest and most economical solution for handling emerging solid waste issues. Given the increasing quantities of wastes being landfilled at JRL, expansion of this landfill is a critical solution that will be necessary in addition to proactive steps to increase waste infrastructure options as well as enhancing efforts toward meeting statutory waste reduction, diversion, and recycling goals. Difficult decisions will need to be made about the overall purpose and use of this state-owned landfill, how to maximize its capacity and lifespan, whether to invest in alternative infrastructure for waste disposal at other locations, and how market pressures can be modified to encourage waste diversion programs.

D. Projected Demand for Capacity

Currently, there are significant gaps in Maine's Eastern Maine region for managing MSW. Investment activity[39] focused on restarting both the idled Orrington waste-to-energy incinerator and the Hampden solid waste processing facility are underway, but uncertainties remain with regard to, operating timeframes, financial barriers, and long-term capacity. Should either of these facilities begin operations, the concerns about how to cost effectively manage MSW in the region should ease. However, at the current time MSW is bypassing from both facilities going directly to landfills. JRL will likely continue to be the recipient of most of this MSW stream over the next few years as it is closest in proximity to the region impacted (logistics and transportation make this more cost effective). It should be mentioned that both of these facilities while currently operating do fall higher up on Maine's solid waste management hierarchy.

Statewide, other than the issue specific to Maine's Eastern Maine region, Maine appears to have adequate capacity for at least 10 years before several landfill facilities reach their capacity. This assumes however that an expansion license application is both received by and approved by the Department for the JRL facility. As of the date of this report, the Department has received a PIR from JRL for a future expansion.[40] The loss of JRL as a disposal facility would create catastrophic capacity issues as it receives over 50% of all material landfilled in Maine annually. If JRL moves forward with its application for an expansion, the projected capacity at current fill rates would most likely add an additional 15 to 20 years, which at the earliest brings it to being at capacity once again in 2042.

Even with capacity available statewide for the next 10 years, unless significant progress is made in ensuring that the state has existing or new infrastructure for waste processing and disposal, as well as enhancing waste diversion programs, landfill capacity will become an even more pressing issue in 15 years. For example:

- If the application for expansion for the Hatch Hill Landfill is approved, Hatch Hill will reach its estimated capacity in 12 to 15 years. This means that as early as 2035, Maine will lose approximately 50,000 tons of waste disposal capacity.

[39] The new operators taking over the Orrington waste-to-energy incinerator have renamed the facility, "Garbage Recycling and Clean Energy" or "GRACE" and plan to resume full operation of the facility. See: https://www.bangordailynews.com/2023/11/27/news/bangor/orrington-trash-incinerator-restart-operations-joam40zk0w/.

[40] In the past licensing for the JRL facility from start to finish has taken approximately six years.

- Crossroads Landfill is expected to reach the capacity of its recent expansion in 17 years, putting its operations until about 2040. This will substantially impact Maine's waste disposal capacity as this landfill accepts on average about 300,000 tons annually (although some of this comes from out-of-state).

- Bath Landfill is expected to reach capacity in 21 years, allowing its operations until 2044. The loss of the Bath Landfill will have a relatively minor impact to Maine's overall waste disposal capacity, as that landfill receives only approximately 12,000 tons of material annually.

- The loss of the Hatch Hill and Bath landfills, in particular, will impact disposal options for the Central Maine region in about 15-20 years.

As with all of these landfills, landfill operators can extend the life span of their landfill by turning away or not accepting wastes. This will pose additional challenges to generators of solid waste who may need to seek alternative disposal outlets which may be farther away and cost more to access. These costs likely will be passed on to municipalities in most cases, which in turn will pass costs on to Maine residents.

To extend operating time to Maine's existing landfills, it is important not just to evaluate landfill expansions, but also to consider how to bring new or licensed but non-operating facilities online more quickly. This is a critical need as it currently takes several years from the beginning of the licensing process to the end when construction and operation are allowed to take place. Long-term disposal capacity is a significant and valid concern. With the exception of Aroostook County, which appears to have landfill capacity for a minimum of 40 years, it is clear that if considerable reduction in the amount of material going to landfills is not achieved, or unless new technology and infrastructure is brought online in multiple locations in Maine, a sizeable portion of Maine's landfill capacity will be gone within 20 years. Maine's increases in waste generation as discussed in Sections III and IV above, indicate that this timeframe could be even shorter. Costs related to hauling MSW, CDD, recycling material, salvageable material, compostable food waste, and other waste streams are a significant portion of the overall cost for the management of this material, in addition to its greenhouse gas emissions impacts. These costs will likely be passed on to Maine residents and communities.

As Maine evaluates adding new infrastructure and enhancing existing waste diversion programs, it is important to consider locating facilities near areas where waste material is generated, utilizing regionalization, and implementing "hub and spoke" models for transferring waste material to make hauling more efficient and cost effective. In addition to practical issues associated with managing an increased amount of waste over time and maximizing existing and new infrastructure, it is important to recognize that many waste streams that could be diverted are being disposed of because disposal is often the lowest cost option. There is a clear need for a market readjustment to incentivize more sustainable materials management to maximize long-term disposal capacity and increase efficiencies in our management of materials.

V. Stakeholder Input Summary

The Department has encouraged public input on the contents of this Plan update as well as the direction of future materials management efforts by holding five public meetings across the State in Aroostook, Washington, Penobscot, Kennebec, and Cumberland counties. The meetings were held both in person and online to encourage participation. Meeting recordings were posted on the Department's website and written comments were accepted by email. Attendance at each of the meetings ranged from five to approximately twenty participants. The Department received nine written comments submitted through email.

Discussion was encouraged by a series of prepared questions specific to current materials management practices as well as broadly scoped questions regarding desired improvements. Not surprisingly, discussion ranged from logistical issues of a more local or regional nature to issues common to the State at large. Issues identified as common across the State included lack of drop-off locations for materials covered by current producer responsibility programs, lack of feedback on municipal reporting, and inconsistent availability of public information regarding programs and best practices to manage various discarded materials. Reliance of the state on meeting waste capacity needs through disposal rather than diversion efforts was a common concern. Additionally, participants discussed a desire for the Department to increase its efforts in communication in many of the aspects of waste management, from increasing information availability on individual facilities to providing information on recycling opportunities and handling problematic materials.

A. General Concerns of Maine's Waste Management System

Overall, a consensus emerged supporting greater effort in the top two tiers of Maine's Solid Waste Management Hierarchy; reduce and reuse. While waste reduction may be the hardest to measure, it remains the highest priority. Reuse is more tangible and yields a myriad of positive impacts. Examples of reuse candidates mentioned by attendees included pellet bags (deposit), refillable beverage containers, water dispensers in lieu of bottled water, 1-lb. propane canisters (refillable in CA, MA, RI), repair cafés (already emerging around the state), tool libraries (sharing), and reuse stores.

In each of the five public forums held, the Maine Waste Management Agency (and after 1995, the State Planning Office) ("MWMA/SPO") were both mentioned for the fact that they no longer exist, and the bulk of their tasks were not picked up by the Department or other agencies. Attendees discussed how the MWMA/SPO was a driving force in bringing "reduce, reuse and recycle" into common parlance throughout the state from the late 1980s on. It not only administered a robust grant funding program for waste infrastructure throughout the state, but it also tracked progress toward overall waste reduction goals set by the Legislature through staff providing a high level of assistance to municipalities in filing annual reports to MWMA/SPO. Staff were tasked with not only seeing that each individual facility's recordkeeping was adequate and reports were filed on time but, perhaps most importantly, providing feedback to the facility managers regarding shortfalls and best management practices.

A significant number of those attending stakeholder meetings expressed a degree of angst regarding the future of JRL, the incinerator in Orrington, and the long-delayed waste processing facility in Hampden. It was recognized that currently, landfilling and waste-to-energy

incinerators are the foundation on which all else in waste management rests. A concern was expressed that materials diverted from landfilling by successful recycling and other diversion efforts will be replaced at JRL with wastes sourced from out-of-state.

The different levels of waste management services provided by the municipalities throughout the State was another topic of concern. Rural Maine has become a mosaic of differing collection programs from one town to the next. While all municipalities and unorganized areas have some sort of household waste disposal option, not all municipalities have a robust recycling program, and some offer no recycling at all. As a result, many communities do not have the necessary infrastructure to participate in longstanding producer responsibility programs to allow for free or reduced-cost collection of e-waste, mercury-containing light bulbs and thermostats, architectural paint and rechargeable batteries. Further, some rural communities have signed onto expensive curbside collection programs with little consideration for collaboration with neighboring towns. Without collaboration, duplicative efforts within a region lead to less-than-optimal costs and greater vulnerability to market changes. It also makes determining whether a program is successful in terms of recycling and waste diversion difficult.

Concern was expressed that vertically integrated private companies have gained disproportionate control of waste management and recycling services, particularly in rural areas. This appears to be a common issue when municipalities approach such services on an individual rather than a regional manner, as there is less leverage to negotiate contract terms and prices. When opting out of collaborative regional transfer stations, municipal flexibility, control, and choice are more limited. Attendees also expressed concerns that small, independent towns are forced into restrictive or predatory-appearing contracts for transport, recycling, processing, and disposal due to lack of true competition for such services.

B. Solutions Suggested to Maine's Waste Management System

Attendees at the public meetings proposed several recommendations for addressing waste management issues, as discussed below.

1. Promote regionalization for new, more efficient waste transfer and recycling facilities.

Whether at the county level or as a result of nearby municipalities working together, it was discussed that regional facilities could provide more sophisticated governance over service contracts as well as offering expanded services to residents that curbside programs cannot manage and small municipalities may struggle to offer on their own.

2. Facilitate universal waste and other problematic waste collection in new regions.

E-waste, mercury-containing items, paint, and rechargeable batteries have long been collected in some areas of the State, but due to lack of collection locations, these programs are not readily available to all. Municipalities could be collection points, but many choose not to. In place of developing a collection facility in each rural municipality, a central collection facility for neighboring rural communities would be more efficient and could be as simple as placing one or more properly sized shipping containers (or a similarly sized storage container) in a host community, with oversight and controlled access to ensure the site is used for its intended

purpose. Oversight of a collection location could be under a fire department, town office, or public works department. Such programs could be developed with funds dispersed through the State's Waste Diversion Grant Program. Program creativity could expand such a collection system to include other recyclables or organics, as well as offering information kiosks regarding programs and opportunities for sustainably managing wastes.

3. Clearly prioritize regionalization and boost funding for Maine's Waste Diversion Grant Program.

While the current grant program has been quite successful at awarding organics diversion grants up to $40,000 per grantee, there was a concern expressed that there have been few proposals to fund regional solutions in rural areas. It was also suggested to consider streamlining grant applications for regional organizations, which, along with municipalities, are designated as the highest priority in the awarding of funds under 38 M.R.S. § 2201-B.

4. Phase in mandatory food waste recycling with incremental requirements.

A strong desire was expressed to start phasing in a mandatory food waste recycling program. While sufficient infrastructure is not currently in place for collection, transportation, and processing of organics, a phased approach to preventing wasted food and recycling food scraps will allow for planning, investment, and implementation over a period of time that would allow successful regional programs to develop. Attendees noted that participation in such diversion programs needs encouragement beyond simply being informed of its benefits. It was also noted that Vermont, New Hampshire, Massachusetts, Rhode Island, and Connecticut all have some sort of mandatory organics recycling or food waste disposal bans in place.

5. Broaden battery collection to include a larger array of batteries.

Attendees pointed out that the market is moving towards electric powered tools and yard equipment, reducing use of fuel and the related GHG emissions from combustion-powered tools. However, lower quality tools may be treated as "disposable" (rather than repairable) and often end up, batteries attached, in landfills or at recycling facilities where they can cause fires, endanger workers, and waste valuable resources. Attendees suggested that a deposit at the point of purchase or an expansion of the current rechargeable battery stewardship program would be a reasonable starting point to address this important safety risk and improve the recovery of critical minerals contained within batteries and the devices and tools they power.

6. Promote deconstruction of buildings over demolition.

To address the concern regarding the amount of CDD being placed in landfills, attendees discussed incentivizing salvaging and reuse. Attendees noted that CDD consumes a lot of landfill space. Utilizing salvageable materials from construction and demolition sites has the potential to lower demand for virgin materials, conserve higher quality materials, make affordable recovered materials available for reuse, and create local jobs. Deconstruction

provides a significant tax benefit when a property is correctly appraised,[41] and could be further encouraged through educational material for property owners, local ordinances, municipal tax credit programs, or the establishment of a directory for services and purchasable salvaged materials.

7. Discourage single-use food service ware and promote reusable alternatives.

Attendees discussed a desire to develop a grant program or a revolving loan fund specific for commercial and institutional reuse programs, such as washing equipment to scale up reuse programs on a regional basis. Restaurants and schools utilize large quantities of single-use food service ware, mostly made of plastics, for takeout and cafeterias. The useful lifespan of single-use plastic items averages just 15 minutes,[42] and its carbon footprint is significant for such a limited use item. If a school with 500 students (the average school size in the U.S.) replaced what is perceived to be a more sustainable option, such as compostable food containers with reusable food service ware, it would prevent 6,786 pounds of waste annually and the corresponding reduction in carbon dioxide emissions would be equivalent to taking nearly 800 cars off the road.[43]

8. Develop a field task force for materials management.

It was noted that the former MWMA/SPO employed a trained team that would review commercial and industrial facilities and institutions to make informed, situation-specific recommendations on waste reduction, reuse, and recycling. Attendees expressed interest in rekindling a similar program that would also train any interested and qualified parties to conduct such reviews. The data collected by this team could be used to develop a directory to post no longer needed materials generated in northern New England that could add value to another process, identifying and expanding the potential for industrial symbiosis.[44]

9. Right to Repair to encourage industry to produce repairable, durable goods.

Many attendees lamented that durable goods are not so durable anymore, and that greater public education focused on purchasing repairable, durable goods has significant potential to reduce how much waste is generated through the consumption and disposal of poor-quality goods. Possible steps identified to tackle this issue included use of a repair rating for durable products, or the development of an income-based rebate system for purchases of long-lasting, durable goods that are repairable. Such an index exists in France[45] and provides an existing baseline, although certain products available in the U.S. may not be rated by the French repairability index.

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[41] See: https://www.thegreenmissioninc.com/assets/deconstruction-material-and-property-appraisal-issues-in-22.pdf and https://www.thegreenmissioninc.com/assets/appraiser-appraisal%20updated-article.pdf.
[42] See: https://www.qld.gov.au/environment/circular-economy-waste-reduction/reduction/plastic-pollution/single-use-plastics-guide#:~:text=Single%2Duse%20plastics%20have%20helped,usable%20lifespan%20of%2015%20minutes.
[43] Vanderlip, C. (2023, January 3). School cafeterias use tons of single-use containers that go to landfill. Here's how to change that. *Fast Company*. https://www.fastcompany.com/90828505/school-cafeterias-single-use-packaging-waste-circular-economy-reuse.
[44] See: https://nordregio.org/nordregio-magazine/issues/industrial-symbiosis/what-is-industrial-symbiosis/.
[45] See: https://www.indicereparabilite.fr/.

10. Education of youth to instill environmental awareness around waste management, recycling, and reuse.

It was discussed that many people do not understand how the waste management system works, even though everyone contributes waste to it. Education in schools about such systems and the environmental impacts of materials management would be useful. The Maine Climate Hub already provides multiple relevant lessons.[46] To help support further development and inclusion of materials management curriculum for K through 12, attendees suggested providing funding or grants for continued development of grade-appropriate environmental science material related to waste management.

11. Improve collection of household hazardous waste statewide.

Lack of HHW collection was a major concern and attendees would like to see permanent collection points in each county for HHW. It was mentioned that Vermont recently passed a stewardship program for household hazardous waste and suggested that Maine should consider a similar program.

12. Streamline municipal reporting.

Several attendees discussed that, from the municipal perspective, the current transfer station and municipal recycling progress reports and reporting systems are repetitive and inefficient. Streamlining reporting will allow for more efficient data collection, management and analyses and streamline the process of making data available to the public to aid in decision making for waste management.

13. Citizen input and participation.

Several attendees articulated a desire for the State to create and fund staff for a Citizens Advisory Group to act as a review and information outlet for waste management issues.

VI. Future Strategies

The Department is looking forward to evaluating data once its comprehensive assessments are completed. The Department anticipates these studies will provide the data necessary to target the components of the waste stream that will be most impactful toward reaching Maine's recycling and waste diversion goals. The Department will then be able to make recommendations regarding Maine's infrastructure for recycling, composting, diversion efforts, processing and disposal, and also for appropriately managing municipal WWTP sludge.

The strategies below are based on the information available at the time of the publication of this Plan and include input from the public. While the Department does not have enough information at this time to provide recommendations, the Department has observed some strategies that are worth considering right away. These include:

[46] See: https://maineclimatehub.org/.

1. Evaluating the concept of subsidies for waste-to-energy incinerators, anaerobic digestion facilities, or other facilities/processes that can reduce the volume of waste requiring landfilling. Subsidies could be structured either to incentivize construction or expansion of facilities or to subsidize the cost of managing materials/processes other than landfill disposal.

2. Coordinating or partnering with the Finance Authority of Maine for tax incentives or low-interest loans, as available, to develop infrastructure for waste diversion.

3. Considering statewide unit-based pricing, also known as "pay as you throw" to make disposal costs more equitable and provide a financial incentive to reduce waste and increase recycling.

4. Creating subsidies or assistance for food rescue for businesses and other generators or food scrap collection for municipalities.

5. Strengthening participation in existing product stewardship programs for safer, more affordable materials management across the state.

Maine-specific concepts identified by the Department during the stakeholder meetings:

1. Provide additional assistance to municipalities in meeting recycling and waste diversion goals by highlighting reimbursement to municipalities and funding for infrastructure development through the EPR Packaging Program as well as existing opportunities through the Waste Diversion Grant Program.

2. Incentivize reuse, repair, refill, in reducing overall waste generation and the need for prioritizing these actions to conserve resources and reduce emissions while acknowledging the need for and importance of continuing to support and build out infrastructure for recycling and composting.

3. Increase education efforts and cooperative work on reuse, refill, waste reduction, recycling, organics management.

4. Encourage regionalization between municipalities and counties through subsidies. Regional systems could form a "hub and spoke" model for more efficient handling and transportation. Regional facilities could receive subsidies to accept all recyclables, universal waste, and take responsibility for one collection event for HHW, electronics, and other problematic material.

5. Encourage or make requirements for lessors of multifamily housing to provide for the collection of recyclable waste and not force renters to just dispose of wastes.

6. Encourage expansion of "right to repair" to increase the life span of consumer products. Since December 2022, New York, Minnesota, Colorado, and California have passed right to repair bills covering electronics, appliances, and agricultural equipment.

Future planning must also take into account the rural nature of much of Maine. Waste management costs are dependent on economies of scale, whether it be hauling material, processing, or disposal. The more material collected, and the more people serviced, the lower per capita costs will be. The relatively low population density of portions of the state generally drives up the per capita costs for

providing services to those areas. The State may need to provide incentives in order to entice waste facilities and operators to locate in and provide services to portions of the state with lower population densities. Not doing so will create underserved areas of the state compared to more populous areas.

VII. Conclusions

As shown by the data presented in this report and in the Waste Generation and Disposal Capacity Reports published by the Department since the previous Plan update in 2019, Maine has not been making progress towards reaching its waste diversion and recycling goals. The amount of MSW and CDD Maine generates annually has increased, the amount of waste material Maine is landfilling has increased, and the rates of recycling and waste diversion has remained, at best, stagnant in some areas of the state and has decreased in others.

Additionally, Maine has lost capacity in regard to waste-to-energy options due to the idling of one of its three waste-to-energy incinerators. If the facility is not successfully restarted, the permanent loss of that facility would further limit disposal options in Maine. Although Maine's landfill capacity appears adequate for the next 15 years (assuming that the JRL facility is licensed for expansion), after that time period landfill capacity will be quite limited. The only secure spot in Maine's waste arena in terms of capacity is the Northern Maine area, in which AWS appears to have adequate landfill capacity for its regional population for at least 40 years.

The Department anticipates a significantly improved understanding of Maine's waste stream once the aforementioned WC Study, FLWG Study, and Biosolids Study are completed and evaluated. As an example, the Department anticipates that textiles, which have been identified as the fastest growing waste stream in the country,[47] will also be noted as a material of concern in the composition of Maine's MSW stream. The WC Study will provide clear data regarding how much of Maine's waste stream is comprised of such material currently, and target diversion efforts. While it is clear that further action is needed to ensure that Maine's waste reduction and recycling goals are met, and that Maine maintains long-term disposal capacity for waste that needs to be disposed, gathering and analyzing the data being generated by these studies is imperative for sound and economically driven decision making moving forward.

One issue that is apparent from the currently available data is that approximately one-third of the volume of material landfilled in Maine is CDD, CDD residue, wood waste, and other similar material. While some of this material is utilized by the landfill as cover material and other uses such as bulking material for municipal WWTP sludge, much is also being landfilled. Steps should be taken to further reduce the amount of CDD being generated, increase diversion and recycling, and assure when landfilling is necessary that advantageous use of this material at the facility is maximized (i.e., as cover and bulking), minimizing the amount placed in landfills merely as waste. Repurposing of CDD also holds significant economic opportunity, with the potential to support new education pathways, as well as job growth and a new avenue for small businesses.

[47] See: https://nvlpubs.nist.gov/nistpubs/SpecialPublications/NIST.SP.1500-207.pdf.

The cost of transportation has been mentioned in stakeholder meetings as a major factor in materials management around the state for both waste disposal and diversion programs such as recycling and organics management. It is clear that more regionalization is needed and determining how to best foster such regional partnerships is an ongoing process for the Department.

APPENDICES

Appendix A: Maine's Solid Waste Management and Food Recovery Hierarchies

§ 2101. Solid Waste Management Hierarchy

1. Priorities. It is the policy of the State to plan for and implement an integrated approach to solid waste management for solid waste generated in this State and solid waste imported into this State, which must be based on the following order of priority:

   A. Reduction of waste generated at the source, including both amount and toxicity of the waste;

   B. Reuse of waste;

   C. Recycling of waste;

   D. Composting of biodegradable waste;

   E. Waste processing that reduces the volume of waste needing land disposal, including incineration; and

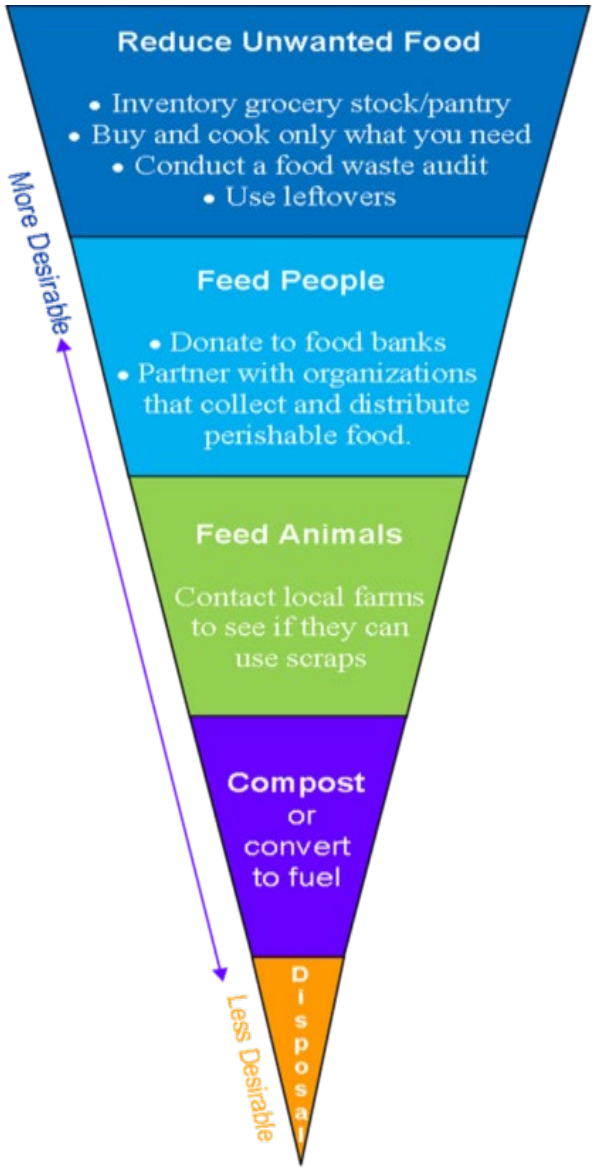
   F. Land disposal of waste.

It is the policy of the State to use the order of priority in this subsection as a guiding principle in making decisions related to solid waste management.

2. Waste reduction and diversion. It is the policy of the State to actively promote and encourage waste reduction measures from all sources and maximize waste diversion efforts by encouraging new and expanded uses of solid waste generated in this State as a resource.

§ 2101-B. Food Recovery Hierarchy

1. **Priorities.** It is the policy of the State to support the solid waste management hierarchy in section 2101 by preventing and diverting surplus food and food scraps from land disposal or incineration in accordance with the following order of priority:



A. Reduction of the volume of surplus food generated at the source;

B. Donation of surplus food to food banks, soup kitchens, shelters and other entities that will use surplus food to feed hungry people;

C. Diversion of food scraps for use as animal feed;

D. Utilization of waste oils for rendering and fuel conversion, utilization of food scraps for digestion to recover energy, other waste utilization technologies and creation of nutrient-rich soil amendments through the composting of food scraps; and

E. Land disposal or incineration of food scraps.

2. Guiding principle. It is the policy of the State to use the order of priority in this section, in conjunction with the order of priority in section 2101, as a guiding principle in making decisions related to solid waste and organic materials management.

Appendix B: List of MSW and CDD Categories and Sub-sorts for a Statewide Waste Audit

Category		Sub-sorts
Paper	1	Books
	2	Boxboard (chipboard)
	3	Compostable Paper
	4	High Grade Office Paper
	5	Magazines/Catalogs
	6	Mixed Recyclable Paper
	7	Newsprint
	8	Non-Recyclable R/C Paper
	9	OCC (Old Corrugated Containers)
	10	Polycoated/Aseptic/Multi-Material Containers
Glass	11	Glass Beverage Bottles - BB
	12	Glass Beverage or Food Containers - NBB
	13	Other Glass (Non-Container)
Metal	14	Aluminum Cans - BB
	15	Aluminum Foil, Pans, and Containers - NBB
	16	Ferrous Containers
	17	Other Ferrous
	18	Other Non-Ferrous
Plastic	19	#1 PET Bottles - BB
	20	#1 PET Food and Dairy Bottles and Jars -NBB
	21	#2 HDPE Bottles - BB
	22	#2 HDPE Food, Dairy & Other NBB
	23	#3-7 Bottles - BB
	24	#3-7 Bottles, Non-BB
	25	#5 PP Food Containers
	26	#6 PS Rigid Food and Beverage Containers
	27	#6 EPS Foam Food and Beverage Containers
	28	Bulky Rigids >1 Gallons
	29	Film, Agricultural and Marine Shrink Wrap
	30	Film, Garbage Bags
	31	Film, Other Bags or Non-Bags
	32	Film, Retail Bags
	33	Thermoforms
	41	Clean Wood
	42	Other Organics
	43	Pet Waste
Electronics	45	Non-CED Electronics
	46	CEDs - CRTs
	47	CEDs - Desktop Computers
	48	CEDs - Laptops and Tablets
	49	CEDs - Printers
	50	CEDs - Television and Monitors (non-CRT)
	51	CEDs - Other
	52	Computer Peripherals
	53	Products with Embedded Batteries
	54	Small Appliances
	55	White Goods
	56	Solar/PV Panels/Components
CDD	57	Asphalt Brick and Concrete (ABC)
	58	Asphalt Shingles
	59	CDD Metal
	60	Ceramic Fixtures
	61	Drywall/Gypsum Board
	62	Oriented Strand Board (OSB)/Plywood
	63	Other/Residual CDD
	64	Painted/Treated Wood
Batteries	65	Batteries - Primary
	66	Batteries – Rechargeable, Li-ion
	67	Batteries – Rechargeable, Other
UW/HHW	68	Mercury-Containing Products - Lamps
	69	Mercury-Containing Products - Thermostats
	70	Mercury-Containing Products - Other
	71	Architectural Paint
	72	Non-Architectural Paint
	73	Household Hazardous Waste
All	74	Carpet/Padding

Category		Sub-sorts
	34	Remainder/Other Plastic
Ceramics	35	Ceramic Bottles - BB
	36	Other Ceramics
Organics	37	Food Waste - Packaged
	38	Food Waste - Unpackaged
	39	Branches and Stumps >1" Diameter
	40	Mixed Yard Waste

Category		Sub-sorts
Other Wastes	75	Diapers/Sanitary Products
	76	Furniture/Bulky Items
	77	Supplements/Pharmaceuticals/Medicines
	78	Textiles/Leather
	79	Rubber/Tires
	80	Mattresses
	81	Miscellaneous Household Waste

CDD Categories and Sub-sorts

Category		Sub-Sorts
Paper	1	OCC Cardboard/Kraft Paper
	2	Other/Composite Paper
Plastic	3	Clean Film
	4	HDPE Buckets
	5	Other Plastic
Metal	6	Ferrous
	7	Non-Ferrous
Glass	8	Glass
CDD	9	Asphalt Paving
	10	Asphalt Shingles
	11	Concrete/Brick/Masonry
	12	Insulation
	13	Carpet/Padding
	14	Ceiling Tiles
	15	Ceramic Fixtures
	16	Gypsum Wall Board
	17	Pallets & Crates
	18	Oriented Strand Board (OSB)
	19	Plywood
	20	Other Engineered Wood
	21	Clean Wood
	22	Painted/Treated Wood
	23	Other CDD
Organics	24	Mixed Yard Waste
	25	Branches and Stumps >1" Diameter
	26	Other Organics
Batteries	27	Batteries - Primary
	28	Batteries – Wet-Cell
	29	Batteries – Rechargeable, Li-ion
	30	Batteries – Rechargeable, Other
UW/Haz Waste	31	Mercury-Containing Products - Lamps
	32	Mercury-Containing Products - Thermostats
	33	Mercury-Containing Products - Other
	34	Architectural Paint
	35	Non-Architectural Paint
	36	Other Hazardous Waste
Electronics	37	CED Electronics
	38	Non-CED Electronics
	39	Products with Embedded Batteries
	40	Solar/PV Panels/ Components
Special/Other	41	White Goods
	42	Mattresses
	43	Furniture/Other Bulky Items
	44	Tires
	45	Soil/Sand/Gravel
	46	Fines/Mixed Residue
	47	All Other Waste

B-2

CASELLA SUSTAINABILITY REPORT

SME
SEVEE & MAHER
ENGINEERS

DRIVE

2024 SUSTAINABILITY REPORT

Driven to Make a Difference

casella

ESTABLISHED 1975

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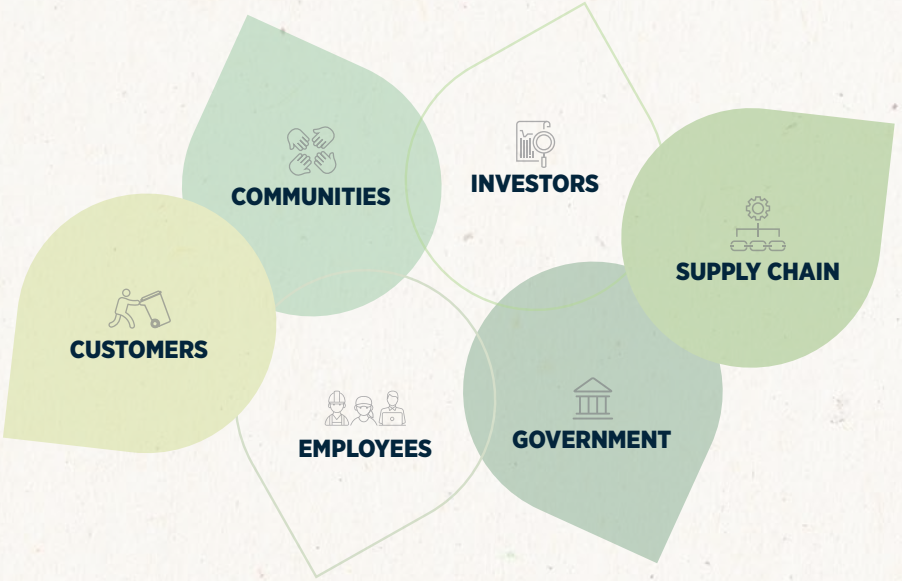
About This Report

To update stakeholders on our progress toward our sustainability vision, we issue a biennial sustainability report. This report has been prepared in accordance with the Global Reporting Initiative (GRI) Standards, with consideration of their reporting principles and the following key concepts:

- **STAKEHOLDER INCLUSIVENESS:** In preparing our report, we strive to consider the perspectives of six key stakeholder groups: Employees, Customers, Communities, Investors, Government, and Supply Chain.
- **SUSTAINABILITY CONTEXT:** Throughout our report, we describe the ways that our sustainability initiatives align with broader societal goals and environmental protections.
- **MATERIALITY:** We report on topics that are important to our stakeholders and that reflect our economic, environmental, and social impacts.
- **COMPLETENESS:** We strive to provide a full picture of the material sustainability issues within our operational boundaries that best reflect the impacts of our business since our last report.



GRI MATERIALITY: Through stakeholder surveys, management interviews, and a facilitated workshop, we identified the environmental, social, and economic topics that are most relevant to our stakeholders and aligned with our business success. The adjacent chart summarizes the results of our assessment. Individual topics are represented by the dots, which we have consolidated into topic areas listed in gray text. This report is organized around the five sustainability topics listed in the upper right quadrant.

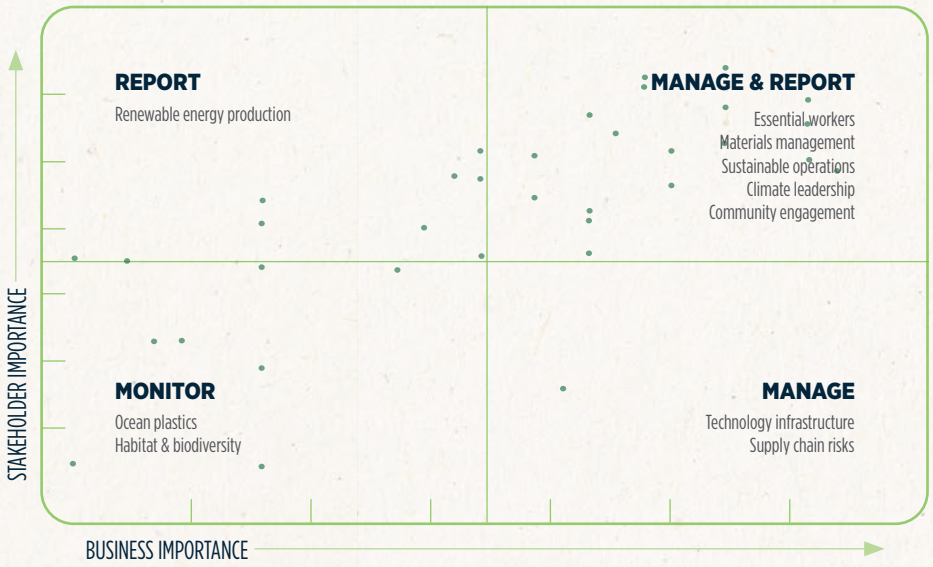
TIME PERIOD: This report is current through July 2024. Data points reflect the 12 months ending December 31, 2023, unless otherwise noted.

OTHER SUSTAINABILITY DOCUMENTS: In addition to this sustainability report, our stakeholders may be interested in one or more of the following references: our GRI Content Index, which is appended to this report; our Sustainability Accounting Standards Board (SASB) disclosure; and our CDP Climate disclosure. All are available on our Investor Relations website at ir.casella.com/esg-practices.

DATA ASSURANCE: Key metrics in this report have undergone external review and verification. The focus of this review is our Scope 1 and 2 greenhouse gas (GHG) emissions, our total recordable incident rate (TRIR) safety performance, and our recycling tonnage. An independent letter of verification, declaring accuracy at a limited level of assurance, is posted on our Investor Relations website.

We invite our readers to send comments or questions regarding this report. Write to: Casella Waste Systems, Inc., Attn: Abbie Webb, 25 Greens Hill Lane, Rutland, VT 05701; abbie.webb@casella.com.

MATERIALITY MATRIX



Chairman & CEO Message

What was true in 1976 when we hired Ken Hier as our first employee to service Killington Mountain Resort, our first commercial customer, remains true today: **Our people are our biggest differentiator and competitive advantage as a sustainable enterprise.**

As our organization continues to grow, we earn the opportunity to introduce our sustainability vision and our Core Values to new customers and communities, and to new employees and their families, throughout the Northeast, Mid-Atlantic, and beyond.

Guided by our Core Values, our sustainability efforts are central to all that we do. They are supported by three pillars: our people, our operations, and the value that we create and share. This year's report details important accomplishments and milestones in all three areas.

OUR PEOPLE

The Kenneth A. Hier Sr. Training Center has trained more than 300 new drivers and technicians with a focus on safety, service, and commitment to excellence. Our total investment in training newly minted Commercial Driver's License (CDL) drivers is nearly $1.5 million to date. Company-wide, we continue to invest in our people: mechanics, technicians, front-line leaders, and all our other vital personnel. We are committed to serving each other, our customers, and our communities so that our organization will continue to flourish.

In 2023, as part of our efforts to reinforce this commitment to touch all facets of the company, we restructured our annual incentive compensation plans. Now, all bonus plans include a goal to improve safety and employee turnover performance year over year. Both targets were exceeded in their first year. Learn more on page 23.

The investments we've made in engagement, safety, training, recruitment, and retention are passed on exponentially to the customers and communities we serve. And as more of our customers demand sustainable solutions to their most complex waste challenges, we remain uniquely positioned to deliver.

OUR OPERATIONS

The integrated waste and recycling services we provide are essential to protecting the environment and public health. We continue to make thoughtful investments in our capacity to recover value from the waste stream while reducing greenhouse gas emissions.

In 2023, we completed a full retrofit of our Boston, Massachusetts, material recovery facility with state-of-the-art equipment and technology—all designed to increase capacity, enhance safety, improve product quality, and provide best-in-class operations for our customers. This investment provides infrastructure that is essential to meeting the service and sustainability needs of customers throughout the region. Learn more on page 29.

We also reached an important climate leadership milestone in 2023: We estimate that for every ton of greenhouse gas we emitted through our operations, we helped prevent more than five tons of greenhouse gas emissions elsewhere in the economy through our recycling, renewable energy, and carbon sequestration services. This accomplishment reflects our focus on simultaneously reducing our emissions and growing our emission-reducing services. We expect progress will continue as we work to advance renewable natural gas infrastructure, and make further upgrades to recycling infrastructure.

CREATING AND SHARING VALUE

Sustainable communities are built through service and cultivated through investment in the people who are called to serve. We could not be prouder of the work that we have completed in recent years.

In 2023, we successfully achieved our goal of contributing $2 million annually to our local communities through in-kind services, sponsorships, and cash contributions. The three-year process to get to this point has included bringing strategic focus to our giving initiatives, along with improved reporting, and reflects the culture of service we embrace at all levels of the organization.

This year, we launched the Casella Foundation, which will help us to sustain our giving initiatives throughout our operations. Having achieved our giving target, we are now turning our focus to employee volunteering, with a goal to attain 21,000 hours of annual community volunteering by 2030.

As society continues to evolve, people expect that their products, goods, and services will become more sustainably produced and delivered. Our customers and communities can attest: Our people are driven to get them there.

All the best,

John W. Casella
Chairman & CEO

KEY TERMS

Three terms illuminate Casella's approach to sustainability.

Sustainability is the work we do every day. It is the business we have built. We create value by managing society's waste and transforming that waste into new resources.

Sustainable Growth is an element of our corporate strategy, focused on delivering profitable organic revenue growth while advancing our sustainability goals.

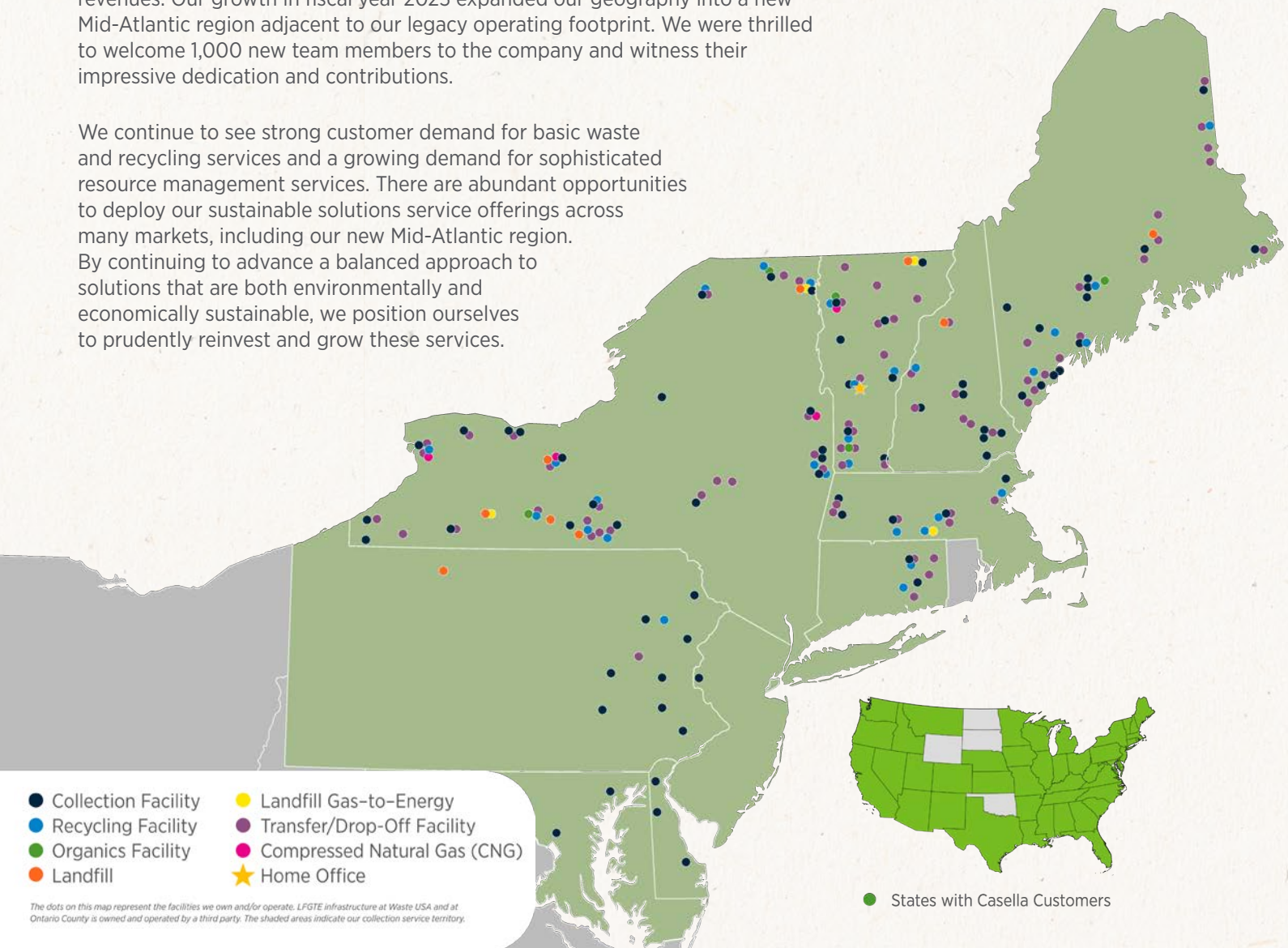
Our 2030 Sustainability Goals are five specific targets, to be achieved by 2030 (see page 17), that reflect the environmental and social topics that are most relevant to our stakeholders and aligned with our business success.

About Us

The past year was a banner year for the company, marked by continued execution against our key strategies and meaningful growth.

We maintained operating focus on our core business while simultaneously closing on seven acquisitions in the year with approximately $315 million of annualized revenues. Our growth in fiscal year 2023 expanded our geography into a new Mid-Atlantic region adjacent to our legacy operating footprint. We were thrilled to welcome 1,000 new team members to the company and witness their impressive dedication and contributions.

We continue to see strong customer demand for basic waste and recycling services and a growing demand for sophisticated resource management services. There are abundant opportunities to deploy our sustainable solutions service offerings across many markets, including our new Mid-Atlantic region. By continuing to advance a balanced approach to solutions that are both environmentally and economically sustainable, we position ourselves to prudently reinvest and grow these services.



The dots on this map represent the facilities we own and/or operate. LFGTE infrastructure at Waste USA and at Ontario County is owned and operated by a third party. The shaded areas indicate our collection service territory.

$1.26B
ANNUAL REVENUE

4,200+
EMPLOYEES

1.8M+
CUSTOMERS

47
STATES WITH CASELLA CUSTOMERS

1,400+
COLLECTION VEHICLES

~170
LOCATIONS

1.4M+
TONS RECYCLED PER YEAR

23%
REVENUE FROM RESOURCE SOLUTIONS

Data represent the 12 months ended December 31, 2023. Acquisitions completed in 2024 are not included in the figures, but they are represented in the shaded map.

Awards and Recognition

World Finance Magazine
2022 Sustainability Award

World Finance introduced its Sustainability Awards in 2022 to honor companies that show a commitment to environmentalism and sustainability and are making the business world a much greener place.

BD (Becton, Dickinson and Company)
2023 Sustainability Supplier of the Year

Casella earned the distinction from BD, a multinational medical technology company. The BD Supplier Recognition Program acknowledges exceptional global suppliers for their achievements. This award recognizes Casella's partnership and support in advancing their common goal of a healthier world through superior performance, continuous improvement, and customer service.

Arc GLOW
2023 Business Partner of the Year

This prestigious award is reserved for a business that supports Arc GLOW's mission and vision through excellent customer service or providing opportunities for employment.

University of Vermont Grossman School of Business
2023 Vermont Legacy Enterprise Award

Casella was recognized for its innovation and sustained excellence in the sustainability space and as one of the first companies in its industry to understand the importance of sustainability reporting and greenhouse gas emissions reductions.

Western New York Sustainable Business Roundtable
2023 Gold Level Award

The distinction recognizes the achievement of significant sustainability milestones in Western New York and continuously improving the organization's performance.

TIME
2024 America's Best Midsize Company

Casella was recently named to *TIME's* "America's Best Mid-Size Companies 2024" list and was the only company in the waste, recycling, and resource management services industry. In addition, Casella was the only company headquartered in Vermont to be recognized among the list of 500. Award recipients were identified based on three dimensions using more than 15 different criteria.

Sustainability Strategy

Our core business creates value for the environment and our communities.

Sustainability is well integrated into our broader corporate strategy and planning. Increasing landfill returns, driving additional profitability in our collection operations, creating incremental value through Resource Solutions, and allocating capital to return driven growth are the strategic initiatives that encompass our multi-year Fiscal 2024 Plan ("2024 Plan"), which targets enhancing shareholder returns by improving cash flows and driving profitable growth.

The 2024 plan has four foundational pillars: People, Sustainable Growth, Technology, and Facilities. Each pillar can help to support continued growth, execution of our strategic plan, and advancement toward our sustainability goals.

- **PEOPLE:** As our team has grown to over 4,000 employees, we have increased investments in safety, culture, and training initiatives. These investments provide a foundation for our workforce to be of service to one another, our customers, and the communities in which we operate.
- **SUSTAINABLE GROWTH:** Our business creates revenue by delivering sustainable material management services to our customers. By enhancing the alignment of our sales, marketing, customer care, communications, and sustainability teams, we strive to deliver profitable organic growth while advancing our sustainability goals.
- **TECHNOLOGY:** We continue to make return driven investments into proven technology. From improving back-office systems, adding new digital tools, and taking a targeted approach to automating and adding technology across our truck fleet to upgrading processing equipment at our material recycling facilities, we are delivering a better service experience for our customers while simultaneously improving our employees' work environment.
- **FACILITIES:** The overall quality of our physical facilities directly impacts our adaptability and resilience in the face of change. We believe that by strategically investing in our facilities, we can build our capacity for change and create a welcoming and accommodating environment for stronger employee attraction and retention.

Our 2030 Sustainability Goals (see page 17) align with our core business and key multi-year strategies. They are designed to address environmental, social, and economic topics that are important to our stakeholders and to our business model.

This 2024 Sustainability Report outlines the important progress we have made toward our goals and highlights how we aim to make further progress.

Corporate Governance for Sustainability

Sustainable Growth is our strategy to deliver profitable organic growth while advancing our sustainability goals. The team responsible for leading this strategy reports directly to our CEO.

Our Board of Directors includes a Nominating and ESG Committee that advises on matters pertaining to the Company's sustainability performance and matters significant to the Company's role as a socially responsible organization. The committee reviews Environmental, Social, and Governance (ESG) topics quarterly, and its charter is available on our Investor Relations website.

More complete information on corporate governance at Casella, including corporate policies, governance documents, and committee charters, can be found on our Investor Relations website at ir.casella.com.

The following policies and codes are publicly available on our Investor Relations website at ir.casella.com/esg-practices.

- Corporate Policies Highlights
- Code of Vendor Conduct
- Health and Safety Policy Statement
- Environmental Policy
- Human Rights Policy
- Insider Trading Policy
- Code of Business Conduct and Ethics

Driving **SUSTAINABILITY**

Our greatest sustainability impact comes through the services we provide in support of our customers' goals. We serve every sector of the economy, providing essential waste and recycling services while striving each day to create new connections in the emerging circular economy.

> **More than ever, customer demand for sustainable resource management service is extremely strong, and we view it as a key lever to our growth strategy. With sustainability at our core, nearly five decades of operational expertise, and a track record of executing customer-driven innovations and environmental solutions, we are uniquely positioned to help our customers and communities achieve their goals.**

— Liza Casella
VP, Sales & Organic Growth

Driven to Serve

We recognize that our greatest impact comes from the services we provide to our customers, enabling diverse organizations across the economy to achieve their own recycling and sustainability goals.

As we advance toward 2 million tons per year of materials recycled, we do so in partnership with our customers. As we cut our own carbon emissions, we reduce the indirect emissions of our customers. Our goals – at Casella and across society – are intertwined and will be achieved through intentional partnership and collaboration.

Our customers include residents and municipalities, education and healthcare institutions, small businesses, large businesses and retailers, industrial manufacturers, and more. We view each of these sectors as integral to advancing resource sustainability and the circular economy.

280+
Distinct fiber, metal, and plastic materials that we manage for our customers

15K
Locations served for retail and industrial companies across North America

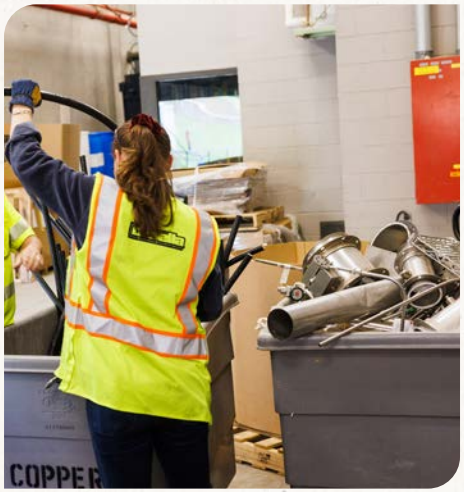
350K
Students served across college and university campuses

1.2M+
Households serviced through our residential and municipal contracts

Distinct material types: Number excludes acquisitions after 4/1/23
Households: Number represents households on residential subscriptions and serviced through municipal contracts, excluding acquisitions after 6/1/23

Circular Economy

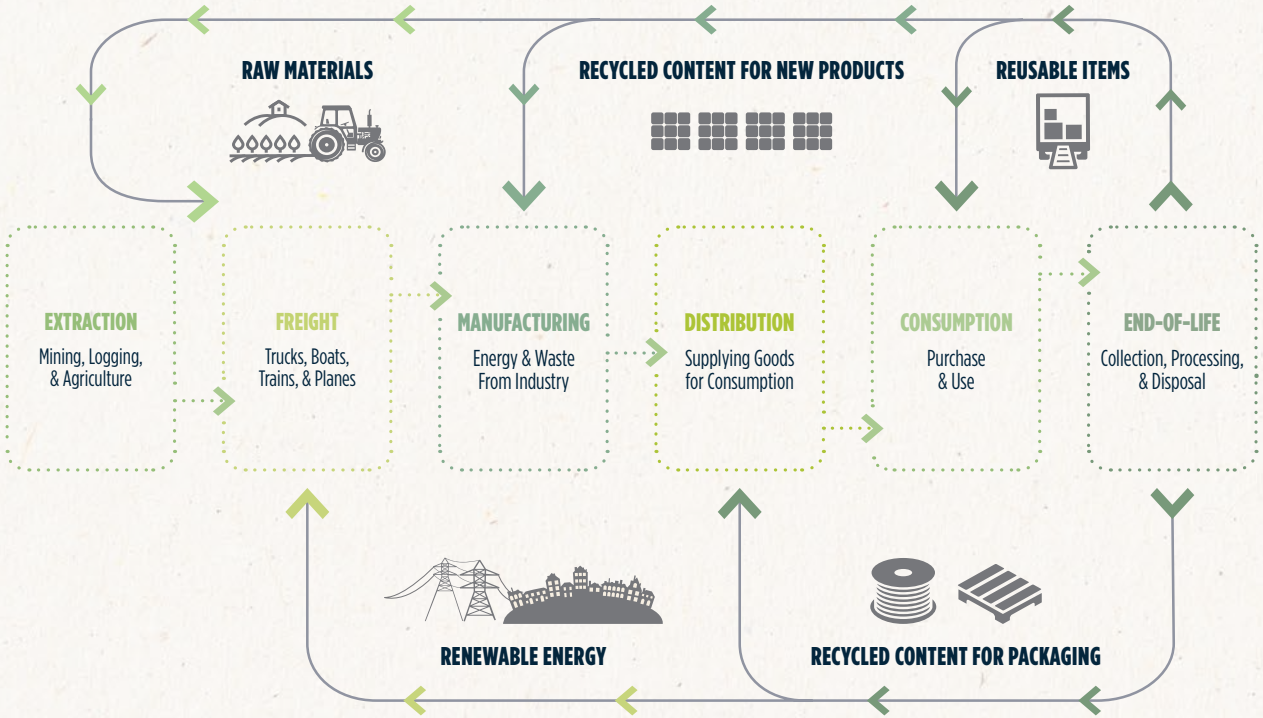
We have the privilege of being a value creator in the emerging circular economy, helping customers achieve their goals through our expertise, people, and infrastructure.



In materials management, a value chain (as depicted below) refers to the full life cycle of a product, including raw material sourcing, production, distribution, consumption, and end-of-life disposal or recycling. While our customers have value chains with clear inputs and outputs, these distinctions blur from our unique vantage point. We work to transform one customer's outputs into another customer's inputs, striving to improve both customers' impacts, while creating the connections that add up to a circular economy.

We create these connections through integrated services, expertise, and unique partnerships. Above all, we help customers meet their goals through our unwavering commitment to service, sustainability, and our Core Values.

MATERIALS MANAGEMENT VALUE CHAIN



Employee Highlight

Meghan Weeden
BUSINESS DEVELOPMENT MANAGER

"

I lead Casella's higher education strategy, which unites the important value of service and sustainability execution for this customer base.

In her role, Meghan serves a group of customers with clearly articulated and highly visible sustainability goals. She is also a credentialed TRUE Advisor, committed to helping customers advance their zero waste goals and pursue the Green Business Certification, Inc's TRUE Zero Waste certification. Meghan is one of more than 20 Casella employees with their TRUE certification, working with stakeholders across the Northeast to create diversion programs, track progress, and lessen environmental impacts.

Integrated Resource Management

The services we provide are all connected. From recycling through to disposal, every element of the work we do is essential to protecting human health and the environment for the customers and communities we serve. We will continue to evolve and grow our services to meet both current and emerging needs.

By bringing a sustainability lens to the way we grow and develop each of these service lines, we create value for our customers and communities, position our company to thrive, and help to conserve, sustain, and renew the world's limited resources.

RECYCLING

We return resources to the economy and reduce pressure on natural resources.

- Zero-Sort Recycling
- Specialty Recycling
- ***Recycle Better™*** Education

SOLUTIONS

We integrate our service offerings to help large customers achieve their goals.

- Professional Services
- Advisory Services
- Circularity Work

ORGANICS

We recover carbon and nutrients so they can be returned to the soil.

- Food Waste
- Municipal Biosolids
- Organic Residuals

COLLECTION

We leverage the latest technologies to safely and efficiently transport waste and recyclables.

- Curbside Collection
- Transfer and Logistics
- Fleet Innovation

ENERGY

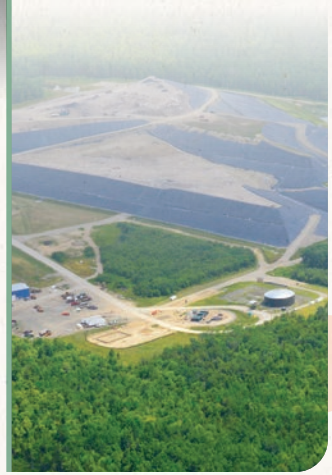
We recover energy from waste in our landfills, and we provide organic feedstock to biogas facilities across our region.

- Landfill Gas to Energy
- Renewable Natural Gas

LANDFILLS

We operate modern landfills to provide safe and secure disposal of residuals that are not yet suited for recycling.

- Modern Landfills
- Renewable Energy



Partnering to Drive Out Waste

Each customer we serve is on their own path to achieving waste and recycling goals. Through our tailored approach, and our decades of experience working with each customer segment, we deliver the services that will best support those goals.

Our customers are united in their need for safe and reliable service to meet their waste and recycling needs. With these basic requirements met, they can shift focus to their waste reduction and recycling goals. To elevate their programs, many customers leverage Casella's capabilities around education and engagement; dashboards and data; and specialty recycling programs for hard-to-recycle materials. Beyond this, we provide advisory services (including waste audits, zero waste plans, and more) to define priorities for waste reduction and opportunities to create value up and down the supply chain.

As a service provider, we are dedicated to meeting customers wherever they may be on their waste and recycling journey and providing them with the tools they need to meet their goals.

ADVISING FOR SUSTAINABILITY

We partner with customers to help them advance environmental sustainability through waste characterization assessments, comprehensive zero waste planning, supply chain strategy, and more.

DASHBOARD & DATA TO DRIVE PROGRESS

Through a combination of reporting and interactive dashboards, we provide customers with the clear, actionable data they need to execute and track their success.

SPECIALTY RECYCLING & WASTE REDUCTION

Drawing upon our operational expertise and strategic sourcing capabilities, we develop programs for hard-to-recycle materials and help to deploy waste-reduction initiatives.

RELIABLE WASTE & RECYCLING SERVICES

The foundation of any program is a commitment to reliable service so our customers can remain focused on their core business.

EDUCATION & ENGAGEMENT

Recycling and waste reduction programs succeed when we provide clear, effective communication tools so everyone can participate.

Stories in Sustainability

Casella serves as a conduit for ideas and innovation, connecting customers with best practices and solutions from other regions and industries.

A sampling of these are highlighted here:

Dedicated Resource Manager: Boston University

Boston University is on an ambitious path to achieve Zero Waste by 2030. After developing their Zero Waste Plan, the university sought out a partner to provide comprehensive Resource Management services on campus. When selected for the work, Casella assigned a dedicated Resource Manager to ensure ongoing progress toward zero waste. The Resource Manager is responsible for advancing improvements to existing services and implementing innovative new programs, working collaboratively with stakeholders on campus to identify, prioritize, and execute education campaigns, collection efficiency improvements, waste reductions, and more. By leveraging technology, data, and our on-campus presence, we have been able to deliver both diversion and savings for the University, which recently celebrated the milestone of being "halfway to zero waste."

Pursuing a Zero Waste Model: Mascoma Bank

Mascoma Savings Bank, as a certified B-Corporation, is committed to "using business as a force for good." With 28 branch locations and additional offices throughout New England, the bank has an ambitious zero waste goal targeting 90% diversion. To achieve this goal, Mascoma has partnered with Casella to provide waste audit, innovation, and consultative support. Elements of the work include baseline waste audit, biannual data review sessions, enhanced signage and labeling, optimizing the number and placement of waste and recycling containers, and conducting virtual recycling education sessions.

Retail Recycling Systems: Shaw's and Star Market

As part of Albertsons Companies, Shaw's and Star Market is "committed to eliminating food waste, reducing the use of plastic, and accelerating our transition to a more circular economy." In support of these important sustainability goals, Shaw's and Star Market has entrusted Casella to establish recycling services for their store locations and distribution centers, conducting robust recycling training programs, innovating and implementing food waste programs, and providing valuable data to support ongoing tracking and continuous improvement initiatives. Through this collaboration, Shaw's and Star Market achieves an impressive recovery and diversion rate each year and is continuing to build the program.

Zero Waste Manufacturing: Coca-Cola Beverages Northeast

The Coca-Cola Company and its network of bottlers, including Coke Northeast, have established a global sustainable packaging initiative called World Without Waste which seeks to develop a circular economy approach to the entire lifecycle of Coca-Cola packaging. This commitment to circularity can be seen in Coke Northeast facilities, where recyclable commodities and non-salable fully packaged goods are systematically captured throughout each of the 26 locations managed by Casella in a collaboration that dates to 2016. Through Casella's depackaging capabilities, liquid beverages are separated from the packaging so that both can be recovered from the disposal stream. These efforts recover significant quantities of valuable commodities each year.

Specialty Recycling: The University of Vermont Medical Center

The UVM Medical Center has established goals to reduce the total volume of waste and increase recycling in all areas of hospital operations. The organization has earned national recognition for its waste reduction efforts in the operating room (OR), including a robust program for recycling blue wrap, the plastic fabric that encases surgical supplies. The keys to success have been establishing a dedicated collection program, collaborating with other hospitals in the region, and most importantly the ongoing championship of dedicated staff. Since its inception, the program, in collaboration with Casella, has recycled over 72 tons of blue wrap. Due to this innovation, along with other sustainability initiatives, The University of Vermont Medical Center has been recognized for Environmental Excellence by Practice Greenhealth, a leading national advocate for sustainable practices in healthcare.

Donations and Reuse: Goodwill Northern New England

Goodwill Northern New England is a nonprofit social enterprise that helps people achieve their life and work goals. The organization gives new life to donated household goods and textiles, capturing 50+ million pounds from the disposal stream each year, while advancing its social mission through job training, career placement, health care supports, and more. Through an award-winning collaboration, Casella helps to direct quality reusable materials to Goodwill through programs such as college and university "Green Move Out" events. The two organizations have also collaborated around workforce and community development. Casella helps Goodwill to responsibly manage broken, damaged, and unsold items, through recycling and traditional disposal services for their locations in Northern New England. Similar collaborations are in development with other Goodwill franchises.

Innovation

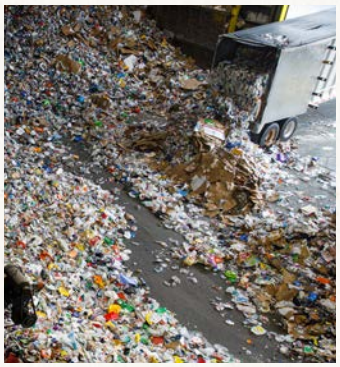
Significant progress toward our customers' waste and recycling goals can be achieved through our core services and technologies. To complement these, we continue to advance new service innovations to meet customers' evolving waste reduction and recycling needs.

MATTRESS RECYCLING

Mattresses have long been viewed as a non-recyclable waste stream. However, we have invested in both the innovation and infrastructure to enable mattress recycling in our region. Casella operates two mattress recycling facilities – in Buffalo, NY, and Willimantic, CT – that provide mattress and box spring recycling solutions for municipalities, colleges, hotels, retailers, and individuals. We process more than 200,000 units per year and capture an estimated 4,000 tons of wood, metal, and foam for recycling.

FOOD WASTE RECOVERY

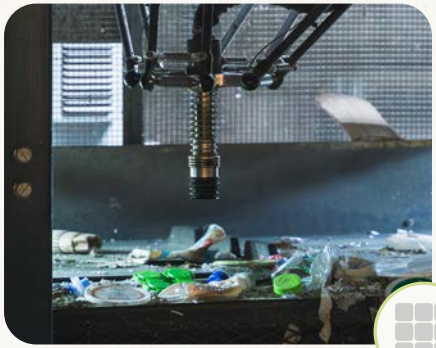
We have been collecting food scraps since 1999 and recover more than 130,000 tons of food per year for uses such as composting, anaerobic digestion, and animal feed. We are continuing to innovate and invest to capture more food from the disposal stream. In 2021, we built Vermont's first organics depackaging facility. We use a mechanical process to separate food waste from packaging so both streams can be recovered. We deliver food and beverage material to anaerobic digesters to make biogas, and most of the empty packaging material is recycled. We also work with customers to deploy innovative on-site processing systems that slurry, grind, or dry food waste at the point of generation to improve recoverability.



Employee Highlight

Felix Toj
OPERATIONS SUPERVISOR

As the operations supervisor of the mattress division at our Willimantic Resource Solutions location, Felix is responsible for 20 Casella teammates who recycle more than 600 mattresses each day. He was instrumental in recognizing that pocket coils - individually wrapped mattress springs - were being disposed of as residue but that systems existed to separate the material so it could be recycled. As a result, the division installed a pocket coil fabric separator in November 2023, which increased recovery and reduced waste.



RECYCLING QUALITY

To enable a circular economy, our role is to capture and produce high-quality recycled commodities that meet the feedstock specifications of processors, mills, and manufacturers. This begins with the education and outreach we provide to help customers place the right materials in their bins. This includes deploying our app, called Recycle Better With Casella, to more than 100,000 households. Within our recycling facilities, we deploy technology to help us to effectively process mixed recyclables and sort the materials by type, shape, and color. Recently, our facilities have been deploying innovative robotics and AI technology to further enhance sorting capabilities. By embracing this new technology, we are positioning our facilities to adapt to evolving market demands while enabling manufacturers and brands to meet their recycled content goals.

RESEARCH PARTNERSHIPS

Many emerging solutions require early-stage research and evaluation. We advance these in collaboration with higher education research institutions. We have the privilege of serving these campuses as customers, and then we work to leverage the knowledge of their students, researchers, and professors to advance circular economy solutions. Project topics have included circularity, micro-plastics, plastic markets, glass recycling, and more. These collaborations also connect students with job opportunities in our field, which we view as a win-win-win.

Customer Highlight

Sustainable Solutions: Healthcare Circularity

BD (Becton, Dickinson and Company) – a leading global medical technology company – manufactures and sells medical devices, including syringes, which enable a wide range of critical medical treatments and care. Over the last decade, Casella and BD have partnered to recover, process, and recycle waste at BD sites across the United States. More recently, the organizations piloted a pioneering circularity program to manage syringes further along the value chain, at healthcare facilities.

The pilot targeted the recycling of medical waste found in sharps disposal containers in healthcare facilities, such as hospitals. It was designed to assess the feasibility of recycling syringes back into the manufacturing process, creating additional local sourcing options, and alleviating important supply chain pressures.

The circularity pilot successfully recovered 40,000 pounds of medical waste for recycling. It evaluated both mechanical recycling methods – in this case, grinding and melting material back into usable formats – and advanced recycling methods – renewing material back into its original chemical form to be used as a raw material.

READ MORE

Sustainability Leadership Awards

Our Sustainability Leadership Awards recognize customers and partners who best exemplify what we can achieve when we work together to reduce waste, increase recycling, and advance the circular economy.

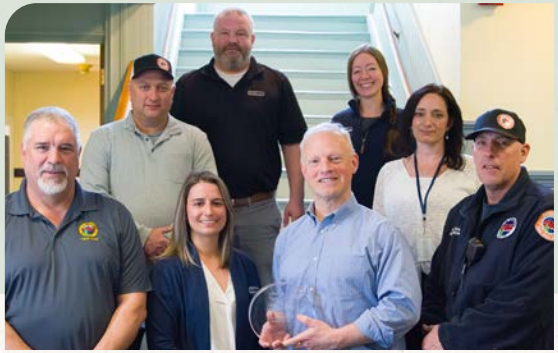
Each year, winners are selected from an inspiring slate of nominees that includes municipalities, businesses, manufacturers, and higher education and healthcare institutions. By highlighting the accomplishments of these partners through this recognition, we hope to provide inspiration and examples for others to follow.

This year's Sustainability Leadership Award winners are innovators and leaders, and we are honored to work alongside them providing services to help advance their materials management initiatives. We are grateful to all our customers, who inspire us to continuously improve each day, and we look forward to honoring them in this manner each year.

— John W. Casella
Chairman and CEO

Sustainability Leadership Award Recipient 2024

CITY OF BIDDEFORD



Biddeford, Maine, is a city with a strong commitment to recycling education and measures to reduce contamination in the recycling stream. They work with us to educate community members through local events, curbside tagging, and regular audits. The city recycling committee meets monthly to review results and discuss new initiatives. Between spring 2022 and fall 2023, the city reduced contamination by as much as 26%, proving the effectiveness and impact of their hard work and commitment to recycling.

READ MORE

PHILLIPS ACADEMY ANDOVER

Phillips Academy, in Andover, Massachusetts, a college preparatory school for more than 1,100 boarding and day students in grades 9-12, has been a Casella customer and partner for 10 years. Their Climate Action Plan includes a goal to achieve 90% waste diversion by the year 2030. Casella and Phillips Academy have expanded programs on campus to capture compost, e-waste, universal waste, metal, and wood. Together we have run Green Move-Out programs for several years, successfully redirecting reusable items to Goodwill.

READ MORE

NOVOLEX

Novolex develops and manufactures diverse packaging products for multiple industries in the foodservice, delivery and carryout, food processor and industrial markets that touch nearly every aspect of daily life. Last year, Casella worked with Novolex to recycle nearly 60,000 tons of post-industrial commodities. At these locations, we have collaborated on employee training initiatives and installing onsite processing equipment to increase recycling tonnage. Novolex reports sourcing 47% of its raw materials from renewable, bio-based or PCR sources in 2023, has invested in clear easy-to-understand product recyclability labeling, and reported 84% of its applicable revenues in 2023 came from products that support a circular economy.

READ MORE

Our GOALS

Our sustainability strategy focuses on advancing toward five strategic goals for the year 2030. We believe that achieving these goals will benefit our customers and communities while positioning our company to thrive and grow.

	Essential Workers	Materials Management	Sustainable Operations	Climate Leadership	Community Engagement
	HEALTH AND SAFETY	RESOURCE SOLUTIONS	FUEL EFFICIENCY	GHG EMISSIONS	COMMUNITY GIVING
	Improve our safety performance, reducing our Total Recordable Incident Rate (TRIR), a measure of recordable incidents compared with hours worked.	**Grow our Resource Solutions business** to reduce, reuse, or recycle more than 2 million tons of solid waste materials per year by 2030.	**Improve our fuel efficiency**, reducing our gigajoules of fuel consumed per ton of material collected by 20% below a 2019 baseline.	**Further reduce our carbon footprint**, measured in metric tons of carbon dioxide equivalents (CO_2e) from scopes 1 and 2 with a 2010 baseline.	**Increase our community giving**, including charitable donations, in-kind services, and local community sponsorships.
2019 Performance	6.2	1.05M	--	↓ 33%	$1.06M[1]
2023 Progress	5.0	1.43M	↓ 12%	↓ 32%	$2.19M
2030 Goal	4.0	2.00M	↓ 20%	↓ 40%	$2.00M

[1] Community Giving metric is for 2020, when tracking began

GOALS UPDATES

In this year's report we are updating two of our 2030 goals, as shown here. Each of these will be discussed in greater detail in the following sections.

GHG Emissions target: Updated to reflect a methodology change and a shift in our base year from 2010 to 2022. For more detail, see page 37.

Community Engagement target: Updated to reflect our early achievement of our giving goal. We will continue to support community giving while bringing focus to our volunteering. For more detail, see page 42.

Climate Leadership

GHG EMISSIONS

Further reduce our carbon footprint, measured in metric tons of carbon dioxide equivalents (CO_2e) from scopes 1 and 2 with a 2010 baseline.

↓ 33%	Baseline
↓ 32%	2023 Progress
↓ 40%	2030 Goal

NEW GOAL

Climate Leadership

GHG EMISSIONS

Further reduce our carbon footprint, measured in metric tons of carbon dioxide equivalents (CO_2e) from scopes 1 and 2 with a 2022 baseline.

--	Baseline
↓ 4%	2023 Progress
↓ 12%	2030 Goal

Community Engagement

COMMUNITY GIVING

Increase our community giving, including charitable donations, in-kind services, and local community sponsorships.

$1.06M[1]	Baseline
$2.19M	2023 Progress
$2.00M	2030 Goal

NEW GOAL

Community Engagement

EMPLOYEE VOLUNTEERING

Increase volunteering in our communities, as measured by employee volunteer hours.

16,000 (2022)	Baseline
14,000	2023 Progress
21,000	2030 Goal

[1] Community Giving metric is for 2020, when tracking began

Essential WORKERS

The men and women of the waste and recycling industry provide an essential service. Their hard work keeps our communities clean, recovers valuable resources, and keeps society running.

Developing a safe, engaged, and ready workforce is key to our success as an organization. We invest in our people so they can learn, grow, and lead our business.

— Kelley Robinson
SVP, Human Resources

GOAL: HEALTH AND SAFETY

Improve our safety performance, reducing our Total Recordable Incident Rate (TRIR), a measure of recordable incidents compared with hours worked.

2019 Performance	**2023** Progress	**2030** Goal
6.2	5.0	4.0

Health and Safety

The Casella team has grown by more than **32%** since 2022 and now employs more than **4,200 people**. With a cultural commitment to personal growth and continuous improvement, our team will constantly evolve and advance in service to each other, our customers, and our communities. The Casella culture and Core Values provide a road map for our continued success.

Serving our customers and communities in a way that protects the health and safety of our people is a daily focus. We integrate our commitment to safety in every aspect of our work, including hiring choices, training programs, and the many daily decisions and actions that add up to a safe day.

We have seen continued improvement in our safety performance, with our total recordable incident rate (TRIR) dropping nearly 20% from 6.2 in 2019 to 5.0 in 2023.

A key contributor to our improving safety performance has been our success in filling vacancies and maintaining near-full staffing levels. When we can prevent employees from becoming overextended, safety incidents often become less frequent.

Other elements of our safety approach include:

- **SAFETY MEETINGS.** Conducted at least monthly–and often biweekly or weekly–these mandatory meetings cover required topics, review any recent incidents, and provide a forum for front-line employees to share feedback and surface concerns, ideas, or new innovations.
- **RETRAINING.** Employees receive a fresh round of training when they begin to use a new piece of equipment or get assigned to a different truck, or following an incident.
- **ACQUISITION INTEGRATION.** As we acquire and integrate new divisions, we work to ensure rapid alignment to the Casella safety culture. Important practices include assigning a safety manager and safety trainer for every location and conducting extensive employee observations to identify training gaps and needs.
- **MANAGEMENT INCENTIVE.** Safety is integrated into compensation for Casella managers. Specifically, management bonuses are linked to reducing the company-wide TRIR towards our 2030 target of 4.0, even as we grow and integrate new acquisitions.

Employee Highlight

Gian Duffy
REGIONAL SAFETY TRAINER

As a regional safety trainer, Gian conducts our new-hire training for our helpers and drivers at our division locations. The 3-day training reviews OSHA requirements, specific equipment operations and hazards, personal protective equipment, and other modules, which culminates with an in-person pre-trip inspection and obstacle course. A safety trainer since 2019, Gian has his SMITH system defensive driving certification, which is a widely used driver safety program. It allows him to train our fleet drivers on safe and defensive driving methods.

Core VALUES

Casella's Core Values provide a shared framework that allows our individual skills and strengths to solve problems.

SERVICE

We win when we help others.

We are sensitive to needs and are eager to be a resource to everyone around us, being generous with our time, talent, and energy.

TRUST

We excel when we assume the best in each other.

Mutual respect and an open, honest environment mark our interactions with others. We acknowledge each other's contributions, we practice active listening, and we deliver on our promises.

RESPONSIBILITY

We succeed when we balance our freedom to act with a sense of accountability.

We invest deeply in creativity, autonomy, and the willingness to take risks. We recognize that these investments bear the greatest fruit when exercised within a framework of disciplined boundaries.

INTEGRITY

We thrive when we do the right thing.

We believe there are enduring principles for everything we do and we strive, in our words and deeds, to meet or exceed those standards.

CONTINUOUS IMPROVEMENT

We prosper when we learn, understand, and improve.

We create opportunities for human talent to thrive. We share what we've learned. We apply the lessons we learn every day to the goal of getting better and better at everything we do.

TEAMWORK

We're more effective when we work together.

Our impact is consistently stronger when we respect, support, and view each other as partners.

Company Highlight

Record Recognition: NWRA Drivers of the Year

READ MORE

Four Casella drivers were recognized for being among the best in the industry as each was named a 2024 Driver of the Year by the National Waste & Recycling Association (NWRA), including a sweep of the regional award category. Out of hundreds of applications from member companies representing close to 80,000 routed trucks, the four Casella drivers' commitment to excellence and safety set them apart from the rest, a true testament to their commitment to excellence stemming from Casella's Core Values.

John Casella, Chairman & CEO, and Ned Coletta, President, joined our Drivers of the Year at the 2024 Waste Expo

Regional Industrial Driver of the Year

John Michaud, Potsdam, NY

For more than 21 years, John Michaud has served the Potsdam area. His career has included servicing residential routes, training new hires, and hauling materials as a tractor-trailer driver, but one thing that you will not find on his record is a safety incident. John's ability to put safety first has earned him the highest recognition for workplace safety: being accident-free since his initial hire in 2001.

Regional Residential Driver of the Year

Shawn Dutton, Fredonia, NY

Shawn Dutton is the ideal community member, with exceptional service throughout his 20 years in the industry. He is known for taking the time to help community members and initiating conversations with customers who just need to talk. His mentorship has elevated his entire division, as Shawn has trained new hires to adhere to his deeply rooted values of service and safety.

Regional Commercial Driver of the Year

Curtis Rhodes, Brattleboro, VT

In each of his 38 years in the industry, Curtis Rhodes has been dedicated to a job well done and done safely. Rhodes has accomplished decades of exemplary service, while maintaining a safety record with no incidents. He goes the extra mile, constantly willing to help his teammates by finishing additional routes or by staying late to make sure equipment is in order for smooth operations the next day.

Regional Industrial Honorable Mention

Cesarin Guerrero, Willimantic, CT

Throughout his 21 years of service, Cesarin "Cesar" Guerrero has served as a natural leader in his division. His above-and-beyond work ethic, paired with his unwavering commitment to safety, customer service, and efficiency, has led to an exemplary safety record with no preventable incidents during his career. Guerrero is described by his team as having a glowing personality, positive values, and a strong willingness to mentor.

People, Culture, and Belonging

Casella is dedicated to fostering personal and professional growth and cultivating a culture of inclusion and belonging rooted in our Core Values of service, trust, responsibility, integrity, continuous improvement, and teamwork.

Through the diverse backgrounds, cultures, and experiences of our team, we collectively develop better and more innovative environmental solutions for the customers and communities we serve.

CAREER PATHS

The cornerstone of our approach to people, culture, and belonging is our commitment to inclusion in our recruiting and career path programs. In 2023, 44% of non–entry level positions were filled through internal promotions.

TRAINING AND LEADERSHIP DEVELOPMENT

In 2023, nearly 100% of our managers participated in self-guided sessions in our new training software program. They received coaching on many relevant topics, including preventing discrimination and harassment, creating a positive work environment, ethical leadership, and more. Combined with in-person training, this led to more than 2,000 training sessions being completed.

LANGUAGE PROGRAMS

After identifying language barriers to advancement, we continue to support Spanish-speaking recycling facility employees in pursuing their hoisting licenses and earning leadership certificates. We have also hosted basic Spanish classes for English-speaking managers.

DIVERSITY & GROWTH

Our growth between 2020 and 2023 has influenced our diversity metrics, as we have entered new areas with new demographics. This is reflected in the chart to the right. With a continued focus on the initiatives outlined above, we believe that we can support diversity throughout our organization.

Employee Highlight

Sean Lukas
DIVISION MANAGER

"

I have an absolutely incredible team. They're hard-working people who show up when they're needed and stay until the job is done. They each bring unique knowledge and skills and have the spirit to work together and solve problems. It's not just me. I'm a part of something at Casella, and that's what I attribute our success to.

Sean Lukas has dedicated almost a decade to the waste and recycling industry, starting out as an Environmental Analyst, working his way to division manager via outstanding customer service and a commitment to safety. Lukas showcases an excellent balance between operational excellence and community engagement, and he has pioneered innovative new programs, including, most recently, an organics composting program at the facility.

DIVERSITY AT CASELLA

		Management	Workforce	All Casella
Gender Diversity	September 2020	24%	19%	20%
	December 2023	19%	18%	18%
Racial Diversity	September 2020	5%	13%	12%
	December 2023	4%	24%	22%

Engagement

Our people are at the center of our ability to evolve, innovate, and grow. By investing in our people, we develop a safe, engaged, and ready workforce that can support future growth and resilience.

In 2021, we focused on enhancing job designs and compelling career paths. In 2022, we continued to develop and extend our training programs, including our CDL school, front-line leadership training, management training, and language classes.

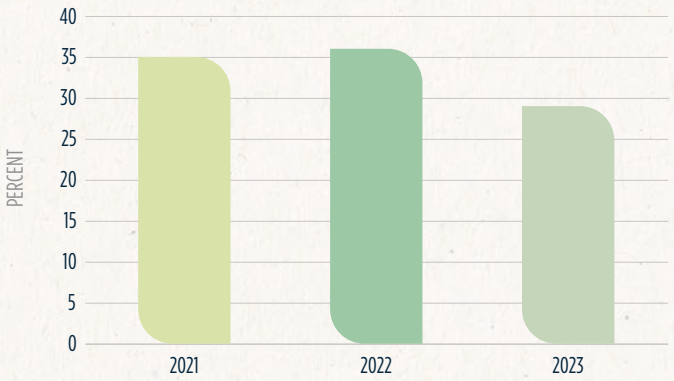
In 2023, we added a maintenance track to our training school (see sidebar on page 24) and deployed a targeted retention and engagement strategy built upon the foundation that engaged managers and engaged employees lead to engaged customers.

Our retention and engagement strategy includes the following elements:

- **MANAGEMENT INCENTIVE.** To promote alignment around developing our workforce, management bonuses are now linked to two employee-focused performance metrics: safety and turnover.
- **LEADERSHIP TRAINING.** We offer several programs that elevate employee engagement. These include hosting a monthly immersive orientation program in the Home Office, a Core Values and Employee Engagement training, Emerging Leaders, and the newly established Foundations of Casella Leadership training.
- **ENGAGEMENT SURVEYS.** The company is leveraging Gallup surveys to track employee engagement and to guide training and development programs. Nearly 2,000 employees have been surveyed to date.
- **ANNUAL PERFORMANCE REVIEWS.** Conducted at all levels of the company, reviews use a Performance Management System that allows employees to set yearly goals to perform self-evaluations and management evaluations, and to create development plans.
- **ACQUISITIONS.** Acquisitions completed in 2023 welcomed more than 1,000 new employees. Our integration training program includes on-boarding these individuals to our pay and benefit structure, our safety standards, and our company culture. We work to foster a smooth integration reflective of our values, while also embracing the novel ideas that come with new and diverse teams.

We have seen continued improvement on our employee turnover rate, a testament to the work being done to engage our employees and ensure that they have the proper tools and support to effectively execute their work.

EMPLOYEE TURNOVER RATE



*Graph above represents all Casella locations, excluding acquisitions completed after April 3, 2023.

The Power of Hard Work

At Casella, we celebrate The Power of Hard Work each and every day. Our drivers and technicians are fueled with purpose and deeply committed to service excellence. The Power of Hard Work is what motivates and rewards all of us.

DESK JOBS AREN'T FOR EVERYONE.

Some of us want work that moves. Work that you see. Work that matters. Important work that keeps society moving. At Casella, hard work isn't just a means to an end. It's something you can build a life on – a future, a family, a legacy. There are no hoops to jump through or emails to send: It's work you can leave behind at the end of the day. And it's work that's here to stay.

Casella – good pay, good people, good life.
That's the power of hard work.

Kenneth A. Hier Sr. Training Center

As labor markets continue to pose challenges throughout the country, and many young people look to secure meaningful employment through careers in the trades instead of opting for college degrees, Casella has created a robust suite of training offerings designed to facilitate a more streamlined entry into the industry.

The Casella CDL Training School, established in 2020, has been a resounding success, enabling us to invest in our people, grow our team of drivers, and support the regional labor force. In 2023, we announced the addition of a Diesel Technician Training Program to similarly develop talent and provide career growth opportunities in our maintenance shops. Combined, the two schools will comprise the Kenneth A. Hier Sr. Training Center.

The diesel technician training curriculum begins with an introduction to commercial vehicles and workplace safety, and then progresses to preventative maintenance, brakes, electrical, and HVAC repair for diesel technicians. Since its inception, the program has graduated more than 40 diesel technicians.

The CDL training school continues to see high attendance, with 81 CDL graduates in 2023 and more than 200 since the school's opening. Graduates from the CDL school continue to have a low turnover rate, a testimony to the program and the defined driver career path we provide the graduates.

The Training Center has been named in honor of Ken Hier, the first employee hired at Casella in 1976. Ken embodied a steadfast commitment to safety and customer service, performing over one million successful service stops throughout his career. In 1996 Ken was named the National Waste and Recycling Association's Driver of the Year, and in 2017 we dubbed him our Driver of a Lifetime. Ken passed away in January 2024.

Other Casella employee training programs include those for front-line leadership; entry-level management for operations, maintenance, and controllers; and language (English and Spanish).

— Ken Hier Sr. —
The Man on the Mountain and
Casella's Driver of a Lifetime

Company Highlight

Career Paths With Purpose: Customer Care

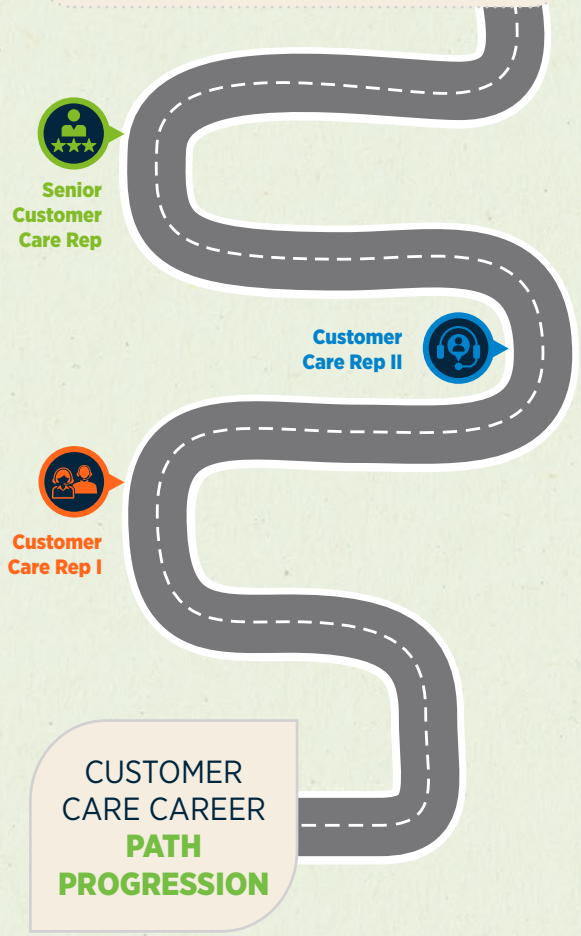
The Casella Customer Care Center is key to providing exceptional service and retaining relationships with customers, and the team exemplifies Casella's Core Values. Employees are selected based on the mission of providing personal service with a passion for solving customer problems or concerns.

Customer care representatives are provided clear and defined career paths for growth. These paths recognize and reward performance, reliability, work ethic, and character, while encouraging team members to reach out of their comfort zones. The team's intentional commitment to personal growth and development results in enthusiastic, engaged employees who are passionate about their work and workplace.

To date, more than 50 employees who began their Casella careers in Customer Care have advanced to other roles in the company.

Customer Care is a department that lives by Casella's Core Values. We strive for continuous improvement in helping to grow our people and teams within the organization, and in our relationships with our customers every day.

— Bridget Jakubowski
Director of Customer Initiatives



Employee Highlight

Kixx Diaz
DRIVER

Rochester, NY, driver Maritza "Kixx" Diaz made Casella history when she became the first female to earn her CDL Class-A upgrade through the Casella CDL training school. She is the only female roll-off driver in her division and is widely recognized for her commitment to the community and her love of engaging with her customers.

Materials MANAGEMENT

Each year, Casella works with customers to recover more than 1.4 million tons of valuable resources from society's discards. These resources return to supply chains to become new products, reducing the need to extract, transport, and process new resources.

Extracting materials from the waste stream and creating new resources has always been a large part of the Casella strategy. Since that first truck, it's been a large aspect of the business, which means we can provide our customers with the recycling expertise and advice they need to meet their goals.

— Bob Cappadona
VP, Resource Solutions

GOAL: RESOURCE SOLUTIONS

Grow our Resource Solutions business to reduce, reuse, or recycle more than 2 million tons of solid waste materials per year by 2030.

2019 Performance	**2023** Progress	**2030** Goal
1.05M	**1.43M**	**2.00M**

Resource Solutions

We work with customers to recover valuable resources from all elements of the disposal stream. This includes traditional recyclables, food waste and other organics, industrial recyclables, and more.

Through investments in infrastructure, innovation, and education, we aim to be recycling two million tons per year by 2030.

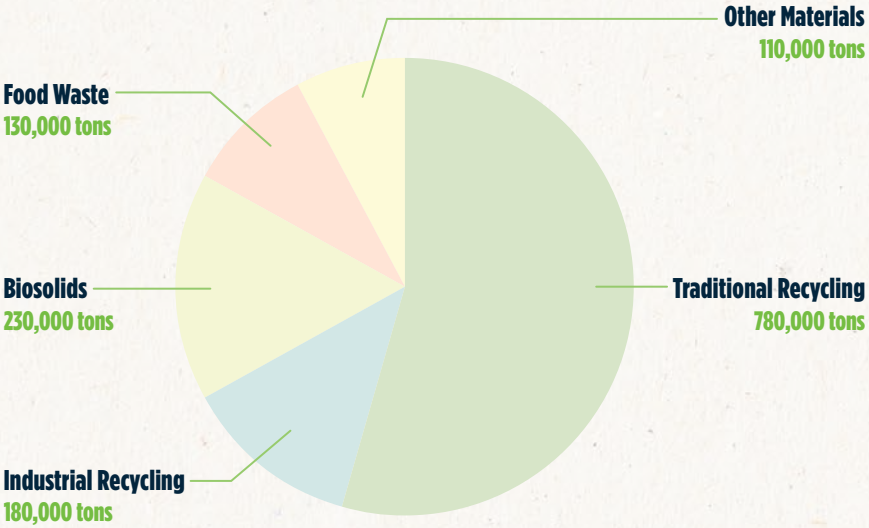
- **INFRASTRUCTURE:** Recovering thousands of tons of material every day requires an ongoing investment in collection and processing infrastructure. We have developed a business model that allows us to make these investments while realizing appropriate returns.
- **INNOVATION:** Processing technology continues to advance. Recent innovations deploy optical sensors, robotics, and machine learning to simultaneously optimize efficiency, productivity, and commodity quality. Many of these technological advancements can be seen in our facilities. (For instance, see Service Meets Innovation at the Charlestown Materials Recovery Facility (MRF) highlight on page 29.)
- **EDUCATION:** The aspirational vision of a circular economy can be achieved only through the capture of clean recyclables from the communities we serve. Although some contamination can be managed with technology, proper sorting at the source is the most effective strategy.

Since 2019, we have increased the tonnage we recycle annually by nearly 400,000 tons. In 2023, we completed a full retrofit of our largest recycling facility. With the added capacity of this retrofit plus the addition of new facilities in NY and PA, we are positioned to see tonnage growth in 2024.

We face challenges and barriers to achieving our goal. Contamination in the recycling stream adds cost and impedes quality. Some municipalities have chosen to discontinue their recycling programs in response to budget pressures and myths about the effectiveness of recycling. For organics, the presence of PFAS and other chemical contaminants may prevent beneficial use.

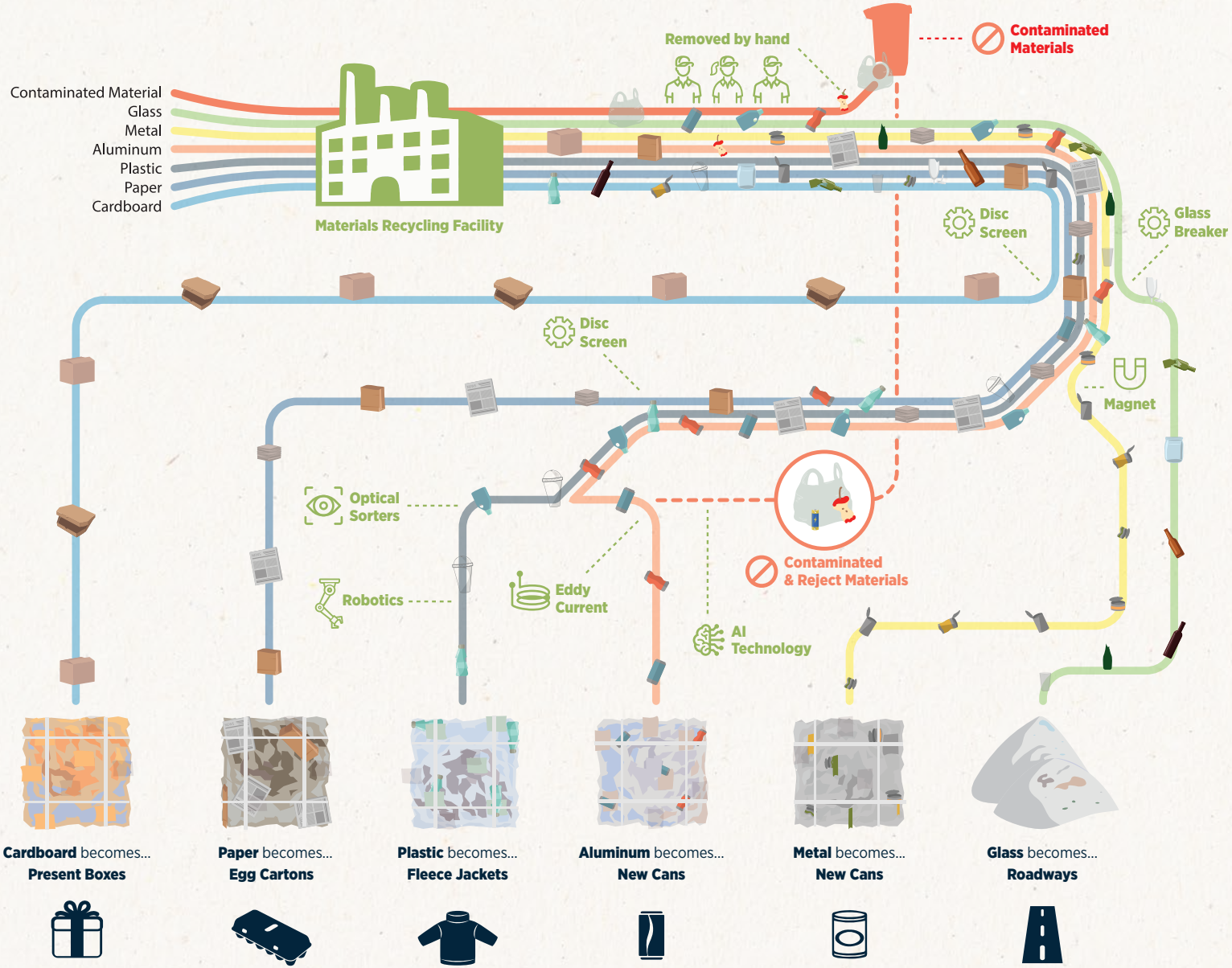
MATERIAL RECOVERED

The 1.4 million tons we recovered break down into the following categories:



Recycling Technology

Modern recycling facilities use advanced technology to separate mixed recyclables into clean recycled commodities that can be manufactured into new products.



This graphic is intended to be a depiction of a Materials Recovery Center and does not factually represent Casella's facility designs.

Optical Sorters: Sensors visually scan and identify target materials then separate them using compressed air and/or robotics.

Disc Screen: Rotating shafts with rubber discs are calibrated to capture cardboard and paper while allowing other items to fall through.

Glass Breaker: A specialized disc screen separates glass fragments, which are then cleaned and sized using ballistic separators and blowers.

Magnet: Magnetic separators – often in the form of large rotating magnetic drums – pull metals from other recyclables.

Eddy Current: Rotating magnets induce a charge in nonferrous metals such as aluminum and repel them from the other materials.

Robotics: Robotics are increasingly used to both identify and capture target materials at high rates of speed and accuracy.

AI Technology: Advancements in artificial intelligence and machine learning can support productivity, product quality, and material data.

Company Highlight

Service Meets Innovation at Charlestown MRF

In July 2023, Casella reopened the doors of the region's largest largest Materials Recovery Facility in Charlestown, MA. Known as the Boston MRF, the recycling facility underwent a retrofit costing about $20 million. The project brings an added 50,000 tons per year of processing capacity to New England. Featuring the latest technologies, including robotics and artificial intelligence, the facility can accommodate an evolving recycling stream while helping to meet market demand for quality recycled commodities.

Casella's investment in this retrofit brings many other benefits: added processing capacity for the region, enhanced recovery rates on specific commodities, continued ability to meet stringent commodity quality specifications, and reduced reliance on difficult-to-staff sorting positions.

The retrofit project increased the Boston MRF's processing load by 20%—raising it to 230,000 tons annually from 180,000—and gave it a throughput rate of 50 tons per hour. The system employs nine optical sorters, two scalping screens, two ballistic separators, aspiration points for film removal, a glass processing system, robotics, and artificial intelligence technology

"The new system in Boston has given us the ability to accurately sort and separate recyclables like never before. We have seen a huge improvement to our product mix, and we now produce some of the cleanest commodities on the market. During our retrofit, we added fresh-air, climate-controlled sorting enclosures so our employees would have a clean, comfortable place to work in. In addition, this system was designed to be easily accessed for maintenance and cleaning, reducing the chance of injuries and making a safer work environment."

— Austin McKnight
Market Area Manager

READ MORE

Employee Highlight

Dominic Mantica
ENGINEERING & MAINTENANCE MANAGER

"I really appreciate the Boston MRF retrofit updates, specifically the technology. I can digitally connect to the machinery from home or from the road if there's a problem, which can increase uptime. It has made my work-life balance much better.

As the engineering and maintenance manager at the Boston MRF since 2010, Dominic is responsible for maintaining and repairing the equipment there along with auditing the material flow to find inefficiencies in the process, engineering layout updates as necessary. His constant monitoring of the equipment and its effectiveness allows the MRF to run with minimal downtime and increased material recovery.

Renewable Energy

Solid waste that is not yet suitable for recycling can still become a resource.

When placed in a landfill, waste feeds naturally occurring bacteria that produce methane biogas. This biogas can be used to make electricity, to fuel vehicles, or added to natural gas pipelines that fuel homes and businesses.

All of Casella's active landfills capture and combust methane biogas. As of 2023, four active facilities and one closed facility deliver gas to energy plants that generate electricity. We expect two more will direct their biogas to renewable natural gas facilities in 2024. At all of our sites, gas that is not captured for energy is flared to keep methane out of the atmosphere.

In July 2023, Casella entered a partnership with WAGA Energy to develop renewable natural gas capacity at three landfills. Following an estimated two-year permitting and construction period, the initial production across these three sites is expected to total approximately 1,300,000 MMBtu per year of renewable natural gas.

Casella facilities also host smaller-scale renewable energy projects, including wind turbines, solar photovoltaics, and an innovative landfill geothermal system.

1 Your waste creates biogas

- Biodegradable material like food, paper, some textiles, wood, and sludge break down to make landfill biogas.
- Plastics don't produce biogas; these fossil-derived materials remain sequestered in the landfill.

2 We operate systems to collect landfill biogas

- We install vertical and horizontal wells that actively pull gas from the landfill.
- Gas technicians continuously monitor gas data, conduct surface scans, and tune wells.
- Drone technology enhances our monitoring and helps to pinpoint gas system maintenance needs.
- Gas is pretreated for use in renewable energy production.

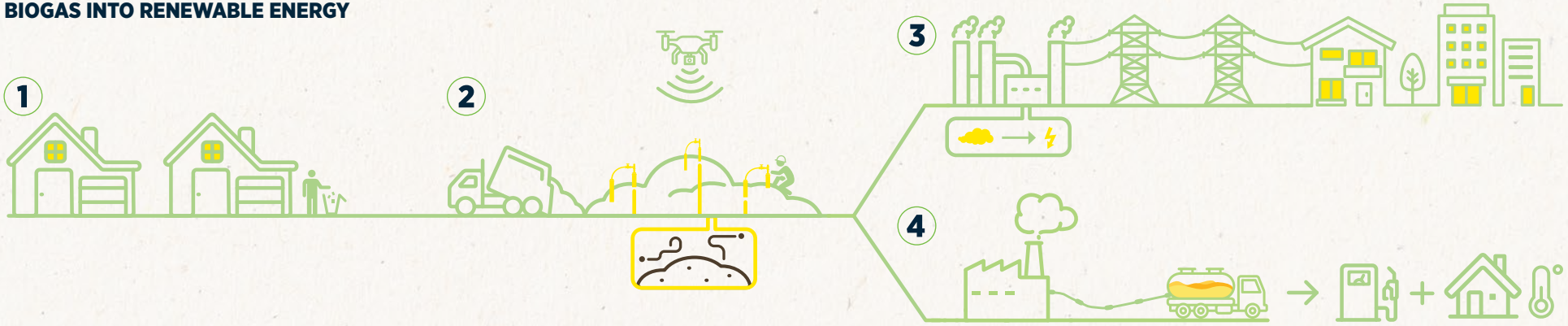
3 Landfill biogas can become electricity

- Last year our landfills supplied gas to produce 220,000 MWh, enough for about 30,000 New England households.
- The electricity created from our landfills is 7x greater than the electricity we consume.

4 Landfill biogas can become renewable natural gas

- We are working with partners who intend to clean and compress our landfill biogas to make renewable fuel that can be used for vehicles, heating, and more.

TRANSFORMING LANDFILL BIOGAS INTO RENEWABLE ENERGY



Company Highlight

Clinton County Landfill

For more than 15 years, the Clinton County Landfill in Morrisonville, NY, has been turning waste into a resource. In October 2008, the site became the fifth Casella facility to begin producing renewable electricity from landfill biogas. Since then, its engines have been feeding enough power to the grid for roughly 6,000 New England homes.

Landfill biogas occurs naturally as organic materials decompose in landfills. Landfill gas-to-energy projects benefit the climate twice: First, by capturing methane before it can be released to the atmosphere, and second, by making electricity for the grid and displacing the fossil fuel that might have been needed to make that power.

Whereas some renewable energy sources generate power only when the sun shines or the wind blows, landfill biogas can produce power 24/7/365. These facilities are increasingly important as society works to reduce reliance on fossil fuels.

The Clinton County Landfill team is proud to serve its community in multiple ways, providing a safe and secure disposal facility for customers' waste as well as an on-site recycling facility, compost operation, and renewable power plant.

With innovative technology, this facility transforms an environmentally harmful emission into a valuable resource. Creating renewable energy from the natural decomposition of waste showcases our commitment to environmental stewardship.

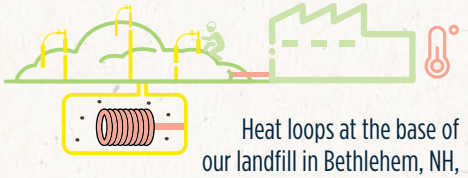
— Amy Davies, P.E.
Environmental Engineer

READ MORE

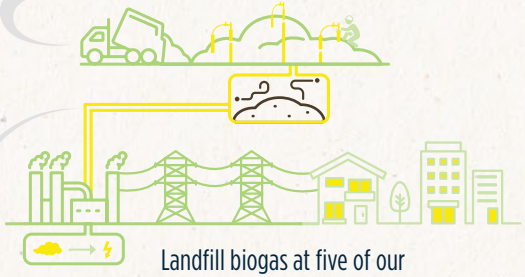
RENEWABLE ENERGY AT SOLID WASTE FACILITIES

The rooftop of our recycling facility in Springfield, MA, hosts 1.1 MW of solar panels

The wind blowing off of Lake Erie powers two turbines at our facility in Buffalo, NY



Heat loops at the base of our landfill in Bethlehem, NH, capture the thermal energy to heat our shop



Landfill biogas at five of our sites fuels engines that produce renewable electricity for the grid

Soon, we expect to deliver landfill gas to plants that produce renewable natural gas for vehicle fuel

Sustainable OPERATIONS

Through the services we provide, we help our customers and communities meet their environmental goals. We can also benefit the environment by reducing the impact of our own operations.

Running our trucks more efficiently and sustainably benefits us and it benefits our customers. As we modernize our fleet and execute our route efficiency projects, we save fuel, cut emissions, and reduce costs. It takes teamwork: From our drivers and technicians to our technology partners and vehicle suppliers, everybody has an important role.

— Sean Steves
SVP & Chief Operating Officer

GOAL: FUEL EFFICIENCY

Improve our fuel efficiency, reducing our gigajoules of fuel consumed per ton of material collected by 20% below a 2019 baseline.

2019 Performance	**2023** Progress	**2030** Goal
--	↓12%	↓20%

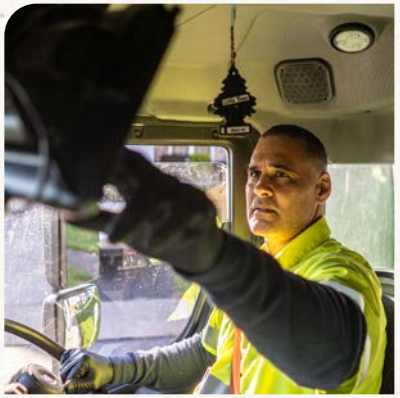
Fuel Efficiency

When we conserve fuel, through routing improvements and vehicle automation, we simultaneously reduce costs and emissions.

In 2023, we continued to advance route efficiency projects as part of our overarching fleet automation and conversion strategy. These projects enable us to remove older trucks from service while eliminating unnecessary heavy-duty truck traffic in the communities we serve.

We track our fuel intensity in terms of the amount of fuel we consume per ton of waste or recyclables we collect. Between 2019 and 2023, we have reduced this metric by 11.7%. We expect to see further improvements in the coming year as we execute our plan in more markets.

Through investments in truck automation and technology, we can conserve fuel while also improving worker safety and driver productivity. These benefits, along with the fuel and emission savings, combine to propel important progress toward multiple sustainability goals.



FLEET INNOVATION

1 Automated Lifting Arm

By automating our fleet, we reduce the need for employees to repeatedly exit the truck and manually maneuver bins. This keeps our people safer, improves the efficiency of their work, and reduces physical barriers to employment. We ended fiscal year 2023 with 56% of our residential fleet automated.

2 Curotto-Can® Technology

With Curotto-Can technology, we improve route management, flexibility, and productivity, which helps to advance our fuel efficiency goals.

3 360-Degree Onboard Cameras

Our collection vehicles include driver-facing, front-facing, and back-up cameras. Many vehicles employ up to eight cameras for full 360-degree visibility and roadway safety.

4 Hopper Cameras

Select vehicles include a hopper camera, positioned to observe incoming material and spot unacceptable items. By monitoring sorting errors and communicating with customers, we can improve recycling quality.

5 Onboard Computers

With onboard computing technology available on approximately 70% of our fleet, we support routing improvements to enhance both driver productivity and fuel efficiency.

6 Preventive Maintenance

In conjunction with all of the latest technology, basic preventive maintenance remains essential to protecting driver safety, promoting fuel efficiency, and ensuring that we can provide the safe, reliable service our customers need and expect.

Alternative Fuels

As we advance our fuel efficiency, we are also actively evaluating opportunities to switch to alternative fuels and reduce our reliance on diesel fuel.

Compressed natural gas (CNG) fuels a portion of our overall fleet. We have found the trucks to be clean and quiet, and we continue to purchase some CNG vehicles each year. However, this technology remains limited in that many of our communities do not have access to the necessary fueling infrastructure.

PUTTING EV TECHNOLOGY TO THE TEST

Electric vehicle (EV) technology is becoming available for many sectors. Through a grant from the State of Vermont, we have been testing two electric refuse trucks to determine whether the technology can meet the uniquely rigorous daily demands of our fleet. The seasonality and terrain of Vermont have provided a diverse and demanding testing ground, allowing us to monitor performance differences across weather conditions and along rural and mountainous routes. We have been providing the data to the manufacturer to help them work through challenges and to continue developing the technology.

READ MORE

Employee Highlight

Marissa Sprouls
ENVIRONMENTAL COMPLIANCE ANALYST

Marissa is an Environmental Compliance Analyst for Casella's divisions in Massachusetts and New Hampshire. She conducts environmental training sessions, assists with response to spills and emergencies, and manages environmental reporting related to landfill gas, stormwater, and fleet. In her role, she works with state and local regulators to support compliance amid evolving regulations. Staying current with environmental compliance requirements helps to mitigate impacts to air, soil, and groundwater.

Environmental Compliance

Compliance with environmental regulations is a core expectation for each of our operations and a daily responsibility of each Casella employee.

Our engineering and environmental professionals work with our facility operating teams to improve operations while reducing environmental risk. We operate in a geography that has stringent environmental regulations, and we are proud to manage to these standards. Our approach includes the following elements:

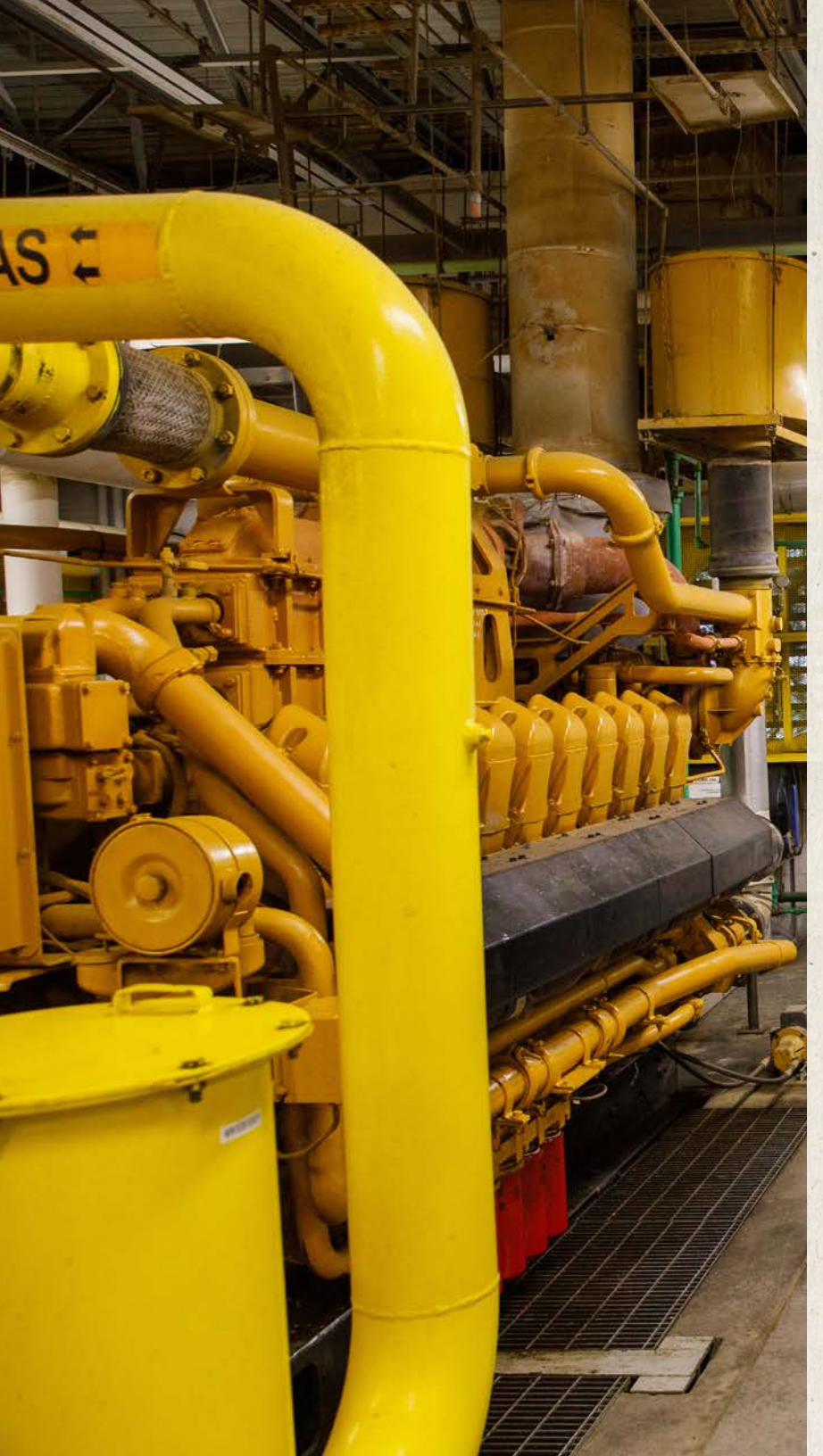
- Casella employs a team of environmental engineers and compliance professionals dedicated to providing our operations teams with the knowledge and resources needed for compliance and environmental protection.
- Through our updated Environmental Compliance Review program, our teams work to prevent, detect, and correct potential noncompliance issues and ensure preparedness for external inspections.
- Casella facilities track their recurring permit conditions and responsibilities in the company's environmental task management database, with the support of a dedicated administrator.
- Casella employees receive training on environmental topics relevant to their position during on-boarding and throughout the year.

Emerging Solutions: PFAS Treatment

The field of environmental services is always evolving, as society's needs and goals change. An example of a recent area of concern are the so-called forever chemicals, per- and polyfluoroalkyl substances (PFAS). Members of this complex group of synthetic chemicals, used in thousands of consumer products, do not easily decompose, and recent developments in monitoring technology have revealed that these substances are widely present at detectable levels throughout the environment.

Casella has launched a testing program at our Vermont landfill to tackle the problem of separating PFAS from landfill leachate. The process being evaluated is called foam fractionation, in which rising air bubbles are introduced at the bottom of the water column and the PFAS attaches to them. The resulting foam can be separated from the water and then trapped in concrete blocks for secure disposal. The scrubbed leachate can then be managed by wastewater treatment facilities.

The treatment process is one of the first in the country to be tested at a landfill. By testing this emerging technology, we can play a role, as an industry leader, in helping others to address a widespread environmental challenge. From 2005 to 2010, Casella proactively began to measure and manage the greenhouse gas emissions produced by our customers' waste, in advance of regulations or requirements. In many ways, our preliminary work with PFAS treatment is being implemented in this same spirit.



Climate LEADERSHIP

For Casella, climate leadership is not about doing less—it is about doing more. It is about capturing more gas; producing more renewable energy; reducing, reusing, and recycling more material; and sequestering more carbon.

Over the past 20 years, the solid waste industry has made great progress in reducing greenhouse gas emissions. Through technological innovation, infrastructure investments, and operational focus, we can continue to capture more gas and deliver it to our renewable energy partners.

— Sam Nicolai
VP, Engineering & Compliance

GOAL: GHG EMISSIONS

Further reduce our carbon footprint, measured in metric tons of carbon dioxide equivalents (CO_2e) from scopes 1 and 2 with a 2022 baseline.

2019 Performance	↓ 33%
2023 Progress	↓ 32%
2030 Goal	↓ 40%

Emission Reductions

Between 2005 and 2010, we reduced our Scope 1 and 2 greenhouse gas emissions by 45%. Between 2010 and 2022, we reduced them by another 32%.

We are proud to have driven these significant reductions in total emissions over a period when our businesses and facilities grew substantially.

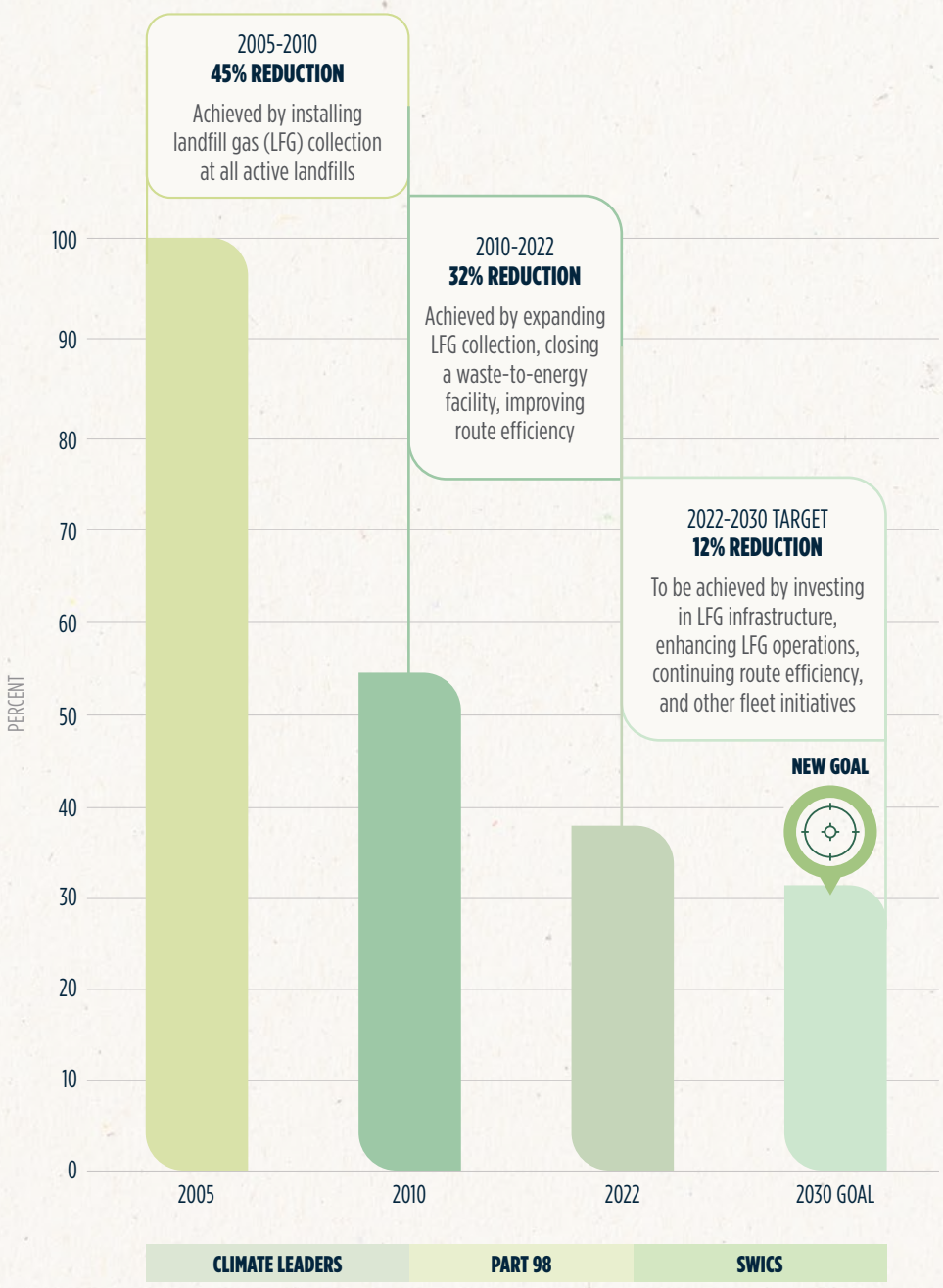
Most of these emission reductions have been realized at our landfills, where our operating teams work to capture methane and reduce the climate footprint of society's unrecycled waste. We also manage emissions from our fleet through the fuel efficiency measures described on page 33.

With this year's report, we are aligning with our industry peers to adopt the SWICS (Solid Waste Industry for Climate Solutions) model for quantifying greenhouse gas emissions from landfills. The new model is similar to the EPA model we began using in 2010, but it is more nuanced and takes into account a wider range of operating variables, such as surface emission monitoring and wellfield data, which we believe results in a more accurate accounting of modeled emissions.

Our 2023 emissions totaled 598,478 metric tons of CO_2e, calculated using the SWICS and GHG Protocol methodologies, then verified by external reviewers.

Rather than recalculating our emissions dating back to 2010, we are setting our baseline to 2022 and continuing toward our 2030 target. Our restated goal – aligned with our previously published target – is to reduce our emissions to 12% below 2022 by 2030. Our restated base-year emissions total 640,846 metric tons of CO_2e. The progression of our greenhouse gas reduction achievements is illustrated in the graphic to the right.

GREENHOUSE GAS REDUCTION ACHIEVEMENTS AND 2030 GOALS



Planning and Resilience

In fall 2023, we convened leaders from across the company to evaluate risks and opportunities associated with climate change.

During our analysis, we reviewed three hypothetical future climate scenarios and discussed the impact each might have on our business. A key insight from the dialogue was that building climate resilience is about investing in our capacity for change. We were encouraged to find that many of our recommendations map nicely onto the foundational pillars in our preexisting strategy: people, technology, innovation, and facilities.

Another element of our approach to climate resilience is our Casella Priority Response (CPR) process. The CPR process guides our response in the event of operational disruptions, including natural disasters. Through prompt, coordinated response, we strive to minimize impacts to our customers and maintain our overall level of service. As climate change increases the frequency and severity of storm events, our communities need reliable debris removal and disposal services to ensure they can clean up, rebound, and rebuild.

Company Highlight

Drone-Based Emission Monitoring

Technology continues to advance in all aspects of the industry, including at our landfills. Relating to landfill gas management, we have seen the emergence of remote monitoring technology capable of detecting and pinpointing sources of methane gas across large acreages. Today, Casella's facilities deploy regularly scheduled flights of drone-based methane detectors as a diagnostic tool to identify areas in need of tuning or maintenance. By adopting this new technology, we are able to capture more gas, keeping it out of the atmosphere and redirecting it to renewable energy production.

Technological advancements around monitoring and managing landfills have continued to allow us to optimize landfill operations and improve our efficiency. This shift enables us to be more knowledgeable about our sites and creates opportunities for improved capture efficiency.

— Josh Haley
Division Manager

Employee Highlight

Steven DuBrey
LANDFILL ENVIRONMENTAL TECH MANAGER

"Each field is unique, and requires a lot of imagination and data analysis to figure out what is needed to maximize gas collection. It is incredibly rewarding because it has a direct impact on the communities our landfills serve.

Steven oversees seven of Casella's landfill gas collections systems, where his duties vary across sites. He is used as an employee resource, planning for future collection systems while troubleshooting problems and being a mentor to newer technical staff members. He is also responsible for taking compliance readings and adjusting gas flows at the landfills.

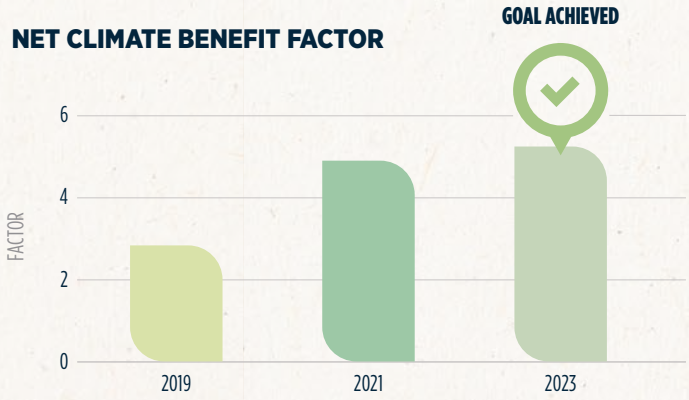
Net Climate Benefit

For every ton of greenhouse gas we emit through our operations, our services prevent an estimated 5.6 tons of greenhouse gas emissions elsewhere in the economy.

Our recycling services prevent emissions throughout global product supply chains. The energy we generate prevents fossil fuel combustion in the power grid. And our work sequesters biogenic carbon in landfills and agricultural soils.

As we continue to reduce our direct emissions through landfill gas management and fuel efficiency, we understand that we can also reduce indirect emissions through our recycling, energy, and carbon sequestration services. To track our full climate impact, we monitor a ratio we call our Net Climate Benefit. We calculate this by adding the emission reduction benefit of our recycling, renewable energy, and sequestration activities and dividing this number by our total Scope 1 and 2 emissions. These calculations are completed using EPA factors and tools.

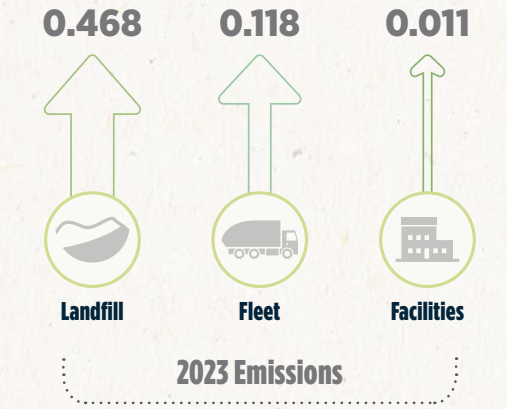
In our 2020 sustainability report, we outlined a goal to increase our Net Climate Benefit factor to 5.0x by 2030. In 2019 and 2020 our Net Climate Benefit calculations accounted for a portion, but not all, of our recycling, energy, and sequestration activities. For our 2021 inventory, we expanded the calculation to incorporate additional materials such as industrial recycling and biosolids. Since our last report, we saw our Net Climate Benefit increase from 4.8x using 2021 data to 5.6x using 2023 data. The driving factor for improvement during this two-year period was the growth in the tons we captured for recycling by working with our customers.

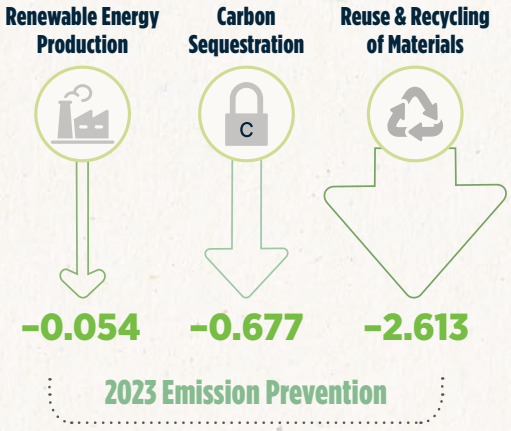


*A more detailed explanation of our Net Climate Benefit calculation can be found in our annual CDP disclosure by visiting casella.com/esg-practices.

Calculating Our Net Climate Benefit Factor

Million Metric Tons of CO_2e





	2023
Emission Prevention	2.635
	÷
Emissions	0.551
NET CLIMATE BENEFIT FACTOR	**5.6**

Community ENGAGEMENT

At Casella, we are driven to make a difference by investing in the communities where we live and work through local giving, employee volunteering, and educational outreach.

Our approach to community engagement draws on our Casella Core Values. Through our interactions, we want to build dialogue and trust with our community. We want to understand local needs, support local goals, and lead with compassion.

— **Abby Kristan**
Community Engagement Manager

GOAL: COMMUNITY GIVING

GOAL ACHIEVED

Increase our community giving, including charitable donations, in-kind services, and local community sponsorships.

2019 Performance	**2023** Progress	**2030** Goal
$1.06M[1]	$2.19M	$2.00M

[1] Community Giving metric is for 2020 when tracking began

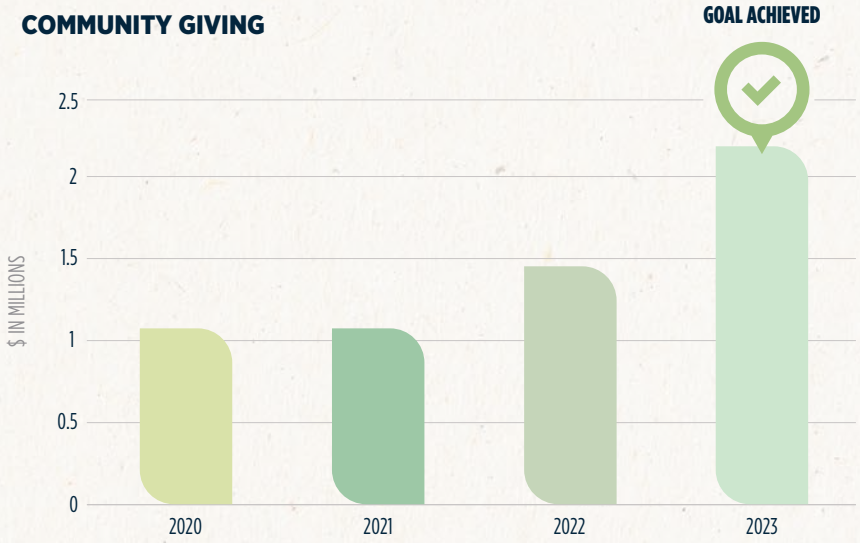
Community Giving

In 2023, we achieved and surpassed our community giving goal, contributing an estimated $2,200,000 in the form of charitable donations, local sponsorships, and in-kind services.

This giving consisted primarily of locally directed contributions to community causes and organizations.

In addition to achieving our 2030 goal, we are proud to announce the launch of The Casella Foundation, described below. With this Foundation, we aim to strengthen and grow our longstanding commitment to supporting the communities where we live and work.

Having achieved our initial target, we intend to continue our charitable donations, local community sponsorships, and in-kind services, and we aim to announce a new community giving goal in our next report. In the meantime, we will bring greater focus to our employee volunteering initiatives.



Company Highlight

The Casella Foundation

In 2024, we launched The Casella Foundation in alignment with our long-term commitment to supporting the communities where we live and work. The primary focus of the Casella Foundation is to support qualified non-profit charitable organizations demonstrating community impact in environmental and natural resource conservation. Beyond this primary focus, we also support organizations advancing neighborhood revitalization, workforce development, and disaster relief.

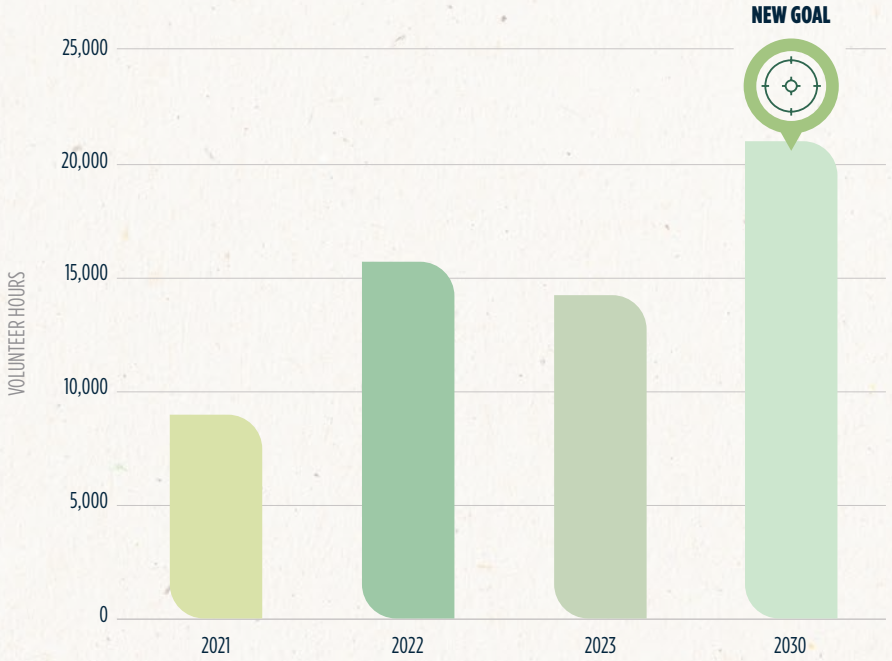
Employee Volunteering

As part of our drive to make a difference in the communities where we live and work, our teams organize and execute volunteering events including disaster relief efforts, food drives, neighborhood clean-ups, mentor connections, and much more.

To strengthen and amplify our beneficial impact, we have invested in a new employee volunteering portal and established a Community Champions Network of leaders. Their goal is to create an environment to inspire their coworkers to maximize their impact through volunteering.

We encourage Casella employees to participate in five or more hours per year of volunteering, with a particular emphasis on sharing their recycling and sustainability expertise with their communities. Having achieved our first community giving goal (see page 41), we will now turn our focus to building our employee volunteering program, with a new goal to invest 21,000 hours per year of our time and expertise in our local communities. We will adjust this goal periodically, as needed, to account for our growing team.

EMPLOYEE VOLUNTEERING



Employee Highlight

Paul Riopelle
DRIVER

Paul Riopelle served our country for 15 years in the National Guard and today serves his customers in Salem, NH.

"I love participating in community events and touch-a-trucks. I love getting kids involved in the trucks, learning, and seeing their smiling faces.

Employee Highlight

Jessica Dibble
OPERATIONS MANAGER

As Operations Manager in Horseheads, NY, Jessica Dibble represents the second of three generations of women in her family to bring their work ethic and leadership to Casella.

"Each year we participate in community events, including trunk-or-treats, parades, and more. I believe all of us enjoy giving back to the community we serve and educating people on what we do.

Employee Highlight

Chez Morton
MARKET AREA MANAGER

Market Area Manager Chez Morton and his team demonstrate the power of hard work and commitment to the local community each day through their work in Lebanon Farms, PA.

"Community engagement and volunteerism is at the heart of our mission here in the Mid-Atlantic region. Our people not only work but live here, and we strongly believe in fostering strong relationships within the communities we serve.

Educational Outreach

Throughout this report, we have presented our vision for sustainable materials management within our communities.

As we work to build the necessary services and infrastructure, we know that sharing our knowledge and expertise across our operating footprint helps us to educate the communities we serve.

Each year, we share our technical knowledge by participating in community events, visiting local schools, lecturing in university classrooms, offering facility tours, serving on industry panels, meeting with municipal governments, testifying to state-level leaders, and more. We deliver education through our social media, blogs, and other outlets to aid the communities we serve.

To strengthen and amplify educational outreach, we have created K-12 kits for local schools, to help inspire young people to care about the environment and understand the impact they have.

Company Highlight

The Power of Play

Education plays a critical role in creating sustainable communities, and Casella is proud to partner with Wonderfeet Kids Museum in Rutland, VT, to bring to life a unique learning experience for children of all ages through a customized Casella exhibit about recycling and waste.

The interactive model truck exhibit is designed to bring children and families together as they explore proper recycling habits. It offers visitors a behind-the-scenes look at fleet technology, educating and empowering the next generation.

READ MORE

Community Engagement Stories

For additional community engagement stories, scan here >

READ MORE

After the recent flooding in Vermont, we partnered with local communities to provide essential support and volunteer services. Our volunteers showed commitment and compassion as they worked alongside community members to rebuild and restore the affected areas.

We are honored to have partnered with Staff Sergeant Travis Mills and the nonprofit Travis Mills Foundation, dedicated to supporting veterans who have been injured in combat. Casella volunteers worked together to create corn hole sets, which were donated to the Travis Mills Foundation Veterans Retreat along with a contribution.

Our Fort Edward, New York, team joined local Earth Day clean-up efforts by donating supplies, providing food and drinks for volunteers, and making a donation. More than 30 Casella employees also pledged their support.

The Dover Air Force Base Housing hosted Earth Day celebrations with educational activities and a hands-on Touch-A-Truck experience, showcasing our commitment to safety, sustainability, and inspiring the next generation.

The Casella Calendar Contest has been inspiring and educating third-grade students about waste and sustainability for nearly 20 years. The contest aims to instill lifelong habits, such as reducing waste, reusing items, recycling, and sharing this knowledge with others.

The Worcester Green Corps spent the day at our Material Recovery Facility in Auburn, Massachusetts. They took an extensive tour of our operations and gained insight into our initiatives and collaborative impact.

Safe Harbor Statement

Certain matters discussed in this report, including, but not limited to, the statements regarding the Company's intentions, beliefs or current expectations concerning its sustainability goals and commitments and anticipated actions to meet such goals and commitments, and the Company's progress towards, and achievement of, its sustainability strategy and vision, are "forward-looking statements" intended to qualify for the safe harbors from liability established by the Private Securities Litigation Reform Act of 1995. These forward-looking statements can generally be identified as such by the context of the statements, including but not limited to words such as "believe," "expect," "anticipate," "plan," "may," "would," "intend," "estimate," "will," "guidance" and other similar expressions, whether in the negative or affirmative. These forward-looking statements are based on current expectations, estimates, forecasts and projections about the industry and markets in which the Company operates and management's beliefs and assumptions. The Company cannot provide assurance that it actually will achieve the plans, intentions, expectations or guidance disclosed in the forward-looking statements made. Such forward-looking statements, and all phases of the Company's operations, involve a number of risks and uncertainties, any one or more of which could cause actual results to differ materially from those described in its forward-looking statements. Such risks and uncertainties include or relate to, among other things, the following: the ability to improve the Company's safety performance; the ability to increase the amount of recyclables processed or other resources managed; the impact of changes to, or new, statutory, regulatory and legal requirements; the ability to improve the Company's fuel efficiency; the ability to further reduce the Company's carbon footprint; and the amount of the Company's giving in its communities. There are a number of other important risks and uncertainties that could cause the Company's actual results to differ materially from those indicated by such forward-looking statements. These additional risks and uncertainties include, without limitation, those detailed in Item 1A, "Risk Factors" in the Company's Form 10-K for the fiscal year ended December 31, 2021 and in the Company's Form 10-Q for the quarterly period ended June 30, 2022, and in other filings that the Company may make with the Securities and Exchange Commission in the future. The Company undertakes no obligation to update publicly any forward-looking statements whether as a result of new information, future events or otherwise, except as required by law.

Materiality Statement

The terms "material," "materiality," and other similar terms, as referred to in this Sustainability Report, our website, and our ESG materiality assessment process are distinct from those terms when used in the context of Securities and Exchange Commission ("SEC") disclosure. As used in this Sustainability Report, our website, and our ESG materiality assessment process, these terms are not defined in accordance with SEC rules and interpretation. Issues deemed material for purposes of our sustainability and ESG reporting and for purposes of determining our ESG strategy may not be considered material for SEC reporting purposes, nor does inclusion of information in our sustainability and ESG reporting indicate that the topic or information is material to the Casella's business or operating results.

Scorecard

TOPIC	TARGET	METRIC DESCRIPTION	2020	2021	2022	2023	2030 GOAL
Essential Workers	Health and Safety	Health & Safety Total Recordable Incident Rate (TRIR), a measure of recordable incidents compared to hours worked	5.9	5.4	5.5	5.04	4.0
Materials Management	Resource Solutions	Tons of solid waste materials that we reduce, reuse, or recycle through our operations or with third parties in collaboration with our customers	1.221	1.213	1.457	1.432	2.000
Sustainable Operations	Fuel Efficiency	Gigajoules of fuel consumed per ton of waste and recycling collected	0.464	0.459	0.457	0.437	0.396
		Percentage below 2019 baseline	6.3%	7.3%	7.7%	11.7%	20.0%
Climate Leadership	GHG Emissions	Metric tons of carbon dioxide equivalent (CO_2e) emissions from scopes 1 and 2[1]	568,998	551,180	640,846[3]	598,478	
		Scope 1	564,186	546,100	634,676[3]	591,890	
		Scope 2	4,812	5,080	6,170[3]	6,588	
		Biogenic CO_2 (metric tons)[2]	185,208	186,834	191,710	187,524	
		Percentage below 2010 baseline	35%	37%	32%	32%	40%
		New goal: Percentage below 2022 baseline	--	--	--	4%	12%
Community Engagement	Community Giving	Charitable donations, in-kind services, and local community sponsorships, in millions (USD)	$1.062	$1.063	$1.410	$2.197	$2.000
	Employee Volunteering	New goal: Employee volunteering hours	--	9,000	16,000	14,000	21,000

[1] The company's GHG inventory for 2023 has been independently verified according to the standards required for a limited level of assurance. Visit ir.casella.com/esg-practices to view the Independent Verification Declaration.

[2] The company added the disclosure of biogenic CO_2 from the combustion of biomass materials, primarily landfill biogas, in 2020.

[3] Our updated GHG Emissions goal uses a base year of 2022. We have restated our base year emissions to account for acquisitions completed in 2022 and 2023. This restatement has not yet been independently assured.

GRI Content Index

This report has been prepared in accordance with the GRI standards.

We prepared this report over the course of 2023. In this, our eighth full sustainability report, we remain focused on the same six stakeholder groups (Employees, Customers, Communities, Investors, Government, and Supply Chain) and within the same scope and boundaries (Organizational Control) as in prior years.

Our most recent GRI assessment was completed in 2020. It focused on identifying the topics for inclusion in our sustainability reporting. The process consisted of an online survey sent to approximately 200 internal stakeholders and 70 external stakeholders, with a response rate of over 40%. The online survey was supplemented with nine stakeholder interviews. The five topic areas identified through that process are: essential workers, materials management, sustainable operations, climate leadership, and community engagement. These five topic areas provide the framework for our report, which was further developed with direct input from leaders representing multiple functions throughout our organization. Performance indicator data were compiled by the Sustainability Team. Casella's Vice President of Sustainability leads our biennial report development process. We value the input we receive from our key internal stakeholders during the reporting process, and our process for soliciting input from a broad range of stakeholders is described in Appendix A. We issue our reports biennially, and in off years, release a performance indicator scorecard accompanied by a brief interim update.

GRI 2: GENERAL DISCLOSURES 2021		
Number	**Disclosure Title**	**Location**
Section 1: The organization and its reporting practices		
2-1	Organizational Details	Sustainability Report | About this Report | pg. 3
2-2	Entities included in the organization's sustainability reporting	Sustainability Report | About this Report | pg. 3
2-3	Reporting period, frequency, and contact point	Sustainability Report | About this Report | pg. 3
2-4	Restatements of information	Sustainability Report | Emission Reductions | pg. 37 restatement of baseline year
2-5	External Assurance	Sustainability Report | About this Report | pg. 3 Investor Relations Website | ir.casella.com/esg-practices
Section 2: Activities and Workers		
2-6	Activities, value chain, and other business relationships	Sustainability Report | About Us | pg. 5
2-7	Employees	Sustainability Report | About Us | pg. 5
2-8	Workers who are not employees	N/A

Section 3: Governance		
2-9	Governance structure and composition	2024 Proxy Statement | pg. 24 Other governance documents | ir.casella.com/esg-practices
2-10	Nomination and selection of the highest governance body	Nomination and ESG Committee Charter | ir.casella.com/esg-practices Proxy Statement | pg. 78
2-11	Chair of the highest governance body	Proxy Statement | pg. 17
2-12	Role of the highest governance body in overseeing the management of impacts	Proxy Statement | pgs. 26-29
2-13	Delegation of responsibility for managing impacts	Proxy Statement | pg. 29
2-14	Role of the highest governance body in sustainability reporting	Sustainability Report | Sustainability Strategy | pg. 7
2-15	Conflicts of Interest	Code of Business Conduct and Ethics | ir.casella.com/esg-practices
2-16	Communication of critical concerns	Code of Business Conduct and Ethics | ir.casella.com/esg-practices Proxy Statement | pg. 31
2-17	Collective knowledge of the highest governance body	2023 CDP Climate Response | ir.casella.com/esg-practices Proxy Statement | pg. 24
2-18	Evaluation of the performance of the highest governance body	2023 CDP Climate Response | ir.casella.com/esg-practices Proxy Statement | Corporate Governance | pg. 24
2-19	Remuneration Policies	Proxy Statement | pg. 36 Proxy Statement | ESG Incentive | pg. 38 and pg.46
2-20	Process to determine remuneration	Proxy Statement | pg. 40
2-21	Annual total compensation ratio	Proxy Statement | pg. 66
Section 4: Strategy, Policies and Practices		
2-22	Statement on sustainable developement strategy	Sustainability Report | Sustainability Strategy | pg. 7
2-23	Policy commitments	Human Rights Policy | ir.casella.com/esg-practices
2-24	Embedding policy commitments	Code of Business Conducts and Ethics | ir.casella.com/esg-practices Human Rights Policy | ir.casella.com/esg-practices
2-25	Processes to remediate negative impacts	Code of Business Conduct and Ethics | ir.casella.com/esg-practices Proxy Statement | Corporate Governance | pgs. 24-32
2-26	Mechanisms for seeking advice and raising concerns	Code of Business Conduct and Ethics | ir.casella.com/esg-practices
2-27	Compliance with laws and regulations	Code of Business Conduct and Ethics | ir.casella.com/esg-practices
2-28	Membership Associations	Sustainability Report | Appendix B
Section 5: Stakeholder Engagement		
2-29	Approach to stakeholder engagement	Sustainability Report | Appendix A
2-30	Collective bargaining agreements	2022 SASB Disclosure | ir.casella.com/esg-practices 2023 10K | pg. 27

GRI 3 MATERIAL TOPICS		
Number	**Disclosure Title**	**Location**
3-1	Process to determine Material Topics	Sustainability Report | GRI Materiality | pg. 3 Sustainability Report | Appendix A
3-2	List of Material Topics	Sustainability Report | GRI Materiality | pg. 3
3-3	Management of Material Topics	See relevant topic standards
GRI 303 Water & Effluents, 2018		
Number	**Disclosure Title**	**Description**
3-3	Management of Material Topics	Other than typical sanitary wastewater generated at our facilities, the primary source of wastewater managed by Casella is leachate collected from our landfills and other solid waste management facilities. The collection, storage, transportation, and disposal of leachate is performed in accordance with the applicable federal, state, and local regulations, and includes redundant containment and monitoring systems at our generation and processing facilities. Onsite leachate management treatment infrastructure can include targeted pretreatment of specific compounds, aeration or other odor management programs, or full-scale treatment for NPDES discharge. Offsite disposal of leachate occurs at permitted wastewater treatment facilities, often coupled with solid waste management of the wastewater facility residual solids. Casella facilities also utilize a variety of leachate minimization strategies, including the use of final and interim capping projects, rain flaps and stormwater diversion systems, and the usage of compost and other organic materials to establish robust vegetative cover for landfill slopes. Both the quantity and quality of leachate generated at each facility is tracked over time, and annual goals are utilized to drive improvements and implement best practices.
303-1	Interactions with water as a shared resource	The company's water consumption is low, primarily consisting of use for sanitation and drinking water, with limited amounts for irrigation, dust suppression, and vehicle washing. Recycled water is utilized where possible for dust suppression. The largest source of wastewater is leachate collected from active landfill facilities. Landfills work to minimize leachate production through operational best management practices, and dispose of collected leachate at permitted disposal facilities.
303-2	Management of water discharge–related impacts	Wastewater streams delivered to permitted wastewater treatment facilities are sampled and tested in accordance with state-or facility-specific permits. Onsite treated flows are managed in accordance with approved NPDES discharge permits.
303-4	Water discharge by quality and destination	137.9 million gallons of landfill leachate was directed to wastewater treatment plants in 2023. 6.2 million gallons of landfill leachate was treated and discharged under NPDES permits. Minimal quantities of sanitary wastewater were treated and discharged through permitted septic systems.

GRI 305 Emissions, 2016		
3-3	Management of Material Topics	Independent Verification Declaration | ir.casella.com/esg-practices Sustainability Report | Climate Leadership | pgs. 36-39
305-1	Direct (Scope 1) GHG Emissions	Sustainability Report | Scorecard Appendix
305-2	Energy Indirect (Scope 2) GHG Emissions	Sustainability Report | Scorecard Appendix
GRI 306 Waste, 2020		
3-3	Management of Material Topics	Sustainability Report | Materials Management Section | pgs. 26-31
306-1	Waste generation and significant waste-related impacts	Sustainability Report | Materials Management Section | pgs. 26-31
306-2	Management of significant waste-related impacts	Sustainability Report | Circular Economy and Integrated Resource Management pgs. 10-11
GRI 403 Health and Safety, 2018		
3-3	Management of Material Topics	Sustainability Report | Health and Safety | pg. 20
403-1	Statement of whether a health and safety management system has been implemented	Sustainability Report | Health and Safety | pg. 20
403-9	Worker-related injuries	Sustainability Report | Scorecard Appendix
GRI 404 Training & Education, 2016		
3-3	Management of Material Topics	Sustainability Report | Essential Workers Section | pgs. 19-25
404-1	Average hours of training per year per employee	Sustainability Report | People, Culture, and Belonging | pg. 22
404-2	Programs for upgrading employee skills and transition assistance programs	Sustainability Report | Engagement | pg. 23
404-3	Percentage of employees receiving regular performance and career development reviews	Sustainability Report | Engagement | pg. 23
GRI 405 Diversity and Equal Opportunity, 2016		
3-3	Management of Material Topics	Sustainability Report | People, Culture, and Belonging | pg. 22 Human Rights Policy | ir.casella.com/esg-practices
405-1	Diversity of governance and workforce by age, gender, and race	Sustainability Report | People, Culture, and Belonging | pg. 22 Human Rights Policy | ir.casella.com/esg-practices
GRI 413 Local Communities, 2016		
3-3	Management of Material Topics	Sustainability Report | Community Engagement Section | pgs. 40-44
413-1	Operations with local community engagement, impact assessments, and development programs	Sustainability Report | Community Engagement Section | pgs. 40-44

Appendices

Appendix A: Stakeholder Engagement

Upon issuing each biennial sustainability report, we work to actively engage members of each of our six key stakeholder groups: Employees, Customers, Communities, Investors, Government, and Supply Chain. We conduct this outreach via multiple channels including meetings, webinars, public events, facility tours, and social media. We value sharing our sustainability journey with these stakeholders and drawing upon their insight and feedback to continuously improve our performance.

Appendix B: Memberships & Organizations

Casella is a member of or collaborates with the following organizations as of 12/31/2023.

National

National Waste & Recycling Association
NWRA Future Industry Leaders Alliance (NWRA FILA)
NWRA Women's Council
Association of Post-Consumer Plastic Recyclers
Recycled Materials Association (ReMA)
Product Stewardship Institute (PSI)
Water Environment Federation
Solid Waste Association of North America (SWANA)
US Composting Council
American Biogas Council
United Way
Detachable Container Association (DCA)
Society of Human Resources Management (SHRM)
Businesses for Social Responsibility (BSR)
Environmental Research & Education Foundation (EREF)

Regional

Northeast Recycling Coalition (NERC)
Northeast Resource Recovery Association (NRRA)
SWANA Northern New England Chapter
Environmental Business Council of New England (EBC)
Goodwill of Northern New England
Northeast Biosolids and Residuals Association
Mid-Atlantic Biosolids Association (MABA)
New England Water Environment Association (NEWEA)
New England Vegetable and Fruit Association
Eastern Paper Mill Suppliers Association
Northeast Human Resources Association (NEHRA)

Massachusetts

Greater Boston Chamber of Commerce
Massachusetts Municipal Association
Worcester Regional Chamber of Commerce
Associated Builders and Contractors, Massachusetts Chapter
Massachusetts Nursery and Landscape Association
Massachusetts Water Environment Association (MAWEA)
Asian American Civic Association

Vermont

Vermont Council on Rural Development (Newsletter)
Vermont Chamber of Commerce
Vermont Truck and Bus Association
Vermont Businesses for Social Responsibility
Association of Builders and Contracts VT
Vermont Human Resources Association (VTHRA)
Employer Support of the Guard and Reserve (ESGR)
Green Up Vermont
Chittenden Solid Waste District
Champlain Valley Farmer Coalition, Inc.

Appendices

Maine

Maine Chamber of Commerce
Maine Water Environment Association (MWEA)
Maine Rural Water Association
Maine Landscape and Nursery Association
Maine Organic Farmers & Gardeners Association (MOFGA)
Maine Municipal Association
Maine Resource Recovery Association (MRRA)
Maine Aggregate Association
Environment and Energy Technical Association (E2TECH)
Maine Motor Transport Association
Associated Builders and Contractors (ABC) of Maine
Bangor Region Chamber of Commerce

New Hampshire

Business and Industry Association of New Hampshire
New Hampshire Businesses for Social Responsibility
Association of Builders and Contractors NH
New Hampshire Timberland Owners Association
New Hampshire Home Builders Association
New Hampshire Nursery and Landscape Association (NHLA)

New York

New York State Association for Solid Waste Management
New York State Solid Waste Federation
New York State Association for Reduction, Reuse, and Recycling (NYSAR3)
New York Water Environment Association (NYWEA)
New York Farm Bureau
REMADE Institute
WNY Sustainable Business Roundtable

Connecticut

Connecticut Recyclers Coalition
Connecticut Nursery and Landscape Association (CNLA)
Connecticut Environmental Business Council (EBC)
Recycle Connecticut
CT DEEP's Solid Waste Advisory Committee

Mid-Atlantic Region Office

Professional Recyclers of Pennsylvania

Delaware

Middletown Area Chamber of Commerce
SWANA Mid-Atlantic Chapter

Maryland

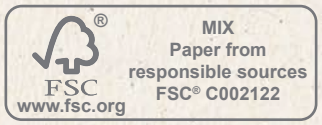
NWRA Maryland Chapter Legislative Fund

Pennsylvania

Lancaster Chamber of Commerce

Appendix C: ESG Practices

To see Casella's full list of ESG Practices including Reports and Disclosures, Corporate policies – including our environmental policy – and Governance Documents and Committee charters, please visit ir.casella.com/environment.



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B-3

MATTRESS RECYCLING LETTER

SME
SEVEE & MAHER
ENGINEERS

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

Sent via electronic mail

April 29, 2025

Jeffrey Pelletier
358 Emerson Mill Road
Hampden, ME 04444

Re: Casella Mattress Recycling Program Report

Dear Mr. Pelletier:

The Maine Department of Environmental Protection ("Department") issued a Public Benefit Determination ("PBD") with conditions (#S-020700-W5-CV-N) for a proposed 61-acre expansion to Juniper Ridge Landfill ("JRL") on October 2nd, 2024. Condition #3 of the PBD required Casella to submit a report detailing its plans and schedule to implement the mattress recycling program within 6 months. On March 28, 2025, Casella submitted a report detailing schedules and plans for its mattress recycling program to the Department for review.

The report discusses Casella's plans to add a mattress recycling program to its existing Materials Recovery Facility (MRF) in Scarborough. Casella submitted an application for a solid waste processing facility license to allow for the processing, dismantling, and recycling of mattresses at the Scarborough MRF on February 18, 2025. The Department accepted the application as complete for processing on March 7, 2025, and is still in process at this time.

Casella anticipates receiving 130-260 mattresses per day when the facility is fully operational. Assuming a 75% recovery rate, Casella estimates that 600 to 1,200 tons of mattress material would be diverted from landfills per year.

The Department has reviewed Casella's report on the plans and schedule for implementing a mattress recycling program. The Department finds that Casella has satisfied Condition #3 of the PBD license (#S-020700-W5-CV-N).

Please contact me if you have questions.

Sincerely,

Dominique DiSpirito

Dominique DiSpirito
Division of Materials Management
Bureau of Remediation and Waste Management
Eastern Maine Regional Office

2025 Casella Mattress Recycling Program MEDEP Response

APPENDIX C

COPY OF PROPERTY DEED

SME
SEVEE & MAHER
ENGINEERS

Bk 9188 Pg152 #3751
02-05-2004 @ 03:12p

QUITCLAIM DEED WITH COVENANT

KNOW ALL BY THESE PRESENTS, that Fort James Operating Company, "**GRANTOR(S),**" a Virginia corporation with a place of business at Old Town, Penobscot County, Maine, for consideration paid, grants to the State of Maine, acting by and through its Executive Department, State Planning Office "**GRANTEE**", and pursuant to Resolves, 2003, ch. 93, with Quitclaim Covenant, the land and buildings described in Exhibit A attached hereto and incorporated herein by reference, located in Old Town, Penobscot County, Maine (the "Premises"). The Premises are conveyed subject to the restrictive covenants and right of reverter set forth in Exhibit B attached hereto and incorporated herein by reference.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

IN WITNESS WHEREOF, the said Fort James Operating Company has caused this instrument to be sealed with its corporate seal and signed in its corporate name by Michael C. Burandt, its Executive Vice President this 3rd day of February, 2004.

FORT JAMES OPERATING COMPANY

By: _____
Its: Executive Vice President
Printed Name: Michael C. Burandt

SEAL

STATE OF
COUNTY OF Fulton, ss.

On February 3, 2004, personally appeared the above-named Michael C. Burandt, Executive Vice Pres of said corporation in his said capacity, and acknowledged the foregoing to be his free act and deed and the free act and deed of said corporation.

Before me,

_____
Notary Public
Printed Name:

A. CLAIRE SHERWOOD
Notary Public, Fulton Cty, Georgia
Commission Expires June 16, 2007

SEAL

Exhibit A
To
Quitclaim Deed with Covenant

Parcel Description

Four parcels located at Old Town, Penobscot County, Maine, and described as follows (individually referred to as "Parcel" and collectively referred to as "Parcels"):

PARCEL ONE: A certain parcel of land with any buildings thereon, situated on the northeast side of Route 43, 3.4 + miles west of the intersection of Route 43 and Route 95, in the city of Old Town, County of Penobscot, State of Maine and being more particularly described as follows:

1) BEGINNING at a 3/4 inch rebar located on the northeast side of Route 43, at the northwest corner of land now or formerly of Scott E. Bergquist as described in deed recorded at the Penobscot County Registry of Deeds in Book 3608, Page 247. Said rebar is also located at the southwest corner of the "Cadorette Parcel" as shown on plan entitled "Perkins & Cadorette Parcels, Standard Boundary Survey (with exceptions)" by Squaw Bay Corp. of Cumberland, Maine, June, 1995, Ronald M. Carpentier, PLS #2042, recorded at the Penobscot County Registry of Deeds, Plan Book D46-95, to which reference is hereby made;

2) THENCE South 82° 12' 30" East, 1445.38 feet along the land of said Bergquist to a cedar post and the land now or formerly of James River Paper Company, Inc. as described in the deed recorded at the Penobscot County Registry of Deeds in Book 4870, Page 200;

3) THENCE North 4° 27' 20" East, 809.31 feet along the land of said James River Paper Company, Inc. to a point;

4) THENCE North 5° 59' 05" East, 15.69 feet along the land of said James River Paper Company, Inc. to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the land now or formerly of Alfred Perkins and Florine Perkins as described in the deed recorded at the Penobscot County Registry of Deeds in Book 1448, Page 22;

5) THENCE North 82° 46' 26" West, 2014.87 feet along the land of said Perkins to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the sideline of Route 43;

6) THENCE South 29° 43' 31" East, 1013.29 feet along Route 43 to a 3/4 inch rebar and point of beginning.

The above-described parcel contains 32.4 acres.

Being the same premises described in a Warranty Deed given by Francis R. Cadorette and Rhonda B. Cadorette to James River Paper Company, Inc., dated June 13, 1995, and recorded in said Registry in Book 5878, Page 272.

PARCEL TWO: A certain parcel of land with any buildings thereon situated on the northeast side of Route 43, 3.4+ miles west of the intersection of Route 43 and Route 95, in the City of Old Town, County of Penobscot, State of Maine, and being more particularly described as follows:

COMMENCING at a 5/8 inch rebar with survey cap marked "RMC NO. 2042" located at the intersection of the northeast sideline of Route 43, and the southerly boundary line of land now or formerly of Alfred Perkins and Florine Perkins as described in deed recorded at the

Penobscot County Registry of Deeds in Book 1448, Page 22. Said rebar is also located at the northwest corner of the "Cadorette Parcel" as shown on plan entitled "Perkins & Cadorette Parcels, Standard Boundary Survey (with exceptions)" by Squaw Bay Corp. of Cumberland, Maine, June, 1995, Ronald M. Carpentier, PLS #2042. to be recorded at the Penobscot County Registry of Deeds to which reference is hereby made. Thence South 82° 46' 26" East, 1485.52 feet along the Cadorette parcel to the point of Beginning.

1) THENCE from the Point of Beginning South 82°46'26" East, 529.45 feet along the Cadorette Parcel to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the land now or formerly of James River Paper Company, Inc., as described in the deed recorded at the Penobscot County Registry of Deeds in Book 4870, Page 200;

2) THENCE North 5° 59' 05" East, 828.72 feet along the land of said James River Paper Company, Inc. to a cedar post and the land of Alfred J. Meister as described in the deed recorded at the Penobscot County Registry of Deeds in Book 3738, Page 197;

3) THENCE North 84° 06' 52" West, 529.33 feet along the land of said Meister to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the land now or formerly of said Perkins;

4) THENCE South 5° 59' 05" West, 816.33 feet along the land of said Perkins to a 5/8 inch rebar with plastic survey cap marked "RMC NO. 2042" and the Point of Beginning.

The above-described parcel contains 10 acres.

Being the same premises described in a Warranty Deed given by Alfred K. Perkins and Florine J. Perkins to James River Paper Company, Inc. dated June 13, 1995, and recorded in said Registry of Deeds in Book 5878, Page 278.

PARCEL THREE: Lots 1 through 9 and 14 through 22, inclusive, as shown on the survey "Tyron Tree Farm" dated February 23, 1988, recorded in the Penobscot County Registry of Deeds in Plan file C26-88, together with a strip of land fifty (50) feet wide leading from Bennoch Road to the northerly line of Lot 11 on said plan, which strip was conveyed to Patten Corporation – Downeast by deed of Lyman B. Feero and Rosalita Feero, dated June 4, 1988, and recorded in said Registry in Book 4244, Page 5, and together with a right of way for all purposes over the roads fifty (50) feet wide, the centerlines of which are shown on said plan, leading from the northerly line of Lot 11 to the lots hereby conveyed. This right of way includes, but is not limited to, the right to install, use, maintain, repair and replace utility lines, poles and cables.

Together with all right, title and interest in and to that portion of the discontinued roadway lying northerly of the above described Parcel Three and southerly of the Town of Alton southerly line.

Being the same premises described in a Warranty Deed given by James River Corporation to James River Paper Company, Inc. dated July 10, 1991, and recorded in said Registry in Book 4870, Page 200.

Exceptions

The Parcels are conveyed subject to the following exceptions:

ALL PARCELS:

1. State of Maine, Department of Environmental Protection, Site Location Findings of Fact and Order, dated August 24, 1995, and recorded in the Penobscot County Registry of Deeds in Book 5939, Page 147.

2. Declarations of Covenants and Restrictions by James River Paper Company, Inc., dated December 20, 1993, recorded in said Registry in Book 5518, Page 67; Corrected Declaration of Covenants and Restrictions, dated January 20, 1994, recorded in said Registry in Book 5549, Page 162; and Amendment to Declaration of Covenants and Restrictions, dated November 30, 1995, recorded in said Registry in Book 6044, Page 118.

PARCELS ONE AND TWO ONLY:

1. Such state of facts as shown on the plan entitled "Cadorette House Lots, Route 43, Old Town, Maine," prepared by Squaw Bay Corp., dated June 1995, and recorded in said Registry in Plan 1996-59.

2. Such statement of facts as shown on the plan entitled "Perkins & Cadorette Parcels, Route 43, Old Town, Maine," prepared by Squaw Bay Corp., dated June 1995, recorded in said Registry in Plan D46-95.

PARCEL THREE ONLY:

1. Rights of way acquired by the University of Maine System by deeds dated July 27, 1989, and recorded in said Registry in Book 4490, Page 322 and Book 4490, Page 325.

2. Restrictions and conditions set forth in the deed from Pattern Corporation to James River Corporation recorded in said Registry in Book 4654, Page 310.

3. Rights of way reserved in the deed form Camillis G. Kidder to Napoleon Parady, dated January 10, 1910, and recorded in said Registry in Book 750, Page 407.

4. Order of the Grantee of Maine, Department of Environmental Protection, dated October 3, 1988, recorded in said Registry in Book 4345, Page 19.

5. Such statement of facts, including easements and rights of way, as shown on the plan entitled "Tryon Tree Farm, Patten Corporation-Downeast," prepared by Raymond S. Silsby, dated February 23, 1988, and recorded in said Registry in C26-88.

NOTICE OF SOLID WASTE DISPOSAL FACILITY

Pursuant to Maine Department of Environmental Protection Solid Waste Management Regulation, Chapter 400 Appendix C.11, Grantor provides the following notice:

The Premises contains an active secure solid waste disposal facility (the "Facility"). The Facility was licensed by the Maine Board of Environmental Protection on July 28, 1993. The Facility began operations on December 2, 1996. The Facility is 68 acres and is located southern quadrant of Parcel Three of the Premises. The following non-hazardous wastes have been placed in the Facility to a maximum depth of approximately 30 feet:

- pulp and papermill wastewater treatment plant sludge,
- lime wastes and grit,
- woodwastes and inert debris,
- small quantities of soil and sawdust contaminated with process chemicals that are non-hazardous,
- virgin oily contaminated debris,
- soil rags, oil filters, absorbent materials, crushed grease drums and waste grease,

- sand from sand filters,
- non-hazardous sand from sand blasting,
- multifuel fly ash and bottom ash from the Lincoln Pulp and Papermills, and
- wood ash from the City of Old Town

BK 7188 P9158 #3751

Exhibit B
To
Quitclaim Deed with Covenant

Use Restrictions. So long as Grantee is obligated to provide disposal capacity to Grantor pursuant to Section 5.1 of the Amendment and Restatement of Agreement Regarding Solid Waste Disposal Facility Acquisition and Operation between Fort James Operating Company and State of Maine, acting by and through its Executive Department, State Planning Office, as it may be amended from time to time ("Acquisition Agreement") dated on or about the date of this Quitclaim Deed with Covenant the Premises will not be used in any manner that would prohibit or impair, in any way, the construction and operation of a solid waste landfill of sufficient size, nature, scope and location as is required to satisfy the Grantee's capacity commitment to Grantor under Section 5.1 of the Acquisition Agreement. The Grantee is prohibited from constructing any facility or improvement at the Premises that would prohibit or impair, in any way, the construction and operation of a solid waste landfill of sufficient size, nature, scope and location as is required to satisfy the Grantee's capacity commitment to Grantor under Section 5.1 of the Acquisition Agreement. In addition to the foregoing, the Premises shall not be developed for any uses unrelated to use as a solid waste landfill that creates any undue risk of harm to public health resulting from the use of a portion of the Premises as a solid waste landfill.

Transfer Restrictions The Grantee is restricted from selling, assigning, transferring or otherwise disposing of any interest in, granting any rights to, mortgaging or otherwise encumbering all or any portion of the Premises, during the term of the capacity commitment under Section 5.1 of the Acquisition Agreement, without the transferee or successor explicitly assuming the Grantee's capacity commitments under Section 5.1 of the Acquisition Agreement in a written document reasonably acceptable to Grantor, provided, however, that the Grantee may collaterally assign its rights under any operating agreement and, on notice to Grantor, may dispose of an interest in, or grant rights to, the Premises so long as such disposition or grant does not prohibit or impair, in any way, the construction and operation of a solid waste landfill of sufficient size, nature, scope and location as is required to satisfy the Grantee's capacity commitment to Grantor under Section 5.1 of the Acquisition Agreement. Any sale, assignment, transfer or other disposition of the Premises, whether with or without assumption of the Section 5.1 capacity commitments, will not discharge the Grantee from its responsibilities to satisfy those commitments except to the extent specifically released by Grantor in writing.

Covenants Running with the Land. The foregoing terms and conditions constitute covenants running with the land and shall touch and concern the land during the term of their applicability. Such terms and conditions are binding upon the Grantee, its successors and assigns, as well as all transferees, lessees or future owners of the Premises or any portion thereof.

Reverter Option.

(a) The Grantor reserves the option to cause reversion of title to the Premises to Grantor in the event the Grantee fails to perform, in any material respect, any of its material obligations under the Acquisition Agreement. Grantor will provide the Grantee with prompt written notice of the alleged default or breach, specifying in reasonable detail the facts relative to the breach and the related obligation under the Acquisition Agreement. Grantee shall have

ninety (90) days to cure such default or breach, or if such default or breach, by its nature, cannot be cured within such period, such additional time as may be necessary to cure the default (not to exceed one hundred eighty (180) days), provided Grantee has exercised its reasonable commercial efforts and taken reasonable steps to begin a cure within the initial ninety (90) day period. A delay in performance caused by a Force Majeure (as defined in the Acquisition Agreement) is not a basis for exercise of Grantor's right of reverter. The right of reverter expires if it is not exercised on or before the thirtieth (30th) anniversary of the recording of this Quitclaim Deed with Covenant.

(b) Upon expiration of the cure period referenced above, Grantor may, at its option but subject to the terms hereof, exercise the reverter on thirty (30) days prior written notice to the Grantee and thereby cause immediate and automatic fee simple title to the Premises to revert to Grantor, or any affiliate thereof specified as the entity taking title under this reverter, upon recordation of a certificate executed by a duly authorized officer of Grantor certifying that:

(i) The conditions required to give rise to Grantor's rights under this reverter clause have been satisfied;

(ii) Grantor is thereby exercising its right to cause reversion of the fee simple title to the Premises to Grantor, or an affiliate of Grantor named in the certificate as the entity to receive reversionary title to the Premises;

(iii) The cure periods referenced above have expired and Grantor has given Grantee thirty (30) days prior written notice of Grantor's intent to exercise reverter and (A) the Grantee has not disputed Grantor's right to exercise the reverter following the expiration of the cure periods referenced above or (B) if Grantee has disputed Grantor's right to exercise the reverter, a court of competent jurisdiction has determined that Grantor is authorized to exercise its reverter, and such decision shall not be subject to further appeal; and

(iv) Upon recordation of the certificate, title automatically and irrevocably shall revert to Grantor, or it designated affiliate, without any action required by or of the Grantee or any other party.

(c) The Grantee may, at its option, terminate the reverter upon recordation of a certificate executed by a duly authorized officer of the Grantee certifying that:

(i) the conditions required to give rise to the Grantee's rights to terminate the reverter have been satisfied;

(ii) the Grantee has given Grantor notice of breach of the terms of the Acquisition Agreement by Grantor, and the Grantee has given Grantor thirty (30) days prior written notice of the Grantee's intent to terminate the reverter following the expiration of the cure periods referenced above and (A) the Grantor has not disputed the Grantee's right to terminate the reverter or (B) if it has disputed the Grantee's right to terminate the reverter, a court of competent jurisdiction has determined that the Grantee is authorized to terminate the reverter, and such decision shall not be subject to further appeal; or

(iii) Grantor has ceased to operate both its papermaking and commercial pulping operations at the Old Town Mill for a period of one (1) year.

(iv) Upon recordation of the certificate, the right of reverter contained herein shall automatically and irrevocably be deemed to be terminated, without any action required by or of the Grantor or any other party.

(d) The Grantee may seek judicial relief to enjoin the reversion provided for hereunder or seek a declaratory judgment on the issue of whether such conditions to exercise or terminate the right of reverter have been satisfied. Grantor may seek injunctive or other equitable relief to enforce the reversion provided for hereunder or seek a declaratory judgment on the issue of whether the conditions to exercise or terminate the right of reverter have been satisfied. If a party elects to seek an injunction and a court fails to enjoin the reversion or permit the termination of the reversion, as the case may be, such party may pursue all other legal remedies available to it to challenge a party's right to exercise or terminate the right of reversion. After the final resolution of any dispute, or if the Grantee does not dispute the reverter, if it is determined that exercise of the right of reverter by Grantor was authorized, the Grantee will cooperate fully with Grantor and exercise its reasonable commercial efforts to assist Grantor in transferring any and all necessary Governmental Approvals relating to the ownership and operation of the Facility (as defined in the Acquisition Agreement) provided, however, that Grantor acknowledges that the Grantee's commitment for cooperation is not a guaranty of issuance of any permit or approval of transfer because the Department of Environmental Protection is an independent permitting authority.

"Maine Real Estate Transfer Tax Paid"

PENOBSCOT COUNTY, MAINE
Susan F. Bulay
Register of Deeds

(W0208216.1)

PROTECTED AREA DESCRIPTION
JUNIPER RIDGE LANDFILL TRACT
OLD TOWN, MAINE

A certain lot or parcel of land with the improvements thereon situate in the City of Old Town, County of Penobscot, State of Maine, more particularly described as follows:

Tract One: Beginning at a wood post found marking the southeasterly corner of lot numbered one (1) as shown on a plan titled, Final Plan Tyron Tree Farm ..." dated February 23, 1988, recorded in Penobscot County Registry of Deeds, Plan File C26-88; thence on an easterly prolongation of the southerly line of said lot numbered one, North 80 degrees, 46 minutes, 40 seconds East, a distance of 183.6 feet to an iron rod set; thence North 11 degrees, 21 minutes West a distance of 539.2 feet to an angle; thence North 25 degrees, 18 minutes West a distance of 364.6 feet to an iron rod set; thence North 18 degrees, 00 minutes East a distance of 332.9 feet to an angle; thence North 9 degrees, 11 minutes West a distance of 507.9 feet to an iron rod set; thence North 12 degrees, 32 minutes East a distance of 225.9 feet to an angle; thence North 42 degrees, 32 minutes East a distance of 273.9 feet; thence North 71 degrees, 8 minutes East a distance of 234.3 feet to an iron rod set; thence North 87 degrees, 3 minutes East a distance of 468.2 feet to an angle; thence South 45 degrees, 47 minutes East a distance of 206.3 feet to an iron rod set; thence South 73 degrees, 48 minutes East a distance of 258.5 feet to and angle; thence North 20 degrees, 16 minutes East a distance of 183.6 feet to an angle; thence North 60 degrees, 28 minutes East a distance of 112.4 feet to an iron rod set; thence South 36 degrees, 11 minutes East a distance of 169.7 feet to an angle; thence South 25 degrees, 18 minutes West a distance of 183.3 feet to an iron rod set; thence South 72 degrees, 57 minutes East a distance of 224.8 feet to an angle; thence South 62 degrees, 35 minutes East a distance of 204.8 feet to an angle; thence North 89 degrees, 59 minutes East a distance of 149.1 feet to an iron rod set; thence South 62 degrees, 23 minutes East a distance of a distance of 247.3 feet to an angle; thence South 74 degrees, 1 minute East a distance of 202.5 feet to an angle; thence South 87 degrees, 17 minutes East a distance of 251.3 feet to an angle; thence North 67 degrees, 45 minutes East a distance of 194.3 feet to an iron rod set; thence North 21 degrees, 8 minutes West a distance of 2,319.0 feet to an iron rod set on the municipal boundary between the City of Old Town and the Town of Alton; thence along said municipal boundary line, South 79 degrees, 44 minutes West, a distance of 3347.5 feet to a point on the southeasterly boundary of Lot 12 of "Preservation Wetlands" as described in Exhibit B of a Declaration of Covenants and Restrictions made by James River Paper Company recorded in Penobscot County Registry of Deeds, Book 5518, Page 67; thence following the southeasterly boundary of Lot 12 of "Preservation Wetlands", South 6 degrees, 33 minutes West, a distance of 479.3 feet; thence continuing along the southeasterly boundary of Lot 12 of "Preservation Wetlands", South 28 degrees, 18 minutes West, a distance of 446.9 feet; thence continuing along the southeasterly boundary of Lot 12 of "Preservation Wetlands", South 2 degrees, 35 minutes East, a distance of 604.7 feet; thence continuing along the southeasterly boundary of Lot 12 of "Preservation Wetlands", South 47 degrees, 39 minutes West, a distance of 961.3 feet to the westerly

boundary of lot numbered two (2) as shown on the aforementioned plan of Tryon Tree Farm recorded in Penobscot County Registry of Deeds, Plan File C26-88; thence along the westerly boundary of lot numbered two (2), as shown by said plan, South 10 degrees, 50 minutes East, a distance of 792.5 feet to the northerly boundary line of lot numbered one (1) as shown on the aforementioned plan of Tryon Tree Farm; thence along the northerly boundary line of lot numbered one (1), South 79 degrees, 19 minutes West a distance of 554.7 feet to the northwesterly corner of said lot numbered one (1); thence along the westerly boundary of lot numbered one (1), South 10 degrees, 33 minutes East, a distance of 661.4 feet to the southwesterly corner of said lot numbered one (1); thence following the southerly boundary line of lot numbered one (1), North 80 degrees, 46 minutes, 40 seconds East, a distance of 2,553.5 feet to the point of beginning, enclosing 247.4 acres.

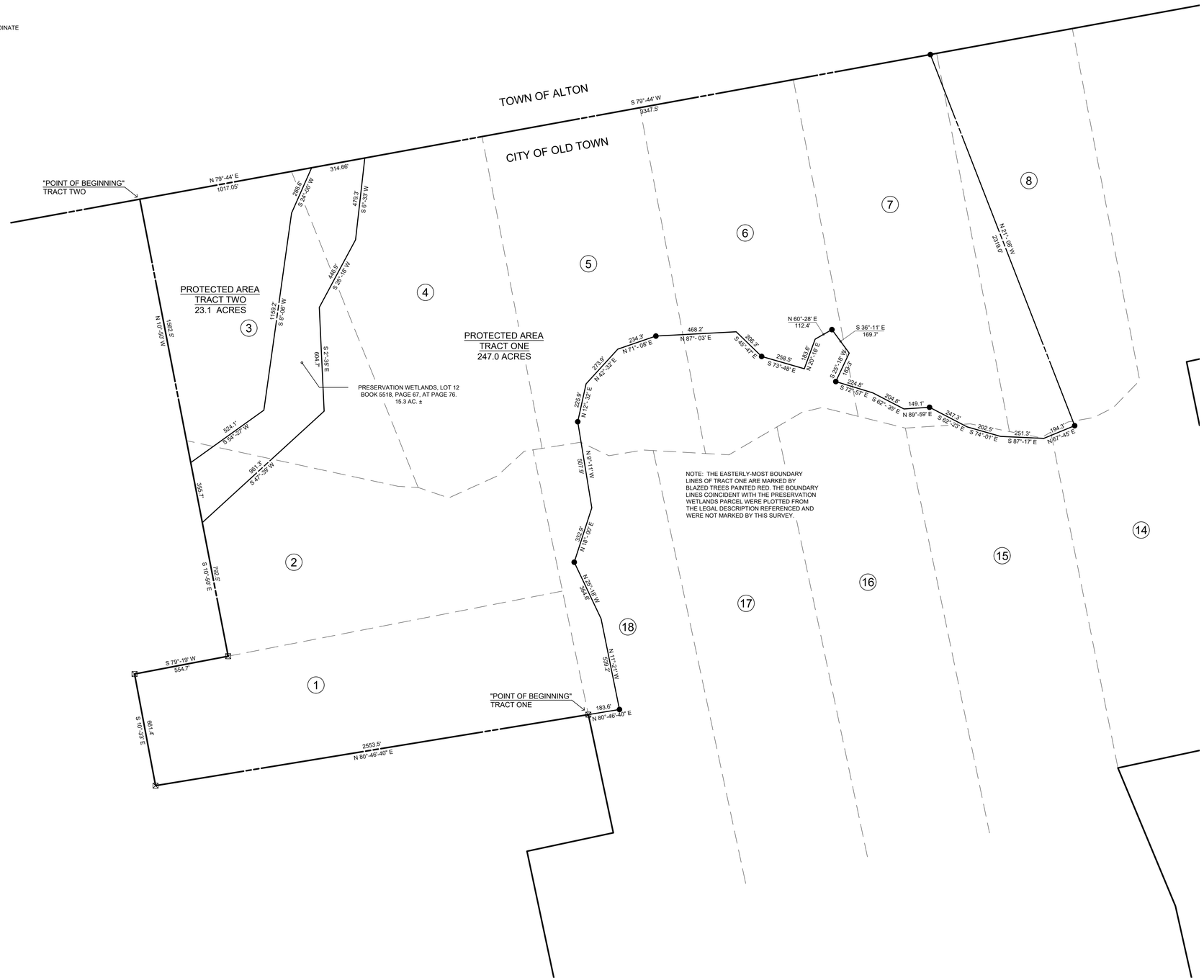
Tract Two: Beginning at the point of intersection formed by the northerly prolongation of the westerly boundary of lot numbered three (3) as shown on the plan of Tryon Tree Farm recorded in Penobscot County Registry of Deeds, Plan File C26-88, with the municipal boundary between the City of Old Town and the Town of Alton; thence following the municipal boundary, North 79 degrees, 44 minutes East, a distance of 1,017.05 feet to the northwesterly boundary of Lot 12 of "Preservation Wetlands" as described in Exhibit B of a Declaration of Covenants and Restrictions made by James River Paper Company recorded in Penobscot County Registry of Deeds, Book 5518, Page 67; thence following the northwesterly boundary of Lot 12 of "Preservation Wetlands", South 24 degrees, 0 minutes West, a distance of 288.6 feet; thence continuing along the northwesterly boundary of Lot 12 of "Preservation Wetlands", South 8 degrees, 6 minutes West, a distance of 1,159.2 feet; thence continuing along the northwesterly boundary of Lot 12 of "Preservation Wetlands", South 54 degrees, 27 minutes West, a distance of 524.1 feet to the westerly boundary of lot numbered two (2) as shown on the aforementioned plan of Tryon Tree Farm recorded in Penobscot County Registry of Deeds, Plan File C26-88; thence following the westerly boundary of lot numbered two (2) and the westerly boundary of lot numbered three (3), as shown by said plan, North 10 degrees, 50 minutes West, a distance of 1,562.5 feet to the point of beginning, enclosing 23.1 acres

Bearings referenced herein are oriented to magnetic north, July 1992, as determined by a survey conducted by Plisga & Day, Land Surveyors.

For the Grantor's source of title reference is made to Parcel Three in a deed from Fort James Operating Company to State of Maine dated February 3, 2004, recorded in Penobscot County Registry of Deeds, Book 9188, Page 152.

Richard A. Day
12-19-2017
Revised to 12-21-2017

GRID NORTH, MAINE STATE COORDINATE SYSTEM OF 1983, EAST ZONE.



SCALE: 1"= 300'

300' 0 300' 600' 900' 1,200'

NOTES

(1) DOCUMENTS REFERENCED ON THIS PLAN ARE RECORDED IN PENOBSCOT COUNTY REGISTRY OF DEEDS UNLESS OTHERWISE NOTED.

LEGEND

BOUNDARY SYMBOLS

- ● NO. 6 REBAR, SET
- ○ IRON PIPE FOUND
- ⊙ IRON ROD/BOLT FOUND
- ⊠ WOOD POST
- (15) LOT NUMBERING AS SHOWN ON PLAN OF TYRON TREE FARM, PLAN FILE C26-88.

LINE TYPE LEGEND

- EXISTING PROPERTY LINE
- EASEMENT BOUNDARY
- ADJOINING PROPERTY LINE
- INTERIOR PARCEL LINE

SURVEY STANDARD

BEARINGS AND DISTANCES SHOWN ON THIS PLAN WERE DETERMINED FROM OBSERVATIONS MADE BY "C/A-CODE" GPS INSTRUMENTATION WITH A MANUFACTURER'S SPECIFICATION FOR ACCURACY OF LESS THAN ONE METER UNDER OPTIMAL CONDITIONS.

STATE OF MAINE
RICHARD A. DAY
NO. 1151
PROFESSIONAL LAND SURVEYOR

RICHARD A. DAY, MAINE LICENSED PROFESSIONAL LAND SURVEYOR No. 1151

SHEET TITLE

PROTECTED AREA BOUNDARY SURVEY

PROPERTY OF
STATE OF MAINE
PENOBSCOT COUNTY REGISTRY OF DEEDS
BOOK 9188, PAGE 152
JUNIPER RIDGE LAND FILL - OLD TOWN, MAINE

PLISGA & DAY
LAND SURVEYORS
72 MAIN STREET
BANGOR, ME 04401
(207) 947-0019

PROJECT:	SHEET:
06248	1 of 1
DATE: 12-21-2017	
SCALE: 1"=300'	

APPENDIX D

FINANCIAL ABILITY

D-1 LETTER OF CREDIT
D-2 CLOSURE FUNDING AGREEMENT

SME
SEVEE & MAHER
ENGINEERS

D-1

LETTER OF CREDIT

SME
SEVEE & MAHER
ENGINEERS

October 29, 2025

To Whom It May Concern,

Re: Juniper Ridge Landfill – Expansion Costs

We understand that you have requested information from NEWSME Landfill Operations, LLC, a subsidiary of Casella Waste Systems, Inc., ("the Company"). The Company has authorized us to provide this letter subject to the terms set forth herein.

The Company has maintained a banking relationship with us since 1995 and has maintained its relationship with us in a satisfactory manner.

Bank of America, N.A. is the Administrative Agent for and a participant in the Company's five year $1,500 million Senior Credit Facilities compromised of a $700 million Revolving Line of Credit and a $800 million Term Loan A. As of this Date, there is approximately $673.7 million available under the Revolving Line of Credit to be utilized for direct borrowings and issuance of standby letters of credit subject to certain conditions.

Please note that the information set forth in this letter is subject to change without notice, and is provided in strict confidence, without any responsibility or liability on the part of Bank of America, N.A. Bank of America, N.A. undertakes no responsibility to update the information set forth in this letter.

Sincerely,

Bank of America, N.A.

Mike Contreras
Director | General Industrials Group
Bank of America, N.A.
110 N. Wacker Dr. | IL4-110-14-10 | Chicago, Illinois 60606-1511
☎: 312-874-1826 | ✉: michael.contreras@bofa.com

D-2

CLOSURE FUNDING AGREEMENT

SME
SEVEE & MAHER
ENGINEERS

Jeffrey Pelletier
NEWSME Landfill Operations, LLC
Juniper Ridge Landfill
358 Emerson Mill Road
Hampden, ME 04444

August 30, 2024

Karen Knuuti
Environmental Specialist
Bureau of Remediation and Waste Management
Maine Department of Environmental Protection
106 Hogan Road
Bangor, ME 04401

Re: 853746 Increase Surety Bond Rider for Juniper Ridge Landfill
853747 Increase Surety Bond Rider for Juniper Ridge Landfill

Karen,

Enclosed please find the original updated surety bonds for JRL closure and post-closure care financial assurance. Both bonds were increased based on recommendations made by a third-party consultant and the MEDEP. The correspondence for approval was provided via email on July 3, 2024.

Should you require additional information or clarification, please do not hesitate to contact me via email at Jeffery.pelletier@casella.com or via mobile phone at 207-249-8025

Sincerely,
Jeffrey Pelletier

Jeffrey Pelletier
Environmental Manager

cc: via email
Jeffrey Pelletier – PTL Environmental Manager
Wayne Boyd – PTL General Manager
Luigi Pizzuti – PTL Environmental Analyst
Lane Gould – Maine BGS Landfill Manager
William Longfellow – Maine BGS Director
Kathy Turbuck – MEDEP Site Engineer

INCREASE RIDER TO SURETY BOND

PURPOSE: **INCREASE RIDER**

To be attached to Bond Number **853746** by **Evergreen National Indemnity Company**, as Surety in the amount of **Thirty-One Million, Three Hundred Forty-Three Thousand and 00/100 Dollars ($31,343,000.00),** on behalf **NEWSME Landfill Operation, LLC,** the Principal, in favor of the **State of Maine Department of Environmental Protection.**

In consideration of the premium charged for the attached bond, it is mutually understood and agreed by the Principal and the Surety that the bond shall be modified to read as follows: The above said bond amount shall **Thirty-Five Million, Eight Hundred Eighty-Three Thousand, One Hundred and 00/100 Dollars ($35,883,100.00),** effective the 12th day of August, 2024.

All other items, limitations and conditions of said bond except as herein expressly modified shall remain unchanged.

Signed, sealed and date this 22nd day of July, 2024.

Surety: Evergreen National Indemnity Company

By: _____
Patricia A. Temple, Attorney-In-Fact

EVERGREEN NATIONAL INDEMNITY COMPANY

Independence, Ohio

POWER OF ATTORNEY

Bond No. 853746

KNOW ALL MEN BY THESE PRESENTS: That the Evergreen National Indemnity Company, a corporation in the State of Ohio does hereby nominate, constitute and appoint:

Denise M Borowy, Julie K Bowers, Hilarie Frankenberry, Karen M LoConti-Diaz, Lillian Pezzano, Patricia A Temple

its true and lawful Attorney(s)-In-Fact to make, execute, attest, seal and deliver for and on its behalf, as Surety, and as its act and deed, where required, any and all bonds, undertakings, recognizances and written obligations in the nature thereof, PROVIDED, however, that the obligation of the Company under this Power of Attorney shall not exceed TWENTY FIVE MILLION AND 00/100 DOLLARS ($25,000,000.00)

This Power of Attorney is granted and is signed by facsimile pursuant to the following Resolution adopted by its Board of Directors on the 23rd day of July, 2004:

"RESOLVED, That any two officers of the Company have the authority to make, execute and deliver a Power of Attorney constituting as Attorney(s)-in-fact such persons, firms, or corporations as may be selected from time to time.
FURTHER RESOLVED, that the signatures of such officers and the Seal of the Company may be affixed to any such Power of Attorney or any certificate relating thereto by facsimile; and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company; and any such powers so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached."

IN WITNESS WHEREOF, the Evergreen National Indemnity Company has caused its corporate seal to be affixed hereunto, and these presents to be signed by its duly authorized officers this 1st day of April, 2024.

EVERGREEN NATIONAL INDEMNITY COMPANY

By: _____
Robert W. Shepard, President

By: _____
David A. Canzone, CFO

Notary Public)
State of Ohio) SS:

On this 1st day of April, 2024, before the subscriber, a Notary for the State of Ohio, duly commissioned and qualified, personally came Robert W. Shepard and David A. Canzone of the Evergreen National Indemnity Company, to me personally known to be the individuals and officers described herein, and who executed the preceding instrument and acknowledged the execution of the same and being by me duly sworn, deposed and said that they are the officers of said Company aforesaid, and that the seal affixed to the preceding instrument is the Corporate Seal of said Company, and the said Corporate Seal and signatures as officers were duly affixed and subscribed to the said instrument by the authority and direction of said Corporation, and that the resolution of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at Cleveland, Ohio, the day and year above written.

WILLIAM J. KOVAL, JR
NOTARY PUBLIC • STATE OF OHIO
My commission has no expiration date.
Section 147.03 R.C.

By: _____
William J. Koval, Jr., Notary Public
My commission has no expiration date
Section 147.03 R.C.

State of Ohio) SS:

I, the undersigned, Secretary of the Evergreen National Indemnity Company, a stock corporation of the State of Ohio, DO HEREBY CERTIFY that the foregoing Power of Attorney remains in full force and has not been revoked; and furthermore that the Resolution of the Board of Directors, set forth herein above, is now in force.

Signed and sealed in Independence, Ohio, this 22nd day of July, 2024.

_____
Wan C. Collier, Secretary

INCREASE RIDER TO SURETY BOND

PURPOSE: **INCREASE RIDER**

To be attached to Bond Number **853747** by **Evergreen National Indemnity Company**, as Surety in the amount of **Fourteen Million, Eight Hundred Sixty-Eight Thousand, Two Hundred and 00/100 Dollars ($14,868,200.00),** on behalf **NEWSME Landfill Operation, LLC,** the Principal, in favor of the **State of Maine Department of Environmental Protection.**

In consideration of the premium charged for the attached bond, it is mutually understood and agreed by the Principal and the Surety that the bond shall be modified to read as follows: The above said bond amount shall **Thirty-Two Million, Four Hundred Twenty-Seven Thousand, Three Hundred and 00/100 Dollars ($32,427,300.00),** effective the 12th day of August, 2024.

All other items, limitations and conditions of said bond except as herein expressly modified shall remain unchanged.

Signed, sealed and date this 22nd day of July, 2024.

Surety: Evergreen National Indemnity Company

By: _____
Patricia A. Temple, Attorney-In-Fact

EVERGREEN NATIONAL INDEMNITY COMPANY

Independence, Ohio

POWER OF ATTORNEY

Bond No. 853747

KNOW ALL MEN BY THESE PRESENTS: That the Evergreen National Indemnity Company, a corporation in the State of Ohio does hereby nominate, constitute and appoint:

Denise M Borowy, Julie K Bowers, Hilarie Frankenberry, Karen M LoConti-Diaz, Lillian Pezzano, Patricia A Temple

its true and lawful Attorney(s)-In-Fact to make, execute, attest, seal and deliver for and on its behalf, as Surety, and as its act and deed, where required, any and all bonds, undertakings, recognizances and written obligations in the nature thereof, PROVIDED, however, that the obligation of the Company under this Power of Attorney shall not exceed TWENTY FIVE MILLION AND 00/100 DOLLARS ($25,000,000.00)

This Power of Attorney is granted and is signed by facsimile pursuant to the following Resolution adopted by its Board of Directors on the 23rd day of July, 2004:

> "RESOLVED, That any two officers of the Company have the authority to make, execute and deliver a Power of Attorney constituting as Attorney(s)-in-fact such persons, firms, or corporations as may be selected from time to time.
> FURTHER RESOLVED, that the signatures of such officers and the Seal of the Company may be affixed to any such Power of Attorney or any certificate relating thereto by facsimile; and any such Power of Attorney or certificate bearing such facsimile signatures or facsimile seal shall be valid and binding upon the Company; and any such powers so executed and certified by facsimile signatures and facsimile seal shall be valid and binding upon the Company in the future with respect to any bond or undertaking to which it is attached."

IN WITNESS WHEREOF, the Evergreen National Indemnity Company has caused its corporate seal to be affixed hereunto, and these presents to be signed by its duly authorized officers this 1st day of April, 2024.

EVERGREEN NATIONAL INDEMNITY COMPANY

By: _____
Robert W. Shepard, President

By: _____
David A. Canzone, CFO

Notary Public)
State of Ohio) SS:

On this 1st day of April, 2024, before the subscriber, a Notary for the State of Ohio, duly commissioned and qualified, personally came Robert W. Shepard and David A. Canzone of the Evergreen National Indemnity Company, to me personally known to be the individuals and officers described herein, and who executed the preceding instrument and acknowledged the execution of the same and being by me duly sworn, deposed and said that they are the officers of said Company aforesaid, and that the seal affixed to the preceding instrument is the Corporate Seal of said Company, and the said Corporate Seal and signatures as officers were duly affixed and subscribed to the said instrument by the authority and direction of said Corporation, and that the resolution of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at Cleveland, Ohio, the day and year above written.

WILLIAM J. KOVAL, JR.
NOTARY PUBLIC • STATE OF OHIO
My commission has no expiration date.
Section 147.03 R.C.

By: _____
William J. Koval, Jr., Notary Public
My commission has no expiration date
Section 147.03 R.C.

State of Ohio) SS:

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Signed and sealed in Independence, Ohio, this 22nd day of July, 2024.

_____
Wan C. Collier, Secretary

APPENDIX E

TECHNICAL ABILITY

SME
SEVEE & MAHER
ENGINEERS

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
ASSESSMENT TO THE
FINANCE AUTHORITY OF MAINE
(PURSUANT TO 10 M.R.S.A. § 1044(11))

NOVEMBER 7, 2024

PROJECT APPLICANT / LOCATION

Casella Waste Systems, Inc., Various Locations

PROJECT DESCRIPTION

The applicant, Casella Waste Systems, Inc. (hereinafter "Applicant"), has submitted a Tax-Exempt Bond Inducement Application to the Finance Authority of Maine ("FAME") for the purpose of (1) refinancing of the currently outstanding $25,000,000 stated principal amount of Finance Authority of Maine Solid Waste Disposal Revenue Bonds, which financed certain solid waste processing and disposal facilities, including landfill development costs and construction, disposal equipment and related improvements, office equipment, vehicles, containers, equipment, land and the costs of issuance of the Series 2005 Bonds; (2) financing of the acquisition, development, construction and/or equipping of facilities used in connection with the disposal, conversion, or reclamation of solid waste, including, without limitation: (A) the acquisition and equipping of new collection vehicles, trucks, trailers, solid waste disposal containers and related equipment, and computers; (B) the acquisition and installation of certain solid waste recycling sorting and processing equipment; (C) the acquisition, construction, improvement and equipping of certain solid waste disposal, collection, transfer, recycling and customer care facilities; (D) the acquisition and development of landfill facilities including (i) landfill cell development and liners to create additional disposal capacity at the Company's permitted landfill sites, (ii) landfill gas treatment and processing infrastructure, and (iii) other related costs including paving, grading and other infrastructure improvements; and (E) additional capital expenditures for the development, design, engineering, replacements, demolition, construction, and renovation that were, or will be, undertaken or incurred to accomplish the foregoing; and (3) the funding of the costs of issuance and other common costs of the Series 2024 Revenue Obligation Securities. All such Project components were or are located or are to be located at and operated from and at one or more of Applicant's various locations in Maine as identified in the application.

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826
RAY BLDG., HOSPITAL ST.

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04679-2094
(207) 764-0477 FAX: (207) 760-3143

web site: www.maine.gov/dep

PRIMARY SOURCES OF INFORMATION

- Applicant's FAME Tax-Exempt Bond Inducement Application;
- Applicant's FAME Environmental Questionnaire;
- Applicant's FAME Department of Environmental Protection Assessment Application; and
- Maine DEP records and staff – Bureau of Air Quality, Bureau of Land Resources, Bureau of Water Quality, Bureau of Remediation and Waste Management, and Office of the Commissioner.

ENVIRONMENTAL CONSIDERATIONS CONCERNING THE PROJECT SITE

LICENSING OBLIGATIONS:

Casella Waste Systems, Inc. and its subsidiaries maintain numerous DEP licenses and permits for the facilities and operations that are the subject of this financing proposal, including but not limited to:

Bureau of Air Quality

- Title V air emission license and several New Source Review (NSR) amendments for the Pine Tree Landfill facility located in Hampden, Maine.
- Title V air emission license and several NSR amendments for the Juniper Ridge Landfill facility located in Old Town, Maine.
- Minor source air emission license for the Hawk Ridge Compost facility in Unity, Maine.

Bureaus of Land Resources and Water Quality
Several freshwater wetlands alteration permits at various facilities.

Bureau of Remediation and Waste Management
Casella Waste Systems, Inc. and its subsidiaries hold numerous solid waste licenses from the DEP's Bureau of Remediation and Waste Management. These are listed in the Applicant's FAME application materials and were summarized in the DEP's October 18, 2005 FAME Assessment. Since 2005, closure of the Pine Tree Landfill has been completed, and the landfill is now in post-closure care. All of the issues noted in the prior assessment have been resolved, and there are currently no substantive issues at the landfill. No enforcement action has been initiated at the facility since the 2005 assessment was done.

Also, since the 2005 assessment the Juniper Ridge Landfill remains operational and an application for expansion of the landfill is expected to be submitted this fall. On October 2, 2024, DEP issued a public benefit determination regarding a proposed 11.9 million cubic yard expansion of the facility. The proposed expansion would increase the landfill footprint by 61

acres and provide 11.3 years of capacity. All of the issues noted in the prior assessment have been resolved, and there are currently no substantive issues at the landfill. No enforcement action has been initiated at the facility since the 2005 assessment was done.

On February 16, 2024, DEP sent a letter to Casella Resource Solutions requiring a corrective action plan to be submitted for PFAS impacts at the Hawk Ridge Compost Facility located at 73 Reynolds Road in Unity. A corrective action plan was submitted to the DEP and an evaluation of corrective actions at the compost facility is ongoing.

There are no substantive issues at any of the transfer stations operated by the Applicant.

The following facilities on the 2005 list are either gone, or are no longer owned/operated by the Applicant: Maine Energy, the Lewiston landfill (although Applicant now operates a Single-Sort facility at the Lewiston transfer station), and KTI Biofuels.

SITE CLEAN-UP RESPONSIBILITIES:

A review of the Department's records indicate there are no outstanding clean-up responsibilities at the Applicant's facilities. A summary of spills reported to the DEP's Division of Response Services is attached for each of the project locations. All of the spills have been cleaned up to the satisfaction of the Department.

COMPLIANCE RECORD:

A search of the Department's Enforcement Information System ("EIS") database found no outstanding compliance or enforcement issues for the Applicant.

ADDITIONAL COMMENTS:

The Department has no additional comments.

PREPARED BY: MARK MARGERUM / DEP, OFFICE OF THE COMMISSIONER
DATE: NOVEMBER 7, 2024

Project Location 1 Spill Reports:

SPILL #	SPILL ADDRESS	DATE	SPILL TYPE
A-196-2015	73 Reynolds Road, Unity	4/16/2015	Hydraulic Oil
A-480-2015	73 Reynolds Road, Unity	7/21/2015	Hydraulic Oil
A-566-2015	73 Reynolds Road, Unity	9/9/2015	Hydraulic Oil
A-589-2015	73 Reynolds Road, Unity	8/21/2015	Hydraulic Oil
A-73-2016	73 Reynolds Road, Unity	2/4/2016	Hydraulic Oil
A-226-2016	73 Reynolds Road, Unity	4/26/2016	Waste Oil
A-706-2016	73 Reynolds Road, Unity	12/29/2016	Hydraulic Oil
A-329-2017	73 Reynolds Road, Unity	6/20/2017	Hydraulic Oil
A-357-2017	73 Reynolds Road, Unity	7/3/2017	Hydraulic Oil
A-371-2017	73 Reynolds Road, Unity	7/10/2017	Hydraulic Oil
A-189-2018	73 Reynolds Road, Unity	4/9/2018	Hydraulic Oil
A-382-2018	73 Reynolds Road, Unity	6/28/2018	Hydraulic Oil
A-393-2018	73 Reynolds Road, Unity	7/9/2018	Hydraulic Oil
A-551-2018	73 Reynolds Road, Unity	10/10/2018	Hydraulic Oil
A-79-2019	73 Reynolds Road, Unity	2/12/2019	Hydraulic Oil
A-361-2019	73 Reynolds Road, Unity	6/28/2019	Hydraulic Oil
A-413-2019	73 Reynolds Road, Unity	7/23/2019	Hydraulic Oil
A-660-2020	73 Reynolds Road, Unity	11/4/2020	Hydraulic Oil
A-150-2021	73 Reynolds Road, Unity	4/2/2021	Hydraulic Oil
A-285-2021	73 Reynolds Road, Unity	6/14/2021	Hydraulic Oil
A-417-2021	73 Reynolds Road, Unity	8/23/2021	Hydraulic Oil
A-420-2021	73 Reynolds Road, Unity	9/2/2021	Hydraulic Oil
A-650-2021	73 Reynolds Road, Unity	1/3/2022	Unspecified Oil
A-107-2022	73 Reynolds Road, Unity	2/24/2022	Hydraulic Oil
A-583-2022	73 Reynolds Road, Unity	11/4/2022	Hydraulic Oil
A-698-2022	73 Reynolds Road, Unity	12/31/2022	Hydraulic Oil
A-305-2023	73 Reynolds Road, Unity	5/31/2023	Hydraulic Oil

Project Location 3 Spill Reports:

SPILL #	SPILL ADDRESS	DATE	SPILL TYPE
P-478-2015	424 River Road, Lewiston	6/17/2015	Hydraulic Oil
P-103-2016	424 River Road, Lewiston	2/8/2016	Hydraulic Oil
P-175-2016	424 River Road, Lewiston	3/2/2016	Diesel Fuel
P-809-2020	424 River Road, Lewiston	11/23/2020	Hydraulic Oil
P-894-2020	424 River Road, Lewiston	12/21/2020	Hydraulic Oil
P-88-2021	424 River Road, Lewiston	2/26/2021	Hydraulic Oil

Project Location 5 Spill Reports:

SPILL #	SPILL ADDRESS	DATE	SPILL TYPE
B-637-2015	358 Emerson Mill Road, Hampden	9/29/2015	Hydraulic Oil
B-282-2016	358 Emerson Mill Road, Hampden	5/6/2016	Hydraulic Oil
B-613-2016	358 Emerson Mill Road, Hampden	9/22/2016	Antifreeze
B-550-2017	358 Emerson Mill Road, Hampden	8/10/2017	Fire
B-711-2017	358 Emerson Mill Road, Hampden	10/13/2017	Hydraulic Oil
B-764-2018	358 Emerson Mill Road, Hampden	12/11/2018	Hydraulic Oil
B-497-2019	358 Emerson Mill Road, Hampden	8/21/2019	Hydraulic Oil
B-178-2022	358 Emerson Mill Road, Hampden	4/27/2022	Hydraulic Oil
B-422-2023	358 Emerson Mill Road, Hampden	9/1/2023	Hydraulic Oil
B-519-2023	358 Emerson Mill Road, Hampden	10/9/2023	Hydraulic Oil

Project Location 6 Spill Reports:

SPILL #	SPILL ADDRESS	DATE	SPILL TYPE
B-546-2021	31 Freedom Parkway, Hermon	12/10/2021	Diesel Fuel

Project Location 7 Spill Reports:

SPILL #	SPILL ADDRESS	DATE	SPILL TYPE
I-31-2017	9 Florence Avenue, Houlton	2/21/2017	Hydraulic Oil

Project Location 8 Spill Reports:

SPILL #	SPILL ADDRESS	DATE	SPILL TYPE
B-145-2016	2828 Bennoch Road, Old Town	3/8/2016	Hydraulic Oil
B-76-2018	2828 Bennoch Road, Old Town	2/1/2018	Hydraulic Oil
B-292-2018	2828 Bennoch Road, Old Town	5/8/2018	Hydraulic Oil
B-43-2019	2828 Bennoch Road, Old Town	1/24/2019	Hydraulic Oil
B-219-2023	2828 Bennoch Road, Old Town	5/16/2023	Fire
B-220-2023	2828 Bennoch Road, Old Town	5/16/2023	Hydraulic Oil
B-436-2023	2828 Bennoch Road, Old Town	9/8/2023	Diesel Fuel
B-236-2024	2828 Bennoch Road, Old Town	4/23/2024	Transmission Oil
B-341-2024	2828 Bennoch Road, Old Town	6/6/2024	Hydraulic Oil

Project Location 10 Spill Reports:

SPILL #	SPILL ADDRESS	DATE	SPILL TYPE

SPILL #	SPILL ADDRESS	DATE	SPILL TYPE
P-412-2019	64 Arthur J Reno Sr. Road, West Bath	5/24/2019	Hydraulic Oil
P-345-2022	64 Arthur J Reno Sr. Road, West Bath	7/8/2022	Antifreeze
P-211-2019	299 Walkers Mills Road, Bethel	3/18/2019	Hydraulic Oil
P-722-2016	87 Pleasant Hill Road, Scarborough	9/6/2016	Hydraulic Oil
P-914-2016	87 Pleasant Hill Road, Scarborough	11/9/2016	Antifreeze
P-877-2019	87 Pleasant Hill Road, Scarborough	10/18/2019	Oil
P-230-2022	87 Pleasant Hill Road, Scarborough	5/10/2022	Diesel Fuel
P-167-2024	87 Pleasant Hill Road, Scarborough	2/20/2024	Waste Oil
P-18-2015	594 County Road, Westbrook	1/8/2015	Hydraulic Oil
P-287-2015	594 County Road, Westbrook	4/20/2015	Hydraulic Oil
P-295-2015	594 County Road, Westbrook	4/22/2015	Hydraulic Oil
P-326-2015	594 County Road, Westbrook	4/30/2015	Hydraulic Oil
P-461-2015	594 County Road, Westbrook	6/11/2015	Oil
P-508-2015	594 County Road, Westbrook	6/26/2015	Hydraulic Oil
P-551-2015	594 County Road, Westbrook	7/29/2015	Compressor Oil
P-755-2015	594 County Road, Westbrook	9/14/2015	Hydraulic Oil
P-1057-2015	594 County Road, Westbrook	12/21/2015	Hydraulic Oil
P-161-2016	594 County Road, Westbrook	2/26/2016	Hydraulic Oil
P-241-2016	594 County Road, Westbrook	3/28/2016	Hydraulic Oil
P-244-2016	594 County Road, Westbrook	3/29/2016	Hydraulic Oil
P-399-2016	594 County Road, Westbrook	5/18/2016	Diesel Fuel
P-788-2016	594 County Road, Westbrook	10/10/2016	Hydraulic Oil
P-582-2017	594 County Road, Westbrook	7/28/2017	Waste Oil
P-607-2017	594 County Road, Westbrook	8/3/2017	Transmission Oil
P-637-2017	594 County Road, Westbrook	7/28/2017	Diesel Fuel
P-78-2018	594 County Road, Westbrook	2/2/2018	Antifreeze
P-271-2018	594 County Road, Westbrook	4/24/2018	Hydraulic Oil
P-500-2018	594 County Road, Westbrook	7/9/2018	Antifreeze
P-804-2018	594 County Road, Westbrook	10/19/2018	Hydraulic Oil
P-825-2018	594 County Road, Westbrook	10/26/2018	Hydraulic Oil
P-312-2023	594 County Road, Westbrook	5/11/2023	Antifreeze

Project Location 11 Spill Reports:

SPILL #	SPILL ADDRESS	DATE	SPILL TYPE
A-135-2015	3 Lafleur Road, Waterville	3/19/2015	Hydraulic Oil
A-730-2019	3 Lafleur Road, Waterville	12/12/2019	Diesel Fuel
A-189-2020	3 Lafleur Road, Waterville	4/14/2020	Hydraulic Oil

SME
SEVEE & MAHER
ENGINEERS
Blanchard Road, PO Box 85A, Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692 • sme-engineers.com

BRIAN D. PIERCE, P.E.

EDUCATION

B.S. – Civil and Environmental Engineering, University of Maine, 1994

Special Courses
Pump System Design – 2010, Ross Mackay, Phoenix, Arizona
Advanced Hydrology: Modeling and Special Topics – 2001, Augusta, Maine
Design of Geosynthetics in Waste Containment Facilities, 2001 – Dr. Robert Koerner, Folsom, Pennsylvania
Quality Assurance/Quality Control of Geosynthetics in Waste Containment Facilities, 2001 – Dr. Robert Koerner, Folsom, Pennsylvania
Waste Geotechnics, 2000 – University of Maine, Dr. Brian Cooke

PROFESSIONAL REGISTRATIONS/CERTIFICATIONS

Professional Engineer – Maine, Arizona, Illinois, Maryland, Massachusetts, New Hampshire, New Jersey, Ohio, Pennsylvania, Texas, Connecticut, Minnesota, and Vermont
40-Hour Safety Training for Hazardous Waste Operations (OSHA 29 CFR 1910.120)
8-Hour Supervisory Training for Hazardous Waste Operations (OSHA 29 CFR 1910.120)
Radiological Safety and Gauge Operation for Nuclear Testing Equipment (49 CFR 172)
Solid Waste Association of North America (SWANA) Northern New England Chapter, Director 2019 to 2023, Board Member 2019 to 2023

EMPLOYMENT HISTORY

2019 to present – Sevee & Maher Engineers, Inc., Principal and Chief Engineer
2018 to 2019 – Sevee & Maher Engineers, Inc., Chief Engineer
1999 to 2018 – Sevee & Maher Engineers, Inc., Project Engineer
1994 to 1999 – Dames & Moore, Inc., Augusta, Maine, Staff Engineer

PROFESSIONAL EXPERIENCE

Mr. Pierce has experience in the management, design, and construction oversight of numerous environmental and landfill related projects throughout the Northeast. Mr. Pierce has over 30 years of experience with civil and environmental engineering design, construction oversight, and environmental site assessment. He has managed and performed detailed designs for landfill cell construction and closure projects in Maine and throughout the northeastern United States. He has also prepared numerous Landfill Cell Development and Stormwater Management and Erosion Control Plans for site development and landfill design projects.

Landfill Project Management: His landfill project management experience includes management of landfill engineering and permitting for privately owned paper mill landfills in Maine. Management includes client relations and permit preparation for landfill expansion and closure documents, including geotechnical investigations and engineering design (liner and cover system design, stormwater design, erosion control, and infrastructure design).

Landfill Design: Mr. Pierce's landfill design experience includes preparing numerous landfill cell and closure designs for permitting and construction. Work includes preparing detailed engineering drawings, construction specifications, stormwater management plans, erosion and sediment control plans cell development plans, and operation manuals for landfills in the northeastern United States. His work also includes preparation and creation of construction contracts and review and comparison of Contractor bids for cell and closure construction projects. Mr. Pierce is proficient in the use of many computer assisted engineering design software applications, such as AutoCAD computer aided drafting software, Carlson civil design software, HydroCad stormwater modeling software, and Hydrain channel design software.

Landfill Inspection: Mr. Pierce has performed numerous quarterly and annual site inspections for active and closed landfill facilities throughout the eastern United States over the past 20 years. Landfill Inspection responsibilities included scheduling, performing, and completing inspections. This includes follow-up with both clients and regulators on corrective actions identified during the inspections.

Landfill Construction Oversight: Mr. Pierce spent the first six years of his engineering career providing landfill construction oversite at landfill closure and cell construction projects at state and federally regulated landfill facilities in the northeast. This work included oversite of both landfill related earthwork and geosynthetics.

Civil Engineering Design: In addition to landfill related projects, Mr. Pierce has been involved as a project engineer on several civil engineering projects for commercial, industrial, and residential clients in Maine. Projects include:

- Pineland Farms Redevelopment – design and permitting; road planning and design; utility routing and improvements; drainage measures, and wastewater disposal on a 2,000-acre site
- Backyard Farms – design and permitting; road planning and design; utility routing and improvements; drainage measures, and wastewater disposal for 75 acres of greenhouse facilities
- Planning, design and permitting for private developments.

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, PO Box 85A, Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692 • sme-engineers.com

LISA J. JACOB, P.G., L.G.

EDUCATION

Wright State University – M.S. in Geology/Geophysics, 1997
Smith College – B.A. in Geology, 1994

PROFESSIONAL REGISTRATION

Licensed Geologist – Maine
Professional Geologist – Pennsylvania

AFFILIATIONS

Geological Society of Maine, Board Member and Secretary
Environmental and Energy Technology Council of Maine, Member
National Groundwater Association, Member

EMPLOYMENT HISTORY

2018 to present – Sevee & Maher Engineers, Inc., Principal and Senior Geologist
2014 to 2018 – Sevee & Maher Engineers, Inc., Senior Geologist
2006 to 2014 – Sanborn Head & Associates, Inc., Portland, Maine, Senior Project Manager
1997 to 2006 – Enviroscan, Inc., Lancaster, Pennsylvania, Senior Project Manager
1996 to 1997 – Wright State University, Dayton, Ohio, Teaching Assistant in Geology and Geophysics
1996 – Unocal Corporation, Sugarland, Texas, Assistant Geophysicist

EXPERIENCE

Ms. Jacob, an SME principal, co-leads SME's Site Investigation and Remediation team. She is a licensed Professional Geologist with over 28 years of experience in geologic investigations specializing in geophysics, geomorphology, hydrogeology, and geochemistry.

Ms. Jacob has managed and led environmental investigations that include environmental due diligence, remedial investigations, vapor intrusion investigations, feasibility assessments and corrective measures studies, and remedial design and implementation for national and international industrial clients. Her remedial investigations have included sites with chlorinated solvent, petroleum, PCB, and heavy metals contamination, in complex geologic settings and active industrial facilities. Ms. Jacob has led successful remediation projects that include implementation of contaminant removal, in situ destruction, and containment strategies. Ms. Jacob has established herself as a trusted advisor to her clients and is skilled in regulatory interaction/negotiation and public and community relations.

Selected Project Experience:

- **General Dynamics Bath Iron Works, Bath, ME (2018-2019)** – Project manager responsible for RCRA Facility Investigation (RFI) including characterization of site soil and groundwater, resulting in development and implementation of Self-Implementing Cleanup Plan for PCBs.

- **Mallinckrodt US LLC, Orrington, ME (2009 to present)** – Project manager responsible for environmental investigations of mercury and volatile organic compounds (VOCs) in soil, groundwater, and bedrock at a former chlor-alkali manufacturing facility. Designed and implemented groundwater remediation systems in two areas of the site to address dissolved-phase mercury in overburden soils and bedrock groundwater.
- **General Dynamics Bath Iron Works, Bath and Brunswick, ME (2018 to present)** – Project manager responsible for characterization of polychlorinated biphenyl (PCB) presence in building materials and site soil at various locations. Prepared and implemented multiple Self-Implementing Cleanup Plans for PCBs. Interacted with federal and state regulators to respond to questions.
- **Former Sprague Electric Company Site, Sanford, Maine (2017 to present)** – Provided support for a remedial investigation and remedy design for the site of a former electronics manufacturing facility managed under RCRA. Recent work included:
    - Analysis of vapor intrusion potential
    - Hydrogeological assessment and development of a detailed conceptual site model
    - completion of a focused Corrective Measures Study to identify remedy options for a "hot spot" of chlorinated solvent presence in overburden soils
    - design and implementation of a targeted excavation to remove soils with high concentrations for off-site disposal, and
    - completion of groundwater optimization to the satisfaction of the Maine Department of Environmental Protection.
- **Maine Department of Environmental Protection (MEDEP), Limerick, ME (2021-present)** – Project manager responsible for characterization of overburden and bedrock water quality in vicinity of a former Maine DOT storage and maintenance facility, for the objective of identifying the source of VOC contamination in a bedrock water supply well. Work to date has included investigation of overburden groundwater quality at the site and in the near vicinity, borehole geophysical logging and packer sampling, and bedrock water quality monitoring at area monitoring points.
- **August Corporation, Dover-Foxcroft, ME (2018)** – Project manager responsible for Phase I and II environmental site assessments (ESAs) at a former car dealership and service station, intended for redevelopment as a recreational facility. Work included sampling and characterization of shallow soils, soil gas, and shallow groundwater, registration and removal of USTs, successful participation in the Voluntary Response Action Program (VRAP) administered by the MEDEP.
- **Woodland Pulp, Baileyville, Maine (2021)** – Project manager responsible for removal of two 10,000-gallon underground storage tanks in accordance with MEDEP regulations.
- **Confidential Commercial Client, Cumberland County, Maine (2020 to present)** – Project manager responsible for Phase I and II ESAs at a former private airstrip, and successful participation in MEDEP's VRAP.

TRAVIS C. CARPENTER, P.E.

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, PO Box 85A, Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692 • sme-engineers.com

EDUCATION

B.S. – Civil Engineering, Massachusetts Institute of Technology, 1995

PROFESSIONAL REGISTRATIONS AND CERTIFICATIONS

Professional Engineer – Maine
HAZWOPER 40-Hour and 8-Hour Refresher

EMPLOYMENT HISTORY

2024 to present – Sevee & Maher Engineers, Inc., Cumberland, ME, Senior Geotechnical Engineer
2017 to 2024 – Kleinschmidt Associates, Falmouth, ME, Senior Geotechnical Engineer and Advisor
2014 to 2017 – John Turner Consulting, Dover, NH, Vice President of Engineering and Director of Geotechnical Engineering Services
2002 to 2014 – MACTEC/AMEC Environment & Infrastructure, Portland, ME, Senior Geotechnical Engineer
1997 to 2002 – Jacques Whitford Company, Portland, ME, Geotechnical Engineer
1995 to 1997 – Professional Service Industries, Portsmouth, NH, Staff Engineer/Branch Manager

AFFILIATIONS

Association of State Dam Safety Officials
International Association of Foundation Drilling
American Society of Civil Engineers

PROFESSIONAL EXPERIENCE

Mr. Carpenter has nearly 30 years of geotechnical engineering experience in the investigation, design, and construction of projects involving brownfields redevelopment, landfills/low-permeability cover systems, environmental remediation, embankments/dams, and new site development. He has extensive experience developing and implementing geotechnical investigations, laboratory testing programs, and instrumentation and monitoring plans. Mr. Carpenter performs geotechnical engineering analyses for foundations, pavements, retaining walls, ground improvements, geosynthetics and cover systems, embankment stability and seepage, and hard armoring. He develops design drawings, technical specifications, and bid documents and reviews subgrade preparation, fill placement, and earthworks during construction.

Representative projects demonstrating Mr. Carpenter's areas of expertise:

- **Remedial Investigation, Feasibility Study, and Remedial Design, Callahan Mine Superfund Site, MaineDOT, Brooksville, ME** – Evaluated and designed stabilization measures and low-permeability cover system for a 60-foot-tall mine tailings impoundment constructed atop soft marine clays.
    - Assessed global static stability, liquefaction potential, and seismic stability as well as localized stability for excavation and re-location/placement of 75,000 cubic yards of

tailings and waste rock.

  - Evaluated magnitude and time-rate of primary consolidation settlement due to fill loading; wick drains and/or earthquake drains for dissipation of excess pore pressures.
  - Designed cover system geosynthetics, including assessment of interface stability and drainage layer capacity.
  - Developed geotechnical instrumentation and monitoring plan for global stability, local stability, and response to excavation and fill placement.
  - Earlier in the project, developed and implemented the geotechnical field and laboratory testing programs, including CPTu explorations, geotechnical soil borings, nested wells/piezometers, and strength and consolidation testing of tailings, tailings "slimes," and marine clays.

- **Feasibility Study, Remedial Design, and Brownfield Redevelopment, Former Manufactured Gas Plant (MGP), NiSource (Northern Utilities), Lewiston, ME** – Prepared geotechnical engineering components of a feasibility study and remedial design and provided support during construction to convert a former industrial site into a public park, performed under the MEDEP's VRAP program.
  - Performed engineering calculations and developed design details/drawings and technical specifications for the excavation of 25-foot-deep DNAPL collection trench at the toe of 20-foot-tall 1H:1V riverbank and the installation of a low-permeability cover system on re-graded portions of the riverbank.
  - Evaluated global stability of the riverbank slope, interface stability of anchored geocell slope protection/cover system, drainage layer capacity, and vapor control/gas venting.
  - Developed preliminary sheet pile design to assess feasibility of trench construction means and methods.
  - Reviewed all Contractor submittals relative to earthworks and/or geosynthetics and provided periodic on-site review during construction.

- **Embankment Rehabilitation and Spillway Refurbishment, Marshfield Dam, Green Mountain Power, Marshfield, VT** – Designed and supported in the construction of an embankment toe filter berm, a new penstock bypass pipe, and a new stepped concrete emergency spillway.
  - Developed and implemented geotechnical investigation programs to support instrument installations and evaluations of embankment stability, seepage mitigation, and spillway foundation design and head-cutting mitigation.
  - Prepared design details and provided support during construction for the toe filter berm and filter blanket to address seepage along the toe of the 1,000-foot-long earthen embankment dam, including slope stability analyses, filter design, and riprap sizing.
  - Developed design drawings, construction sequencing, and earthwork specifications for the new emergency spillway including joint drains, underdrains, engineered filters, frost protection layers, and head-cutting mitigation measures.
  - Installed vibrating wire piezometers (VWPs) to monitor pore pressures and associated seepage along a 6-foot diameter concrete penstock through the embankment and at selected locations within the embankment. Directed the instrument installations,

compiled and evaluated the associated monitoring data, and assisted the client with procurement and installation of an automated wireless instrument monitoring system.

- **Remedial Action Work Plan, Remedial Design, and Brownfield Redevelopment, Study Area 6 North, Confidential Client, Jersey City, NJ** - Evaluated and designed remedial action items (excavation and on-site relocation of contaminated soils, installation of perimeter hydraulic barrier walls, and construction of a low-permeability cover system) in conjunction with planned site redevelopment (multi-story retail, commercial, and residential).
    - Performed detailed settlement analyses to estimate magnitude and duration of primary consolidation settlement of underlying organics and clays, and designed a pre-loading/surcharge program, targeting a maximum 6-month primary consolidation period, to mitigate post-construction settlement of the low-permeability cover system.
    - Developed a geotechnical instrumentation and monitoring plan to measure and evaluate the response of the site soils to the surcharge.
    - Earlier in project, developed and implemented geotechnical subsurface exploration and laboratory testing programs. Directed the 5-week-long exploration program that included multiple rigs/crews, CPTu explorations, geotechnical soil borings, and “nested” wells/piezometers and scoped/evaluated strength and consolidation testing of silt/clay soils and peat layers.

SME
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Blanchard Road, PO Box 85A, Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692 •smemaine.com

ANDREW P. GOBEIL, L.G., P.G., L.S.E.

EDUCATION

B.S. – Geology, Boston College, 1998
M.S. – Geology and Geophysics, Boston College, 2005

PROFESSIONAL REGISTRATION

Licensed Geologist – Maine
Professional Geologist – Pennsylvania, Florida
Licensed Site Evaluator – Maine

EMPLOYMENT HISTORY

2008 to present – Sevee & Maher Engineers, Inc., Hydrogeologist
2003 to 2008 – Sweet Associates, Falmouth, Maine, Hydrogeologist
2001 to 2003 – Geologic Services Corporation, Hudson, Massachusetts, Hydrogeologist

PROFESSIONAL EXPERIENCE

Mr. Gobeil has over 23 years of professional experience in geology and hydrogeology. He specializes in hydrogeologic investigations related to water resources development and groundwater and geologic characterization related to landfill sites, remediation sites, subsurface wastewater disposal leachfields, and quarries and borrow pits. Mr. Gobeil has extensive experience and capability in analytical and numerical groundwater flow modeling and contaminant fate and transport modeling. His experience with hydrogeologic characterizations includes planning, conducting, and analyzing short-term and long-term groundwater pumping tests; classification and logging of subsurface soils and bedrock; and geologic mapping. Mr. Gobeil also has broad experience with analysis and assessment of groundwater quality data for landfill sites and remediation sites.

Examples of assignments and qualifications in his various areas of expertise have included:

- New Jersey Water Supply Development – Mr. Gobeil has assisted with the permitting and construction administration for Community Water Supply wells throughout the state for New Jersey's largest water purveyor. His work experience in water supply development includes water supply well design, well drilling supervision, geologic and geophysical subsurface characterization, bedrock fracture trace and lineament analysis, groundwater pumping tests, hydrogeologic analysis and characterization of confined and unconfined aquifers, and preparation of permit applications.

- Assessment of Gasoline (MTBE) Migration – Mr. Gobeil has developed groundwater models for numerous retail gasoline remediation sites. His experience includes hydrogeologic characterization, water quality assessment, and numerical groundwater flow and fate and transport modeling for MTBE plumes in extensive sand and gravel aquifers in Long Island, New York and Cape Cod, Massachusetts. Groundwater modeling included designing the placement and pumping rates for proposed extraction well networks.

- Quarry and Borrow Pit Permitting – Mr. Gobeil has completed hydrogeologic assessments, including various groundwater modeling techniques, to determine the hydrogeologic impacts related to excavation below the groundwater table at several quarry and borrow sites in Maine.

- Analysis and Design for Groundwater Extraction Wells for a Remediation Site – Mr. Gobeil constructed an extensively detailed numerical groundwater flow model used for design of a network of groundwater extraction wells in a complex geologic setting for a hazardous-waste remediation site in Orrington, Maine. The calibrated groundwater model was used to select extraction well locations, screen depths, and pumping rates. Mr. Gobeil assisted in design of the extraction wells, oversaw the construction of the wells, and completed pumping tests of various durations for analysis of the hydrogeologic characteristics of the Site.

- In-Situ Bioremediation Augmentation at Dissolved Chlorinated Solvent Remediation Site – Mr. Gobeil has provided hydrogeologic assessment and design for in-situ bioremediation augmentation for a dissolved chlorinated solvent remediation site in Kansas City, Kansas. The assessment included an investigation to provide evidence for existing anaerobic biological activity at the Site to delineate the extent of dissolved chlorinated solvents in groundwater, and to determine the spacing and injection volumes of an emulsified vegetable oil substrate designed to stimulate anaerobic biological activity. The emulsified vegetable oil substrate injections resulted in substantial reduction of dissolved chlorinated solvents in groundwater, and a Closure Report has been prepared for the site.

- Landfills and Landfill Permitting
  - Hydrogeologic Field Investigations - Mr. Gobeil has coordinated and implemented field programs for hydrogeologic investigations and reporting for proposed landfill locations. His contributions have included detailed rock and soil descriptions, field collection and interpretation of geophysical data, identification of highly hydraulically transmissive zones in bedrock and soils, hydrogeologic testing to determine the direction and amount of anisotropy in bedrock groundwater flow, long-term groundwater pumping tests, manual and computer assisted analysis of hydrogeologic investigation data, identification of potential sensitive receptors, and localized and regional groundwater flow modeling. He is experienced with compilation and reporting of hydrogeologic investigation data as exhibits used for landfill permitting applications.

  - Groundwater Modeling for Landfills – Mr. Gobeil has developed groundwater models for proposed landfill locations. His experience includes compilation and incorporation of hydrogeologic investigation data into three-dimensional numerical groundwater flow models and model calibration to observed groundwater conditions. This process includes incorporating into the model the observed geology and its hydrogeologic characteristics, identified groundwater flow boundaries, groundwater recharge characteristics, and groundwater pumping from surrounding water users. His calibrated groundwater models were used for determining groundwater flow directions away from proposed landfill areas, determining groundwater time-of-travel, and to evaluate for protection of potential sensitive groundwater receptors. He is experienced with assembling and reporting of groundwater model development and groundwater simulation results as exhibits used for landfill permitting applications.

  - Groundwater Quality Assessment for Landfills – Mr. Gobeil has experience with groundwater quality assessment monitoring for landfills and has developed groundwater quality detection monitoring programs for landfills. He provides annual assessments and reporting of groundwater quality data for landfills with respect to historical data. His assessments include comparison of groundwater quality data to applicable Federal and State regulatory standards, identification of statistically significant groundwater quality trends, and identification of statistical differences between groundwater monitoring locations that are upgradient and downgradient from the landfills.

RYAN L. CLAY, PE
Project Manager

KEY AREAS OF PRACTICE
Solid Waste Engineering and Permitting

Drainage Design

Site/Civil Design

EDUCATION
B.S., Civil Engineering, University of New Hampshire, 2008

REGISTRATIONS
Professional Engineer – ME, NH, NJ

SANBORN HEAD
Since 2012

Ryan has over fourteen years of engineering experience, including twelve years at Sanborn Head. His experience includes working as a lead designer and project manager for landfill related construction projects and site/civil land development projects. Ryan's project record includes the successful design and construction of landfill liner systems and cap systems, landfill gas collection systems, and stormwater management and treatment systems. Ryan is typically involved in several stages of a project including the initial planning stage, permitting stage, bid phase, and construction phase.

RELEVANT EXPERIENCE

Salt Lake Valley Solid Waste Management Facility, Gas Collection and Conveyance System (GCCS) Improvements and South Header Design, Salt Lake City, UT

Designed focused improvements to the gas collection and control system to expand coverage, enhance system performance, and achieve regulatory compliance. Services included evaluation of the existing system, and preparation of design calculations, construction drawings, and technical specifications.

Juniper Ridge Landfill, New England Waste Services of Maine, Old Town, ME

Responsible for the design of long-term landfill gas system expansions at the Juniper Ridge Landfill (since 2014), owned and operated by Casella Waste Systems, Inc. Efforts include sequential development planning, sizing of landfill gas pipes, condensate management design, and considerations for cost/constructability.

Juniper Ridge Landfill, Archaea Energy, RNG Facility Design, Old Town, ME

Assisted with design, permitting, and construction of a renewable natural gas (RNG) processing facility at the Juniper Ridge Landfill in Old Town, Maine. The RNG facility is designed to convert raw landfill gas into pipeline quality natural gas that is suitable for beneficial use, thereby reducing emissions that would otherwise be generated by the flaring of landfill gas at the landfill. The facility is capable of processing up to 3,200 standard cubic feet per minute (scfm) of landfill gas (at 50% methane).

Central Landfill, Engineering Support Services, Johnston, RI

Manages engineering and design of the gas collection and control system at the Central Landfill in Johnston, Rhode Island (since 2016). Services also include providing assistance during construction and preparing as-built documentation for gas collection system installations.

Bayview Landfill, Gas System Expansion, Elberta, UT

Prepared design drawings for expansion of the gas collection and control system to increase the quantity and quality LFG being directed to the renewable natural gas facility on site.

Four Hills Landfill, Landfill Gas System Expansions, City of Nashua, NH

Designed and prepared construction documents for several expansions of the LFG extraction system at the Four Hills Landfill (from 2014 to present). Prepared opinions of cost and technical specifications for each project.

North Country Environmental Services, Inc. Landfill, Gas Collection & Control System Engineering Services, Bethlehem, NH

Prepared an evaluation of the existing gas collection and control system at the NCES landfill and designed a 5-year plan for landfill gas system expansion at the site.

Steve Knapp, PWS, LSE, CWB®
Biodiversity Research Institute, Portland ME
Telephone: (207) 570-9462
Email: steve.knapp@brienvironmental.org

BRI Position: Director of Wetlands Program/Senior Environmental Scientist – with over 18 years' experience specializing in wetland delineations, wetland habitat assessments, vernal pool identification and assessments, stream assessments, and permitting. Project work includes designing, implementing, and monitoring wetland restoration/ mitigation projects, stream restoration projects, and invasive species management. Also performs wetland functional and wildlife habitat assessments, environmental permitting, botanical inventories, stream surveys, terrestrial and aquatic invertebrate surveys, and amphibian surveys.

Education: 2004 B.S., University of Maine, Wildlife Ecology, concentration in conservation biology

Notable Projects: (over 35,000 acres of natural resource delineation surveys performed)

2024 **Juniper Ridge Landfill** (Alton, Maine)
Senior Scientist responsible for completing a natural resources survey and functional analysis of several hundred acres associated with a landfill expansion in Northern Maine. Duties included completion of jurisdictional wetland delineations, vernal pool surveys, and functional analysis of proposed impacts.

2023 **Spring Salamander Survey** (Woodstock, Maine)
Senior Scientist responsible developing a survey protocol and implementing a survey for northern spring salamander (*Gyrinophilus porphyriticus*) as part of a proposed solar development. Work included habitat assessment and identification of salamander species. Identified species were mapped with sub-meter GPS and a full report was provided to the Maine Department of Inland Fisheries and Wildlife.

2022 **Solar Construction Oversight** (~Multiple projects in Maine)
Senior Scientist responsible for providing construction oversight for several solar projects in Maine undergoing constructions. Work included ensuring that environmental permit conditions were adhered to and that erosion and sediment control BMPs were followed correctly.

2022 **Warren Meadows Solar** (~900 Acres, Warren Maine)
Senior Scientist responsible for providing oversight of natural resource surveys and conducting agency consultation for a solar project in Warren, ME. Completed agency consultation and review of mapped Deer Wintering Areas within the project area.

2019-2022 **Three Corners Solar Project** (~900 Acres, Unity Maine)
Senior Consultant responsible for providing oversight of natural resource surveys and conducting agency consultation for the Three Corners project in Maine.

2019-2021 **Maine Small Site Solar Due Diligence** (~1,000 Acres, Maine)
Senior Consultant performing wildlife, wetland, and permitting consulting services for 13 various solar sites throughout Maine.

2019 **Barefoot and Broadhead Solar** (~200 Acres, Waterville Maine)
Senior Consultant responsible for managing the State and Federal permitting including the preparation of an Environmental Assessment (EA) for the Federal Aviation Administration (FAA).

2019 **Compensatory Mitigation Credit Development Project** (South Carolina)
Senior environmental scientist responsible for the assessment of 29 parcels owned by Santee Cooper in South Carolina for the potential to create mitigation credits for wetland, stream, or rare, threatened, or endangered species habitat. From these parcels, 10 potential sites were identified that could be used by Santee Cooper to create mitigation credits. Along with site assessment, duties included the preparation a decision matrix that ranked the priority of each site based on feasibility and cost. Santee Cooper is currently evaluating which site to develop for mitigation credits.

2018 **Constitution Pipeline** (New York and Pennsylvania)
Senior scientist member of a multidisciplinary team to that developed a detailed mitigation plan for unavoidable impacts to wetlands resulting from a proposed 125-mile pipeline through portions of New York and Pennsylvania. Specific duties included developing and completing a wetland functional assessment for impacted wetlands and proposed wetland mitigation.

2018 **Horseshoe Wind Project** (200 Acres, Rumford Maine)
Senior Project Scientist responsible for completing natural resource surveys and agency consultation for a proposed wind project in Rumford, Maine.

2018 **Trafton Road Interchange** (Waterville, Maine)
Senior Project Manager responsible for organization and oversight of natural resource surveys and environmental permitting for the proposed Trafton Road interchange in Waterville, Maine. In addition to resource surveys duties included completion of Federal Highway Administration (FHA) Environmental Assessment (EA) to comply with NEPA. The project was successfully permitted and was constructed in 2017. In addition, services following the interchange development included natural resource surveys on approximately 1,000 acres on lands owned by the client.

Selected Publications:

Knapp, S., M. Bernier, B. Lake, J. Burrows, D. Kircheis, T. Trinko Lake. 2011. West Winterport: A Successful Dam Removal and Habitat Restoration Case Study. Maine Water Conference. Augusta, Maine. March 16, 2011.

Kircheis, D., T. Trinko, M. Bernier, M. Philips, **S. Knapp**, J. Austin. 2012. A Systematic Approach to Improve Fish Passage at Dams Necessary for Recovery of Endangered Atlantic Salmon. Maine Water Conference.

Certifications and Professional Affiliations:

- Licensed Site Evaluator 376
- Professional Wetland Scientist 2231
- Certified Wildlife Biologist (CWB®)
- Secretary Maine Association of Wetland Scientists
- Vernal Pool Technical Committee member, Maine Association of Wetland Scientists
- Maine Chapter of The Wildlife Society

Douglas Stewart PWS

Senior Principal, Environmental Services Practice / Regional Growth Leader / *Role: Principal-in-Charge*

30 years of experience · Topsham, Maine

Doug is a Professional Wetland Scientist and Ecologist with over 30 years of professional natural resource consulting experience. He is a Senior Principal with Stantec's Environmental Services Practice and works extensively on large scale energy and infrastructure projects both domestically and internationally. Doug's work focuses on natural resource characterization in both terrestrial and aquatic environments, ecological impact assessments, ecological restoration, ecological risk assessment, National Environmental Policy Act, Clean Water Act (Section 401, 404, and 408) Permitting, Emergency Planning and Response, Natural Resource Damage Assessments, expert witness testimony, and third-party reviews. He has authored several publications on ecological sampling and analysis, quantification of ecological impacts, risk assessment, ecological restoration, and eDNA and regularly presents on these topics at energy industry conferences in the US and abroad.

EDUCATION

BS, Natural Resources, Concentration in Soil Science, College of Applied Sciences and Agriculture, University of Maine, Orono, Maine, 1993

Wetlands Identification and Delineation, University of New Hampshire, Durham, New Hampshire, 1998

CERTIFICATIONS & TRAINING

40-Hour Hazwoper Certification, OSHA, Topsham, ME, 1993

8 Hour Hazwoper Refresher , OSHA, Topsham, ME, United States, 2019

REGISTRATIONS

Professional Wetland Scientist #1823, Society of Wetland Scientists

Licensed Site Evaluator #349, State of Maine

Registered Maine Guide #27390137

PROJECT EXPERIENCE

P310/P381 Dry Dock No. 1 Super Flood Basin Project, Kittery, Maine Principal Scientist

Coordinated with the design team and lead the environmental team to delivered permits and successfully meet the project schedule. The project scope included dredging over 3 acres of subtidal area to construct closure walls and create the basin. Completed the environmental assessment and permitting for state and federal approvals for this project. This work included the dredge characterization and waste disposal. Stantec developed and completed a sediment sampling program to characterize proposed dredge materials for their suitability for licensed waste facilities, on-site beneficial use and USACE ocean disposal sites. Developed a Marine Mammal monitoring App to collect observation data on marine mammals during construction and create efficient reporting to the National Marine Fisheries Service.

Callahan Mine Superfund Site Ecological Characterization | Brooksville, Maine | Principal Scientist

Completed large-scale ecological characterization and extensive field studies in support of ecological risk assessment and removal/restoration activities at the site of a former zinc mine located directly on the coast of Maine. Provided evaluations of wildlife and ecological impacts through field surveys, biota and sediment sampling, modeling, and statistical analysis. Coordinated development of overall ecological risk assessment for the project and provided technical support in sampling design and data analysis.

Wetland and Stream Restoration, Former Loring Air Force Base | Limestone, Maine | Principal Wetland Scientist and Project Manager

As part of the Loring CERCLA program, planned, designed, and constructed the ecological restoration of 2.5 miles of high value brook trout stream and over 50 acres of freshwater wetlands following sediment removal actions. Baseline ecological data collection was initiated in 1993 and completed in 1995. Ecological and human health risk assessments were completed in 1995-1996, wetland and stream restoration design was completed in 1996-1997, sediment removal action was completed in 1997-1998, wetland restoration was completed in 1998-1999, and long-term biological and wetland monitoring was initiated in 1999 and is ongoing. This project, one of the largest and most complex ecological restoration projects in the northeast, is used as an example of successful wetland and stream restoration by both the scientific community and state and federal resource agencies. Over 10 years since restoration construction was completed, long-term monitoring demonstrates that wetland functions and values have been successfully restored, and a diverse assemblage of stream and wetland communities are present.

Douglas Stewart PWS

Idlewild Acres USEPA Wetland Alteration Settlement | Cape Cod, Massachusetts | 2012-present | Principal

Lead the settlement in response to a USEPA enforcement action and subsequent consent decree regarding unauthorized conversion of cranberry bogs on Cape Cod, Massachusetts. Stantec conducted a baseline assessment to characterize existing site conditions and historic records review to identify wetland conditions and the associated functions that existed at the site prior to the disturbances. Appropriate wetland restoration goals and objectives were identified for 2.7 acres of wetland area. Using the collected groundwater data and available LiDAR data, Stantec identified target surface elevations that would provide for wetland hydrology of the restoration site as well as restore flood storage capacity. Following the groundwater monitoring study, Stantec prepared a wetland restoration plan detailing measures to restore wetland area and functions, particularly flood storage capacity, wetland hydrology, and vegetation while accommodating ongoing use of the wetland areas for commercial agriculture. The plan was approved by the EPA. Stantec continues to conduct annual post-construction monitoring.

York Wetland Restoration | Biddeford, Maine | Principal Wetland Scientist and Project Manager

Worked with a private landowner to develop a conceptual stream and wetland restoration plan for a 16-acre stream/wetland restoration site and 200-acre wetland/threatened and endangered species preservation site. Work performed on this site included wetland and vernal pool mapping, threatened and endangered species surveys, and conceptual wetland restoration and creation planning. This wetland creation/restoration site is currently considered one of the most valuable and feasible mitigation sites in Maine by state and federal regulatory and resource agencies.

City of Brewer Penobscot River Bank Stabilization Project | Brewer, Maine | Project Manager and Principal Scientist

Directed ecological surveys to characterize the coastal wetland resources affected by the construction of a multi-use recreational trail, upgrade of an existing boat launch, and stabilization of a mile of riverbank along the east shore of the Penobscot River between the Interstate-395 Bridge and the Penobscot River Bridge in Brewer. Surveys focused on the intertidal and subtidal areas directly impacted by the proposed work, as well as areas within 25 feet of the limit of work. Also conducted Essential Fish Habitat and Endangered Species assessments and a characterization of fisheries and wildlife resources that could be affected by the proposed project. Developed a mitigation strategy for mitigating for riverine impacts associated with this site that included a fish passage restoration project. Completed Maine Natural Resources Protection Act and Corps CWA Section 404 permit.

Newell Brook Stream and Wetland Restoration | New Portland, Maine | Project Manager and Principal Scientist

Performed ecological surveys to collect information on a 10-acre wetland violation in western Maine. Post-alteration baseline information collected included wetland communities, existing site elevations, and reference site characterizations to support the preparation of the Stream and Wetland Restoration Plan. Prepared, submitted, and negotiated a Stream and Wetland Restoration Plan with the Maine Department of Environmental Protection for review. Performed continuous oversight during stream and wetland restoration activities, oversaw the re-soiling and re-vegetation of the site, and conducted the annual long-term monitoring required by state and federal permits issued for the project.

University of Maine, Orono, USEPA Enforcement Action and Wetland Restoration Project | Orono, Maine | Principal Wetland Scientist and Project Manager

Currently working for the University to resolve an EPA enforcement action associated with the unpermitted alteration of several acres of wetlands and other regulated resources. Work completed to date includes an assessment of historical wetland impacts across the 2,000-acre site, negotiation of the EPA Administrative Order, and development of a restoration plan for approximately 8 acres of wetland restoration. Additional work for the University has included Inland Wading Bird and Waterfowl surveys, regulatory jurisdictional determinations, wetland characterizations, threatened and endangered species surveys, wetland delineations across the entire property, wetland alteration permitting, development of a wetlands training program, and wetlands restoration/creation design. Also completed after-the-fact Corps CWA Section 404 permitting and Maine Natural Resources Protection Act Permitting.

Nalcor, Lower Churchill Hydroelectric Project | Labrador, Newfoundland | Principal Wetland Scientist

Conducted wetland mitigation planning for impacts associated with the proposed 2,000-megawatt Lower Churchill Hydroelectric Dam. Conducted extensive literature searches for successful wetland and habitat mitigation associated with large-scale hydroelectric facilities throughout North America. Conducted site searches for wetland and species-specific mitigation for an estimated 15 square kilometers of habitat impacts. Completed inventory of potentially suitable sites along the 200-kilometer study area and prepared probable opinion of costs associated with the identified sites.

Douglas Stewart PWS

SELECTED PUBLICATIONS AND PRESENTATIONS

Pries, A., D.B. Stewart, K. Moore, I. Trefry. *Innovative Collection and Reporting for Marine Mammal Monitoring, Portsmouth Naval Shipyard Drydock 1*. Kittery, Maine. Ports 22 Conference, Honolulu, Hawaii. 2022

Reilly, T., V. King, D. Stewart. Stantec Expands Natural Capital Practice, Building Resilience & Unlocking Value in Ecosystems. *Environmental Business Journal*, 2021, pp. 5.

Reilly, T., V. King, D. Stewart. Stantec Expands Natural Capital Practice, Building Resilience & Unlocking Value in Ecosystems. *Environmental Business Journal*, 2021, pp. 5.

Stewart, D.B., *Environmental DNA – Real Time Results in the Field to Confirm the Presence/Absence of Target Species*. Gulf 3, International Conference on Managing the Health of the Gulf Ecosystem, Dubai, UAE, November, 2019.

Clinton D. Cyr, PE, INCE Board Certified

LEAD ENGINEER, ACOUSTICS GROUP

EDUCATION

M.Eng., Acoustics, Pennsylvania State University

B.S., Mechanical Engineering - Acoustics Concentration, University of Hartford

PROFESSIONAL REGISTRATIONS

Registered Professional Engineer Massachusetts, Mechanical, #55368

Board Certified by the Institute of Noise Control Engineering, #23008

PROFESSIONAL AFFILIATIONS

Institute of Noise Control Engineering (INCE)

Acoustical Society of America (ASA)

PROFESSIONAL SUMMARY

Mr. Cyr is a Lead Engineer in the Acoustics group at Epsilon Associates with expertise in the areas of environmental impact assessment and noise control. He has honed his skills through years of experience conducting on-site measurement programs, generating acoustic models, and performing project feasibility studies for a diverse range of industries, agencies, and utilities across the United States. Mr. Cyr's career has also developed into conducting mitigation analyses, sound level compliance testing, and sitting as the subject matter expert for both sound level and shadow flicker studies.

Mr. Cyr helps developers successfully site and permit a wide variety of projects, including industrial-scale renewable energy projects (wind, solar, battery energy storage), electrical substations, cogeneration facilities, conventional power plants, transmission lines, warehouses, commercial developments, and light-rail transit systems.

With over a decade of hands-on training and leading successful field programs, Mr. Cyr has gained an intimate knowledge of the tools used for sound level measurement and meteorological data collection, including Larson Davis, Brüel & Kjær, and Norsonic sound level meters, as well as HOBO® and ATMOS portable weather stations and Roland audio recorders. Mr. Cyr has developed numerous complex sound propagation models using the DataKustik CadnaA software. The models have spanned a variety of project types. Other technical modeling software packages in Mr. Cyr's experience include the wind turbine shadow flicker analysis software, WindPRO, the Federal Highway Administration Traffic Noise Model (TNM), and the U.S. Dept. of Energy Bonneville Power Administration's Corona and Field Effects (CAFÉ) Program.

PROFESSIONAL EXPERIENCE

NOISE ASSESSMENT – INDUSTRIAL

Juniper Ridge Landfill, Old Town, Maine – Casella Waste Systems, Inc. Collected and analyzed background sound levels over a 2-week duration to analyze typical work-day sound levels at the closest noise sensitive receptors to the facility. Reference sound level measurements for a series of operational equipment were performed for further analysis during a separate field program. Mr. Cyr also performed the sound level impact assessment associated with a proposed renewable natural gas facility at the landfill.

Excel Recycling, Auburn, Maine – Excel Recycling, LLC. Performed a sound level impact assessment for a proposed automobile recycling center in Auburn, Maine. The assessment included CadnaA modeling of multiple operational scenarios and an evaluation of state and local limits.

Clough Mill Road Sand and Gravel, Pembroke, N.H. – Kruger Trucking, LLC. Performed a sound level monitoring program for a proposed excavation expansion plan in southern New Hampshire as part of a noise impact assessment.

Circular Hill Quarry, Genesee County, N.Y. – Continental Placer, Inc. Predicted the sound level impact for a scenario at a sand and gravel site by use of Datakustik CadnaA sound level modeling software. Sound levels at the closest noise sensitive receptor were presented and compared against applicable limits in a letter report.

ST Coots LLC, Savona Site, Steuben County, N.Y. – Continental Placer, Inc. Predicted the sound level impact for three scenarios at a sand and gravel site by use of CadnaA sound level modeling software. Noise sensitive receptor levels were presented under each scenario compared against applicable limits in brief letter report.

Scudder Sand & Gravel Pit, Erwin, N.Y. – Dalrymple Gravel & Contracting Co., Inc. Performed a sound level monitoring program for a proposed excavation expansion plan in Steuben County, New York as part of a noise impact assessment.

NOISE ASSESSMENT – RENEWABLE ENERGY

RoxWind, Maine – RoxWind, LLC. Performed a sound level impact analysis of a proposed wind project consisting of 4 wind turbines in the Town of Roxbury, ME to evaluate potential impacts from the project on the surrounding community and compliance with the State of Maine regulations through CadnaA modeling.

West Range Wind, Maine – Iberdrola Renewables, LLC. Conducted a comprehensive pre-construction sound level measurement program for a proposed ~100 MW wind project in Somerset County, Maine

Antrim Wind Energy, N.H. – Antrim Wind Energy, LLC. Conducted an extensive sound level impact assessment of a proposed 28.8 MW wind project in Hillsborough County, New Hampshire, which included a comprehensive, ambient sound monitoring program designed by NH SEC guidelines to evaluate any potential impacts from the project on the surrounding community.

Big Turtle Wind Farm II, Mich. – Heritage Sustainable Energy. Performed a complex sound level compliance program for a 29.4 MW wind project in Huron County, Michigan to evaluate actual sound levels from the project during worst-case wind conditions in the surrounding community.

Coye Hill Wind I, Conn. – Coye Hill Wind, LLC. Conducted a sound level impact assessment of a proposed four wind turbine project in Union, Conn., which included a comprehensive, ambient sound monitoring program to evaluate any potential impacts from the project on the surrounding community.

Dakota Range Wind I/II & III, S.D. – Apex Clean Energy, Inc. Performed sound level impact analyses of a proposed 2-phase wind project in Codington, Grant, and Roberts Counties, SD to evaluate potential impacts from the project on the surrounding community through CadnaA modeling. Impacts in the three counties were evaluated separately based on individual county regulations regarding sound.

Dodge County Wind Project, Minn. – NextEra Energy Resources, LLC – Atwell, LLC. Performed a sound level impact analysis of a proposed wind project in Dodge and Steele Counties, MN to evaluate potential impacts from the project on the surrounding community through an ambient sound level monitoring program and CadnaA modeling. Procedures from a noise study protocol and report guidance document published by the Minnesota Department of Commerce, Energy Facility Permitting were followed.

Groton Wind, N.H. – Iberdrola Renewables. Conducted an extensive sound level compliance assessment of a constructed 48 MW wind project in Groton, NH, which included a comprehensive, two-season, operational sound monitoring program to evaluate any impacts from the project on the surrounding community.

NOISE ASSESSMENT - POWER GENERATION

Harvard University District Energy Facility, Boston, Mass. – Harvard University. Performed a complex sound level analysis for a proposed power generation facility in Allston (Boston), Massachusetts to evaluate sound level impacts in the community. The Cadna model incorporated noise sources from the energy generation system, cooling system, chiller system, and ventilation system in the facility.

CPV Fairview Power Plant, Cambria County, Penn. – Haley & Aldrich. Performed an extensive, two-season sound level monitoring program for a proposed power plant in Jackson Township. The program involved long-term and short-term monitoring and complex data processing to characterize the existing sound environment.

NOISE ASSESSMENT - COMMERCIAL/RESIDENTIAL

45-47 Townsend Street, Roxbury, Mass. – KIC Roxbury, LLC. Conducted a sound level impact assessment of a proposed mixed-use redevelopment project in the Washington Park South neighborhood of Roxbury, involving a baseline sound survey and intricate computer modeling.

95 St. Alphonsus Street, Boston, Mass. – Wingate Companies. Conducted a sound level impact assessment of a proposed mixed-use development in the Mission Hill neighborhood of Boston, involving a baseline sound survey and complex computer modeling.

ELECTRICAL TRANSMISSION NOISE ASSESSMENT

NSTAR Station 71, Boston, Mass. – NSTAR Electric & Gas Corporation D/B/A Eversource Energy. Completed an ambient noise study of the proposed location for an operational transformer on Warrenton Street in Boston.

NSTAR Station 278, Framingham, Mass. – NSTAR Electric Company D/B/A Eversource Energy. Performed a sound level monitoring program for a transformer substation in a quiet residential neighborhood to assess the sound level impacts and analyze the effects of temporary and permanent mitigation.

Rock Tavern to Sugarloaf Transmission Line Project, Orange County, NY – New York Transco LLC. Completed a pre-construction noise study of a proposed transmission line and substation rebuild. The study included an ambient monitoring program and complex Cadna/A modeling to meet stringent sound level limits set forth by the NYS Department of Public Service.

TRANSPORTATION/TRANSIT NOISE ASSESSMENT

Keyspan Sagamore Western Expansion Project, Mass. – National Grid. Performed a complex sound level impact assessment to characterize the effect on traffic noise at residences from clearing approximately 15 feet of trees along a state highway for a gas pipeline project. Measurements were performed with the use of a reference sound source that could be identically reproduced both pre- and post-construction to accurately derive the effect on traffic noise.

EXPERT TESTIMONY EXPERIENCE

- Expert witness before the Massachusetts Energy Facilities Siting Board, on sound level assessment for the proposed Park City Wind offshore wind energy project, Virtual Hearings (2022, 2023).
- Subject Matter Expert before the Town of Windsor Locks Planning & Zoning Commission, on sound level assessment for a proposed warehouse project, Windsor Locks, CT (2023).
- Subject Matter Expert and presenter before BOEM, BSEE, DoD, EPA, FPISC, NOAA, NPS, USACE, USCG, USFWS, NYSDOS, NJBPU, and NJDEP, on sound level assessment for a proposed offshore wind energy project, Virtual Meeting (2023).
- Subject Matter Expert before the City of Auburn Planning Board, on sound level assessment for a proposed automotive recycling facility project, Auburn, ME (2022).
- Expert witness before the Town of Johnston Planning Board, on noise issues for the Johnston Distribution Center project, Johnston, RI (2021).
- Subject Matter Expert and presenter before the Town of Scituate Board of Selectmen, on post-construction sound level compliance study for Scituate Wind, Scituate, MA (2020).
- Subject Matter Expert before the Isabella County Planning Commission, for the Isabella Wind Project, Isabella County, MI (2019).

CONFERENCE PRESENTATIONS

Cyr, Clinton D., 2024. The moving goalposts – tightening design goals during a sound impact study for a New York State Article VII filing. NOISE-CON 2024, New Orleans, LA.

O'Neal, Robert, Bastasch, Mark, Cyr, Clinton D, 2022. Verification of sound modeling results for a wind energy project. NOISE-CON 2022, Lexington, KY.

Cyr, Clinton D., 2020. Combined Heat and Power Project – A Community Noise Case Study. NOISE-CON 2020, Virtual Conference.

VIEWSHED

JUDY COLBY-GEORGE

Judy Colby-George, GISP, is the owner and principal of Viewshed. She has over 30 years of experience helping clients to implement GIS and engage in complex spatial issues. Judy has extensive experience with public participation GIS and working with clients to understand the spatial relationships of various policies and programs. Her work ranges from creating and updating GIS data sets, development of online mapping applications, cartography, visualizations, viewshed analyses, and providing detailed analysis to solve client problems.

Judy has been an integral part of VIEWSHED's SLVIA work, she has developed the methodology for the GIS and mapping portions of the work, assisted with the writing and editing of the final reorts, and provided project management.

SELECT EXPERIENCE

Kitty Hawk South Wind SLVIA
Offshore North Carolina

Kitty Hawk North Wind SLVIA
Offshore North Carolina & Virginia

Ocean Wind SLVIA
Offshore New Jersey

New England Aqua Ventus VIA
Offshore Maine

New England Clean Energy Connect VIA
Maine

Northern Pass Transmission VIA
New Hampshire

Maine Power Reliability Program VIA
Maine

New York Transco VIA
New York

Bull Hill Wind VIA
Maine

Weaver Wind VIA
Maine

Western Maine Renewable Energy Wind VIA
Maine

Walden Renewables Solar Viewshed Analysis
New England

Monhegan Broadband Cell Phone Tower VIA
Maine

Maine LNG Storage Facility VIA
Maine

Downeast Wind VIA
Maine

PROFESSIONAL AFFILIATIONS

URISA Board of Directors, Secretary
Maine GIS Users Group
Maine Association of Planners
New England URISA
American Association of Geographers

EDUCATION

University of Maine
Master of Ecology and Environmental Science

University of Wisconsin-Madison
Master of Land Resources with focus on GIS & Coastal Planning

University of Wisconsin-Madison
Bachelor of Science in Geography & Certificate of Environmental Studies

EMPLOYMENT

VIEWSHED (formerly Spatial Alternatives & TJD&A)
Principal / Owner (2001 - present)
Yarmouth, ME

SELECT PRESENTATIONS

Building Community Using Geospatial Tools Workshop, GIS Pro, Boise, ID, 2022

Equity, Social Justice, and GIS, Maine Municipal Assoc. Tech Conference, 2019

Municipal GIS Process and Policy, Panel Discussion NEARC 2017

Randy Dunton, P.E., PTOE, IMSA II

PROJECT MANAGER

Years Experience:
33

Years with Firm:
18

Education
B.S., Civil Engineering, University of Maine - Orono, 1991

Registration
Professional Engineer –
ME #8686
NH #14676

Professional Traffic Operations Engineer #611

Certification
ISMA Traffic Signal Construction Technician Level II

IMSA Traffic Signal Field Technician Level II

IMSA Traffic Signal Design/ Engineering Technician Level II

Membership
Institute of Transportation Engineers, Maine Chapter – Past President

Randy is a project manager at Gorrill Palmer and manages the Transportation Planning Group. Randy has over 30 years of experience in traffic and transportation engineering. He has worked for both the private sector as well as with the MaineDOT as the Region Traffic Engineer for the southern region of the state. His design and project management experience includes traffic signal design, traffic permitting, intersection and corridor designs, feasibility studies, traffic calming design, safety evaluations and analysis, traffic modeling and analysis, and peer reviews. His experience also includes roundabout design. He is a licensed professional engineer in both Maine and New Hampshire, a certified Professional Traffic Operations Engineer (PTOE), and has numerous IMSA certifications.

Relevant Experience

Route 4 Traffic & Safety Study – Berwick, ME
Client: KACTS | Role: Project Manager / Senior Traffic Engineer
This was a corridor study of Route 4 from the South Berwick town line to the North Berwick town line, approximately 2.9 miles. It involved a safety review, a speed study review, capacity analysis, geometric design of the corridor, access management, and numerous stakeholder and public meetings. The study was recently completed and recommendations are being considered for implementation.

Scarborough Downs Mixed Use Development – Scarborough, ME
Client: Crossroad Holdings | Role: Senior Traffic Engineer
One of the largest—if not the largest—mixed-use projects in Maine that includes the development of 500 acres in the middle of Scarborough. The project is expected to include offices, retail, residential, supermarkets/convenience store, industrial park, community center, and restaurants. The study area includes over 20 intersections that needed data collection (by others), which Gorrill Palmer then reduced to create pre- and post-development volumes after seasonal adjustments, other development considerations, and annual growth were all considered. Each use had its own trip distribution and assignment that needed to be determined and considered. Capacity analysis is being completed for each intersection using computer modeling, including several coordinated systems.

Maine Medical Center Campus Expansion – Portland, ME
Client: MaineHealth | Role: Project Manager (Traffic)/Sr. Traffic Engineer
This project involved the expansion of the existing MMC campus in downtown Portland. This included data collection (by GP and others) and the analysis of numerous intersections in the adjacent roadway network. The project was complicated by the fact that the employee garage was being razed and a new satellite 2,400-space garage was being constructed with an associated shuttle service. All these factors had to be considered in the analysis, which was completed using computer simulation modeling. In addition, numerous traffic control plans had to be created and additional analysis competed to ensure acceptable operations at effected intersections. This included the complete closure of a section of Congress Street for approximately six weeks and rerouting traffic. A pedestrian hybrid beacon was designed by GP and recently installed on St. John Street to accommodate pedestrians from the parking garage.

Route 236 Corridor Study – Kittery and Eliot, ME
Client: KACTS | Role: Project Manager
This was a corridor study of Route 236 for the two municipalities as well as KACTS. It involved a safety review using the Highway Safety Manual, a speed study review, capacity analysis, geometric design of the corridor, signal warrant analysis, and numerous stakeholder and public meetings. The study was recently completed and recommendations are now being considered for implemented in the next few years.

Minot Ave, High St & Main St Intersection Improvements – Auburn, ME
Client: MaineDOT | Role: Senior Traffic Engineer
Gorrill Palmer provided preliminary and final design services for this intersection safety and sidewalk/ADA improvement project at six intersections in Auburn, ME. Work included design of pedestrian ramps and landings, sidewalks, traffic calming, and signal system replacement. Traffic calming proposed as part of this project included a raised intersection with pedestrian crosswalks at one of the project intersections.

Route 11, Route 121 & Route 124 Signal and ADA Improvements – Mechanic Falls, ME
Client: MaineDOT | Role: Senior Traffic Engineer
Gorrill Palmer is providing design services for traffic/pedestrian signal and ADA ramp improvements at the intersection of Route 11, Route 121, and Route 124 in Mechanic Falls, ME. The project scope includes full replacement of traffic and pedestrian signal equipment and ADA ramp reconstruction with curb extensions. Work also includes traffic analysis and signal design (phasing, timing) with the implementation of an exclusive pedestrian crossing phase and signalization of entrances located inside the intersection footprint.

Traffic Signal Improvements – Sabattus, Rockport & Lebanon, ME
Client: MaineDOT | Role: Senior Traffic Engineer
Gorrill Palmer provided preliminary and final design services for four traffic signal improvement projects at the Route 9/Route 126 and Route 9/Route 132 intersections in Sabattus; Route 17/Route 90 intersection in Rockport; and Route 202/Depot Road intersection in Lebanon. These projects included traffic analysis and signal design with modifications to traffic signal phasing and timing to improve safety with implementation of protected left-turn phases at each location.

Smyrna Street Signal Improvements – Houlton, ME
Client: MaineDOT | Role: Senior Traffic Engineer
Gorrill Palmer assisted MaineDOT with completion of design and bid package review and updates for readvertisement of an intersection/ traffic signal improvement project in Houlton. Gorrill Palmer is currently providing Phase III construction support services.

Main Street Feasibility Study – Dover-Foxcroft, ME
Client: Town of Dover-Foxcroft | Role: Project Manager
Gorrill Palmer is completing a transportation planning study for a 2.5-mile stretch of Route 6/15 (East & West Main Street) in Dover-Foxcroft, ME. This village partnership initiative (VPI) study involves reviewing the existing conditions, completing safety audits, making recommendations for safety and mobility improvements, coordinating with three ongoing MaineDOT bridge projects, public facilitation, and developing conceptual plans, cost estimates, evaluation matrix and reports.

Route 235/Old Augusta Road Intersection Improvements – Warren, ME

Client: MaineDOT | Role: Senior Traffic Engineer
Gorrill Palmer is providing preliminary and final design services associated with the intersection improvements project in Warren, ME. The project will aim to improve intersection safety by converting the existing intersection (stop-controlled on side roads only) into an all-way stop condition with overhead flashing beacon and supplemental ground mounted LED flashing signage on Route 235. Other work includes turning movement documentation, geometric improvements including truck aprons, open/closed drainage improvements, and signing/striping improvements.

Route 9/Saw Mill Hill Intersection Improvements – Berwick, ME
Client: MaineDOT | Role: Senior Traffic Engineer
Gorrill Palmer is providing preliminary and final design services associated with intersection improvements at the intersection of Route 9 (School St.) and Saw Mill Hill in Berwick, ME. The project involves reconfiguring the intersection to make Route 9 traffic a free-flowing straight movement through the intersection while also reconfiguring Saw Mill Hill (stop condition) to intersect Route 9 at a 90-degree angle. Work also includes pedestrian/bicycle accommodations, open/closed drainage improvements, striping/signing improvements, public facilitation, superelevation review, and ongoing project coordination with abutting properties under construction.

Franklin Street & Marginal Way Improvements (LAP) – Portland, ME
Client: City of Portland | Role: Senior Traffic Engineer
Gorrill Palmer is providing preliminary and final design services associated with the design of signal upgrade improvements at the intersection of Franklin Street and Marginal Way in Portland, ME. This LAP project was designed concurrently with the city-led Franklin Street Corridor project that was set to make geometric and ADA improvements to the intersection. This project included layout and design of new signalized equipment, assuming all roadway and ADA improvements were being constructed by the other project. Work included traffic analysis, mast arm design, structural load ratings, signal phasing and timing, signal coordination, and removal of the existing span wire system.

Congress Street Signal Improvements (LAP) – Portland, ME
Client: City of Portland | Role: Senior Traffic Engineer
Gorrill Palmer provided preliminary and final design services as well as construction oversight of this signal and ADA improvements project that included eight intersections and a mid-block crossing along outer Congress Street in Portland, ME. The project included designing ADA improvements at three intersections, providing geometric improvements at two intersections, providing signal interconnection between all nine locations, and updating all signal equipment within the project. This project also included the installation of the first HAWK beacon in the state.

Broadway Improvements (LAP) – Bangor, ME
Client: City of Bangor | Role: Senior Traffic Engineer
Gorrill Palmer provided preliminary and final design services associated with safety, intersection, and corridor improvements along Broadway from Center Street to the I-95 southbound ramps in Bangor, ME. This LAP project included utility coordination, right of way mapping, roadway and intersection design, pedestrian and bicycle accommodations, traffic analysis, modifications to traffic signals, access management and reconfiguring of side road intersections.

Route 236/91 Intersection Improvements – South Berwick, ME

Client: MaineDOT | Role: Senior Traffic Engineer
Gorrill Palmer provided preliminary and final design services associated with intersection improvements at the intersection of Route 236 and Route 91 in South Berwick, ME. Work included installing a new signal (steel strain poles) at the intersection and providing geometric improvements including drainage improvements, provisions for a westbound right-turn lane on Route 91, an additional through lane on Route 236 northbound, and repurposed channelized right-turn lanes on Route 236.

Franklin Street Improvements – Portland, ME
Client: City of Portland | Role: Senior Traffic Engineer
Gorrill Palmer provided preliminary design services associated with 0.19 miles of roadway and intersection improvements along Franklin St. from Marginal Way to Lancaster St. (including the Franklin/Somerset/Fox intersection) in Portland, ME. This city-led project included design of leading-edge bicycle and pedestrian accommodations, design and review of horizontal and vertical roadway components, environmental permitting, utility coordination, geometric improvements to two intersections, signal improvements including mast arm design, structural load ratings, signal phasing and timing, signal coordination, and removal of existing signal system (mast arms).

Rumford Signal Improvements – Rumford, ME
Client: MaineDOT | Role: Senior Traffic Engineer
Gorrill Palmer is providing preliminary and final design services associated with traffic signal improvements along Route 2, Portland Street, and Bridge Street in Rumford, ME. This signal replacement project includes design and layout of proposed signal equipment at the Route 2/Hancock Street, Portland Street/River Street, and Bridge Street/Congress Street intersections. This project also includes ADA improvements at all project intersections.

Attachment C – Resumes for Bat Analysis

Laura Berube

Project Environmental Scientist
13 years of experience ·Topsham, Maine

Laura is a Project Environmental Scientist for projects involving avian and bat studies for pre- and post-construction projects in eastern United States and Canada. Laura is a wildlife biologist and is proficient in acoustic bat analysis including manual vetting of rare and threatened species and the use of automated analysis programs: Kaleidoscope, BCID, EchoClass, and Sonobat. She has performed acoustic bat data analysis for projects ranging from West Virginia, United States, north to Newfoundland, Canada. Laura also has strong bird identification skills and the ability to identify bird species by both sight and sound. She has recently performed diverse avian studies for a number of renewable energy projects in the Northeastern United States, with field work including visual raptor surveys, eagle point count surveys, nocturnal migrant radar surveys, breeding bird surveys, and acoustic bat surveys. Laura is proficient in data management, analysis, summary, and vigorous QAQC for a variety of avian wildlife surveys.

Laura is also responsible for conducting vernal pool surveys and natural resource assessments and supporting wetland delineations to assist with the preparation of local, state, and federal permit applications. She has worked on a variety of natural community and rare plant surveys and projects ranging from general reconnaissance observations to quantitative community- and species-specific surveys. These projects have involved natural community mapping and analysis for transportation projects, utility corridors, and development sites.

PROFESSIONAL EXPERIENCE

• Stantec Consulting. 2010-present. Project Environemntal Scientist.
• University of Maine. 2009. Wildlife Department Field Assistant.

EDUCATION

Bachelor of Science, Wildlife Ecology, University of Maine, Orono, Maine, 2010

Bat Conservation and Management - Acoustic Data Management Workshop, Bat Survey Solutions, LLC - Janet Tyburec and John Chenger, Fairfield, Maine, 2015

Wilderness First Aid Certified, SOLO, Topsham, Maine, 2014

40-Hour HAZWOPER Certification, Topsham, Maine, 2014

OSHA 10-Hour Construction Certification, ClickSafety, Topsham, Maine, 2012

MEMBERSHIPS

Secretary/Treasurer, 2014-2019, The Wildlife Society, Maine

PROJECT EXPERIENCE

NATURAL RESOURCE SERVICES

Hand Analysis of Acoustic Bat Data | Topsham, Maine

Over ten years of experience conducting analysis of bat detector data to determine species of bats for multiple project sites in eastern United States and Canada. Analysis results were then provided to clients to assist with their project planning and permit applications in compliance with applicable local, state, and federal natural resource regulations.

Automated Program Analysis of Acoustic Bat Data | Topsham, Maine

Conducted analysis of bat detector data using Kaleidoscope, BCID, and Sonabat software to determine species of bats for multiple project sites for both passive acoustic bat surveys and presence/absence acoustic bat surveys targetting northern long-eared bat (*Myotis septentrionalis*) and Indiana bat (*Myotis sodalis*). Analysis results were provided to clients to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Solar and Infrastructure Update Projects | Vermont | Project Manager

Wrote the proposals and was Project Manager for proposed projects requiring northern long-eared bat surveys. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Post-construction Avian Fatality Monitoring at a Developed Wind Project | New Hampshire | Project Manager

Project Manager of the post-construction monitoring survey conducted at a developed wind project in New Hampshire. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client and applicable state and federal natural resource agencies to assist with the compliance of the permit.

Ichthyoplankton Sampling | Field Technician

Assisted in ichtyoplankton field sampling to characterize the marine egg and larvae community present and potentially susceptible to impingement and entrainment at the cooling water intake structure of a facility withdrawing cooling water from Penobscot Bay, in support of the Clean Water Act 316(b) for a confidential client. The results of the sampling will be included in 316b report and would be used to inform the design of the impingement control system to be eventually installed.

Proposed Wind Project | Maine | Project Manager

Project Manager for proposed wind project requiring pre-construction avian and wildlife surveys. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Wind Projects | Maine | Task Manager

Responsible for the staffing and scheduling of field surveys including visual raptor surveys, eagle point count surveys, breeding bird surveys, and acoustic bat surveys. Also responsible for task managing the completion of sections of the final reports to be delivered to clients to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Orangeville, Marsh Hill, and Sheldon Wind Projects, Post-Construction Monitoring | Western New York | Technician Supervisor

Supervised four post-construction monitoring technicians. Responsible for timecard and expense approval, tracking completion of safety trainings, and communicating with staff about needs while in the field.

Proposed Wind Project, Down East Maine

Conducted pre-construction wind project development surveys and impact assessments for a proposed wind project in Maine. These assessments included raptor surveys, eagle point count surveys, acoustic bat surveys, nocturnal radar surveys, and breeding bird surveys. Analyzed and reported on data for reporting purposes related to impact assessment and permitting efforts.

Agency Meeting and Site Visit for Proposed Wind Project, Down East Maine

Attended a pre-application agency consultation meeting for a proposed wind project in Down East Maine. Attended a site visit at proposed project area with client and agency representatives. Provided information on pre-construction wildlife field surveys conducted by Stantec at proposed wind project.

Rollins Wind Project Invasive Species Monitoring | Lincoln, Maine

Conducted invasive species surveys along a recently constructed transmission line right-of-way according to the standards and methods developed in the Invasive Species Management Plan.

Schedule Coordinator | Topsham, Maine

Proposed Linear Project | New Brunswick, Canada

Conducted surveys for rare, threatened, and endangered species of plants and wildlife, assessments of existing wildlife habitat values, and mapping of wetland and stream resources.

Proposed Wind Project, Western New York

Conducted eagle point count surveys to determine eagle locations and behavior in relation to proposed wind turbines. Assisted in survey design, mapping, and implementation. Preformed quality assurance and control on data to inform potential collision risk of eagles as a result of the project.

Bull Hill Wind Farm Post-Construction Monitoring, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras. Responsible for searcher efficiency trials, which involved the placement and monitoring of carcass retrieval by other surveyors.

Groton Wind Farm, Raptor Surveys, Breeding Bird Surveys, Nocturnal Migrant Radar Surveys | Grafton County, New Hampshire | Task Manager

Responsible for the staffing and scheduling of field surveys. Also responsible for task managing the completion of sections of the final report to be delivered to the client. Conducted raptor, breeding bird, and nocturnal migrant radar surveys.. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Record Hill Wind Farm Raptor Surveys, Roxbury, Maine

Conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Rollins Wind Farm Post-Construction Mortality Monitoring and Raptor Surveys, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Evaluated as having high searcher efficiency scores for the on-the-ground trials. Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras. Also conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Proposed Wind Project Bird and Bat Surveys, Coye Hill, Connecticut

Conducted pre-construction wind project development surveys and impact assessments for a proposed wind project in Connecticut. These assessments included raptor surveys, acoustic bat surveys, and breeding bird surveys.

Eastern Box Turtle Protection Plan and Construction, Brewster, Massachusetts

Conducted regular fence inspection in accordance with and NHESP-approved Eastern Box Turtle Protection Plan designed to protect box turtles in compliance with MESA during construction of a pump station development project. Responsible for documenting the presence of any box turtles in the vicinity of the fencing and reporting deficiencies in the fencing to appropriate personnel.

Stetson I and II Wind Farms Post-Construction Monitoring, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Evaluated as having high searcher efficiency scores for the on-the-ground trials. Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras.

Oakfield Wind Project Avian Studies | Maine

Conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Ecological Characterizations | Coos County, New Hampshire

Conducted surveys for rare, threatened, and endangered species of plants and wildlife, assessments of existing wildlife habitat values, and mapping of wetland and stream resources in a remote area of New Hampshire.

Data Manager | Topsham, Maine

Responsible for managing data related to bird and bat studies conducted by the office. Responsible for the retrieval, and placement of data to assist in effective report writing and limiting of possible liability.

Wind Project | Eastern Maine

Project scientist responsible for organization, progress, and safety of field staff through the field work phase (wetland delineations, vernal pool surveys, and other natural resource mapping) of large-scale wind power development. Responsible for data management and associated reporting of findings to accompany state and federal permit applications.

Beech Hill Wind Project | Aroostook County, Maine

Assisted in wetland delineations, vernal pool surveys, and Global Positioning System surveys for a proposed 34-turbine wind project and associated 67-mile transmission line. Identified streams and Wetlands of Special Significance based on the criteria in the Maine Department of Environmental Protection's Natural Resource Protection Act. Characterized wetland and waterbody resources based the U.S. Fish and Wildlife Service Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et. al 1979). Documented the biological and physical characteristics of potential vernal pool habitat based on the criteria of the Maine Department of Inland Fisheries and Wildlife.

Proposed Wind Project | Northern California

Analyzed crepuscular radar data targeting federally threatened and state endangered marbled murrelets (*Brachyramphus marmoratus)* and reviewed and managed acoustic bat survey data for reporting purposes related to impact assessment and permitting efforts.

Proposed Wind Project | Central Maine

Conducted wetland delineations, vernal pool surveys, and Global Positioning System surveys over an area totaling approximately 6,800 acres for a proposed 55-turbine wind project in Central Maine. Determined wetland boundaries using the technical criteria described in the U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987). Identified streams and Wetlands of Special Significance based on the criteria in the Maine Department of Environmental Protection's Natural Resource Protection Act. Characterized wetland and waterbody resources based the U.S. Fish and Wildlife Service Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et. al 1979). Documented the biological and physical characteristics of potential vernal pool habitat based on the criteria of the Maine Department of Inland Fisheries and Wildlife.

Block Island Wind Farm, Offshore | Rhode Island

Conducted analysis of bat detector data using Kaleidoscope software and provided quality review of bat call determinations by the software to determine species of bats. Analysis results were provided to the client to assist with the project’s compliance of applicable state and federal natural resource regulations.

Natural Resource Advisory Role in Oil Spill Response | Large Interstate Oil Spill in Gulf of Mexico | 2010-present | Natural Resource Advisor

Natural Resource Advisor (NRA) conducting environmental oversight of oil spill cleanup activities in compliance with an emergency consultation under Section 7 of the Endangered Species Act. NRAs worked directly with operational cleanup crews to implement Best Management Practices (BMPs). These BMPs served as the formal technical guidance issued under the emergency consultation. The objective of this work was to minimize secondary impacts of the cleanup activities on protected resources, including sea turtles, migratory and nesting shorebirds, beach mice, mangrove wetlands, estuaries, coastal wetlands, and dune systems. Implemented BMPs and conducted surveys for piping plover and sea turtles within designated critical habitats. Conducted training and oversight of cleanup crews and prepared daily reports documenting NRA activities. Worked closely with cleanup operations to provide education on BMPs and documenting daily compliance for use in USFWS consultation process and evaluation of secondary impacts to protected resources as part of the Natural Resources Damage Assessment (NRDA).

Proposed Wind Project, Offshore | Northeast and Mid-Atlantic US

Conducted analysis of bat detector data using Kaleidoscope software and provided quality review of bat call determinations by the software to determine species of bats. Analysis results were provided to the client to assist with planning and permit applications in compliance with applicable state and federal natural resource regulations.

Trevor Peterson PhD

Project Manager, Senior Wildlife Biologist
26 years of experience · Topsham, Maine

Dr. Peterson is a senior wildlife biologist and project manager specializing in renewable energy projects, bird and bat migration, and rare species assessments. He focuses on solutions to quantify and manage turbine-related wildlife impacts at terrestrial and offshore commercial wind projects. Since joining the company in 2003, Trevor's project experience has included a wide range of wide range of wildlife surveys at proposed and existing wind projects, rare bat surveys, breeding bird surveys, raptor surveys, nocturnal radar surveys, vernal pool water quality and ecological monitoring, rare turtle telemetry and demographic studies, natural community characterization, and vegetation monitoring. He earned his PhD in Ecology and Environmental Sciences from the University of Maine for his research on the use of long-term acoustic bat data to study bat migration and predict and manage potential impacts from land-based and offshore wind projects. Before working at Stantec, Trevor worked seasonally for the National Park Service at Acadia National Park and Isle Royale National Park and as an island caretaker for the Maine Island Trail Association. Dr. Peterson serves as Stantec's technical lead for acoustic bat surveys, responsible for updating equipment, survey methods, and data analysis/reporting methods.

EDUCATION

AB, Biology/Environmental Studies, Summa cum Laude, Phi Beta Kappa, Bowdoin College, Brunswick, Maine, US, 2002

Semester Program in Costa Rica, Tropical Field Biology, Environmental Studies, and Spanish, Duke University, Durham, North Carolina, US, 2000

PhD Ecology and Environmental Sciences , University of Maine, Orono, ME, 2020

CERTIFICATIONS & TRAINING

Habitat Conservation Plan Training, US Fish and Wildlife Service National Conservation Training Center, Shepherdstown, WV, United States, 2010

MEMBERSHIPS

Member, Northeast Regional Migration Monitoring Network

Member, Northeast Bat Working Group

Member, The Wildlife Society, Maine, May 2011-present

PROJECT EXPERIENCE

RENEWABLE ENERGY, OFFSHORE

Tracking Bats using Nanotag Telemetry in the Gulf of Maine

Senior Biologist and Project Manager. Developed and implemented survey techniques to track bats along the Maine coast using nanotag technology. Constructed and installed 5 telemetry receivers along the coast to supplement an existing network of monitoring stations. Project was funded by Stantec and supported by federal, state, academic, and NGO partners.

Regional Offshore Acoustic Bat Monitoring | Gulf of Maine, mid-Atlantic, Great lakes

Senior Biologist and Project Manager. Developed and implemented survey techniques and data analysis for long-term (2009–2014) acoustic bat monitoring in the Gulf of Maine, mid-Atlantic, and Great Lakes. Surveys included long-term monitoring at over 40 locations including remote islands, offshore weather buoys, ships, and coastal sites. Project was funded by Stantec, the US Department of Energy, and supported by federal, state, academic, and NGO partners.

RENEWABLE ENERGY

Activity-based Informed Curtailment: Using Acoustics to Design and Validate Smart Curtailment at Wind Farms | US Department of Energy | 2019 - 2022 | Prinicipal Investigator

Dr. Peterson serves as the principal investigator for this multi-year study of the use of acoustic bat data recorded at wind turbines to design and evaluate activity-based informed curtailment alternatives designed to manage risk to bats with minimal loss of renewable energy generation.

Avian and Bat Surveys at New Creek Wind Energy Project | Grant County, West Virginia

Project Manager, Field Supervisor, Expert Witness. Managed pre-construction agency consultation and bird and bat surveys, and coordinated field efforts, including breeding bird surveys, raptor surveys, bat mist-netting surveys, bat telemetry surveys, acoustic bat surveys, carcass monitoring, and curtailment studies. Managed post-construction fatality monitoring and nacelle-height acoustic monitoring to design activity-based informed curtailment programs to reduce impacts to bats.

Avian and Bat Surveys at Laurel Mountain Wind Energy Project | AES | Randolph and Barbour Counties, West Virginia

Project Manager, Field Supervisor, Expert Witness. Conducted bird and bat field surveys within proposed wind project. Coordinated pre-construction and post-construction field efforts, including breeding bird surveys, raptor surveys, bat mist-netting surveys, acoustic bat surveys, carcass monitoring, and curtailment studies. Managed correspondence between the developer, operator, and state and federal wildlife agencies. Prepared survey reports, avian bird and bat risk assessment, testimony, and a site-specific Avian and Bat Protection Plan.

Pre-construction Avian and Bat Surveys at Proposed Wind Energy Project | Texas

Project Manager and Field Supervisor. Developed an innovative work scope to conduct a variety of field surveys focusing on assessing potential impacts to Mexican free-tailed bats and managed a variety of field surveys including nocturnal radar surveys, NEXRAD data analysis, acoustic bat monitoring, and visual night-vision surveys. Mr. Peterson also coordinated discussions between project developers, state wildlife agencies, and non-profit groups.

Avian and Bat Surveys at Armenia Mountain Wind Energy Project | AES | Tioga and Bradford Counties, Pennsylvania

Project Manager and Field Supervisor. Conducted bird and bat field surveys within proposed wind project. Coordinated field efforts, including breeding bird surveys, raptor surveys, bat mist-netting surveys, and acoustic bat surveys. Managed correspondence between the developer and state and federal wildlife agencies. Prepared survey reports and a site-specific bird and bat risk assessment for the project. Managed two years of post-construction monitoring according to Pennsylvania Game Commission protocols.

Post-construction Avian and Bat Mortality Monitoring at Forward and Lookout Wind Projects | Edison-Mission Energy | Somerset County, Pennsylvania

Project Manager and Field Supervisor. As the Project Manager for post-construction bird and bat mortality surveys at two of the first operational wind projects to participate in Pennsylvania's Voluntary Cooperative Wind Energy agreement, Mr. Peterson developed survey work scopes, and coordinated fieldwork for multiple years of monitoring, including daily mortality surveys, acoustic bat surveys, and diurnal raptor surveys. Mr. Peterson also coordinated project-related agency communications with state and federal wildlife agencies.

NATURAL RESOURCE SERVICES

Acoustic Bat Surveys: Proposed Road Corridors | Tennessee Department of Transportation | Tennessee

Technical and Field Supervisor. Conducted acoustic bat surveys in a variety of habitats within 67-kilometer long segments of multiple potential highway corridors within a National Forest for the Tennessee Department of Transportation. Completed data analysis and prepared survey reports.

Indiana Bat and Rare Bird Surveys at Proposed Wind Energy Project | Jefferson and Oswego Counties, New York

Project Manager and Field Supervisor. Coordinated multiple years of habitat evaluations, acoustic bat surveys, and radio telemetry surveys for Indiana bats at a proposed wind project in northwestern New York. Mr. Peterson also coordinated and conducted field surveys for breeding birds and rare birds within the area.

PUBLICATIONS & WHITEPAPERS

Peterson, T.. *Predicting and managing risk to bats at commercial wind farms using acoustics. A dissertation submitted in partial fulfillment of the requirements for the degree of doctor of philosophy, University of Maine.*, 2020.

Peterson, T.S., A. Uesugi, and J. Lichter. Tree recruitment limitation by introduced snowshoe hares, Lepus americanus, on Kent Island, New Brunswick. *Canadian Field Naturalist 119 (4). 569-572*, 2005.

Peterson, T.S., B. Mcgill, C.D. Hein, and A. Rusk. Acoustic exposure to turbine operation quantifies risk to bats at commercial wind energy facilities. . *Wildlife Society Bulletin*, 2021, pp. 552-565.

Johnson, J.S., J.D. Kiser, K.S. Watrous, and T.S. Peterson. Day-roosts of Myotis leibii in the Appalachian Ridge and Valley of West Virginia. *Northeastern Naturalist 18 (1): 95-106.*, 2011.

Peterson, T.S., S.K. Pelletier and M. Giovanni. Long-term bat monitoring on islands, offshore structures, and coastal Sites in the Gulf of Maine, mid-Atlantic, and Great Lakes - final report. *Prepared for the US Department of Energy*, 2016.

Peterson, T.S., S.K. Pelletier, S.A. Boyden, and K.S. Watrous. Offshore acoustic monitoring of bats in the Gulf of Maine. *Northeastern Naturalist 21(1): 86-107*, 2014.

JEFFREY J. DORIS
Senior Project Manager

KEY AREAS OF PRACTICE

Air Quality Engineering and Permitting

Solid Waste Engineering and Permitting

Groundwater Engineering and Modeling

EDUCATION

M.S., Civil & Environmental Engineering, University of Vermont, 2006

B.S., Chemical Engineering, University of Kansas, 1996

SANBORN HEAD

Since 2005

Jeffrey is a senior project manager specializing in air permitting and air permit compliance reporting, in particular for municipal solid waste landfills including emissions reporting for Federal Greenhouse Gas. He has professional experience modeling groundwater flow and transport with MODFLOW, and modeling air pollutant dispersion with USEPA's AERMOD. Several of his permitting projects have involved beneficial use to convert landfill gas to energy in generator engines or in Renewable Natural Gas (RNG) facilities that increase the methane content of the gas to pipeline quality. Jeff has worked closely with State air permitting agencies in Vermont, Maine, and Massachusetts. He has also helped with subsurface remediation projects for industrial clients in the United States and abroad. Prior to working in environmental consulting with Sanborn Head, he worked in the field of engineering and environmental research.

RELEVANT EXPERIENCE

King County Solid Waste Division Cedar Hills Regional Landfill, Maple Valley, WA

Assisted with gas collection system design and air permitting including preparation of landfill gas projections and emissions estimates for a landfill expansion.

Chaffee County Landfill, Chaffee County, CO

Assisted with air compliance reporting for Chaffee County Landfill in Colorado, including preparation of a Tier 2 sampling protocol for a site without a gas collection system.

Mineral County Landfill, Mineral County, CO

Assisted with air compliance reporting for Mineral County Landfill in Colorado, including a design capacity report following commencement of construction of a landfill expansion.

Brunswick Anaerobic Digester Facility, Brunswick, ME

Prepared an air permit application for an expansion of the anaerobic digester facility in Brunswick, Maine, including a new combined heat and power engine and a new renewable natural gas (RNG) filtration process.

Solid Waste Greenhouse Gas Emissions Study, Northeast Region

On behalf of Casella, prepared a study of greenhouse gas (GHG) emissions as reported by facilities to EPA to compare GHG emissions from landfills and solid waste combustors in the Northeastern States to help State agencies plan solid waste management hierarchies.

Waste Management's Middleborough Landfill, Landfill Air Services, Middleborough, MA

Has provided air permit compliance support including preparation of a spreadsheet to track monthly and 12-month rolling emissions. For State reporting, has prepared annual greenhouse gas reports and Source Registration Emission Statements, which are due every three years.

Archaea Energy, Juniper Ridge Landfill, RNG Air Permitting, Old Town, ME

Submitted a successful New Source Review (NSR) air license application for a Renewable Natural Gas (RNG) project to use methane generated in the landfill in the

natural gas pipeline. The project includes engine generators to power the process and a thermal oxidizer to combust waste gas.

Casella's NEWSVT Landfill and Washington Electric Cooperative, Coventry, VT

Has performed air permitting and reporting for the site since 2005, including air permit applications for each landfill expansion and for the renewable energy project at the site with five landfill gas-to-energy (LFGTE) engines generating up to eight megawatts of electricity distributed on the electrical grid. Has performed AERMOD air pollutant dispersion modeling for the permit applications. Reporting for the site includes semi-annual reports on the gas collection and control system and annual emissions inventories. Helped the site transfer to the updated New Source Performance Standards for MSW Landfills.

Casella's Juniper Ridge Landfill, Old Town, ME

Has performed air licensing and reporting for the site since 2005, including submittal of New Source Review (NSR) air license applications and Part 70 Major Source Operating Permit applications including Best Available Control Technology (BACT) analysis for hydrogen sulfide (H2S) removal technologies to reduce sulfur dioxide (SO2) emissions. Has provided annual submittals including air emissions reporting (iSTEPS, MAIRIS, and CAERS), Part 70 (Title V) reporting, EPA greenhouse gas reporting, NSPS semiannual reporting for the gas collection and control system with Startup, Shutdown, and Malfunction reporting for the flare, and a summary of the wellfield data. Has prepared Air Pollutant Dispersion Modeling for air licensing using USEPA's AERMOD program. Helped the site transfer to the updated New Source Performance Standards for MSW Landfills.

Waste Management's Fitchburg Landfill, Westminster, MA

Performed air permitting and reporting at the site including Air Quality Plan Approval and Title V Air Quality Operating Permit applications for the flare and the landfill gas-to-energy facility. Designed and implemented an automated spreadsheet program to track monthly emissions and permit compliance. Provided annual Massachusetts Greenhouse Gas Reporting, Annual Massachusetts Source Registration Emission Statements, Annual non-methane organic compounds (NMOC) emission reports, Title V Air Operating Permit Semiannual and Annual Reporting, and Compliance Certifications. Prepared Air Pollutant Dispersion Modeling for air permitting using USEPA's AERMOD program.

Casella's Pine Tree Landfill, Hampden, ME

Submitted New Source Review (NSR) permit applications, Part 70 Major Source Operating Permit applications and annual emissions inventories for the landfill. Assisted with design, operation, and reporting for the Thiopaq® sulfur removal used to reduce SO2 emissions. Provided annual NMOC emission reports, Part 70 (Title V) Reporting, and EPA Greenhouse Gas Reporting. Prepared Air Pollutant Dispersion Modeling for air permitting using USEPA's AERMOD program.

City of Bath Landfill, Bath, ME

Submitted air permit applications for the landfill gas combustion flare and reports for landfill gas sampling. Provided annual federal greenhouse gas reporting. Assisted with landfill gas operations and safety training.

Landfill Air Permitting, NH

Assisted intermittently on landfill air permitting projects in New Hampshire since starting for Sanborn Head in 2005, including; Casella's North Country Environmental Services, Inc. (NCES) Landfill, the City of Lebanon, New Hampshire Municipal Landfill,

where a gas collection and flaring system began operating in January 2015, the City of Nashua Four Hills Landfill, and the NextEra LFG-to-energy facility at Four Hills Landfill.

Waste Management's Barre Landfill, Barre, MA

Assisted with monthly compliance tracking and air emissions reporting for the Barre Landfill in Barre, Massachusetts, including; annual Massachusetts Greenhouse Gas Reporting, Triennial Massachusetts Source Registration Emission Statement, Data processing for Annual Federal Greenhouse Gas Reporting, and annual flare inspections.

Southbridge Recycling & Disposal Park, Southbridge, MA

Has provided air permitting and reporting services since 2014, including air permitting for the LFG-to-energy engine and the flare system. Provided annual NMOC emission reports, Massachusetts Greenhouse Gas Reports, Massachusetts Source Registration Emission Statements, Federal Greenhouse Gas Reports, and annual reporting to the Department of Energy (DOE) Energy Information Administration (EIA). Helped the site transfer to the updated New Source Performance Standards for MSW Landfills.

Waste Management's Taunton Landfill, Taunton, MA

Provided annual Massachusetts Greenhouse Gas Report, Massachusetts Source Registration Emission Statements, Title V Air Operating Permit Semiannual and Annual Reporting and Compliance Certifications; and Data processing for Annual Federal Greenhouse Gas Reporting.

Waste Management's Granby Landfill, Granby, MA

Provided annual Massachusetts Greenhouse Gas Reports, Massachusetts Source Registration Emission Statements, Title V Air Operating Permit Semiannual and Annual Reporting and Compliance Certifications; and Data processing for Annual Federal Greenhouse Gas Reporting.

Republic Landfills, MA

Developed reporting templates and prepared the initial source registrations and semiannual reports that were submitted by Sanborn Head.

Waste Management's Crossroads Landfill, Norridgewock, ME

Has worked on air licensing for the Crossroads Landfill in Norridgewock, Maine since 2008, including an application for a landfill gas-to-energy facility generating 4.0 megawatts, which was approved by Maine DEP in July 2008, an application for a biosolids processing facility (sludge dryer), which was approved by Maine DEP in November 2023, and an application for a new flare, which was approved by Maine DEP in March 2024. Also assists with surface emissions monitoring (SEM) and SEM reporting.

Maine Energy Recovery Company, Biddeford, ME

Project manager responsible for preparation of a Chapter 115 Air License Modification Application including a BACT Analysis for VOC treatment options for the refuse-derived-fuel generating facility.

Cullman Environmental Waste Management Center, Dodge City, AL

Project Manager responsible for assessing the potential gas collection rates from a landfill for a prospective carbon offsets project. Prepared design documents to be used to construct a gas collection and control system at the landfill to reduce the uncontrolled emissions of methane.

Omya Inc., Florence, VT

Performed groundwater flow and transport modeling of dissolved organic constituents from an industrial process using Visual MODFLOW™ and MT3D99™. Supported with analytical modeling and including a sensitivity analysis to assess potential ranges of groundwater transport distances.

Industrial Field Services, France

Performed field services for groundwater and subsurface remediation projects in France during 2007 in Montpellier, during 2009 near Rouen, and during 2012 in Colmar.

PRESENTATIONS/PUBLICATIONS

Doris, J.J., "Comparing Greenhouse Gas Emissions from Landfills and Waste-to-Energy Combustors", Colorado SWANA 2021 Annual Conference, Boulder, CO, November 2021.

Teal, L.C. and Doris, J.J., "Renewable Natural Gas and the Implications for Waste Management Hierarchies," Air & Waste Management Association EM Magazine, June 2021.

Doris, J.J. and King, T.M., "Agreement to Supply Landfill Gas to the University of Maine," Solid Waste Association of North America Annual Landfill Gas Symposium, Las Vegas, NV, 2013.

Doris, J.J., "Air Dispersion Modeling for Low-Level Air Toxic Emissions from Landfills," Federation of New York Solid Waste Associations Spring Conference, Bolton Landing, NY, 2012.

Besaw, L.E., Rizzo, D.M., Kline, M., Underwood, K.L., Doris, J.J., Morrissey, L.A., Pelletier, K., "Stream classification using hierarchical artificial neural networks: A fluvial hazard management tool," Journal of Hydrology, Volume 373, Issues 1-2, pp. 34-43, June 30, 2009.

Doris, J.J., Rizzo, D.M., Dewoolkar, M., "Forecasting vertical ground surface movement from shrinking/swelling soils with artificial neural networks," International Journal for Numerical and Analytical Methods in Geomechanics, Vol. 32, Issue 10, pp. 1229-1245, Oct. 29, 2007.

Rizzo, D.M., Li, Z., Hayden, N.J., Wei, X., Pinder, G.F., Doris, J.J., Rossman, A., "Modeling Contaminant Transport in a Large-Scale Groundwater Tank with Media Heterogeneity," Eos Trans. AGU, 87(52), Fall Meet. Suppl., Abstract H21C-1392, 2006.

Doris, J.J., Underwood, K.L., Rizzo, D.M., "A Watershed Classification System Using Hierarchical Artificial Neural Networks for Diagnosing Watershed Impairment at Multiple Scales," ASCE Conf. Proc. 138, 317, 2004.

Juniper Ridge Landfill
Gap Assessment - Summary of Observations, Findings, and Recommendations
January 2025

Prepared For:
State of Maine Bureau of General Services – Juniper Ridge Landfill
2828 Bennoch Road
Alton, Maine 04468

Prepared By:
Blue Ridge Services Montana, Inc.
PO Box 1945
Hamilton, MT 59840
BlueRidgeServices.com

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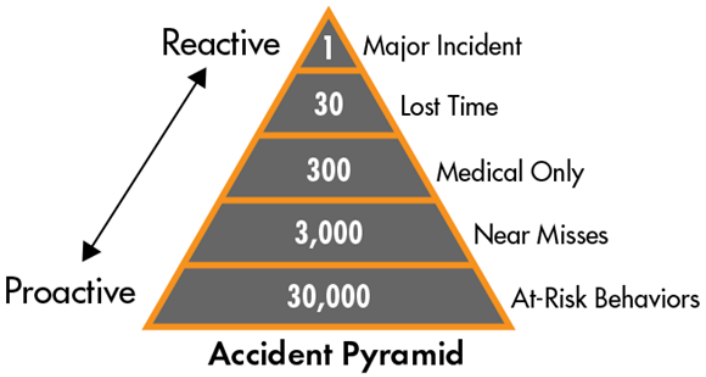
INTRODUCTION & APPROACH

Blue Ridge Services Montana, Inc. (BRS) was contracted by the State of Maine Bureau of General Services (State) to perform a Gap Assessment of the Juniper Ridge Landfill (JRL) which is operated under an operator service agreement with Casella Waste Systems, Inc. (CWS)

This Gap Assessment was intended to identify high priority areas within current operations where safety and operational improvements are necessary. A Gap Assessment provides an opportunity to proactively assess health and safety conditions before any existing hazards develop into major incidents. According to the Heinrich model (see image), if seemingly minor incidents and safety risks are left uncorrected, they can eventually lead to major injuries and even fatalities. While the numbers associated with each level of the pyramid will vary, BRS's goal was to aid JRL in identifying and controlling even minor operational risks – which will result in a reduced potential for major injuries, liability, and expenses in the future.



This Gap Assessment was not intended to be a regulatory compliance or safety audit nor a comprehensive operational review. Gap Assessment findings and recommendations are primarily based on the BRS team's decades of experience working with hundreds of solid waste operations, solid waste industry standards, and best management practices.

Basic site-specific information was requested and gathered through a questionnaire and several data requests. An on-site assessment was conducted by BRS Operations Consultant Jason Todaro in October 2024. An online, initial presentation of findings and recommendations was provided to State staff January 2025.

The following report summarizes the high priority observations, findings and recommendations developed over the course of this project.

GAP ASSESSMENT OBSERVATIONS, FINDINGS AND RECOMENDATIONS

Facility Overview

Observations & Findings

In comparison to similar sized landfills, we found the JRL to be thoughtfully configured, well-engineered, maintained, and operated. During our assessment of the JRL, we noted the following examples that met or exceeded industry standards.

- The landfill entrance, scale area and support buildings appeared to be well maintained, functioned as intended and presented a positive image.
- The paved and unpaved access roads were in sound condition which allowed customers to safely and efficiently access the facility in all weather conditions.

- The primary landfill heavy equipment fleet was modern, appeared to be in sound condition and was maintained well.
- The redundant heavy equipment within the fleet minimized operational service disruptions.
- The landfill heavy equipment operators appeared to be skilled and capable of performing their respective tasks.
- Use of waste derived and spray-on (foam) alternative daily cover (ADC).
- landfill airspace utilization performance exceeded the industry standard.
- Effective site grading and stormwater management.
- Investment in capital improvement projects.

Capital Improvements

Observations & Findings

Through observations and discussions with CWS, we learned of the following capital improvement projects that have been executed at the JRL.

- Significant gas collection network, gas plant, and gas distribution tie in
- Landfill final cover (capping) project
- Landfill liner development project
- Geosynthetic intermediate cover

These investments all provide significant environmental protection to the surrounding community and ensure the landfill is operated in a compliant manner. The planning engineering and execution of these investments appeared to be in line with other similar projects we have observed throughout the Country.

Landfill Airspace Utilization

Observations and Findings

Airspace is the landfill's primary resource, however there are significant costs related to producing each cubic yard of lined airspace. The following benefits can be achieved by utilizing landfill airspace efficiently:

- Prolong the overall life of the landfill and each individual phase.
- Ability to postpone costly future liner and final cover projects.
- Increased revenue per cubic yard of airspace filled.

Throughout the industry, landfill airspace utilization performance is measured in a variety of ways, most notably as an airspace utilization factor (AUF). An AUF is calculated by identifying the tons of landfilled waste that goes across the scales (over a specified time frame) divided by the total cubic yards of airspace consumed within the same timeframe.

As shown in the adjacent table, CWS provided their annual AUF's for the past five years. It is acceptable to have some variation in performance from year to year. The five-year average indicates that within this time frame an AUF of .83 tons (1,660 pounds) of waste was placed in every cubic yard of airspace at the JRL. We consider performance above .70 tons (1,400 pounds) per cubic yard to be above industry standard. This performance metric indicates that CWS has efficiently utilized the airspace resource at the JRL.

Date	AUF
June 2020	0.93
June 2021	0.76
June 2022	0.80
June 2023	0.90
May 2024	0.78
Average	0.83

Landfill Traffic Management and Spotting

Observations & Findings

While on-site, we found the paved access roads were properly constructed, were in sound condition which allowed customers to safely and efficiently access the facility in all weather conditions. The length of the paved access road allowed mud and debris to be tracked on-site rather than leaving the property and negatively impacting the surrounding community. The all-weather access roads were properly graded and constructed with plenty of rock/aggregate which also allowed customers to safely and efficiently access the facility in all weather conditions.

While on-site, we did not observe a dedicated spotter that provided direction to customers at the active tipping area. It is our understanding that commercial customers are required to have and utilize radios when on-site at the JRL. We were told that all of the communication and direction with the commercial drivers occurs solely over the radio. While on-site, we found minimal signage and directional delineation (cones, barricades, etc.) as we traveled to and approached the active tipping area.

Considering the relatively large deck that was available to tip customers, only four customers were allowed to dump at a time. This tipping configuration led to less-than-ideal delays and queues for customers waiting to dump their loads. The configuration also caused the bulldozers to use a non-traditional approach of peeling the loads perpendicular to the length of the trailer as they were being ejected from the live floor trailers. Not only was this process inefficient it created an unsafe condition with the bulldozers working too close to the customers' trailers and potentially the drivers.

Recommendations

Tipping areas are typically the busiest and most hazardous areas at any landfill. At times that is also true for the JRL, especially when considering the seasonal and daily fluctuations in customer transactions/tonnage. Given the sites average daily tonnage we recommend utilizing a dedicated spotter during peak tonnage hours. Standard Operating Procedures (SOP) should be developed for spotting customers and JRL staff should be trained and uniformly abide by these SOP.

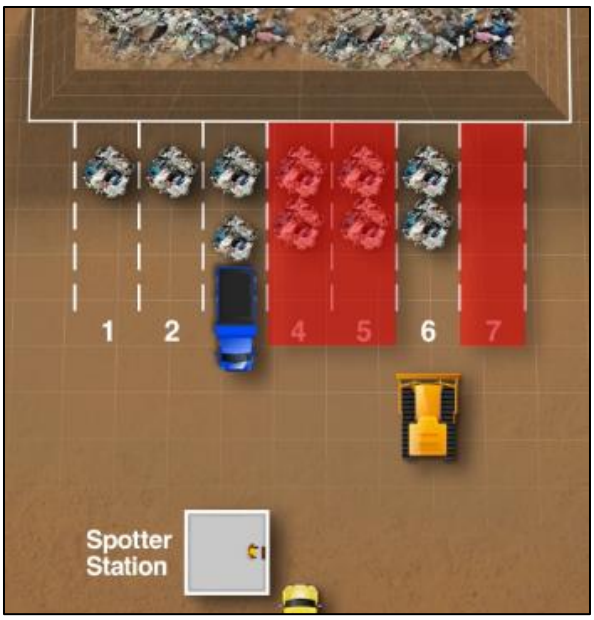
We recommend that the spotter consistently utilizes a fixed spotter station strategically positioned at the active tipping area. This spotter station could be a mobile spotter station (see example), vehicle, or concrete barriers. From the safety of the spotter station, the spotter can greet each customer, visually check loads, and provide verbal (face to face) direction. We recommend that the spotter stay in or is physically protected by the spotter station at all times, as this is the only way to truly protect them from hazards. When properly positioned, a spotter can adequately provide direction while viewing what is taking place at the tipping area.

It is important that the spotter does not assume too much liability by providing excessive direction to customers. We recommend that the spotter provide verbal direction in relation to which tipping slot the customer should utilize and occupy. For example, a spotter may direct a customer to occupy the slot "on the passenger side of the blue truck" that is currently unloading. The customers shall follow the spotters' general directions while maintaining responsibility for the safe operation of their respective vehicles. In addition to the spotter, a combination of signage and delineation (cones, barriers, large equipment tires) should be utilized to direct and communicate the JRL expectations, spacing requirements, and guidelines to customers.

In conjunction with the recommended spotter practices, during peak hourly tonnage we recommend that the JRL implement a "typewriter" tipping pattern. A typewriter pattern requires that once a row on the tipping floor is started, the adjacent tipping slots are occupied and eventually cleared by landfill heavy equipment in a consistent and logical manner (either left-to-right or right-to-left). Directing a customer to a tipping slot out of sequence is discouraged as this minimizes the predictability and intent of the pattern. Referencing historic hourly tonnage, we recommend calculating the total number of tipping slots required to accommodate historic, peak hourly tonnage at the JRL. Anticipating the appropriate amount of tipping slots will minimize customer queues and safety issues traditionally encountered during peak hourly tonnage.

The typewriter tipping pattern has many additional benefits: First it allows the drivers, spotters, and heavy equipment operators to anticipate where the next load is going to be spotted. By maintaining a minimum of a two-slot safety

buffer (approximately 40-feet), the typewriter tipping pattern allows vehicles to remain a safe distance from the heavy equipment as they clear the tipping area and integrate waste into the working face. This safety buffer also prevents heavy equipment from having to "sneak" in-between two vehicles to hastily push the loads to make room for the next inbound vehicle. The standardized pattern also allows uniform practices from one staff member to the next, minimizing confusion and inconsistent practices. The adjacent illustration provides a generic example of a typewriter tipping pattern (working right to left). The red areas illustrate the safety buffers that should always be maintained on either side of the heavy equipment and the customers' vehicles.



Implementation of a typewriter tipping pattern at the JRL could eliminate the inefficient and unsafe practice of peeling the loads perpendicular to the length of the trailer as they were being ejected from the live floor trailers. When properly implemented, a typewriter tipping pattern would safely create more tipping slots which would minimize customer queues and wait times.

Daily Waste Cell Construction

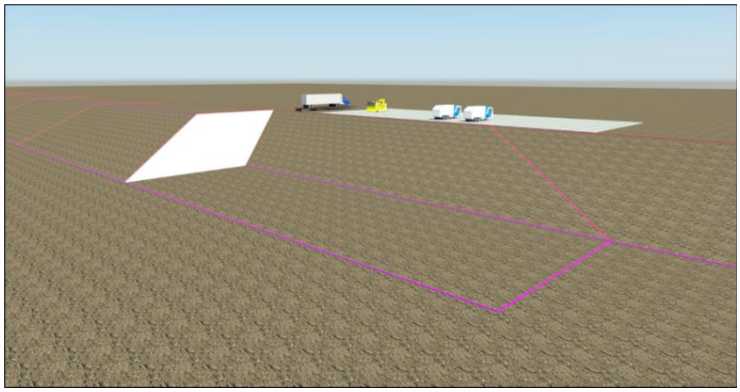
Observations & Findings

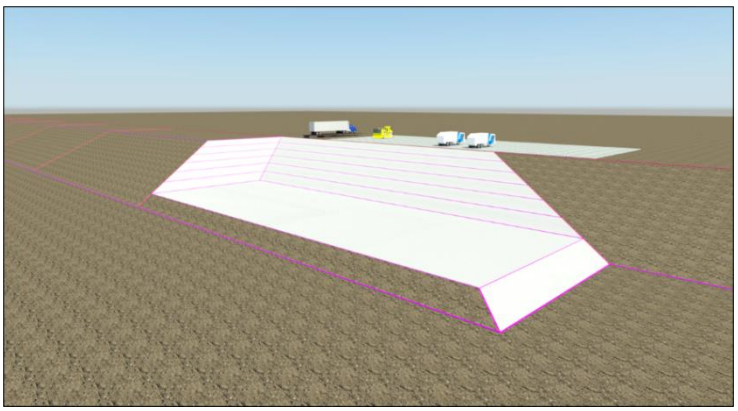
While on-site we observed a traditional advancing face, daily waste cell construction technique. It appeared that sludge was being mixed with waste by the heavy equipment on the tipping floor and deposited on the working face slope. While common in our industry, an advancing face requires compaction to take place primarily on the slope which sacrifices density (compaction). The geometry associated with an advancing face does not optimize the ratio between the daily waste volume and surface area that requires cover soil or ADC each day. As shown in the adjacent photo, it appeared that existing soil (and waste derived ADC) was not stripped or removed at the toe of the advancing face before new waste was placed and compacted. Leaving thick lenses of compacted soil (or waste derived ADC) between the lifts of waste can be a contributing factor to leachate seeps and landfill gas compartmentalization.

Recommendations

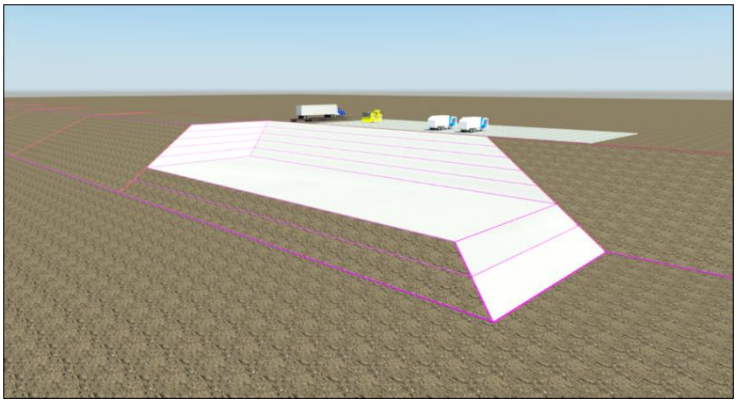
Selecting the best daily waste cell construction method can be a complex task. Many of the major factors are inter-related. For example, to minimize the use of cover soil (on each lift of waste), a very thick lift would be preferable. However, a thick lift, when combined with uphill pushing results in the heavy equipment having to work much harder. Similarly, a steep working face will minimize the surface area, but will also slow the compactor, thus resulting in decreased density. In the following paragraphs, we will present what we believe are the most significant issues related to daily waste cell construction.

The first issue is related purely to geometry, and the fact that a small daily waste cell will have a higher percentage of surface area than that of a larger weekly working face. As the working face size increases, the surface area increases as a squared function (i.e., length x width), whereas the volume increases as a cubed function (i.e., length x width x depth). So, to take maximum advantage of this economy of scale, we recommended that the JRL consider transitioning toward constructing a weekly "pancake", where each day's waste is stacked on top of the previous days. This type of cell construction is most efficient when used in conjunction with an alternative daily cover (ADC) such as a spray on or landfill tarps. A properly executed weekly pancake can increase compaction, minimize heavy equipment hours while minimizing surface area which over time will require less ADC and cover soil.

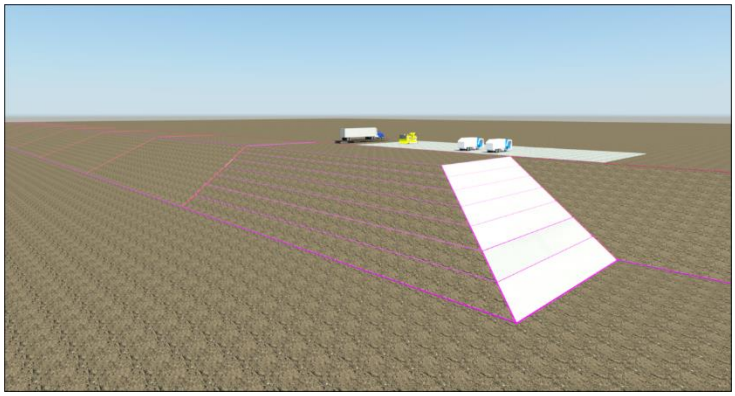




At the beginning of a new weekly pancake, all previously placed cover material (soil or waste derived ADC) on the footprint and slope below (or above) the tipping floors are stripped and stockpiled. Once the cover material has all been stripped, waste can be spread horizontally across the stripped area and compacted. Once the initial lift of waste has been spread and compacted, the compactor(s) briefly vacates the horizontal surface allowing the bulldozers to push (always pushing sludge downhill) a thin lift of sludge across the compacted waste surface. Once the bulldozers have finished pushing the sludge a lift of waste shall be spread across the sludge before the compactor(s) resumes compaction. This process eliminates the need for mixing the sludge with waste on the tipping floor, enhances density (compaction) and prevents the compactor(s) teeth from coming in contact and plugging with sludge. This process would be repeated throughout each day and each weekly pancake. At the end of the first day, the exposed waste surfaces are covered with spray on ADC (white surfaces). Only the one slope receives salvaged cover soil or other suitable cover material.



Each subsequent day, more waste (and sludge) is placed and compacted on the horizontal surface. At the end of each day spray on ADC and salvaged cover soil are utilized for cover.



Once the horizontal surface reaches the desired elevation, the horizontal surface would finally be covered with soil, and the one slope surface would be covered with spray on ADC. The next day, the entire weekly process would be repeated at the adjacent footprint. Please note: the completion of the weekly pancake does not have to occur on any specific day …or on any set time of day. It is simply completed when it reaches the desired elevation – and if it does not reach grade or is not ready to receive cover soil by the end of the day spray on ADC is reapplied. To identify the ideal weekly cell dimensions, number of tipping slots, and spray on ADC requirements for a weekly pancake, we recommend performing an optimum working face geometry assessment.

Cover Soil & ADC

Observations & Findings

It is our understanding that the JRL has little on-site cover soil and relies on a combination of C&D fines, contaminated soil, and spray on foam ADC for cover. The current cover soil practices appeared to be compliant, functioned as intended and we did not observe any deficiencies in cover integrity. In comparison to the traditional practice of using cover soil, this combination of cover materials is beneficial in terms of landfill airspace utilization.

Recommendations

As previously mentioned, it appeared that existing soil (and waste derived ADC) was not stripped or removed at the toe of the advancing face before new waste was placed and compacted throughout the day. Leaving thick lenses of compacted soil (or waste derived ADC) between the lifts of waste can be a contributing factor to leachate seeps and landfill gas compartmentalization. We recommend that CWS explore the process of removing compacted soil (or waste derived ADC) before new waste is placed and compacted throughout each day.

Heavy Equipment Fleet

Observations & Findings

Overall, the primary landfill equipment fleet was modern, appeared to be in sound condition and was well maintained. The redundancy within the fleet allowed uninterrupted services for scheduled or unplanned equipment downtime. The heavy equipment operators appeared to be skilled and capable of performing their respective tasks.

Recommendations

In comparison to the industry and respective daily landfill tonnage at the JRL, we were surprised at the decision to rely solely on smaller (D6) sized bulldozers. We recognize that this may be an operational preference, but larger (D8) sized bulldozers could be more cost effective at pushing and spreading waste than several smaller (D6) bulldozers.

While on-site, we observed the 836 compactors pushing, mixing and spreading waste and sludge. Given their specialized nature and significant owning and operating cost, we suggest allowing the compactors to focus solely on compacting and occasionally trimming waste. Optimizing the use of the compactors can increase waste density and potentially prolong the life of the landfill. Ideally, the bulldozers would be more appropriately tasked with mixing, pushing and spreading waste into the daily waste cell.

Litter Control

Observations & Findings

Excessive litter can be costly and cumbersome to clean up and can lead to issues with neighbors and regulatory compliance. While on-site, we did not observe any excessive accumulation of wind-blown litter or litter blowing off-site. It appeared that CWS relied on portable litter fences (7 sections) and some permanent litter fences to contain wind-blown litter.

Recommendations

When properly deployed, portable litter fencing can be highly effective at containing litter at the point of generation, minimizing its distribution throughout the site. When utilized, it is important that portable fences be tightly arranged, free of gaps and downwind of and as close to the active tipping area(s) as possible. In our experiences, we have found that portable litter fencing is the most crucial component of an effective litter control campaign. We recommend that CWS invest in enough portable litter fences to adequately surround the downwind portions of the active tipping areas.

As a secondary litter control measure, we recommend utilizing temporary litter fencing. When strategically placed, this type of fencing is effective at containing surface litter that has migrated beyond the portable litter fencing zone. Typically, this type of fence consists of t-posts and welded wire fencing, 4-6' high. The use of horizontal and/or vertical litter traps can be incorporated into the fence design, trapping litter, and

containing it within the fence. To be as effective as possible, this fencing needs to be periodically de-constructed and repositioned to the most effective locations. Dependent on on-site conditions and topography a series of temporary litter fences may be needed to collect and contain surface blown litter.

The permanent litter fencing should be considered the last and final layer of litter containment. The permanent fencing should capture any residual litter that has migrated beyond the portable and temporary fencing zones.

If not in place, periodic and regular maintenance and cleaning procedures should be in place for all types of litter fencing. Litter fencing is most effective when wind is allowed to flow freely through the fence, once the fence becomes saturated with litter, the dynamics of the fence change and litter could potentially be blown above or around the fence.

Dust Control

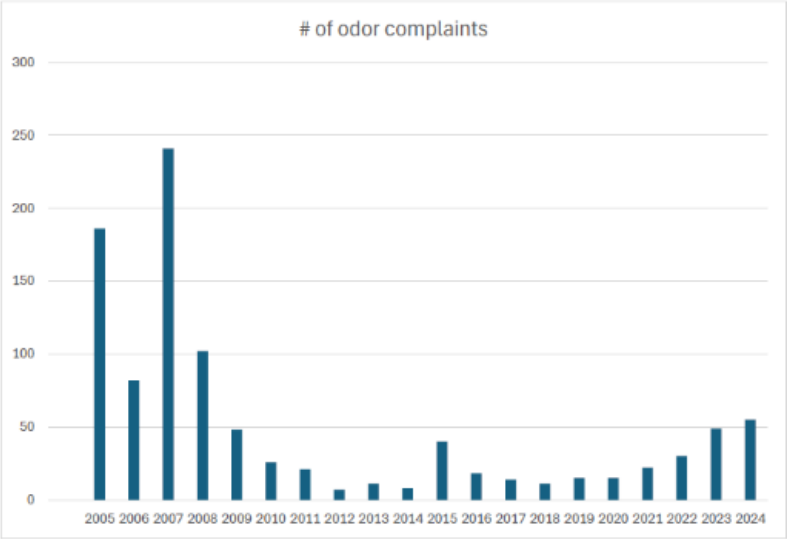
Observations & Findings

While on-site, dust control measures included frequently wetting the paved and unpaved access roads with a water wagon. Dust was further reduced by keeping the surfaces of the paved roads free of dirt and buildup. During our time on-site, we did not observe and dust issues that could potentially impact the surrounding community.

Odor Control

Observations & Findings

While on-site, we toured the surrounding community to gain a perspective of potential odor impacts to neighbors that are in close proximity to the JRL. We were told that the closest neighbor to the JRL property boundary was approximately 2,700'. The JRL has a network of detectors and a SCADA system to detect and report Hydrogen Sulfide odors near the landfill.



We were told that CWS has a 24-hour odor line where an odor complaint for the JRL can be recorded. Thes complaints are then documented in an odor complaint log and staff are available for a call back and site visit when requested. The CWS management team and Maine DEP are notified immediately when a complaint is recorded, and

CWS has weekly odor meetings discussing game plans and remedies. The adjacent table shows the odor complaints that have been logged between 2005-2024. We were told that the rise in complaints between 2019-2024 coincides with the increased disposal rate of MSW bypass and sludge. Considering the average daily tonnage and the fact that 9% of the average daily tonnage is sludge, we consider the recent number of complaints to be low. Not to be dismissive toward these complaints, but it is typical for landfills with significant odor issues to have complaints numbering in the thousands per month.

While on-site we observed and noted that some specific loads of sludge from a particular municipality smelled significantly more odorous than the other loads. We were also told that sludge is accepted during a limited schedule which ensures that it can be adequately covered each day. The current process of mixing and bulking the sludge does have the potential to generate odors.

Recommendations

We recommend that CWS investigates the odorous sludge loads to determine if there is an issue with the customers process that is contributing to the odors. If these odors loads continue to be accepted at the JRL, we recommend developing specific procedures to minimize their potential odor impacts. We also recommend that CWS explores the process of placing alternating lifts of waste and sludge using the pancake daily waste cell construction method. Based on our experience, we have found that this process doesn't aerate the sludge and generate odors as much as the current process of bulking every load of sludge with waste on the tipping floor and working face slope.

Regulatory Compliance

Observations and Findings

We requested and received a three-year history (February 18, 2022 – February 18, 2025) of regulatory areas of concern and notices of violation from the Maine Department of Environmental Protection (MDEP). It is our understanding that July 12, 2024 MDEP issued the following request for compliance.

- "Requiring a compliance schedule and framework to meet the requirements of Mandeep's interpretation of Maine law changes regarding the statutory definition of "Waste generated within the State."."

Our understanding is that this request for compliance has been resolved and there were not any other documented regulatory compliance issues within the last three years.

Safety Planning, Documentation and Training

Observations and Findings

While on-site we did not observe any safety issues and there was evidence of a safety culture that protected employees and customers. We noted the following safety measures that were in place while we were on-site.

- Personal Protective Equipment (PPE) for staff (hard hats, high-vis safety apparel, footwear)
- Strict requirement for customers to wear high-vis safety apparel when on-site
- Adequate spacing between customers at the tipping area
- Radio communications with customers

We requested, received and reviewed the following safety plans and documentation that were in place for the JRL.

- Annual safety training schedule
- 4-year history of safety training documentation
- Landfill Safety Manual
- Health and Safety Manual
- New employee safety orientation
- Accident and Injury Reporting handout
- Safe work guidelines

We found the above plans and documentation were in line with industry standard practices. The content and subject matter were relevant and indicated that safety at the JRL is prioritized by CWS.

APPENDIX F

TRAFFIC ASSESSMENT

SME
SEVEE & MAHER
ENGINEERS

Traffic Assessment
Juniper Ridge Landfill Expansion Old Town

NEWSME Landfill Operations, LLC

2828 Bennoch Road
Old Town, ME 04468

Submitted By:
Gorrill Palmer
300 Southborough Dr., Suite 200
South Portland, Maine 04106
207.772.2515

August 2025

GORRILL PALMER
An LJB Engineering Company

GORRILL PALMER
An LJB Engineering Company

300 Southborough Drive, Suite 200, South Portland, ME 04106
(207) 772-2515|GorrillPalmer.com

Traffic Assessment
Juniper Ridge Landfill Expansion
Old Town, Maine
August 5, 2025

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GORRILL PALMER
An LJB Engineering Company

Executive Summary

The following Executive Summary is prepared for the reader's convenience but is not intended to be a substitute for reading the full report.

Gorrill Palmer (GP) was retained by NEWSME Landfill Operations, LLC (NEWSME), as operator, and the State of Maine Bureau of General Services (BGS) as owner, to examine the traffic operations and impacts associated with the expansion of the Juniper Ridge Landfill (JRL). JRL is located in Old Town, ME, just west of I-95, along Route 16. Access to the facility is achieved through a paved access road that enters the site from Route 16 in Alton, Maine. The access road is approximately 2 miles in length between Route 16 and the entrance into the permitted boundary of the landfill.

The current permitted solid waste footprint at JRL is approximately 122 acres. The proposed expansion would increase this footprint to approximately 179 acres, increasing the capacity from approximately 19.35 million cubic yards (MCY), to approximately 31.25 MCY.

The intent of this assessment is to determine whether the future level of usage will be adequately accommodated by the current transportation network. This assessment determined that, current roads and intersections in the vicinity of JRL will safely and conveniently handle the level of usage associated with the expansion. In addition, it is our understanding that the internal access road has been designed to accommodate the internal flow of traffic.

Solid waste facilities are exempt from the Maine Department of Transportation's Traffic Movement Permit process. However, the Solid Waste Rules administered by the Maine Department of Environmental Protection require that the applicant submit information on the proposed truck routes serving the facility, and the related impacts.

Based on this review, our office has made the following findings and reached the following conclusions for the expansion:

1. Traffic Volumes: Traffic Volumes used for this Assessment included a combination of recent turning movement counts at the driveway and adjacent I-95 ramps and data provided by NEWSME.

2. Truck Routes: The weight limit on I-95 is 100,000 lbs for 3-axle truck tractors and tri-axle semitrailers. This allows the truck hauling material to access the site by I-95 rather than from local roads. We understand that NEWSME has a policy to encourage trucks to use I-95, which should continue through the expansion. Existing truck use is estimated to be approximately 79% via I-95 and approximately 21% using Route 16 to/from the south. This compares to 78% using I-95 and 22% using Route 16 in the previous June 2015 Traffic Assessment. Therefore, it appears there is a slight increase in the use of I-95 and a slight decrease in the use of Route 16.

3. Trip Generation: The proposed expansion expects increased disposal rates from approximately 834,363 tons in 2023 to approximately 880,000 tons per year, an increase of approximately 5 percent. This number is based on the most recent 3-year disposal tonnage average. This forecast increases trip generation as compared to 2023, by approximately 4 trip ends each for the AM & PM peak hours. Daily truck use is forecasted to increase from approximately 178 to 187 trucks per day.

4. Capacity Analysis: Based on the capacity analyses, the current and future level of usage is adequately accommodated by the existing roadway network and no improvements are necessary.

5. Lane Warrants: Based on an evaluation of the site driveway, neither left nor right turn lanes are warranted on Bennoch Road.

6. GP obtained the 2022-2024 Maine Department of Transportation (MaineDOT) crash data to determine if there are any High Crash Locations in the vicinity of the site. Based on the MaineDOT data, no locations are considered HCL's.

7. Sight lines at the existing Juniper Ridge driveway meet, or exceed, MaineDOT requirements. GP recommends that all plantings which will be located within the right-of-way not exceed three feet in height and be maintained at or below that height. Any signage planned for the site, or associated with construction, should not interfere with sight lines.

I. *Existing and Proposed Site*

The Juniper Ridge Landfill is located in Old Town, ME, just west of I-95 along Route 16. The remainder of the facility is bounded by the Alton/Old Town line and Route 43. Access to the facility is achieved through an existing paved access road that enters the site from Route 16 in Alton, Maine. The access road is approximately 2 miles in length between Route 16 and the entrance into the permitted boundary of the landfill. The Route 16 driveway and access road are expected to remain unchanged. As proposed, the project would result in an expansion from 122 acres to approximately 179 acres.

The facility received approximately 834,363 tons of material for disposal in 2023. In 2021 and 2022, 882,124 tons and 933,649 tons of material were received respectively. Based on the average of these most recent three years, JRL expects to receive approximately 880,000 tons per year during operation of the expansion.

The intent of this assessment is to determine whether the future level of usage will be adequately accommodated by the current transportation network. It should be noted that JRL has seen higher volumes than the anticipated 880,000 tons per year in 2021 and 2022, with no reported issues. It should also be noted that a new renewable natural gas facility (RNG Facility) is located on-site that will be operated by only a few employees.

II. *Background Traffic Conditions*

GP based the study on the following information:

- Crash History for 2021-2023 provided by the MaineDOT.
- Turning movement volumes collected by Tri-State Traffic Data from 6:00 AM to 9:00 AM & 2:00 PM to 5:00 PM on Tuesday June 18, 2024, at the following locations:
  - Route 16 at the site driveway
  - Route 16 at the I-95 southbound on-ramp
  - Route 16 at the I-95 northbound off-ramp
- Truck logs provided by NEWSME
- Construction vehicle count provided by Sargent Corporation

Existing Traffic Volumes

Daily Volumes

Based on 2023 monthly data furnished by NEWSME, Average Daily Truck Volumes (ADTV) at JRL are approximately 178 trucks per day (89 inbound and 89 outbound), located in Appendix B. Traffic counts completed by Tri-State Traffic Data indicate that approximately 141 trucks or 79% use I-95, while approximately 37 trucks or 21% use Route 16 to/from the south. The 2024 AADT north of Route 16 (Southgate) provided by MaineDOT is approximately 1,720 vehicles per day; thus, the trucks associated with the current site represent approximately 2.2% of the traffic on Route 16 to/from the south. This is the same % that was identified in the June 2015 Traffic Assessment.

Peak hour Seasonal Adjustment

The MaineDOT utilizes highway classifications of I, II, or III for state and local roadways. Type I roadways are defined as urban roadways, or those roads that typically see commuter traffic and experience little fluctuation from week to week throughout the year. Type II roadways, or arterial roadways, are those that see a combination of commuter and recreational traffic and therefore experience moderate fluctuations during the year. Type III roadways, or recreational roadways, are typically used for recreational purposes and experience significant seasonal fluctuation.

The roadways in the vicinity of the project are classified as Type I roadways. Typically, traffic volumes used in studies such as this are adjusted to reflect the 30th highest hour of traffic volumes in accordance with MaineDOT guidelines. Since traffic volumes were collected in the middle of June, this already represents the peak summer conditions and therefore no seasonal adjustment was needed. This procedure has been employed in previous traffic impact studies reviewed and accepted by MaineDOT.

It should be noted that Sargent Corporation provided information that 139 dump trucks and 26 vehicles visited the site the day the counts were completed. For the purposes of this evaluation, 10% of the 165 work vehicles (17 vehicles) were subtracted from each of the AM & PM peak hours proportionate to the entering and exiting vehicle volumes.

Annual Growth

The 2024 roadway volumes collected in June were increased by 0.5% per year to 2040 to account for yearly background growth on the adjacent street to the projected life span of the project. Growth rate for this area was provided by MaineDOT. The raw volumes shown on Figure 2 of Appendix A were balanced (Figure 3) and adjusted annually to 2040 to arrive at the "2040 Predevelopment" shown on Figure 4.

Other Development

GP contacted David Russell, the Code Enforcement Office for Old Town, to determine whether there are any projects in the vicinity, approved or in the approval process, whose traffic should be added to this project's predevelopment volumes. Based on this communication, it was determined that there are no other projects planned that would have a significant impact on the project area.

III. *Major Truck Routes*

Federal law for gross vehicle weight on I-95 in Maine is 100,000 pounds. Because the trucks to/from the site do not exceed this weight, the trucks can utilize I-95 via Exit 199, followed by a short, approximately 0.25-mile section of Route 16 to the site access road entrance. As identified in a previous section, approximately 79% of site trucks are estimated to use I-95, and approximately 21% of the site trucks are estimated to use Route 16 to/from the south. Minimal, if any, site truck traffic is estimated to use Route 16 to the north.

We understand that NEWSME has a policy to advise trucks to use I-95, which should continue through the expansion.

IV. *Trip Generation*

Typically, trip generation calculations are performed using the rates published in the Institute of Transportation Engineers publication, *Trip Generation*, 11th Edition. However, as "landfill" is not a listed land use in that publication, our trip generation is based on the following sources of information:

- Turning movement counts completed at the site driveway on Tuesday, June 18, 2024.
- Truck logs provided by others for 2023
- Increase in forecast tonnage for the site

Peak Hours Trip Generation Based on Turning Movement Counts

Based on the turning movement counts completed at the landfill access road entrance, our office determined the following level of trip generation, reported in trips ends. One trip in plus one trip out equals two trip ends:

Table 1 – Existing Trip Ends (June 18, 2024)

Trip Type	AM Peak Hour (7:00-8:00 AM)	PM Peak Hour (3:30-4:30 PM)
Non-Truck	2	7
Truck	50	47
Total	**52**	**54**

For purposes of traffic permitting, MaineDOT traffic movement permit rules require that a facility's trip generation be compiled for its estimated 30th highest hour of the year, or the sixth highest week of the year. Although a MaineDOT permit is not required for this project, for the purposes of completing this assessment, the monthly totals from the truck logs were reviewed from January 2023 to December 2023, with the assumption that the peak month would correlate closely with the 30th highest hour (and in fact, would most likely be conservative). Based on this information, the highest tonnage of any month occurred in January 2023, with 82,597 tons and 3,919 truck trip ends, with the second highest month being August 2023, with 76,685 tons and 4,115 truck trip ends. The total tonnage in June 2023 was 74,152 with 3,859 truck trip ends. Using this information, the seasonal increase for June 2024 traffic counts above is 10% to yield the following peak hour truck traffic in trip ends. The 2023 tonnage log is located in Appendix C.

Table 2 – 2024 Peak Design Hour Trip Ends

Trip Type	AM Peak Hour	PM Peak Hour
Non-Truck	3	8
Truck	55	52
Total	**58**	**60**

Increase in Peak Hour Traffic

NEWSME indicates that the facility is anticipated to increase from a disposal rate of approximately 834,363 tons in 2023 to approximately 880,000 tons per year after expansion, an increase of 5 percent resulting in the following peak hour traffic increases.

Table 3 – Peak Hour Increase in Trip Generation

Trip Type	AM Peak Hour	PM Peak Hour
Non-Truck	1	1
Truck	3	3
Total	**4**	**4**

Table 4 – Total Forecast Peak Hour Trip Generation for the Site

Trip Type	AM Peak Hour	PM Peak Hour
Non-Truck	4	9
Truck	58	55
Total	**62**	**64**

Increase in Daily Truck Traffic

The data provided by NEWSME shows an average daily truck use in 2023 of 178. Assuming the truck volumes increase proportionately to the tonnage for the expansion by 5 percent, the result would be an average daily increase of 9 trucks per day, for a total of approximately 187 trucks per day.

V. *Trip Distribution*

The ratio of entering and exiting traffic is based on existing site traffic. The trip distribution is as follows:

Weekday AM Peak Hour:	55% Enter, 45% Exit
Weekday PM Peak Hour:	37% Enter, 63% Exit

VI. *Trip Assignment*

Trip assignment has been based on counts completed at the study area intersections and the existing distribution at the site driveway. The trip distribution percentages and trip assignment are shown on Figure 5 of Appendix A for the AM and PM peak hours.

VII. *Postdevelopment Traffic*

The traffic associated with the expansion as shown on Figure 5, was combined with the 2040 Predevelopment Volumes traffic shown on Figures 4, to yield the post development volumes shown on Figure 6 for both the AM and PM peak hours.

VIII. *Capacity Analyses*

GP completed AM and PM peak hour capacity analyses for the three unsignalized intersections listed in Section II for the year 2040. It should be noted that Sargent Corporation provided information that 139 dump trucks and 26 vehicles visited the site the day the counts were completed. To ensure a conservative analysis, these construction-related vehicle trips were included in the capacity analysis volumes.

The intersections in the study area were evaluated with the Synchro/SimTraffic computer software package (Version 12). Levels of service rankings are similar to the academic ranking system where an 'A' is very good with little control delay and an 'F' represents very poor conditions. If an unsignalized intersection falls below level of service 'D', the intersection is further evaluated to determine if mitigation is needed. The following table summarizes the relationship between control delay and level of service for unsignalized intersections:

Table 5 – Level of Service Criteria for Unsignalized Intersections

Level of Service	Control Delay Per Vehicle (sec)
A	Up to 10.0
B	10.1 to 15.0
C	15.1 to 25.0
D	25.1 to 35.0
E	35.1 to 50.0
F	Greater than 50.0

The predevelopment and postdevelopment analyses utilized the existing roadway network, and volumes forecast by our office.

Table 6 – Level of Service for Juniper Ridge Site Driveway and Route 16

Approach	AM Peak Hour				PM Peak Hour			
	Predevelopment		Postdevelopment		Predevelopment		Postdevelopment	
	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS
Route 16 EB TR	1	A	1	A	1	A	1	A
Route 16 WB LT	1	A	1	A	1	A	1	A
Juniper Ridge NB L	1	A	1	A	8	A	8	A
Juniper Ridge NB R	1	A	1	A	1	A	1	A

Table 7 – Level of Service for Route 16 at I-95 Southbound Ramp

Approach	AM Peak Hour				PM Peak Hour			
	Predevelopment		Postdevelopment		Predevelopment		Postdevelopment	
	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS
Route 16 EB TR	2	A	2	A	2	A	2	A
Route 16 WB LT	2	A	2	A	1	A	1	A

Table 8 – Level of Service for Route 16 at I-95 Northbound Ramp

Approach	AM Peak Hour				PM Peak Hour			
	Predevelopment		Postdevelopment		Predevelopment		Postdevelopment	
	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS	Delay (sec.)	LOS
Route 16 EB T	2	A	2	A	2	A	1	A
Route 16 WB T	1	A	1	A	1	A	1	A
I-95 NB L	6	A	6	A	7	A	7	A
I-95 NB R	1	A	1	A	1	A	1	A

Based on the above tables, the approaches at each of the study area locations are forecast to operate at a level of service "A". The additional traffic generated by the site is anticipated to have minimal impacts to operations.

IX. *Queue Analysis*

Based on the Synchro/SimTraffic computer software package (Version 12) analysis, the 95th percentile queue is not anticipated to exceed 50 feet in length (two cars or one large heavy vehicle) on the driveway approach. Results are provided in the attached capacity analysis report located in Appendix B.

X. *Site Access*

The landfill access road is currently off Route 16 and will continue to be utilized following the expansion. Lane warrants were completed using NCHRP 457 standards and 2040 postdevelopment volumes, this is conservative as lane warrants are typically completed using average conditions. All approaches are single lane and will be maintained; turning movement volumes do not meet warrants for left turn lanes in the AM or PM from Route 16. A right turn lane warrant was not conducted due to no or limited expected right turns into the site from Bennoch Road. Turn lane warrants are included in Appendix C.

XI. *Crash Data*

Gorrill Palmer requested and reviewed the latest three-year crash history for the study area from the MaineDOT and reviewed the safety information on the MaineDOT Crash Query

website for the period of 2022-2024. Crash history is provided in Appendix C. The following describes the safety review in more detail.

High Crash Location (HCL):

To evaluate whether a location has a crash problem, MaineDOT uses two criteria to define a HCL. Both criteria must be met to be classified as a HCL.

1. A critical rate factor (CRF) of 1.00 or more for a three-year period. A CRF compares the actual crash rate to the rate for similar intersections in the state. A CRF of less than 1.00 indicates a rate of less than average **and**:

2. A minimum of eight crashes over the same three-year period.

Based on a review of the crash history, there were a total of four crashes in the vicinity in years 2022-2024. There are no HCLs within the study area.

After reviewing the previous Traffic Assessment completed in 2015, crashes throughout the study area have decreased. There are approximately 21 less crashes from 2022-2024 than the previous reports time period from 2011-2013.

XII. *Sight Distance Analysis*

To evaluate available sight distances for the landfill driveway, Gorrill Palmer completed a field review on March 27th, 2024. Old Town and MaineDOT use different sight distance standards. Since the sight distance requirements for Old Town are longer than MaineDOT, Old Town requirements were used. However, for MaineDOT truck sight distance requirements, MaineDOT sight requirements are longer so this will be incorporated as well. The following table summarizes the required sight distances for both MaineDOT standard travel ways, MaineDOT truck sight distance, and Old Town passenger car requirements.

Table 9 – Standards for Sight Distance

Speed Limit (mph)	Passenger Vehicle – MaineDOT (ft)	Trucks – MaineDOT (ft)	Vehicles – Old Town (ft)
25	200	300	250
30	250	375	300
35	305	460	350
40	360	540	400
45	425	640	450
50	495	745	500
55	570	855	550

MaineDOT sight distance evaluation methodology (both passenger vehicles and larger vehicles) is as follows:

Driveway Observation Point:	10 feet from traveled way *12 feet from traveled way
Height of Eye at Driveway:	3.5 feet above the ground **6.0 feet above the ground
Height of Approaching vehicle:	4.25 feet above the ground

*Old Town Requirements
**For Trucks

Bennoch Road along the site driveway is identified on the MaineDOT Public Map Viewer as 40 mph but increases to 45 mph near the southbound on-ramp to the southeast of the driveway. For the purposes of this sight distance evaluation, the higher 45 mph speed limit was used for evaluation.

Table 11 summarizes the measured sight distances at the existing driveway.

Table 10 – Sight Distance Summary

Location	Old Town Passenger Vehicle Required (feet)	MaineDOT Truck Requirement (feet)	Observed Looking Left (feet)	Observed Looking Right (feet)
Juniper Ridge Landfill	450	640	1000+	1000+

As seen from the results in Table 10, the required sight distances are exceeded for both passenger vehicles as well as heavy vehicles. GP recommends that all plantings (existing or future) or signage (existing or future) within the sight triangles be eliminated or maintained such that they do not interfere with available sight distances.

XIII. *Conclusions*

GP has examined the impact of the traffic associated with the expansion of the Juniper Ridge Landfill facility in Old Town and reached the following conclusions:

1. Traffic Volumes: Traffic Volumes used for this Assessment included a combination of recent turning movement counts at the driveway and adjacent I-95 ramps and data provided by NEWSME.

2. Truck Routes: The weight limit on I-95 is 100,000 lbs for 3-axle truck tractors and tri-axle semitrailers. This allows the truck hauling material to access the site by I-95 rather than from local roads. We understand that NEWSME has a policy to encourage trucks to use I-95, which should continue through the expansion. Existing truck use is estimated to be approximately 79% via I-95 and approximately 21% using Route 16 to/from the south. This compares to 78% using I-95 and 22% using Route 16 in the previous June 2015 Traffic Assessment. Therefore, it appears there is a slight increase in the use of I-95 and a slight decrease in the use of Route 16.

3. Trip Generation: The proposed expansion is forecast to increase disposal rates from approximately 834,363 tons in 2023 to approximately 880,000 tons per year, an increase of approximately 5 percent. This is forecast to increase trip generation to the site by approximately 4 trip ends each for the AM & PM peak hours. Daily truck use is forecast to increase from approximately 178 to 187 trucks per day.

4. Capacity Analysis: Based on the capacity analyses, the current and future level of usage is adequately accommodated by the existing roadway network and no improvements are necessary.

5. Lane Warrants: Based on an evaluation of the site driveway, neither left nor right turn lanes are warranted on Bennoch Road.

6. GP obtained the 2022-2024 MaineDOT crash data to determine if there are HCLs in the vicinity of the site. Based on the MaineDOT data, no locations are considered HCLs.

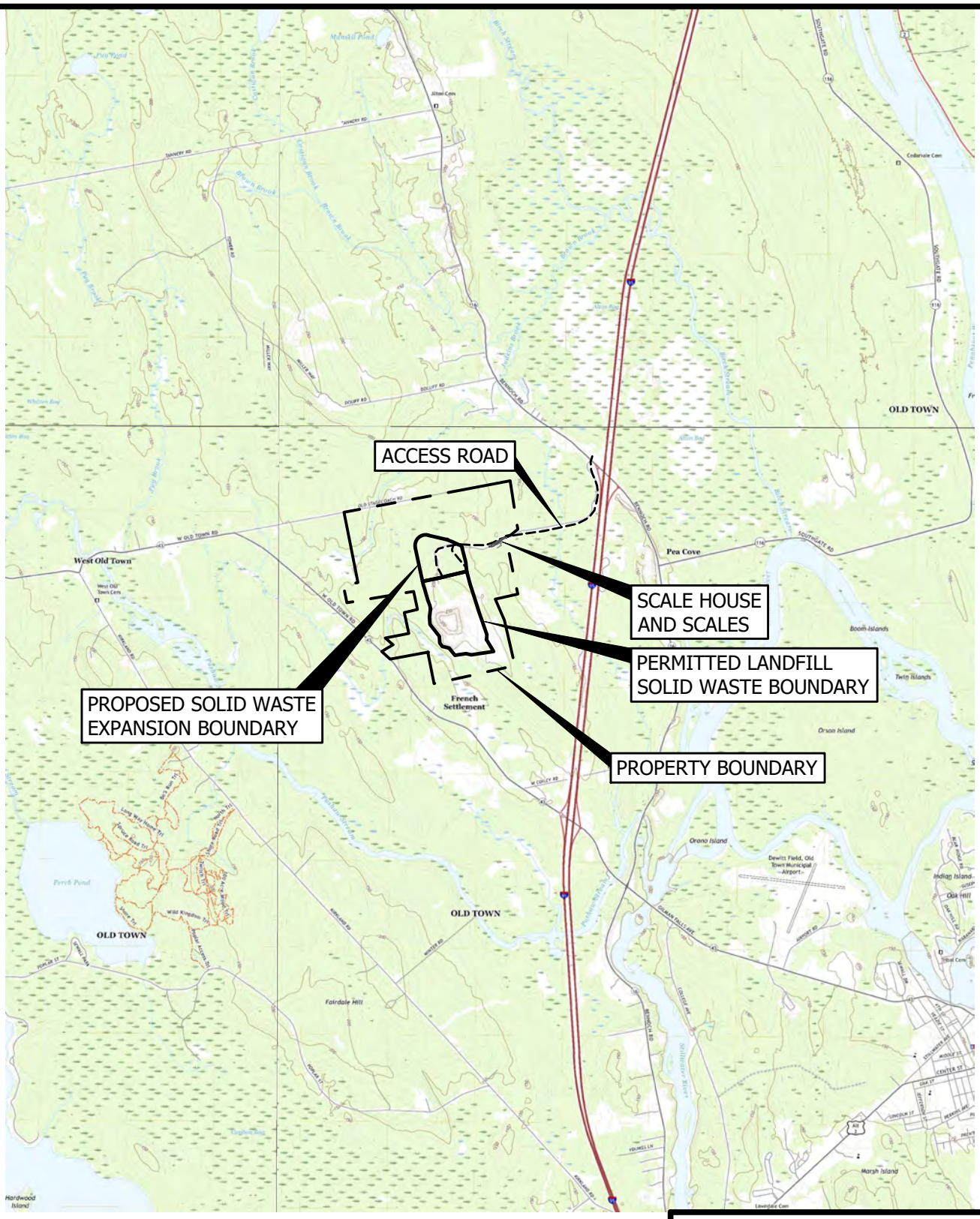
7. The sight lines at the existing Juniper Ridge driveway exceed MaineDOT and Old Town requirements. GP recommends that all plantings which will be located within the right-of-way not exceed three feet in height and be maintained at or below that height. Any signage planned for the site, or associated with construction, should not interfere with sight lines.

Based on these findings, it is the opinion of GP that the existing street system currently accommodates the traffic generated by landfill-related operations and will continue to do so following the expansion.

Appendix A

Site Location Map

Traffic Movement Figures



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE
OLD TOWN, MAINE-2021

SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
SEVEE & MAHER
ENGINEERS

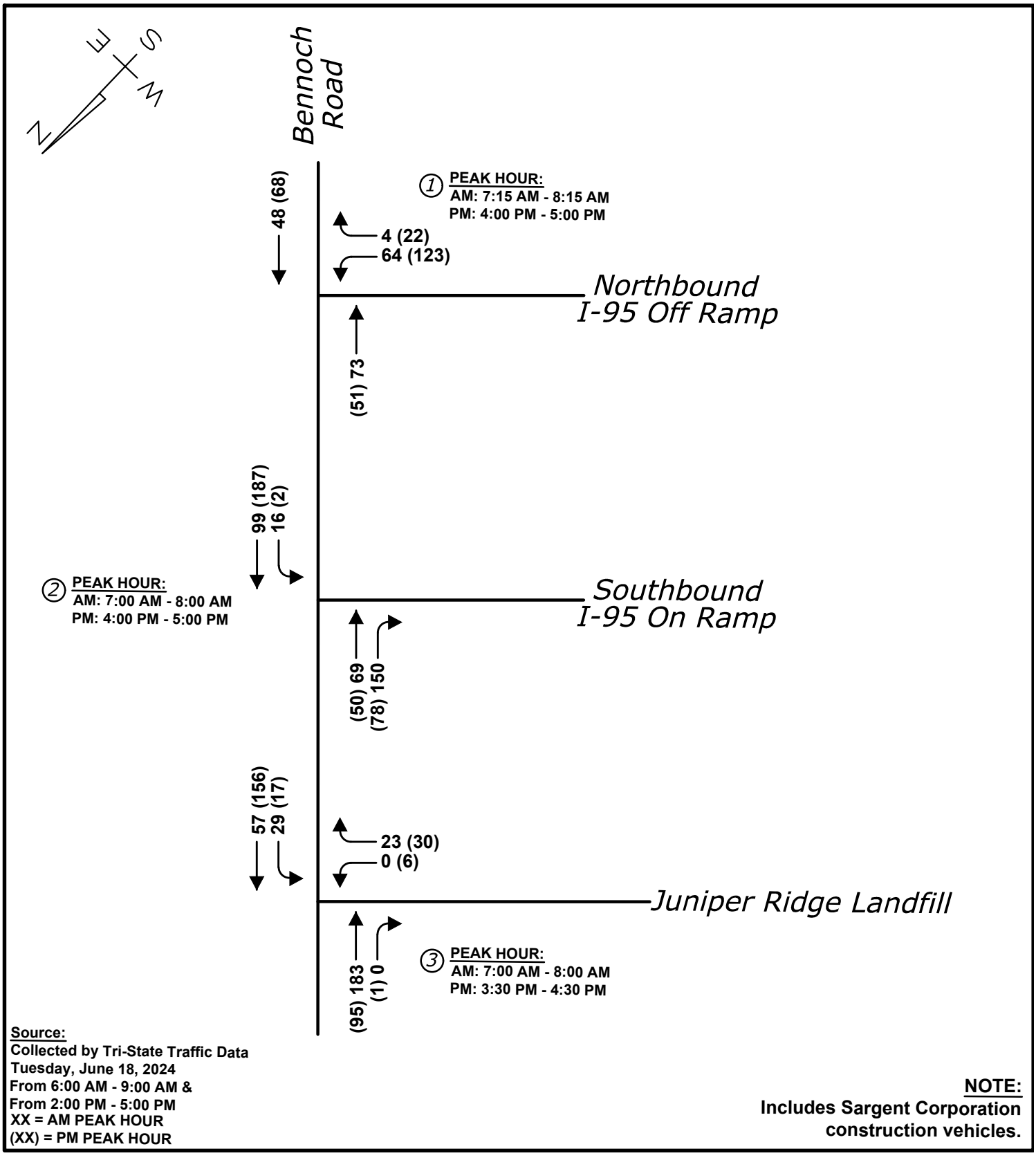
NOT TO SCALE

DWG: SITELOC LMN: SITELOC-EXPANSION CTB: SME-STD.CTB REV: 7/1/2024

\\Nserver\cfs\Casella\OldTownLandfill\Expansion\Phase II Expansion\Acad\Figures\SITELOC.dwg, MAP, 7/1/2024 3:47:42 PM, sjm

2024 RAW VOLUMES

Figure No. 2



Source:
Collected by Tri-State Traffic Data
Tuesday, June 18, 2024
From 6:00 AM - 9:00 AM &
From 2:00 PM - 5:00 PM
XX = AM PEAK HOUR
(XX) = PM PEAK HOUR

NOTE:
Includes Sargent Corporation construction vehicles.

JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

Design:	KJB	Scale:	NONE
Draft:	KJB	Date:	8/1/2025
Checked:	RED	File Name:	Figure Set Juniper Ridge.dwg

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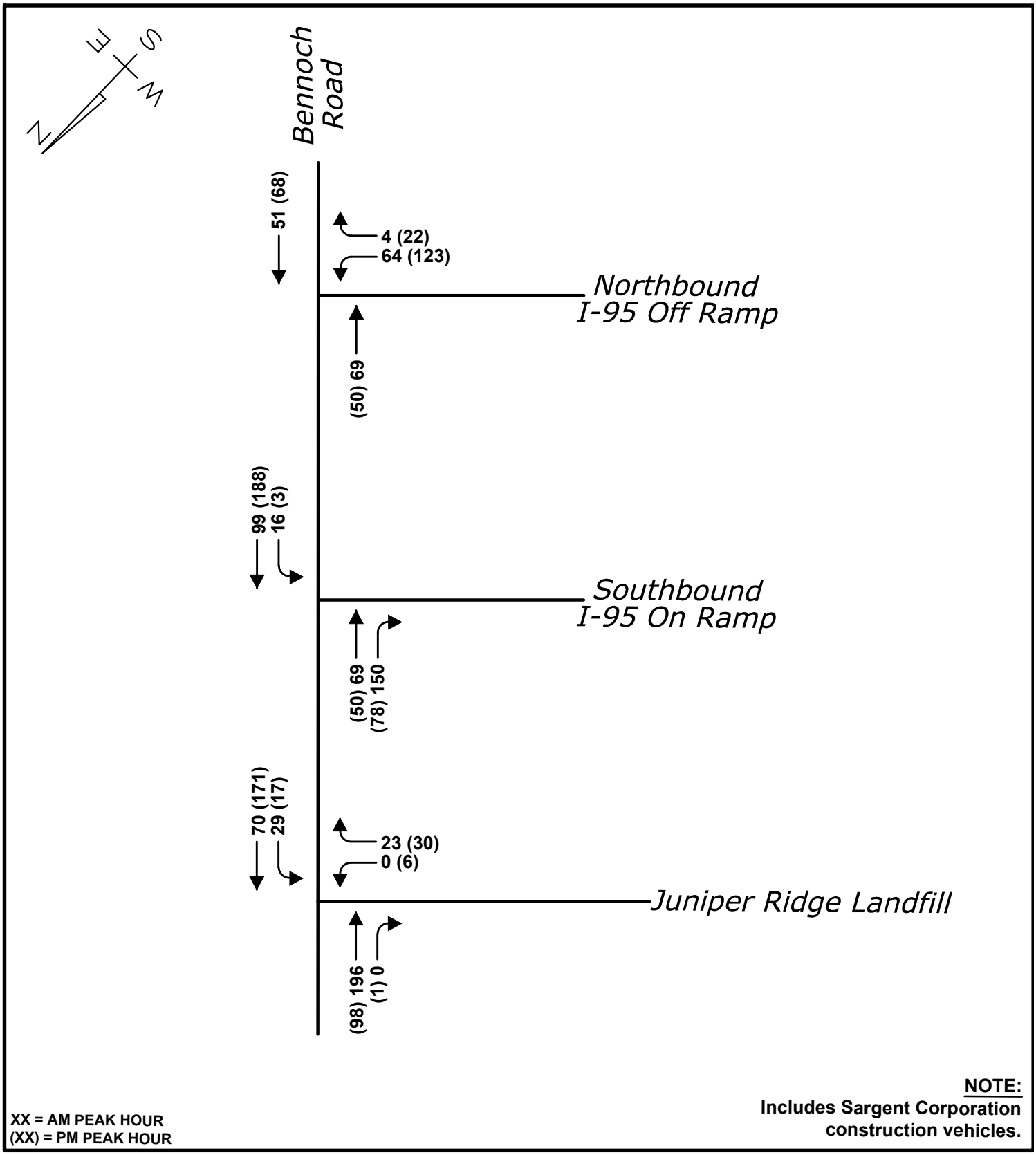
BALANCED VOLUMES

Figure No. 3



XX = AM PEAK HOUR
(XX) = PM PEAK HOUR

NOTE:
Includes Sargent Corporation construction vehicles.

JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

Design: KJB Scale: NONE
Draft: KJB Date: 8/1/2025
Checked: RED File Name: Figure Set Juniper Ridge.dwg

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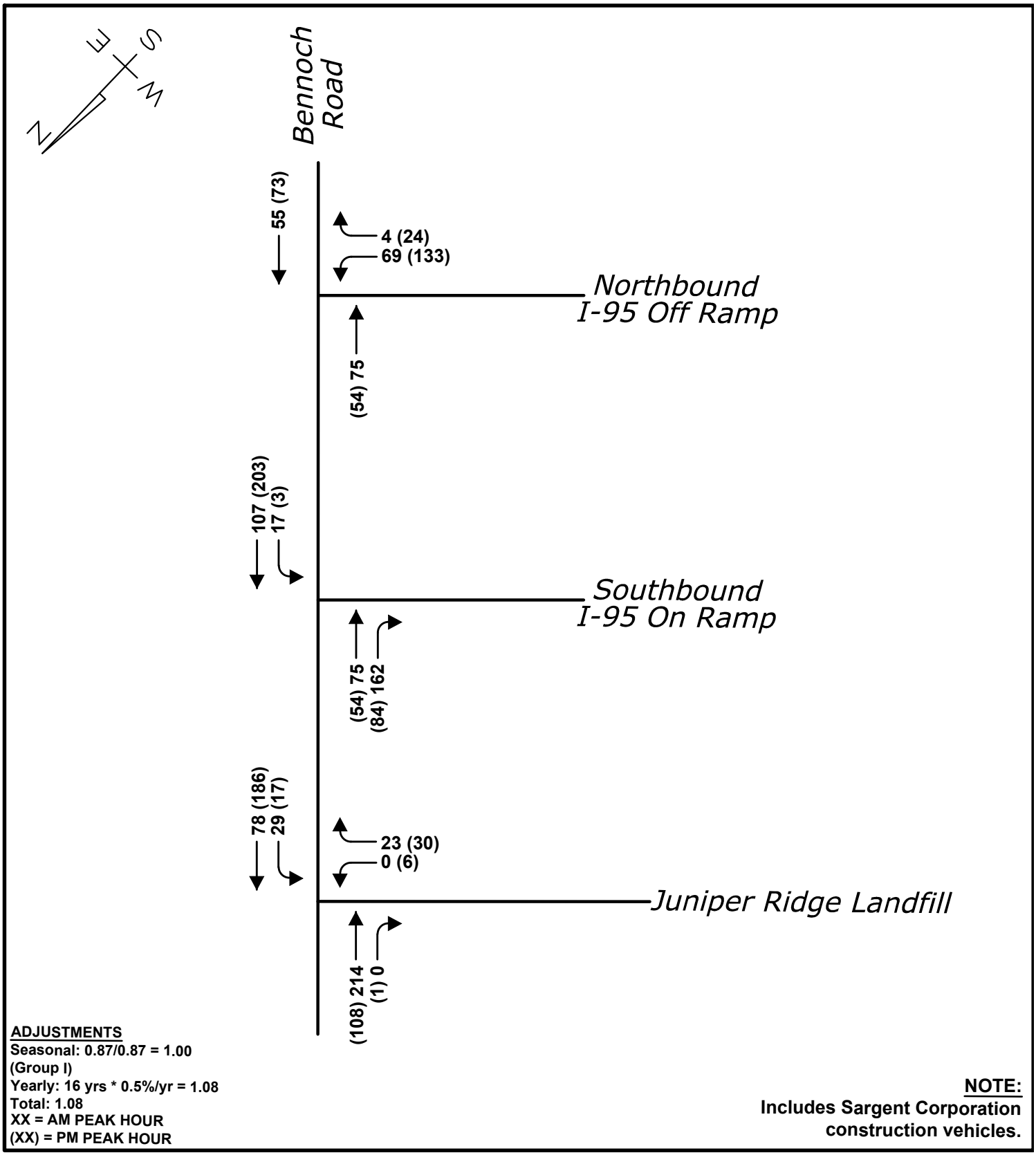
2040 PREDEVELOPMENT

Figure No. 4



ADJUSTMENTS
Seasonal: 0.87/0.87 = 1.00
(Group I)
Yearly: 16 yrs * 0.5%/yr = 1.08
Total: 1.08
XX = AM PEAK HOUR
(XX) = PM PEAK HOUR

NOTE:
Includes Sargent Corporation construction vehicles.

JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

Design: KJB Scale: NONE
Draft: KJB Date: 8/1/2025
Checked: RED File Name: Figure Set Juniper Ridge.dwg

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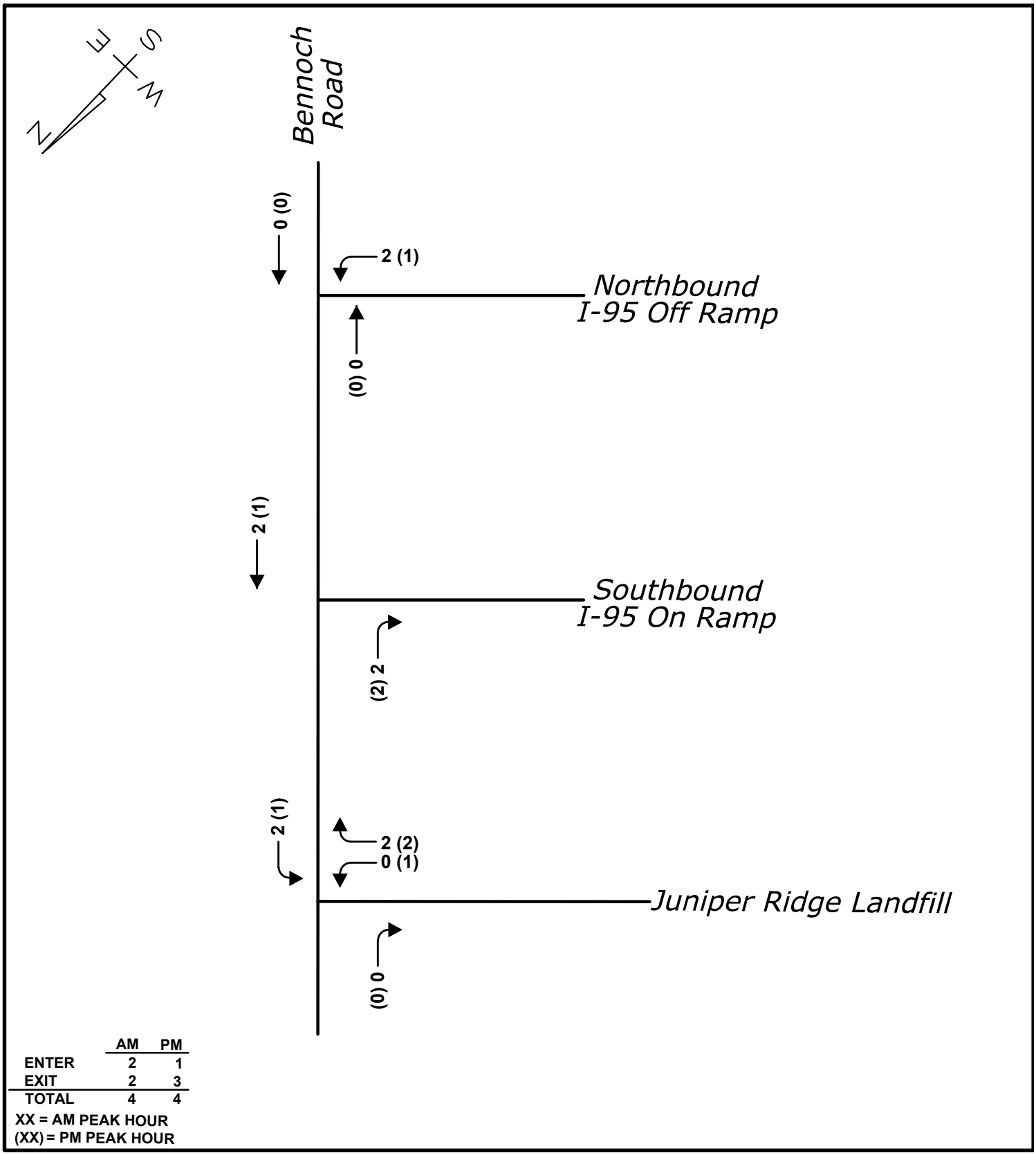
TRIP DISTRIBUTION AND ASSIGNMENT

Figure No. 5



	AM	PM
ENTER	2	1
EXIT	2	3
TOTAL	4	4

XX = AM PEAK HOUR
(XX) = PM PEAK HOUR

JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

Design: KJB Scale: NONE
Draft: KJB Date: 8/1/2025
Checked: RED File Name: Figure Set Juniper Ridge.dwg

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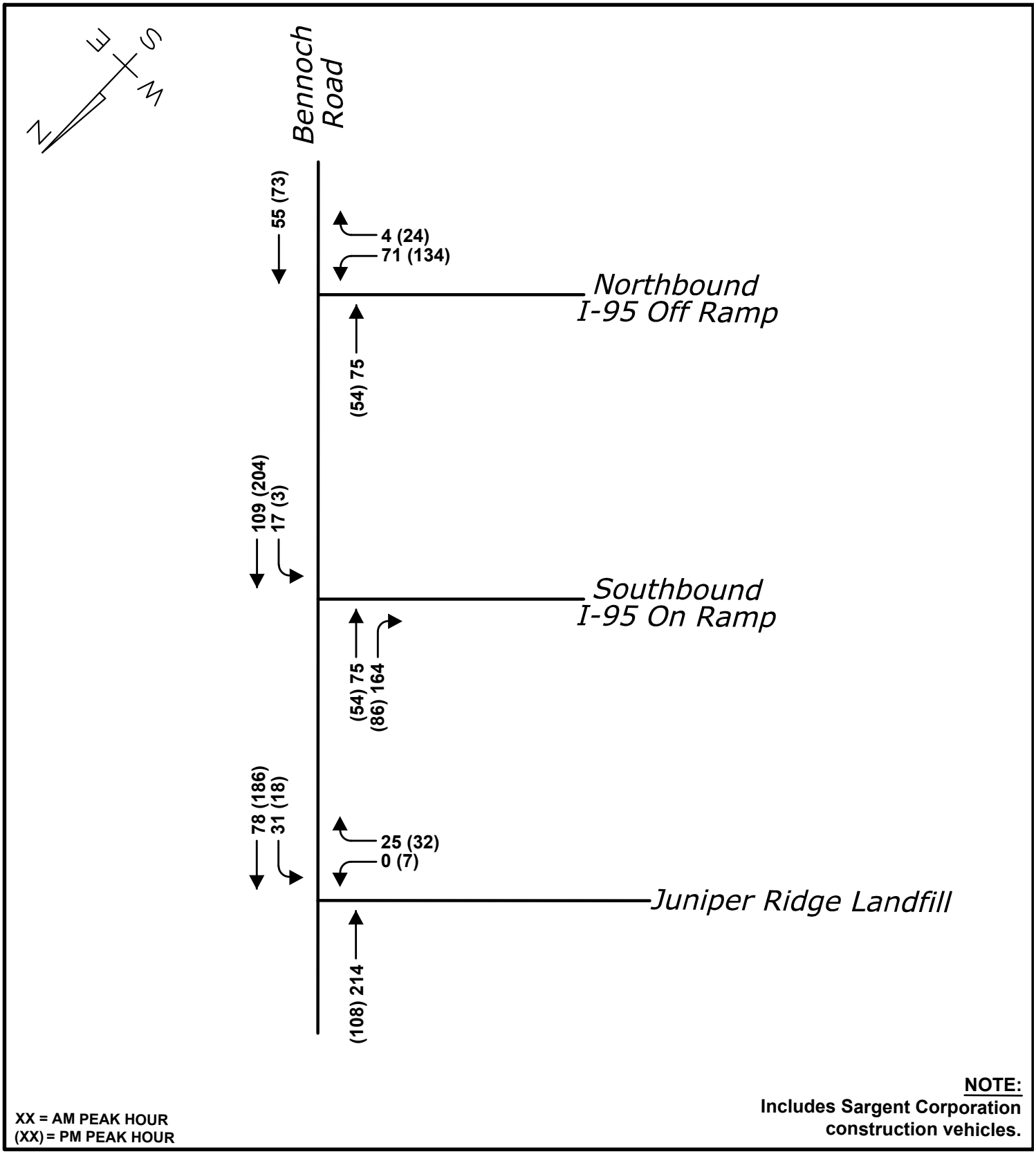
2040 POSTDEVELOPMENT

Figure No. 6



JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

Design: KJB Scale: NONE
Draft: KJB Date: 8/1/2025
Checked: RED File Name: Figure Set Juniper Ridge.dwg

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Appendix B

Capacity Analyses Results

Traffic Counts

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:55	6:55	6:55	6:55	6:55	6:55
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	65	65	65	65	65	65
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	398	376	405	361	394	388
Vehs Exited	402	373	399	361	385	384
Starting Vehs	6	2	1	4	2	2
Ending Vehs	2	5	7	4	11	5
Travel Distance (mi)	133	126	135	125	131	130
Travel Time (hr)	4.7	4.2	4.7	4.3	4.5	4.5
Total Delay (hr)	0.5	0.4	0.5	0.4	0.4	0.4
Total Stops	114	102	130	108	116	113
Fuel Used (gal)	4.7	4.3	4.8	4.3	4.6	4.5

Interval #0 Information Seeding

Start Time	6:55
End Time	7:00
Total Time (min)	5

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	90	82	97	82	75	84
Vehs Exited	96	83	97	81	73	85
Starting Vehs	6	2	1	4	2	2
Ending Vehs	0	1	1	5	4	0
Travel Distance (mi)	29	28	33	30	27	29
Travel Time (hr)	1.1	0.9	1.1	1.0	0.9	1.0
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	29	14	31	23	22	24
Fuel Used (gal)	1.0	0.9	1.2	1.0	0.9	1.0

Interval #2 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	92	90	84	82	94	89
Vehs Exited	88	86	81	82	97	87
Starting Vehs	0	1	1	5	4	0
Ending Vehs	4	5	4	5	1	3
Travel Distance (mi)	31	32	27	28	31	30
Travel Time (hr)	1.1	1.0	0.9	1.0	1.1	1.0
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	25	25	21	23	25	24
Fuel Used (gal)	1.1	1.1	0.9	0.9	1.1	1.0

Interval #3 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	129	108	122	119	133	122
Vehs Exited	128	106	116	120	121	117
Starting Vehs	4	5	4	5	1	3
Ending Vehs	5	7	10	4	13	7
Travel Distance (mi)	43	33	40	41	43	40
Travel Time (hr)	1.5	1.1	1.4	1.4	1.5	1.4
Total Delay (hr)	0.2	0.1	0.1	0.2	0.2	0.2
Total Stops	40	29	39	37	41	38
Fuel Used (gal)	1.6	1.1	1.4	1.4	1.5	1.4

Interval #4 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	87	96	102	78	92	91
Vehs Exited	90	98	105	78	94	92
Starting Vehs	5	7	10	4	13	7
Ending Vehs	2	5	7	4	11	5
Travel Distance (mi)	30	34	36	26	29	31
Travel Time (hr)	1.0	1.2	1.3	0.9	1.0	1.1
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	20	34	39	25	28	29
Fuel Used (gal)	1.0	1.2	1.3	0.9	1.0	1.1

3: Landfill & Bennoch Road Performance by lane

Lane	EB	WB	NB	NB	All
Movements Served	TR	LT	L	R	
Denied Del/Veh (s)					0.4
Total Del/Veh (s)	0.3	0.9		0.5	0.5

5: SB On Ramp & Bennoch Road Performance by lane

Lane	EB	WB	All
Movements Served	TR	LT	
Denied Del/Veh (s)			0.0
Total Del/Veh (s)	1.6	1.3	1.5

7: NB Off Ramp & Bennoch Road Performance by lane

Lane	EB	WB	NB	NB	All
Movements Served	T	T	L	R	
Denied Del/Veh (s)					0.2
Total Del/Veh (s)	1.5	0.3	5.1	0.5	2.4

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	3.5

Intersection: 3: Landfill & Bennoch Road

Movement	WB	NB
Directions Served	LT	R
Maximum Queue (ft)	64	11
Average Queue (ft)	6	1
95th Queue (ft)	32	10
Link Distance (ft)	266	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: SB On Ramp & Bennoch Road

Movement	EB	WB
Directions Served	TR	LT
Maximum Queue (ft)	4	45
Average Queue (ft)	0	5
95th Queue (ft)	3	25
Link Distance (ft)	266	1041
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: NB Off Ramp & Bennoch Road

Movement	NB
Directions Served	L
Maximum Queue (ft)	83
Average Queue (ft)	37
95th Queue (ft)	69
Link Distance (ft)	566
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:55	6:55	6:55	6:55	6:55	6:55
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	65	65	65	65	65	65
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	423	376	394	374	384	393
Vehs Exited	427	373	388	374	375	388
Starting Vehs	6	2	2	4	2	2
Ending Vehs	2	5	8	4	11	6
Travel Distance (mi)	141	128	130	128	127	131
Travel Time (hr)	5.0	4.3	4.5	4.4	4.4	4.5
Total Delay (hr)	0.5	0.4	0.4	0.4	0.4	0.4
Total Stops	112	113	126	116	123	118
Fuel Used (gal)	5.0	4.4	4.6	4.6	4.4	4.6

Interval #0 Information Seeding

Start Time	6:55
End Time	7:00
Total Time (min)	5

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	7:15
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	97	87	97	84	77	87
Vehs Exited	103	88	98	83	75	90
Starting Vehs	6	2	2	4	2	2
Ending Vehs	0	1	1	5	4	0
Travel Distance (mi)	31	30	33	30	27	30
Travel Time (hr)	1.2	1.0	1.1	1.0	0.9	1.0
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	33	19	30	25	24	25
Fuel Used (gal)	1.1	1.0	1.2	1.1	0.9	1.1

Interval #2 Information Recording

Start Time	7:15
End Time	7:30
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	97	89	86	84	100	90
Vehs Exited	93	90	83	84	102	90
Starting Vehs	0	1	1	5	4	0
Ending Vehs	4	0	4	5	2	2
Travel Distance (mi)	33	32	28	29	34	31
Travel Time (hr)	1.1	1.1	0.9	1.0	1.2	1.1
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	25	27	23	22	30	24
Fuel Used (gal)	1.1	1.1	1.0	0.9	1.2	1.1

Interval #3 Information Recording

Start Time	7:30
End Time	7:45
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	145	101	121	128	112	121
Vehs Exited	141	99	120	127	105	119
Starting Vehs	4	0	4	5	2	2
Ending Vehs	8	2	5	6	9	4
Travel Distance (mi)	48	32	39	43	36	40
Travel Time (hr)	1.7	1.1	1.4	1.6	1.2	1.4
Total Delay (hr)	0.2	0.1	0.1	0.2	0.1	0.2
Total Stops	39	33	44	44	34	40
Fuel Used (gal)	1.7	1.1	1.4	1.6	1.2	1.4

Interval #4 Information Recording

Start Time	7:45
End Time	8:00
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	84	99	90	78	95	90
Vehs Exited	90	96	87	80	93	90
Starting Vehs	8	2	5	6	9	4
Ending Vehs	2	5	8	4	11	6
Travel Distance (mi)	29	33	30	26	31	30
Travel Time (hr)	1.0	1.2	1.0	0.9	1.1	1.0
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	15	34	29	25	35	27
Fuel Used (gal)	1.0	1.2	1.0	0.9	1.1	1.0

3: Landfill & Bennoch Road Performance by lane

Lane	EB	WB	NB	NB	All
Movements Served	TR	LT	L	R	
Denied Del/Veh (s)					0.4
Total Del/Veh (s)	0.3	0.8		0.6	0.5

5: SB On Ramp & Bennoch Road Performance by lane

Lane	EB	WB	All
Movements Served	TR	LT	
Denied Del/Veh (s)			0.0
Total Del/Veh (s)	1.7	1.2	1.5

7: NB Off Ramp & Bennoch Road Performance by lane

Lane	EB	WB	NB	NB	All
Movements Served	T	T	L	R	
Denied Del/Veh (s)					0.2
Total Del/Veh (s)	1.4	0.3	5.3	0.5	2.4

Total Network Performance

Denied Del/Veh (s)	0.5
Total Del/Veh (s)	3.5

Intersection: 3: Landfill & Bennoch Road

Movement	WB	NB
Directions Served	LT	R
Maximum Queue (ft)	52	37
Average Queue (ft)	6	1
95th Queue (ft)	31	16
Link Distance (ft)	266	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: SB On Ramp & Bennoch Road

Movement	WB
Directions Served	LT
Maximum Queue (ft)	45
Average Queue (ft)	4
95th Queue (ft)	24
Link Distance (ft)	1041
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: NB Off Ramp & Bennoch Road

Movement	NB
Directions Served	L
Maximum Queue (ft)	84
Average Queue (ft)	38
95th Queue (ft)	69
Link Distance (ft)	566
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:30	3:30	3:30	3:30	3:30	3:30
End Time	4:35	4:35	4:35	4:35	4:35	4:35
Total Time (min)	65	65	65	65	65	65
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	418	389	442	372	398	404
Vehs Exited	411	389	441	370	397	400
Starting Vehs	3	5	4	5	4	3
Ending Vehs	10	5	5	7	5	5
Travel Distance (mi)	152	143	165	137	145	148
Travel Time (hr)	5.3	4.9	5.7	4.7	5.1	5.1
Total Delay (hr)	0.6	0.6	0.7	0.5	0.6	0.6
Total Stops	199	191	231	168	212	200
Fuel Used (gal)	5.3	5.0	5.8	4.7	5.1	5.2

Interval #0 Information Seeding

Start Time	3:30
End Time	3:35
Total Time (min)	5

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:35
End Time	3:50
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	101	86	100	80	86	91
Vehs Exited	98	87	101	83	86	91
Starting Vehs	3	5	4	5	4	3
Ending Vehs	6	4	3	2	4	2
Travel Distance (mi)	37	34	39	31	30	34
Travel Time (hr)	1.3	1.2	1.4	1.0	1.1	1.2
Total Delay (hr)	0.1	0.2	0.2	0.1	0.1	0.1
Total Stops	48	46	52	30	46	44
Fuel Used (gal)	1.3	1.2	1.4	1.0	1.0	1.2

Interval #2 Information Recording

Start Time	3:50
End Time	4:05
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	89	87	98	70	110	91
Vehs Exited	88	89	96	65	109	89
Starting Vehs	6	4	3	2	4	2
Ending Vehs	7	2	5	7	5	5
Travel Distance (mi)	33	34	37	26	43	35
Travel Time (hr)	1.2	1.1	1.3	0.9	1.5	1.2
Total Delay (hr)	0.1	0.1	0.1	0.1	0.2	0.1
Total Stops	45	42	45	34	64	45
Fuel Used (gal)	1.1	1.1	1.3	0.9	1.5	1.2

Interval #3 Information Recording

Start Time	4:05
End Time	4:20
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	143	123	143	126	116	129
Vehs Exited	140	121	139	128	115	128
Starting Vehs	7	2	5	7	5	5
Ending Vehs	10	4	9	5	6	6
Travel Distance (mi)	51	40	48	43	40	45
Travel Time (hr)	1.8	1.4	1.8	1.5	1.4	1.6
Total Delay (hr)	0.2	0.2	0.3	0.2	0.2	0.2
Total Stops	73	54	86	56	64	67
Fuel Used (gal)	1.8	1.4	1.8	1.5	1.5	1.6

Interval #4 Information Recording

Start Time	4:20
End Time	4:35
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	85	93	101	96	86	92
Vehs Exited	85	92	105	94	87	93
Starting Vehs	10	4	9	5	6	6
Ending Vehs	10	5	5	7	5	5
Travel Distance (mi)	31	35	40	37	31	35
Travel Time (hr)	1.0	1.2	1.3	1.3	1.1	1.2
Total Delay (hr)	0.1	0.1	0.1	0.1	0.1	0.1
Total Stops	33	49	48	48	38	44
Fuel Used (gal)	1.0	1.2	1.4	1.3	1.1	1.2

3: Landfill & Bennoch Road Performance by lane

Lane	EB	WB	NB	NB	All
Movements Served	TR	LT	L	R	
Denied Del/Veh (s)					0.4
Total Del/Veh (s)	0.3	0.6	7.9	0.7	0.6

5: SB On Ramp & Bennoch Road Performance by lane

Lane	EB	WB	All
Movements Served	TR	LT	
Denied Del/Veh (s)			0.0
Total Del/Veh (s)	2.0	0.9	1.3

7: NB Off Ramp & Bennoch Road Performance by lane

Lane	EB	WB	NB	NB	All
Movements Served	T	T	L	R	
Denied Del/Veh (s)					0.5
Total Del/Veh (s)	1.2	0.4	6.1	0.5	3.3

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	4.6

Intersection: 3: Landfill & Bennoch Road

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	47	56	40
Average Queue (ft)	3	6	2
95th Queue (ft)	22	31	19
Link Distance (ft)	266	462	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			100
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: SB On Ramp & Bennoch Road

Movement	EB	WB
Directions Served	TR	LT
Maximum Queue (ft)	4	26
Average Queue (ft)	0	2
95th Queue (ft)	3	17
Link Distance (ft)	266	1041
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 7: NB Off Ramp & Bennoch Road

Movement	NB
Directions Served	L
Maximum Queue (ft)	81
Average Queue (ft)	43
95th Queue (ft)	71
Link Distance (ft)	566
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	3:30	3:30	3:30	3:30	3:30	3:30
End Time	4:35	4:35	4:35	4:35	4:35	4:35
Total Time (min)	65	65	65	65	65	65
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	5	5	5	5	5	5
# of Recorded Intervals	4	4	4	4	4	4
Vehs Entered	409	405	444	384	384	404
Vehs Exited	401	405	443	383	384	404
Starting Vehs	4	6	4	6	5	4
Ending Vehs	12	6	5	7	5	6
Travel Distance (mi)	146	149	165	142	139	148
Travel Time (hr)	5.5	5.7	6.3	5.4	5.3	5.7
Total Delay (hr)	0.6	0.6	0.7	0.6	0.6	0.6
Total Stops	186	203	215	199	198	202
Fuel Used (gal)	5.1	5.3	5.8	5.0	4.9	5.2

Interval #0 Information Seeding

Start Time	3:30
End Time	3:35
Total Time (min)	5

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	3:35
End Time	3:50
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	101	97	103	79	85	94
Vehs Exited	97	96	104	78	85	93
Starting Vehs	4	6	4	6	5	4
Ending Vehs	8	7	3	7	5	4
Travel Distance (mi)	37	39	40	29	31	35
Travel Time (hr)	1.4	1.5	1.5	1.1	1.2	1.3
Total Delay (hr)	0.2	0.2	0.2	0.1	0.1	0.1
Total Stops	52	47	52	33	45	45
Fuel Used (gal)	1.3	1.4	1.4	1.0	1.1	1.2

Interval #2 Information Recording

Start Time	3:50
End Time	4:05
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	99	90	95	77	109	94
Vehs Exited	100	95	93	77	111	95
Starting Vehs	8	7	3	7	5	4
Ending Vehs	7	2	5	7	3	5
Travel Distance (mi)	38	35	36	28	44	36
Travel Time (hr)	1.5	1.3	1.3	1.0	1.7	1.4
Total Delay (hr)	0.2	0.1	0.1	0.1	0.2	0.1
Total Stops	50	44	42	39	62	46
Fuel Used (gal)	1.3	1.2	1.2	1.0	1.6	1.3

Interval #3 Information Recording

Start Time	4:05
End Time	4:20
Total Time (min)	15

Volumes adjusted by PHF, Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	125	120	144	132	108	125
Vehs Exited	124	117	137	131	103	122
Starting Vehs	7	2	5	7	3	5
Ending Vehs	8	5	12	8	8	7
Travel Distance (mi)	42	39	47	48	35	42
Travel Time (hr)	1.6	1.5	1.8	1.9	1.4	1.6
Total Delay (hr)	0.2	0.2	0.2	0.2	0.2	0.2
Total Stops	50	59	67	79	53	62
Fuel Used (gal)	1.4	1.4	1.7	1.7	1.3	1.5

Interval #4 Information Recording

Start Time	4:20
End Time	4:35
Total Time (min)	15

Volumes adjusted by Growth Factors, Anti PHF.

Run Number	1	2	3	4	5	Avg
Vehs Entered	84	98	102	96	82	93
Vehs Exited	80	97	109	97	85	94
Starting Vehs	8	5	12	8	8	7
Ending Vehs	12	6	5	7	5	6
Travel Distance (mi)	31	36	43	37	30	35
Travel Time (hr)	1.1	1.4	1.6	1.4	1.1	1.3
Total Delay (hr)	0.1	0.1	0.2	0.2	0.1	0.1
Total Stops	34	53	54	48	38	44
Fuel Used (gal)	1.0	1.3	1.5	1.3	1.1	1.2

3: Landfill & Bennoch Road Performance by lane

Lane	EB	WB	NB	NB	All
Movements Served	TR	LT	L	R	
Denied Del/Veh (s)					0.4
Total Del/Veh (s)	0.4	0.7	7.4	0.6	0.7

5: SB On Ramp & Bennoch Road Performance by lane

Lane	EB	WB	All
Movements Served	TR	LT	
Denied Del/Veh (s)			0.0
Total Del/Veh (s)	1.7	0.9	1.2

7: NB Off Ramp & Bennoch Road Performance by lane

Lane	EB	WB	NB	NB	All
Movements Served	T	T	L	R	
Denied Del/Veh (s)					0.5
Total Del/Veh (s)	1.0	0.9	6.2	0.5	3.3

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	4.6

Intersection: 3: Landfill & Bennoch Road

Movement	WB	NB	NB
Directions Served	LT	L	R
Maximum Queue (ft)	50	50	24
Average Queue (ft)	3	6	1
95th Queue (ft)	24	29	15
Link Distance (ft)	266	462	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			100
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: SB On Ramp & Bennoch Road

Movement	WB
Directions Served	LT
Maximum Queue (ft)	38
Average Queue (ft)	1
95th Queue (ft)	15
Link Distance (ft)	1041
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 7: NB Off Ramp & Bennoch Road

Movement	NB
Directions Served	L
Maximum Queue (ft)	80
Average Queue (ft)	41
95th Queue (ft)	66
Link Distance (ft)	566
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Network Summary

Network wide Queuing Penalty: 0

TRI-STATE TRAFFIC DATA

TSTData.com

Summary

Project	GORRILL PALMER
Project Code	11769
Site Name	11769-1 - Rte 16 & Juniper Ridg
Legs and Movements	All Processed Legs & Movement
Bin Size	15 minutes
Survey Date	2024-06-18, Tuesday
Location	Rte 16 & Juniper Ridge Landfill R
Latitude and Longitude	44.996528, -68.704417

	Start	End	PHF
AM Peak	2024-06-18 07:00:00	2024-06-18 08:00:00	0.87
PM Peak	2024-06-18 15:30:00	2024-06-18 16:30:00	0.86

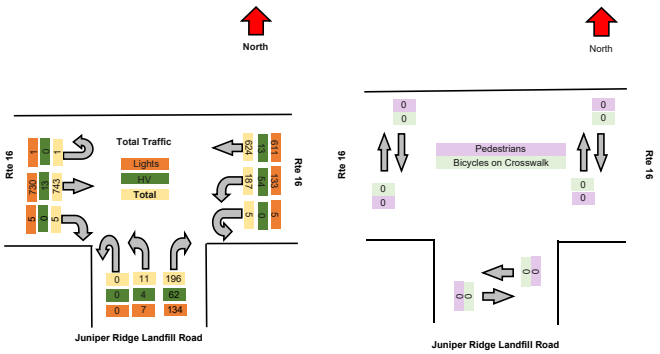
Turning Movement Data

Leg	Rte 16						Rte 16						Juniper Ridge Landfill Road						
Direction	Eastbound						Westbound						Northbound						
Start Time	Thru	Right	U-Turn	App Total	Peds Out	Peds CCW	Left	Thru	U-Turn	App Total	Peds Out	Peds CCW	Left	Right	U-Turn	App Total	Peds Out	Peds CCW	Total
6:00:00	41	0	0	**41**	0	0	4	14	0	**18**	0	0	0	1	0	**1**	0	0	**60**
6:15:00	37	1	0	**38**	0	0	12	13	0	**25**	0	0	0	3	0	**3**	0	0	**66**
6:30:00	47	0	0	**47**	0	0	12	5	1	**18**	0	0	0	4	0	**4**	0	0	**69**
6:45:00	42	0	0	**42**	0	0	10	11	0	**21**	0	0	0	6	0	**6**	0	0	**69**
Hourly Total	167	1	0	**168**	0	0	38	43	1	**82**	0	0	0	14	0	**14**	0	0	**264**
7:00:00	34	0	0	**34**	0	0	8	11	0	**19**	0	0	0	9	0	**9**	0	0	**62**
7:15:00	52	0	0	**52**	0	0	14	15	3	**32**	0	0	0	6	0	**6**	0	0	**90**
7:30:00	58	0	0	**58**	0	0	8	16	0	**24**	0	0	0	5	0	**5**	0	0	**87**
7:45:00	39	0	0	**39**	0	0	8	15	0	**23**	0	0	0	11	0	**11**	0	0	**73**
Hourly Total	183	0	0	**183**	0	0	38	57	3	**98**	0	0	0	31	0	**31**	0	0	**312**
8:00:00	33	0	0	**33**	0	0	6	10	0	**16**	0	0	0	11	0	**11**	0	0	**60**
8:15:00	36	0	0	**36**	0	0	12	14	0	**26**	0	0	0	7	0	**7**	0	0	**69**
8:30:00	26	0	0	**26**	0	0	10	16	0	**26**	0	0	0	9	0	**9**	0	0	**61**
8:45:00	32	0	0	**32**	0	0	7	16	0	**23**	0	0	0	9	0	**9**	0	0	**64**
Hourly Total	127	0	0	**127**	0	0	35	56	0	**91**	0	0	0	36	0	**36**	0	0	**254**
14:00:00	19	0	0	**19**	0	0	12	33	0	**45**	0	0	0	10	0	**10**	0	0	**74**
14:15:00	19	1	0	**20**	0	0	6	30	0	**36**	0	0	1	8	0	**9**	0	0	**65**
14:30:00	27	0	1	**28**	0	0	11	39	0	**50**	0	0	0	9	0	**9**	0	0	**87**
14:45:00	20	1	0	**21**	0	0	4	39	0	**43**	0	0	1	14	0	**15**	0	0	**79**
Hourly Total	85	2	1	**88**	0	0	33	141	0	**174**	0	0	2	41	0	**43**	0	0	**305**
15:00:00	22	1	0	**23**	0	0	6	45	0	**51**	0	0	0	5	0	**5**	0	0	**79**
15:15:00	17	0	0	**17**	0	0	4	31	0	**35**	0	0	1	9	0	**10**	0	0	**62**
15:30:00	34	1	0	**35**	0	0	5	36	0	**41**	0	0	3	15	0	**18**	0	0	**94**
15:45:00	19	0	0	**19**	0	0	8	45	0	**53**	0	0	1	7	0	**8**	0	0	**80**
Hourly Total	92	2	0	**94**	0	0	23	157	0	**180**	0	0	5	36	0	**41**	0	0	**315**
16:00:00	19	0	0	**19**	0	0	6	33	0	**39**	0	0	3	7	0	**10**	0	0	**68**
16:15:00	23	0	0	**23**	0	0	6	42	0	**48**	0	0	1	8	0	**9**	0	0	**80**
16:30:00	25	0	0	**25**	0	0	6	46	0	**52**	0	0	0	5	0	**5**	0	0	**82**
16:45:00	22	0	0	**22**	0	0	2	49	1	**52**	0	0	0	18	0	**18**	0	0	**92**
Hourly Total	89	0	0	**89**	0	0	20	170	1	**191**	0	0	4	38	0	**42**	0	0	**322**
Grand Total	743	5	1	**749**	0	0	187	624	5	**816**	0	0	11	196	0	**207**	0	0	**1772**
% Approach	99.2%	0.7%	0.1%	**0.0%**	0.0%	0.0%	22.9%	76.5%	0.6%	**0.0%**	0.0%	0.0%	5.3%	94.7%	0.0%	**0.0%**	0.0%	0.0%	
% Total	41.9%	0.3%	0.1%	**42.3%**	0.0%	0.0%	10.6%	35.2%	0.3%	**46.0%**	0.0%	0.0%	0.6%	11.1%	0.0%	**11.7%**	0.0%	0.0%	
Lights	730	5	1	**736**	0	0	133	611	5	**749**	0	0	7	134	0	**141**	0	0	**1626**
% Lights	98.3%	100.0%	100.0%	**98.3%**	0.0%	0.0%	71.1%	97.9%	100.0%	**91.8%**	0.0%	0.0%	63.6%	68.4%	0.0%	**68.1%**	0.0%	0.0%	**91.8%**
Hv	13	0	0	**13**	0	0	54	13	0	**67**	0	0	4	62	0	**66**	0	0	**146**
% HV	1.7%	0.0%	0.0%	**1.7%**	0.0%	0.0%	28.9%	2.1%	0.0%	**8.2%**	0.0%	0.0%	36.4%	31.6%	0.0%	**31.9%**	0.0%	0.0%	**8.2%**
Pedestrians	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Pedestrians	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%
Bicycles on Crosswalk	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%

TSTData.com

Summary

Turning Movement Data Plot



TRI-STATE TRAFFIC DATA

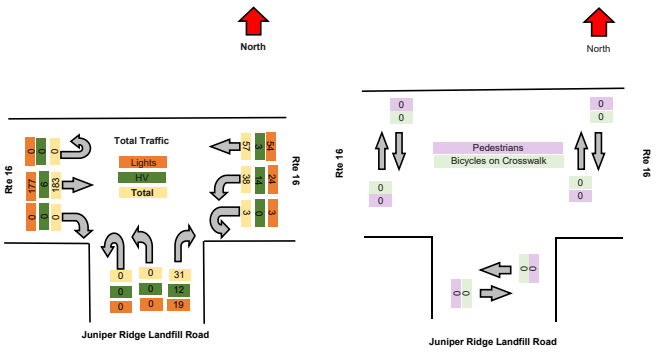
TSTData.com

Summary

Turning Movement Peak Hour Data (AM)

7:00:00

Leg	Rte 16						Rte 16						Juniper Ridge Landfill Road						Total
Direction	Eastbound						Westbound						Northbound						
Start Time	Thru	Right	U-Turn	App Total	Peds CW	Peds CCW	Left	Thru	U-Turn	App Total	Peds CW	Peds CCW	Left	Right	U-Turn	App Total	Peds CW	Peds CCW	
7:00:00	34	0	0	**34**	0	0	8	11	0	**19**	0	0	0	9	0	**9**	0	0	**62**
7:15:00	52	0	0	**52**	0	0	14	15	3	**32**	0	0	0	6	0	**6**	0	0	**90**
7:30:00	58	0	0	**58**	0	0	8	16	0	**24**	0	0	0	5	0	**5**	0	0	**87**
7:45:00	39	0	0	**39**	0	0	8	15	0	**23**	0	0	0	11	0	**11**	0	0	**73**
Grand Total	183	0	0	**183**	0	0	38	57	3	**98**	0	0	0	31	0	**31**	0	0	**312**
% Approach	100.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	38.8%	58.2%	3.1%	**0.0%**	0.0%	0.0%	0.0%	100.0%	0.0%	**0.0%**	0.0%	0.0%	
% Total	58.7%	0.0%	0.0%	**58.7%**	0.0%	0.0%	12.2%	18.3%	1.0%	**31.4%**	0.0%	0.0%	0.0%	9.9%	0.0%	**9.9%**	0.0%	0.0%	
PHF	0.789	0.000	0.000	**0.789**	0.000	0.000	0.679	0.891	0.250	**0.766**	0.000	0.000	0.000	0.705	0.000	**0.705**	0.000	0.000	**0.867**
Lights	177	0	0	**177**	0	0	24	54	3	**81**	0	0	0	19	0	**19**	0	0	**277**
% Lights	96.7%	0.0%	0.0%	**96.7%**	0.0%	0.0%	63.2%	94.7%	100.0%	**82.7%**	0.0%	0.0%	0.0%	61.3%	0.0%	**61.3%**	0.0%	0.0%	**88.8%**
HV	6	0	0	**6**	0	0	14	3	0	**17**	0	0	0	12	0	**12**	0	0	**35**
% HV	3.3%	0.0%	0.0%	**3.3%**	0.0%	0.0%	36.8%	5.3%	0.0%	**17.3%**	0.0%	0.0%	0.0%	38.7%	0.0%	**38.7%**	0.0%	0.0%	**11.2%**
Pedestrians	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Pedestrians	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**
Bicycles on Crosswalk	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**



TRI-STATE TRAFFIC DATA

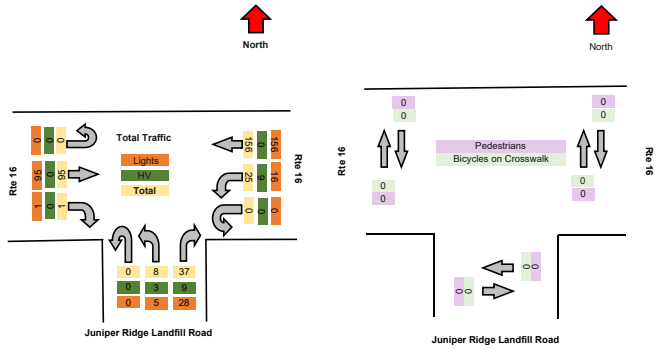
TSTData.com

Summary

Turning Movement Peak Hour Data (PM)

15:30:00

Leg	Rte 16						Rte 16						Juniper Ridge Landfill Road						Total
Direction	Eastbound						Westbound						Northbound						
Start Time	Thru	Right	U-Turn	App Total	Peds CW	Peds CCW	Left	Thru	U-Turn	App Total	Peds CW	Peds CCW	Left	Right	U-Turn	App Total	Peds CW	Peds CCW	
15:30:00	34	1	0	**35**	0	0	5	36	0	**41**	0	0	3	15	0	**18**	0	0	**94**
15:45:00	19	0	0	**19**	0	0	8	45	0	**53**	0	0	1	7	0	**8**	0	0	**80**
16:00:00	19	0	0	**19**	0	0	6	33	0	**39**	0	0	3	7	0	**10**	0	0	**68**
16:15:00	23	0	0	**23**	0	0	6	42	0	**48**	0	0	1	8	0	**9**	0	0	**80**
Grand Total	95	1	0	**96**	0	0	25	156	0	**181**	0	0	8	37	0	**45**	0	0	**322**
% Approach	99.0%	1.0%	0.0%	**0.0%**	0.0%	0.0%	13.8%	86.2%	0.0%	**0.0%**	0.0%	0.0%	17.8%	82.2%	0.0%	**0.0%**	0.0%	0.0%	
% Total	29.5%	0.3%	0.0%	**29.8%**	0.0%	0.0%	7.8%	48.4%	0.0%	**56.2%**	0.0%	0.0%	2.5%	11.5%	0.0%	**14.0%**	0.0%	0.0%	
PHF	0.699	0.250	0.000	**0.686**	0.000	0.000	0.781	0.867	0.000	**0.854**	0.000	0.000	0.667	0.617	0.000	**0.625**	0.000	0.000	**0.856**
Lights	95	1	0	**96**	0	0	16	156	0	**172**	0	0	5	28	0	**33**	0	0	**301**
% Lights	100.0%	100.0%	0.0%	**100.0%**	0.0%	0.0%	64.0%	100.0%	0.0%	**95.0%**	0.0%	0.0%	62.5%	75.7%	0.0%	**73.3%**	0.0%	0.0%	**93.5%**
HV	0	0	0	**0**	0	0	9	0	0	**9**	0	0	3	9	0	**12**	0	0	**21**
% HV	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	36.0%	0.0%	0.0%	**5.0%**	0.0%	0.0%	37.5%	24.3%	0.0%	**26.7%**	0.0%	0.0%	**6.5%**
Pedestrians	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Pedestrians	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**
Bicycles on Crosswalk	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**



TRI-STATE TRAFFIC DATA

TSTData.com

Summary

Project	GORRILL PALMER
Project Code	11769
Site Name	11769-2 - Rte 16 & I-95 SB On R
Legs and Movements	All Processed Legs & Movement
Bin Size	15 minutes
Survey Date	2024-06-18, Tuesday
Location	Rte 16 & I-95 SB On Ramps
Latitude and Longitude	44.995982, -68.703515

	Start	End	PHF
AM Peak	2024-06-18 07:00:00	2024-06-18 08:00:00	0.85
PM Peak	2024-06-18 16:00:00	2024-06-18 17:00:00	0.88

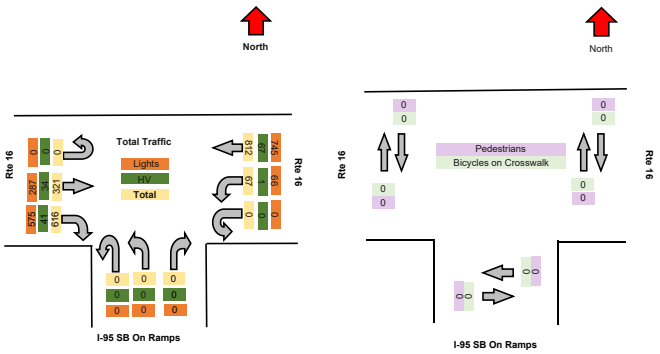
Turning Movement Data

Leg	Rte 16						Rte 16						I-95 SB On Ramps						
Direction	Eastbound						Westbound						Northbound						
Start Time	Thru	Right	U-Turn	App Total	Peds Out	Peds CCW	Left	Thru	U-Turn	App Total	Peds Out	Peds CCW	Left	Right	U-Turn	App Total	Peds Out	Peds CCW	Total
6:00:00	11	31	0	**42**	0	0	4	18	0	**22**	0	0	0	0	0	**0**	0	0	**64**
6:15:00	8	31	0	**39**	0	0	3	25	0	**28**	0	0	0	0	0	**0**	0	0	**67**
6:30:00	13	38	0	**51**	0	0	4	18	0	**22**	0	0	0	0	0	**0**	0	0	**73**
6:45:00	20	26	0	**46**	0	0	2	21	0	**23**	0	0	0	0	0	**0**	0	0	**69**
Hourly Total	52	126	0	**178**	0	0	13	82	0	**95**	0	0	0	0	0	**0**	0	0	**273**
7:00:00	11	34	0	**45**	0	0	4	19	0	**23**	0	0	0	0	0	**0**	0	0	**68**
7:15:00	20	41	0	**61**	0	0	5	32	0	**37**	0	0	0	0	0	**0**	0	0	**98**
7:30:00	20	43	0	**63**	0	0	3	24	0	**27**	0	0	0	0	0	**0**	0	0	**90**
7:45:00	18	32	0	**50**	0	0	4	24	0	**28**	0	0	0	0	0	**0**	0	0	**78**
Hourly Total	69	150	0	**219**	0	0	16	99	0	**115**	0	0	0	0	0	**0**	0	0	**334**
8:00:00	15	29	0	**44**	0	0	5	15	0	**20**	0	0	0	0	0	**0**	0	0	**64**
8:15:00	9	34	0	**43**	0	0	4	26	0	**30**	0	0	0	0	0	**0**	0	0	**73**
8:30:00	14	21	0	**35**	0	0	3	27	0	**30**	0	0	0	0	0	**0**	0	0	**65**
8:45:00	13	28	0	**41**	0	0	3	22	0	**25**	0	0	0	0	0	**0**	0	0	**66**
Hourly Total	51	112	0	**163**	0	0	15	90	0	**105**	0	0	0	0	0	**0**	0	0	**268**
14:00:00	12	17	0	**29**	0	0	3	45	0	**48**	0	0	0	0	0	**0**	0	0	**77**
14:15:00	12	14	0	**26**	0	0	2	36	0	**38**	0	0	0	0	0	**0**	0	0	**64**
14:30:00	13	23	0	**36**	0	0	4	49	0	**53**	0	0	0	0	0	**0**	0	0	**89**
14:45:00	14	20	0	**34**	0	0	3	43	0	**46**	0	0	0	0	0	**0**	0	0	**80**
Hourly Total	51	74	0	**125**	0	0	12	173	0	**185**	0	0	0	0	0	**0**	0	0	**310**
15:00:00	10	17	0	**27**	0	0	2	50	0	**52**	0	0	0	0	0	**0**	0	0	**79**
15:15:00	13	13	0	**26**	0	0	4	35	0	**39**	0	0	0	0	0	**0**	0	0	**65**
15:30:00	14	30	0	**44**	0	0	1	41	0	**42**	0	0	0	0	0	**0**	0	0	**86**
15:45:00	11	16	0	**27**	0	0	2	55	0	**57**	0	0	0	0	0	**0**	0	0	**84**
Hourly Total	48	76	0	**124**	0	0	9	181	0	**190**	0	0	0	0	0	**0**	0	0	**314**
16:00:00	13	13	0	**26**	0	0	1	39	0	**40**	0	0	0	0	0	**0**	0	0	**66**
16:15:00	12	20	0	**32**	0	0	0	47	0	**47**	0	0	0	0	0	**0**	0	0	**79**
16:30:00	13	17	0	**30**	0	0	0	52	0	**52**	0	0	0	0	0	**0**	0	0	**82**
16:45:00	12	28	0	**40**	0	0	1	49	0	**50**	0	0	0	0	0	**0**	0	0	**90**
Hourly Total	50	78	0	**128**	0	0	2	187	0	**189**	0	0	0	0	0	**0**	0	0	**317**
Grand Total	321	616	0	**937**	0	0	67	812	0	**879**	0	0	0	0	0	**0**	0	0	**1816**
% Approach	34.3%	65.7%	0.0%	**0.0%**	0.0%	0.0%	7.6%	92.4%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	
% Total	17.7%	33.9%	0.0%	**51.6%**	0.0%	0.0%	3.7%	44.7%	0.0%	**48.4%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	
Lights	287	575	0	**862**	0	0	66	745	0	**811**	0	0	0	0	0	**0**	0	0	**1673**
% Lights	89.4%	93.3%	0.0%	**92.0%**	0.0%	0.0%	98.5%	91.7%	0.0%	**92.3%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**92.1%**
Hv	34	41	0	**75**	0	0	1	67	0	**68**	0	0	0	0	0	**0**	0	0	**143**
% HV	10.6%	6.7%	0.0%	**8.0%**	0.0%	0.0%	1.5%	8.3%	0.0%	**7.7%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**7.9%**
Pedestrians	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Pedestrians	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%
Bicycles on Crosswalk	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%

TSTData.com

Summary

Turning Movement Data Plot



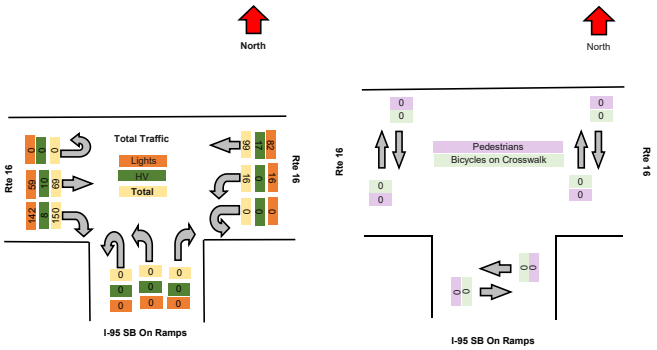
TSTData.com

Summary

Turning Movement Peak Hour Data (AM)

7:00:00

Leg	Rte 16						Rte 16						I-95 SB On Ramps						Total
Direction	Eastbound						Westbound						Northbound						
Start Time	Thru	Right	U-Turn	App Total	Peds CW	Peds CCW	Left	Thru	U-Turn	App Total	Peds CW	Peds CCW	Left	Right	U-Turn	App Total	Peds CW	Peds CCW	
7:00:00	11	34	0	**45**	0	0	4	19	0	**23**	0	0	0	0	0	**0**	0	0	**68**
7:15:00	20	41	0	**61**	0	0	5	32	0	**37**	0	0	0	0	0	**0**	0	0	**98**
7:30:00	20	43	0	**63**	0	0	3	24	0	**27**	0	0	0	0	0	**0**	0	0	**90**
7:45:00	18	32	0	**50**	0	0	4	24	0	**28**	0	0	0	0	0	**0**	0	0	**78**
Grand Total	69	150	0	**219**	0	0	16	99	0	**115**	0	0	0	0	0	**0**	0	0	**334**
% Approach	31.5%	68.5%	0.0%	**0.0%**	0.0%	0.0%	13.9%	86.1%	0.0%	**0.0%**	0.0%	0.0%	#DIV/0!	#DIV/0!	#DIV/0!	**0.0%**	0.0%	0.0%	
% Total	20.7%	44.9%	0.0%	**65.6%**	0.0%	0.0%	4.8%	29.6%	0.0%	**34.4%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	
PHF	0.863	0.872	0.000	**0.869**	0.000	0.000	0.800	0.773	0.000	**0.777**	0.000	0.000	0.000	0.000	0.000	**0.000**	0.000	0.000	**0.852**
Lights	59	142	0	**201**	0	0	16	82	0	**98**	0	0	0	0	0	**0**	0	0	**299**
% Lights	85.5%	94.7%	0.0%	**91.8%**	0.0%	0.0%	100.0%	82.8%	0.0%	**85.2%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**89.5%**
HV	10	8	0	**18**	0	0	0	17	0	**17**	0	0	0	0	0	**0**	0	0	**35**
% HV	14.5%	5.3%	0.0%	**8.2%**	0.0%	0.0%	0.0%	17.2%	0.0%	**14.8%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**10.5%**
Pedestrians	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Pedestrians	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**
Bicycles on Crosswalk	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**



TRI-STATE TRAFFIC DATA

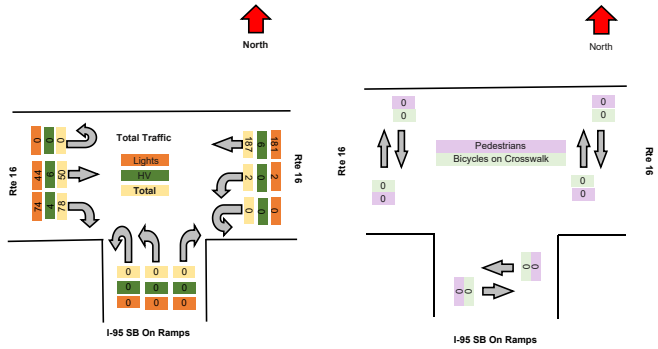
TSTData.com

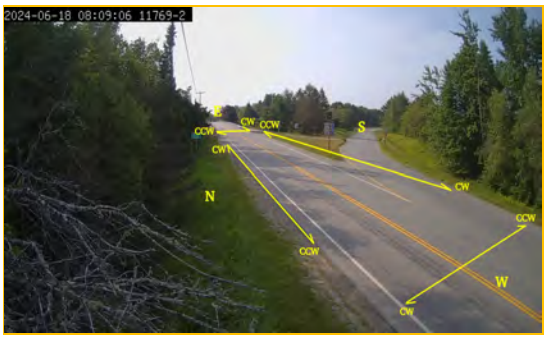
Summary

Turning Movement Peak Hour Data (PM)

16:00:00

Leg	Rte 16						Rte 16						I-95 SB On Ramps						Total
Direction	Eastbound						Westbound						Northbound						
Start Time	Thru	Right	U-Turn	App Total	Peds CW	Peds CCW	Left	Thru	U-Turn	App Total	Peds CW	Peds CCW	Left	Right	U-Turn	App Total	Peds CW	Peds CCW	
16:00:00	13	13	0	**26**	0	0	1	39	0	**40**	0	0	0	0	0	**0**	0	0	**66**
16:15:00	12	20	0	**32**	0	0	0	47	0	**47**	0	0	0	0	0	**0**	0	0	**79**
16:30:00	13	17	0	**30**	0	0	0	52	0	**52**	0	0	0	0	0	**0**	0	0	**82**
16:45:00	12	28	0	**40**	0	0	1	49	0	**50**	0	0	0	0	0	**0**	0	0	**90**
Grand Total	50	78	0	**128**	0	0	2	187	0	**189**	0	0	0	0	0	**0**	0	0	**317**
% Approach	39.1%	60.9%	0.0%	**0.0%**	0.0%	0.0%	1.1%	98.9%	0.0%	**0.0%**	0.0%	0.0%	#DIV/0!	#DIV/0!	#DIV/0!	**0.0%**	0.0%	0.0%	
% Total	15.8%	24.6%	0.0%	**40.4%**	0.0%	0.0%	0.6%	59.0%	0.0%	**59.6%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	
PHF	0.962	0.696	0.000	**0.800**	0.000	0.000	0.500	0.899	0.000	**0.909**	0.000	0.000	0.000	0.000	0.000	**0.000**	0.000	0.000	**0.881**
Lights	44	74	0	**118**	0	0	2	181	0	**183**	0	0	0	0	0	**0**	0	0	**301**
% Lights	88.0%	94.9%	0.0%	**92.2%**	0.0%	0.0%	100.0%	96.8%	0.0%	**96.8%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**95.0%**
HV	6	4	0	**10**	0	0	0	6	0	**6**	0	0	0	0	0	**0**	0	0	**16**
% HV	12.0%	5.1%	0.0%	**7.8%**	0.0%	0.0%	0.0%	3.2%	0.0%	**3.2%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**5.0%**
Pedestrians	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Pedestrians	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**
Bicycles on Crosswalk	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**





TRI-STATE TRAFFIC DATA

TSTData.com

Summary

Project	GORRILL PALMER
Project Code	11769
Site Name	11769-3 - Rte 16 & I-95 NB Off R
Legs and Movements	All Processed Legs & Movement
Bin Size	15 minutes
Survey Date	2024-06-18, Tuesday
Location	Rte 16 & I-95 NB Off Ramps
Latitude and Longitude	44.993865, -68.700422

	Start	End	PHF
AM Peak	2024-06-18 07:15:00	2024-06-18 08:15:00	0.84
PM Peak	2024-06-18 16:00:00	2024-06-18 17:00:00	0.92

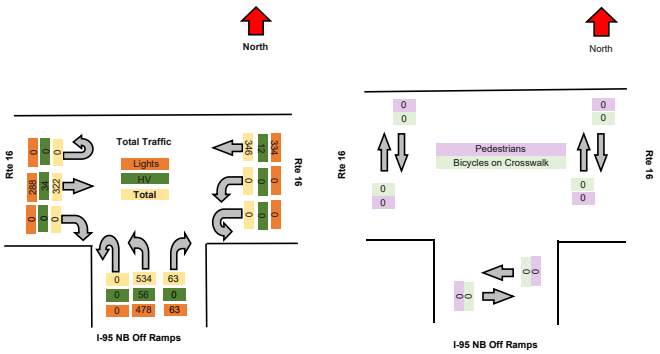
Turning Movement Data

Leg	Rte 16						Rte 16						I-95 NB Off Ramps						
Direction	Eastbound						Westbound						Northbound						
Start Time	Thru	Right	U-Turn	App Total	Peds Out	Peds CCW	Left	Thru	U-Turn	App Total	Peds Out	Peds CCW	Left	Right	U-Turn	App Total	Peds Out	Peds CCW	Total
6:00:00	11	0	0	**11**	0	0	0	11	0	**11**	0	0	11	1	0	**12**	0	0	**34**
6:15:00	8	0	0	**8**	0	0	0	13	0	**13**	0	0	15	0	0	**15**	0	0	**36**
6:30:00	13	0	0	**13**	0	0	0	9	0	**9**	0	0	13	1	0	**14**	0	0	**36**
6:45:00	19	0	0	**19**	0	0	0	15	0	**15**	0	0	9	1	0	**10**	0	0	**44**
Hourly Total	51	0	0	**51**	0	0	0	48	0	**48**	0	0	48	3	0	**51**	0	0	**150**
7:00:00	12	0	0	**12**	0	0	0	14	0	**14**	0	0	9	1	0	**10**	0	0	**36**
7:15:00	20	0	0	**20**	0	0	0	16	0	**16**	0	0	19	1	0	**20**	0	0	**56**
7:30:00	20	0	0	**20**	0	0	0	7	0	**7**	0	0	20	1	0	**21**	0	0	**48**
7:45:00	18	0	0	**18**	0	0	0	18	0	**18**	0	0	10	0	0	**10**	0	0	**46**
Hourly Total	70	0	0	**70**	0	0	0	55	0	**55**	0	0	58	3	0	**61**	0	0	**186**
8:00:00	15	0	0	**15**	0	0	0	7	0	**7**	0	0	15	2	0	**17**	0	0	**39**
8:15:00	9	0	0	**9**	0	0	0	13	0	**13**	0	0	15	3	0	**18**	0	0	**40**
8:30:00	13	0	0	**13**	0	0	0	14	0	**14**	0	0	16	4	0	**20**	0	0	**47**
8:45:00	14	0	0	**14**	0	0	0	10	0	**10**	0	0	17	1	0	**18**	0	0	**42**
Hourly Total	51	0	0	**51**	0	0	0	44	0	**44**	0	0	63	10	0	**73**	0	0	**168**
14:00:00	12	0	0	**12**	0	0	0	21	0	**21**	0	0	27	3	0	**30**	0	0	**63**
14:15:00	11	0	0	**11**	0	0	0	13	0	**13**	0	0	25	3	0	**28**	0	0	**52**
14:30:00	13	0	0	**13**	0	0	0	20	0	**20**	0	0	36	1	0	**37**	0	0	**70**
14:45:00	14	0	0	**14**	0	0	0	12	0	**12**	0	0	32	3	0	**35**	0	0	**61**
Hourly Total	50	0	0	**50**	0	0	0	66	0	**66**	0	0	120	10	0	**130**	0	0	**246**
15:00:00	10	0	0	**10**	0	0	0	23	0	**23**	0	0	31	6	0	**37**	0	0	**70**
15:15:00	13	0	0	**13**	0	0	0	13	0	**13**	0	0	23	4	0	**27**	0	0	**53**
15:30:00	16	0	0	**16**	0	0	0	18	0	**18**	0	0	27	3	0	**30**	0	0	**64**
15:45:00	10	0	0	**10**	0	0	0	11	0	**11**	0	0	41	2	0	**43**	0	0	**64**
Hourly Total	49	0	0	**49**	0	0	0	65	0	**65**	0	0	122	15	0	**137**	0	0	**251**
16:00:00	14	0	0	**14**	0	0	0	17	0	**17**	0	0	25	5	0	**30**	0	0	**61**
16:15:00	11	0	0	**11**	0	0	0	15	0	**15**	0	0	32	5	0	**37**	0	0	**63**
16:30:00	14	0	0	**14**	0	0	0	21	0	**21**	0	0	32	1	0	**33**	0	0	**68**
16:45:00	12	0	0	**12**	0	0	0	15	0	**15**	0	0	34	11	0	**45**	0	0	**72**
Hourly Total	51	0	0	**51**	0	0	0	68	0	**68**	0	0	123	22	0	**145**	0	0	**284**
Grand Total	322	0	0	**322**	0	0	0	346	0	**346**	0	0	534	63	0	**597**	0	0	**1265**
% Approach	100.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	100.0%	0.0%	**0.0%**	0.0%	0.0%	89.4%	10.6%	0.0%	**0.0%**	0.0%	0.0%	
% Total	25.5%	0.0%	0.0%	**25.5%**	0.0%	0.0%	0.0%	27.4%	0.0%	**27.4%**	0.0%	0.0%	42.2%	5.0%	0.0%	**47.2%**	0.0%	0.0%	
Lights	288	0	0	**288**	0	0	0	334	0	**334**	0	0	478	63	0	**541**	0	0	**1163**
% Lights	89.4%	0.0%	0.0%	**89.4%**	0.0%	0.0%	0.0%	96.5%	0.0%	**96.5%**	0.0%	0.0%	89.5%	100.0%	0.0%	**90.6%**	0.0%	0.0%	**91.9%**
Hv	34	0	0	**34**	0	0	0	12	0	**12**	0	0	56	0	0	**56**	0	0	**102**
% HV	10.6%	0.0%	0.0%	**10.6%**	0.0%	0.0%	0.0%	3.5%	0.0%	**3.5%**	0.0%	0.0%	10.5%	0.0%	0.0%	**5.4%**	0.0%	0.0%	**8.1%**
Pedestrians	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Pedestrians	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%
Bicycles on Crosswalk	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%

TSTData.com

Summary

Turning Movement Data Plot



TRI-STATE TRAFFIC DATA

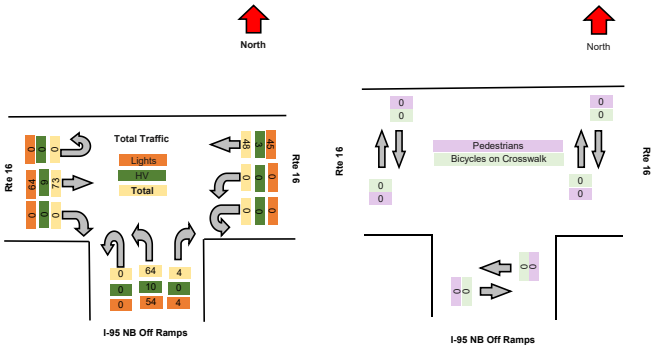
TSTData.com

Summary

Turning Movement Peak Hour Data (AM)

7:15:00

Leg	Rte 16						Rte 16						I-95 NB Off Ramps						Total
Direction	Eastbound						Westbound						Northbound						
Start Time	Thru	Right	U-Turn	App Total	Peds CW	Peds CCW	Left	Thru	U-Turn	App Total	Peds CW	Peds CCW	Left	Right	U-Turn	App Total	Peds CW	Peds CCW	
7:15:00	20	0	0	**20**	0	0	0	16	0	**16**	0	0	19	1	0	**20**	0	0	**56**
7:30:00	20	0	0	**20**	0	0	0	7	0	**7**	0	0	20	1	0	**21**	0	0	**48**
7:45:00	18	0	0	**18**	0	0	0	18	0	**18**	0	0	10	0	0	**10**	0	0	**46**
8:00:00	15	0	0	**15**	0	0	0	7	0	**7**	0	0	15	2	0	**17**	0	0	**39**
Grand Total	73	0	0	**73**	0	0	0	48	0	**48**	0	0	64	4	0	**68**	0	0	**189**
% Approach	100.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	100.0%	0.0%	**0.0%**	0.0%	0.0%	94.1%	5.9%	0.0%	**0.0%**	0.0%	0.0%	
% Total	38.6%	0.0%	0.0%	**38.6%**	0.0%	0.0%	0.0%	25.4%	0.0%	**25.4%**	0.0%	0.0%	33.9%	2.1%	0.0%	**36.0%**	0.0%	0.0%	
PHF	0.913	0.000	0.000	**0.913**	0.000	0.000	0.000	0.667	0.000	**0.667**	0.000	0.000	0.800	0.500	0.000	**0.810**	0.000	0.000	**0.844**
Lights	64	0	0	**64**	0	0	0	45	0	**45**	0	0	54	4	0	**58**	0	0	**167**
% Lights	87.7%	0.0%	0.0%	**87.7%**	0.0%	0.0%	0.0%	93.8%	0.0%	**93.8%**	0.0%	0.0%	84.4%	100.0%	0.0%	**85.3%**	0.0%	0.0%	**88.4%**
HV	9	0	0	**9**	0	0	0	3	0	**3**	0	0	10	0	0	**10**	0	0	**22**
% HV	12.3%	0.0%	0.0%	**12.3%**	0.0%	0.0%	0.0%	6.3%	0.0%	**6.3%**	0.0%	0.0%	15.6%	0.0%	0.0%	**14.7%**	0.0%	0.0%	**11.6%**
Pedestrians	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Pedestrians	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**
Bicycles on Crosswalk	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**	0.0%	0.0%	**0.0%**



TRI-STATE TRAFFIC DATA

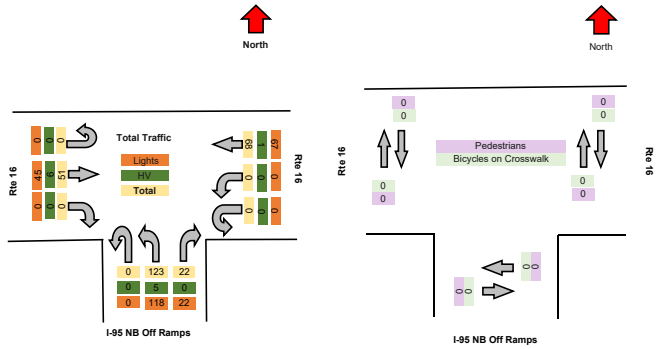
TSTData.com

Summary

Turning Movement Peak Hour Data (PM)

16:00:00

Leg	Rte 16						Rte 16						I-95 NB Off Ramps						Total
Direction	Eastbound						Westbound						Northbound						
Start Time	Thru	Right	U-Turn	App Total	Peds CW	Peds CCW	Left	Thru	U-Turn	App Total	Peds CW	Peds CCW	Left	Right	U-Turn	App Total	Peds CW	Peds CCW	
16:00:00	14	0	0	14	0	0	0	17	0	17	0	0	25	5	0	30	0	0	61
16:15:00	11	0	0	11	0	0	0	15	0	15	0	0	32	5	0	37	0	0	63
16:30:00	14	0	0	14	0	0	0	21	0	21	0	0	32	1	0	33	0	0	68
16:45:00	12	0	0	12	0	0	0	15	0	15	0	0	34	11	0	45	0	0	72
Grand Total	51	0	0	51	0	0	0	68	0	68	0	0	123	22	0	145	0	0	264
% Approach	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	84.8%	15.2%	0.0%	0.0%	0.0%	0.0%	
% Total	19.3%	0.0%	0.0%	19.3%	0.0%	0.0%	0.0%	25.8%	0.0%	25.8%	0.0%	0.0%	46.6%	8.3%	0.0%	54.9%	0.0%	0.0%	
PHF	0.911	0.000	0.000	0.911	0.000	0.000	0.000	0.810	0.000	0.810	0.000	0.000	0.904	0.500	0.000	0.806	0.000	0.000	0.917
Lights	45	0	0	45	0	0	0	67	0	67	0	0	118	22	0	140	0	0	252
% Lights	88.2%	0.0%	0.0%	88.2%	0.0%	0.0%	0.0%	98.5%	0.0%	98.5%	0.0%	0.0%	95.9%	100.0%	0.0%	96.6%	0.0%	0.0%	95.5%
HV	6	0	0	6	0	0	0	1	0	1	0	0	5	0	0	5	0	0	12
% HV	11.8%	0.0%	0.0%	11.8%	0.0%	0.0%	0.0%	1.5%	0.0%	1.5%	0.0%	0.0%	4.1%	0.0%	0.0%	3.4%	0.0%	0.0%	4.5%
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Pedestrians	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bicycles on Crosswalk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Crosswalk	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%



Appendix C

Crash Data

Truck Logs

Lane Warrant Analysis

Annual Waste Acceptance Rates

Maine Department Of Transportation - Office of Safety, Crash Records Section

Crash Summary Report

Report Selections and Input Parameters

REPORT SELECTIONS

☑ Crash Summary I ☐ Section Detail ☑ Crash Summary II ☐ 1320 Public ☐ 1320 Private ☐ 1320 Summary

REPORT DESCRIPTION

Old Town
Bennoch Rd from Southgate Rd (39198) to Juniper Landfill Ent (74309)

REPORT PARAMETERS

Year 2022, Start Month 1 through Year 2024 End Month: 12

Route: 3211055	Start Node: 74309	Start Offset: 0	☐ Exclude First Node
	End Node: 74310	End Offset: 0	☐ Exclude Last Node
Route: 0016X	Start Node: 74309	Start Offset: 0	☑ Exclude First Node
	End Node: 39198	End Offset: 0	☐ Exclude Last Node
Route: 19A1892	Start Node: 41324	Start Offset: 0	☑ Exclude First Node
	End Node: 64507	End Offset: 0	☑ Exclude Last Node
Route: 3201740	Start Node: 64506	Start Offset: 0	☑ Exclude First Node
	End Node: 64507	End Offset: 0	☑ Exclude Last Node
Route: 19A1892	Start Node: 64507	Start Offset: 0	☐ Exclude First Node
	End Node: 41323	End Offset: 0	☐ Exclude Last Node
Route: 19B1892	Start Node: 41212	Start Offset: 0	☐ Exclude First Node
	End Node: 65214	End Offset: 0	☐ Exclude Last Node
Route: 3201917	Start Node: 65214	Start Offset: 0	☑ Exclude First Node
	End Node: 65215	End Offset: 0	☑ Exclude Last Node
Route: 19B1892	Start Node: 65214	Start Offset: 0	☑ Exclude First Node
	End Node: 41213	End Offset: 0	☑ Exclude Last Node

Crash Summary I

Nodes

Node	Route - MP	Node Description	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
74309	3211055 - 0	Int of BENNOCH RD ENT TO JUNIPER LANDFILL	1	0	0	0	0	0	0	0.0	1.258	0.00	0.48	0.00
												Statewide Crash Rate:	0.13	
74310	3211055 - 0.01	End of ENT TO JUNIPER LANDFILL	1	0	0	0	0	0	0	0.0	0.130	0.00	0.27	0.00
												Statewide Crash Rate:	0.12	
36727	0016X - 181.79	Int of BENNOCH RD, UNNAMED 14	1	1	0	0	0	0	1	0.0	0.512	0.65	0.55	1.18
												Statewide Crash Rate:	0.13	
41213	0016X - 181.58	Int of BENNOCH RD RAMP OFF TO BENNOCH RD	1	0	0	0	0	0	0	0.0	0.392	0.00	0.02	0.00
												Statewide Crash Rate:	0.03	
41324	0016X - 181.33	TL Alton Old Town	1	0	0	0	0	0	0	0.0	0.990	0.00	0.12	0.00
												Statewide Crash Rate:	0.03	
39198	0016X - 182.21	Int of BENNOCH RD SOUTHGATE RD	1	0	0	0	0	0	0	0.0	0.783	0.00	0.52	0.00
												Statewide Crash Rate:	0.13	
64506	0016X - 181.38	Int of BENNOCH RD RD INV 3201740	1	0	0	0	0	0	0	0.0	0.859	0.00	0.11	0.00
												Statewide Crash Rate:	0.03	
65215	0016X - 181.56	Int of BENNOCH RD RD INV 3201917	1	3	0	0	0	0	3	0.0	1.072	0.93	0.12	7.57
												Statewide Crash Rate:	0.03	
64507	19A1892 - 0.05	Int of RAMP ON FROM BENNOCH RD RD INV 3201740	1	0	0	0	0	0	0	0.0	0.460	0.00	0.05	0.00
												Statewide Crash Rate:	0.03	
41323	19A1892 - 0.32	Int of I 95 SB RAMP ON FROM BENNOCH RD	1	1	0	0	0	0	1	0.0	2.270	0.15	0.13	1.15
												Statewide Crash Rate:	0.03	
41212	19B1892 - 0	Int of I 95 RAMP OFF TO BENNOCH RD	1	0	0	0	0	0	0	0.0	2.216	0.00	0.13	0.00
												Statewide Crash Rate:	0.03	
65214	19B1892 - 0.21	Int of RAMP OFF TO BENNOCH RD, RD INV 3201917	1	0	0	0	0	0	0	0.0	0.442	0.00	0.04	0.00
												Statewide Crash Rate:	0.03	
Study Years: 3.00		NODE TOTALS:		5	0	0	0	0	5	0.0	11.384	0.15	0.14	1.04

Crash Summary I

Sections

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	Injury Crashes K	A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
74309	74310	5206675	0 - 0.01	3211055 - 0	0.01	1	0	0	0	0	0	0	0.0	0.00003	0.00	-1678.84	0.00
Int of BENNOCH RD ENT TO JUNIPER LANDFILL				RD INV 3211055											Statewide Crash Rate: 235.91		
41324	74309	5206673	0 - 0.03	0016X - 181.30	0.03	1	0	0	0	0	0	0	0.0	0.00036	0.00	787.76	0.00
TL Alton Old Town				ST RTE 16											Statewide Crash Rate: 184.74		
64506	41324	5206669	0 - 0.05	0016X - 181.33	0.05	1	1	0	0	0	0	1	0.0	0.00040	843.25	779.84	1.08
Int of BENNOCH RD RD INV 3201740				ST RTE 16											Statewide Crash Rate: 184.74		
65215	64506	3123292	0 - 0.18	0016X - 181.38	0.18	1	0	0	0	0	0	0	0.0	0.00167	0.00	579.71	0.00
Int of BENNOCH RD RD INV 3201917				ST RTE 16											Statewide Crash Rate: 184.74		
41213	65215	3130297	0 - 0.02	0016X - 181.56	0.02	1	0	0	0	0	0	0	0.0	0.00007	0.00	267.58	0.00
Int of BENNOCH RD RAMP OFF TO BENNOCH RD				ST RTE 16											Statewide Crash Rate: 184.74		
36727	41213	3121657	0 - 0.21	0016X - 181.58	0.21	1	0	0	0	0	0	0	0.0	0.00081	0.00	688.93	0.00
Int of BENNOCH RD, UNNAMED 14				ST RTE 16											Statewide Crash Rate: 184.74		
36727	39198	3121671	0 - 0.42	0016X - 181.79	0.42	1	0	0	0	0	0	0	0.0	0.00264	0.00	515.20	0.00
Int of BENNOCH RD, UNNAMED 14				ST RTE 16											Statewide Crash Rate: 184.74		
64507	41324	5206671	0 - 0.05	19A1892 - 0	0.05	1	0	0	0	0	0	0	0.0	0.00022	0.00	126.98	0.00
Int of RAMP ON FROM BENNOCH RD RD INV 3201740				RD INV 19 A1892											Statewide Crash Rate: 66.09		
64506	64507	3153734	0 - 0.02	3201740 - 0	0.02	1	0	0	0	0	0	0	0.0	0.00000	0.00	-46205.09	0.00
Int of BENNOCH RD RD INV 3201740				RD INV 3201740											Statewide Crash Rate: 66.09		
41323	64507	3116307	0 - 0.27	19A1892 - 0.05	0.27	1	1	0	0	0	0	1	0.0	0.00124	268.44	274.98	0.00
Int of I 95 SB RAMP ON FROM BENNOCH RD				RD INV 19 A1892											Statewide Crash Rate: 66.09		
41212	65214	3116487	0 - 0.21	19B1892 - 0	0.21	1	0	0	0	0	0	0	0.0	0.00093	0.00	283.40	0.00
Int of I 95 RAMP OFF TO BENNOCH RD				RD INV 19 B1892											Statewide Crash Rate: 66.09		
65214	65215	2784808	0 - 0.02	3201917 - 0	0.02	1	0	0	0	0	0	0	0.0	0.00009	0.00	-581.46	0.00
Int of RAMP OFF TO BENNOCH RD, RD INV 3201917				RD INV 3201917											Statewide Crash Rate: 66.09		
65214	41213	2784223	0 - 0.02	19B1892 - 0.21	0.02	1	0	0	0	0	0	0	0.0	0.00000	0.00	-45076.37	0.00
Int of RAMP OFF TO BENNOCH RD, RD INV 3201917				RD INV 19 B1892											Statewide Crash Rate: 66.09		
Study Years: 3.00				Section Totals:	1.51		2	0	0	0	0	2	0.0	0.00845	78.88	328.49	0.24
				Grand Totals:	1.51		7	0	0	0	0	7	0.0	0.00845	276.09	365.96	0.75

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	Injury Crashes K	A	B	C	PD	Crash Report	Crash Date	Crash Mile Point	Injury Degree
74309	74310	5206675	0 - 0.01	3211055 - 0	0	0	0	0	0	0				
41324	74309	5206673	0 - 0.03	0016X - 181.30	0	0	0	0	0	0				
64506	41324	5206669	0 - 0.05	0016X - 181.33	1	0	0	0	0	1	2024-24460	08/30/2024	181.37	PD
65215	64506	3123292	0 - 0.18	0016X - 181.38	0	0	0	0	0	0				
41213	65215	3130297	0 - 0.02	0016X - 181.56	0	0	0	0	0	0				
36727	41213	3121657	0 - 0.21	0016X - 181.58	0	0	0	0	0	0				
36727	39198	3121671	0 - 0.42	0016X - 181.79	0	0	0	0	0	0				
64507	41324	5206671	0 - 0.05	19A1892 - 0	0	0	0	0	0	0				
64506	64507	3153734	0 - 0.02	3201740 - 0	0	0	0	0	0	0				
41323	64507	3116307	0 - 0.27	19A1892 - 0.05	1	0	0	0	0	1	2023-23019	08/08/2023	0.18	PD
41212	65214	3116487	0 - 0.21	19B1892 - 0	0	0	0	0	0	0				
65214	65215	2784808	0 - 0.02	3201917 - 0	0	0	0	0	0	0				
65214	41213	2784223	0 - 0.02	19B1892 - 0.21	0	0	0	0	0	0				
				Totals:	2	0	0	0	0	2				

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM												PM													
	Hour of Day																									
Day Of Week	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	Un	Tot
SUNDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MONDAY	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
TUESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
WEDNESDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
THURSDAY	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
FRIDAY	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2
SATURDAY	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Totals	0	0	0	1	0	1	0	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	7

Vehicle Counts by Type

Unit Type	Total
1-Passenger Car	4
2-(Sport) Utility Vehicle	2
3-Passenger Van	0
4-Cargo Van (10K lbs or Less)	0
5-Pickup	2
6-Motor Home	0
7-School Bus	0
8-Transit Bus	0
9-Motor Coach	0
10-Other Bus	0
11-Motorcycle	0
12-Moped	0
13-Low Speed Vehicle	0
14-Autocycle	0
15-Experimental	0
16-Other Light Trucks (10,000 lbs or Less)	0
17-Medium/Heavy Trucks (More than 10,000 lbs)	3
18-ATV - (4 wheel)	0
20-ATV - (2 wheel)	0
21-Snowmobile	0
22-Pedestrian	0

Unit Type	Total
23-Bicyclist	0
24-Witness	0
25-Other	0
26-Construction	0
27-Farm Vehicle	0
28-Horse and Buggy	0
Total	11

Crash Summary II - Characteristics

Crashes by Driver Action at Time of Crash

Driver Action at Time of Crash	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
No Contributing Action	3	3	0	0	0	0	6
Ran Off Roadway	0	0	0	0	0	0	0
Failed to Yield Right-of-Way	2	0	0	0	0	0	2
Ran Red Light	0	0	0	0	0	0	0
Ran Stop Sign	0	0	0	0	0	0	0
Disregarded Other Traffic Sign	0	0	0	0	0	0	0
Disregarded Other Road Markings	0	0	0	0	0	0	0
Exceeded Posted Speed Limit	0	0	0	0	0	0	0
Drove Too Fast For Conditions	1	0	0	0	0	0	1
Improper Turn	0	1	0	0	0	0	1
Improper Backing	0	0	0	0	0	0	0
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	0	0	0	0	0	0	0
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	1	0	0	0	0	0	1
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	0	0	0	0	0	0	0
Over-Correcting/Over-Steering	0	0	0	0	0	0	0
Other Contributing Action	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0
Total	7	4	0	0	0	0	11

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	7	4	0	0	0	0	11
Physically Impaired	0	0	0	0	0	0	0
Emotional(Depressed, Angry, Disturbed, etc.)	0	0	0	0	0	0	0
Ill (Sick)	0	0	0	0	0	0	0
Asleep or Fatigued	0	0	0	0	0	0	0
Under the Influence of Medications/Drugs/Alcohol	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0
Total	7	4	0	0	0	0	11

Driver Age by Unit Type

Age	Driver	Bicycle	SnowMobile	Pedestrian	ATV	Total
09-Under	0	0	0	0	0	0
10-14	0	0	0	0	0	0
15-19	1	0	0	0	0	1
20-24	2	0	0	0	0	2
25-29	1	0	0	0	0	1
30-39	3	0	0	0	0	3
40-49	2	0	0	0	0	2
50-59	1	0	0	0	0	1
60-69	0	0	0	0	0	0
70-79	1	0	0	0	0	1
80-Over	0	0	0	0	0	0
Unknown	0	0	0	0	0	0
Total	11	0	0	0	0	11

Crash Summary II - Characteristics

Most Harmful Event

Most Harmful Event	Total	Most Harmful Event	Total
1-Overturn / Rollover	0	38-Other Fixed Object (wall, building, tunnel, etc.)	0
2-Fire / Explosion	1	39-Unknown	0
3-Immersion	0	40-Gate or Cable	0
4-Jackknife	0	41-Pressure Ridge	0
5-Cargo / Equipment Loss Or Shift	0	Total	11
6-Fell / Jumped from Motor Vehicle	0		
7-Thrown or Falling Object	0		
8-Other Non-Collision	0		
9-Pedestrian	0		
10-Pedalcycle	0		
11-Railway Vehicle - Train, Engine	0		
12-Animal	1		
13-Motor Vehicle in Transport	9		
14-Parked Motor Vehicle	0		
15-Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle	0		
16-Work Zone / Maintenance Equipment	0		
17-Other Non-Fixed Object	0		
18-Impact Attenuator / Crash Cushion	0		
19-Bridge Overhead Structure	0		
20-Bridge Pier or Support	0		
21-Bridge Rail	0		
22-Cable Barrier	0		
23-Culvert	0		
24-Curb	0		
25-Ditch	0		
26-Embankment	0		
27-Guardrail Face	0		
28-Guardrail End	0		
29-Concrete Traffic Barrier	0		
30-Other Traffic Barrier	0		
31-Tree (Standing)	0		
32-Utility Pole / Light Support	0		
33-Traffic Sign Support	0		
34-Traffic Signal Support	0		
35-Fence	0		
36-Mailbox	0		
37-Other Post, Pole, or Support	0		

Traffic Control Devices

Traffic Control Device	Total
1-Traffic Signals (Stop & Go)	0
2-Traffic Signals (Flashing)	0
3-Advisory/Warning Sign	0
4-Stop Signs - All Approaches	0
5-Stop Signs - Other	3
6-Yield Sign	0
7-Curve Warning Sign	0
8-Officer, Flagman, School Patrol	0
9-School Bus Stop Arm	0
10-School Zone Sign	0
11-R.R. Crossing Device	0
12-No Passing Zone	0
13-None	4
14-Other	0
Total	7

Injury Data

Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	0	0
B	0	0
C	0	0
PD	7	0
Total	7	0

Road Character

Road Grade	Total
1-Level	6
2-On Grade	0
3-Top of Hill	1
4-Bottom of Hill	0
5-Other	0
Total	7

Light

Light Condition	Total
1-Daylight	4
2-Dawn	0
3-Dusk	0
4-Dark - Lighted	1
5-Dark - Not Lighted	2
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	7

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2022	2023	2024	Total
JANUARY	0	0	1	1
FEBRUARY	0	0	0	0
MARCH	0	0	1	1
APRIL	0	0	0	0
MAY	0	0	0	0
JUNE	0	0	0	0
JULY	0	1	0	1
AUGUST	0	1	1	2
SEPTEMBER	0	0	0	0
OCTOBER	0	0	0	0
NOVEMBER	0	0	0	0
DECEMBER	1	0	1	2
Total	1	2	4	7

Report is limited to the last 10 years of data.

Crash Summary II - Characteristics

Crashes by Crash Type and Type of Location

Crash Type	Straight Road	Curved Road	Three Leg Intersection	Four Leg Intersection	Five or More Leg Intersection	Driveways	Bridges	Interchanges	Other	Parking Lot	Private Way	Cross Over	Railroad Crossing	Traffic Circle-Roundabout	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End - Sideswipe	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Head-on - Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Pedestrians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Went Off Road	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
All Other Animal	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jackknife	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rollover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fire	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Submersion	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thrown or Falling Object	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Moose	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	1	0	4	0	0	0	0	2	0	0	0	0	0	0	7

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Blowing Sand, Soil, Dirt												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Blowing Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Clear												
Dark - Lighted	1	0	0	0	0	0	0	0	0	0	0	1
Dark - Not Lighted	0	1	0	0	0	0	0	0	0	0	0	1
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	2	0	0	0	0	0	0	0	0	0	0	2
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Fog, Smog, Smoke												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Other												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Rain												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	1	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Severe Crosswinds												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0

Crash Summary II - Characteristics

Crashes by Weather, Light Condition and Road Surface

Weather / Light	Dry	Ice/Frost	Mud, Dirt, Gravel	Oil	Other	Sand	Slush	Snow	Unknown	Water (Standing, Moving)	Wet	Total
Sleet, Hail (Freezing Rain or Drizzle)												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	0	0	0	0	0
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	0	0	0	0	0	1	0	0	0	0	1
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	0	0	0	0	0	0	0	0	0	0	0
Daylight	0	0	0	0	0	0	0	1	0	0	0	1
Dusk	0	0	0	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	3	1	0	0	0	0	1	1	0	0	1	7

MONTH 2023	NUMBER OF INBOUND TRUCKS	work days including Sat	avg/day	work days M-F	avg/day
JAN	3,919	25	156.76	21	186.62
FEB	3,742	24	155.92	20	187.10
MAR	3,386	27	125.41	23	147.22
APR	3,500	25	140.00	20	175.00
MAY	3,947	26	151.81	22	179.41
JUN	3,859	26	148.42	22	175.41
JUL	3,642	25	145.68	20	182.10
AUG	4,115	27	152.41	23	178.91
SEP	3,826	25	153.04	20	191.30
OCT	3,932	26	151.23	22	178.73
NOV	3,896	25	155.84	21	185.52
DEC	3,479	25	139.16	20	173.95
YEAR	**45,243**	306	147.85	254	178.12

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

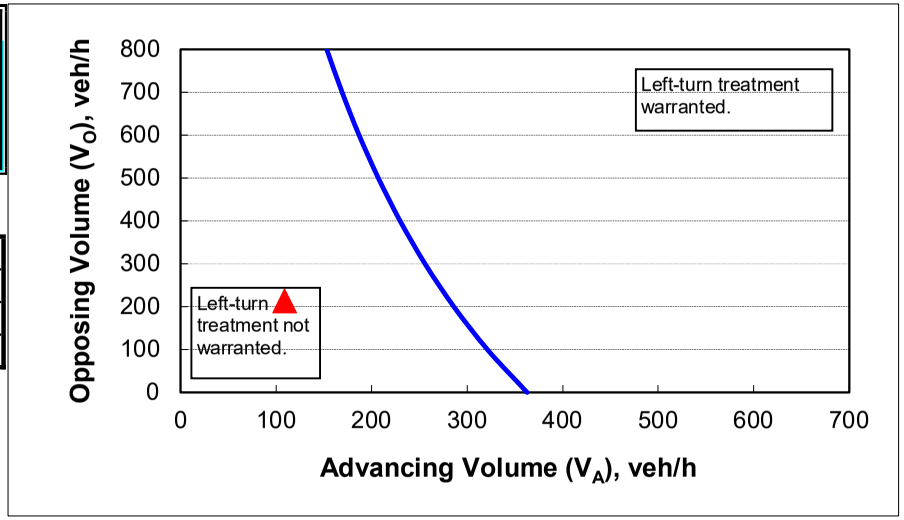
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	28%
Advancing volume (V_A), veh/h:	109
Opposing volume (V_O), veh/h:	214

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	282
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

Figure 2 - 5. Guideline for determining the need for a major-road left-turn bay at a two-way stop-controlled intersection.

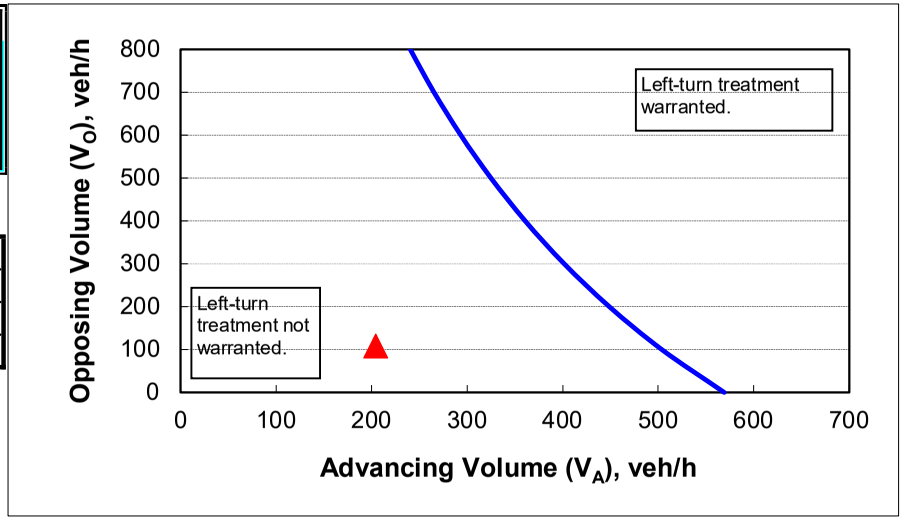
2-lane roadway (English)

INPUT

Variable	Value
85th percentile speed, mph:	45
Percent of left-turns in advancing volume (V_A), %:	9%
Advancing volume (V_A), veh/h:	204
Opposing volume (V_O), veh/h:	108

OUTPUT

Variable	Value
Limiting advancing volume (V_A), veh/h:	499
Guidance for determining the need for a major-road left-turn bay:	
Left-turn treatment NOT warranted.	



CALIBRATION CONSTANTS

Variable	Value
Average time for making left-turn, s:	3.0
Critical headway, s:	5.0
Average time for left-turn vehicle to clear the advancing lane, s:	1.9

ANNUAL TONNAGE ACCEPTED AT JRL

Calendar Year	Tons of Material
2004	53,905
2005	252,314
2006	525,758
2007	472,600
2008	617,782
2009	528,622
2010	708,198
2011	703,880
2012	637,303
2013	606,254
2014	629,021
2015	631,762
2016	670,900
2017	702,529
2018	735,942
2019	818,457
2020	835,261
2021	882,124
2022	933,649
2023	834,363

TONNAGE ACCEPTED AT JRL DURING 2023

Calender Year	Tons of Material
January	82597.08
February	68079.01
March	59128.38
April	64096.43
May	70577.72
June	74151.76
July	71546.91
August	76684.93
September	69647.76
October	67591.71
November	68268.58
December	61992.48

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An LJB Engineering Company

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207.844.1963 (mobile) 207.888.3704 (work)
www.gorrillpalmer.com

From: Lisa Turner <Lisa.Turner@smemaine.com>
Sent: Friday, August 9, 2024 4:23 PM
To: Kyle Brennan <kbrennan@gorrillpalmer.com>
Cc: Randy Dunton <rdunton@gorrillpalmer.com>
Subject: Re: Contractor Trips Into Juniper Ridge Landfill

Yes, that's round trips.

Get Outlook for iOS

From: Kyle Brennan <kbrennan@gorrillpalmer.com>
Sent: Friday, August 9, 2024 2:10:34 PM
To: Lisa Turner <Lisa.Turner@smemaine.com>
Cc: Randy Dunton <rdunton@gorrillpalmer.com>
Subject: Contractor Trips Into Juniper Ridge Landfill

Hey Lisa,

In reviewing the traffic count data for trips in and out of the Juniper Landfill, we wanted to confirm the dump truck trips from contractors on the day of the count.

You sent an email on 6/19/2024 stating that: "there were at least 26 trips in private cars or trucks that were construction related, more if people went out to get lunch. There were 139 dump trucks trips."

We assumed that the 139 dump truck tips were a combination of trips in and out of the site and not just 139 one-way trips. If you could confirm this that would be greatly appreciated.

Thanks,

Kyle Brennan | Design Engineer

APPENDIX G

AGENCY CORRESPONDENCE AND PROTECTED NATURAL RESOURCES, RARE, THREATENED AND ENDANGERED SPECIES

G-1 US FISH AND WILDLIFE SERVICES – THREATENED AND ENDANGERED SPECIES, STANTEC BAT ACOUSTIC SURVEY, AND BRI RARE , THREATENED AND ENDANGERED SPECIES LETTER

G-2 MAINE NATURAL AREAS PROGRAM—RARE SPECIES

G-3 MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE—RARE SPECIES

G-4 MAINE HISTORIC PRESERVATION COMMISSION

G-5 MAINE BUREAU OF LAND RESOURCES – VERNAL POOL SIGNIFICANCE DETERMINATION

G-6 US FISH AND WILDLIFE SERVICES – LIST OF THREATENED AND ENDANGERED SPECIES

G-7 BRI NATURAL RESOURCES REPORT

G-8 DEPREDATION PERMITS AND FEDERAL AVIATION ADMINISTRATION CORRESPONDENCE

G-9 TRIBAL HISTORIC PRESERVATION

SME
SEVEE & MAHER
ENGINEERS

G-1

US FISH AND WILDLIFE SERVICES – THREATENED AND ENDANGERED SPECIES, STANTEC BAT ACOUSTIC SURVEY, AND BRI RARE , THREATENED AND ENDANGERED SPECIES LETTER

SME
SEVEE & MAHER
ENGINEERS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
Phone: (207) 469-7300 Fax: (207) 902-1588

In Reply Refer To: 09/17/2024 18:34:45 UTC
Project code: 2024-0145257
Project Name: Juniper Ridge Landfill Expansion Project

Federal Action Agency (if applicable): Army Corps of Engineers

Subject: Record of project representative's no effect determination for 'Juniper Ridge Landfill Expansion Project'

Dear CHRIS VONDERWEIDT:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on September 17, 2024, for 'Juniper Ridge Landfill Expansion Project' (here forward, Project). This project has been assigned Project Code 2024-0145257 and all future correspondence should clearly reference this number. **Please carefully review this letter.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

Determination for the Northern Long-Eared Bat

Based upon your IPaC submission and a standing analysis, your project has reached the determination of "No Effect" on the northern long-eared bat. To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed

action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17).

Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no consultation with the Service is required (ESA §7). If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13].

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Atlantic Salmon *Salmo salar* Endangered
- Monarch Butterfly *Danaus plexippus* Candidate
- Tricolored Bat *Perimyotis subflavus* Proposed Endangered

Critical Habitats:

- Atlantic Salmon Salmo salar Endangered

You may coordinate with our Office to determine whether the Action may affect the animal species listed above and, if so, how they may be affected.

Next Steps

Based upon your IPaC submission, your project has reached the determination of “No Effect” on the northern long-eared bat. If there are no updates on listed species, no further consultation/ coordination for this project is required with respect to the northern long-eared bat. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the Service should take place to ensure compliance with the Act.

If you have any questions regarding this letter or need further assistance, please contact the Maine Ecological Services Field Office and reference Project Code 2024-0145257 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

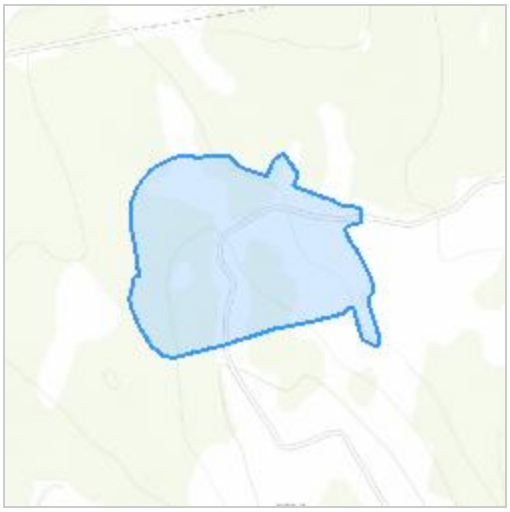
Juniper Ridge Landfill Expansion Project

2. Description

The following description was provided for the project 'Juniper Ridge Landfill Expansion Project':

> Expansion of the Juniper Ridge Landfill in Old Town, Maine.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.9865896,-68.726113042305,14z



DETERMINATION KEY RESULT

Based on the information you provided, you have determined that the Proposed Action will have no effect on the Endangered northern long-eared bat (Myotis septentrionalis). Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for those species.

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of the northern long-eared bat or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. The proposed action does not intersect an area where the northern long-eared bat is likely to occur, based on the information available to U.S. Fish and Wildlife Service as of the most recent update of this key. If you have data that indicates that northern long-eared bats are likely to be present in the action area, answer "NO" and continue through the key.

   Do you want to make a no effect determination?

   Yes

PROJECT QUESTIONNAIRE

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: CHRIS VONDERWEIDT
Address: 30 PARK DRIVE
City: TOPSHAM
State: ME
Zip: 04086
Email christopher.vonderweidt@stantec.com
Phone: 2072407466

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Army Corps of Engineers

Stantec

Memo

To:	Peter Maher and Lisa Turner Sevee and Maher Engineers 4 Blanchard Road Cumberland, ME 04021 lisa.turner@smemaine.com	From:	Laura Berube Stantec Consulting 30 Park Drive Topsham ME 04086 laura.berube@stantec.com
File:	195603227	Date:	August 7, 2024

Reference: Rare Bat Acoustic Survey for the Phase II Expansion of the Juniper Ridge Landfill in Old Town, Maine

BACKGROUND AND PROJECT DESCRIPTION

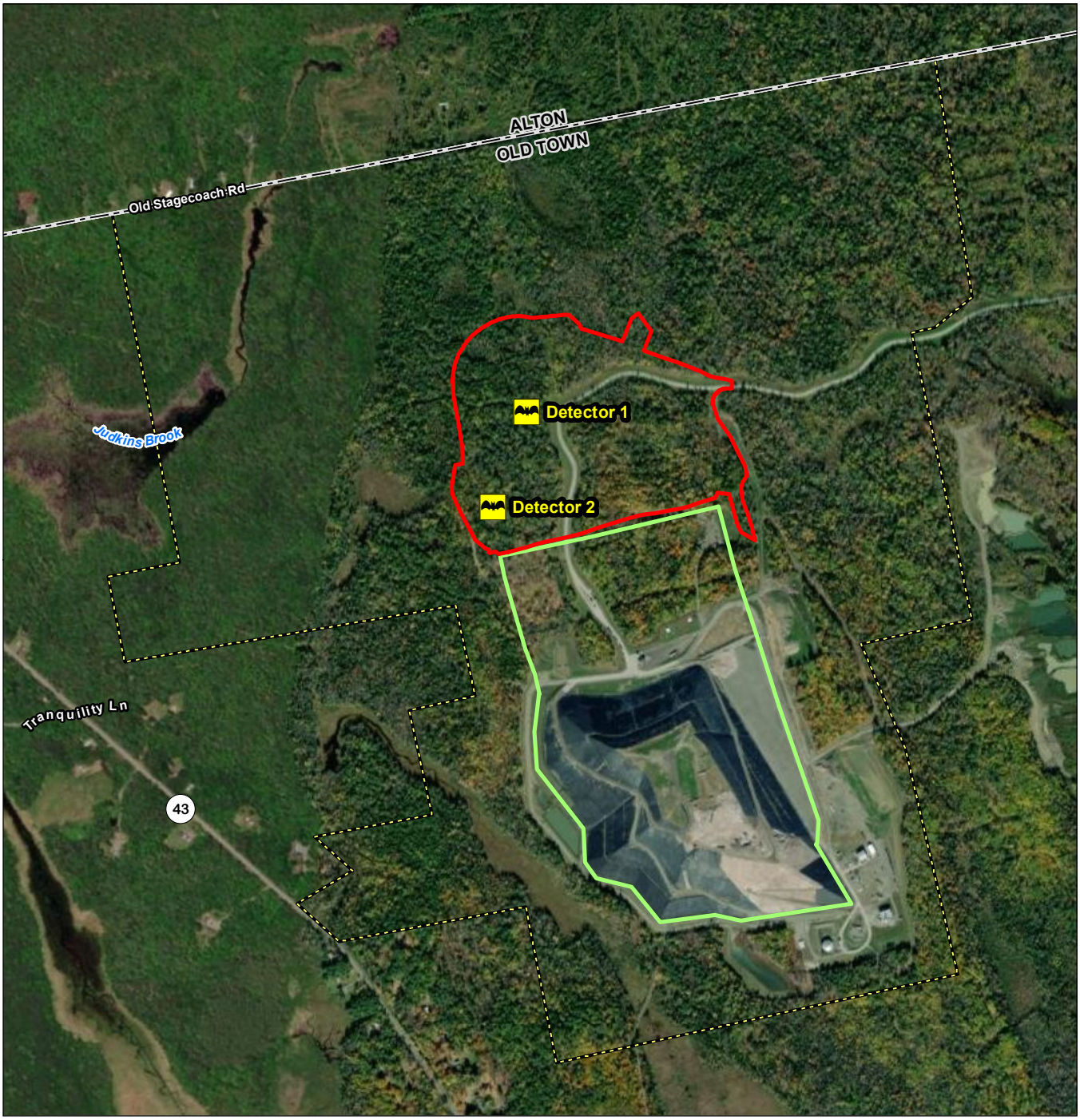
Stantec Consulting Services Inc. (Stantec) conducted a rare bat acoustic survey for the Phase II Expansion of the Juniper Ridge Landfill in Old Town, Maine, targeting northern long-eared bat (NLEB; *Myotis septentrionalis*), federally listed under the Endangered Species Act, and tricolored bat (*Perimyotis subflavus*), a species proposed for federal listing under the Endangered Species Act. The expansion project will require vegetation clearing of approximately 61 acres, which may include clearing of trees considered suitable habitat by the United States Fish and Wildlife (USFWS) for NLEB and tricolored bat[1].

Stantec conducted the rare bat acoustic survey following the 2024 US Fish and Wildlife Service (USFWS) Range-wide Indiana Bat & Northern Long-eared Bat Survey Guidelines (USFWS Guidelines).[2] USFWS Guidelines are followed to evaluate presence or probable absence of federally listed and other bat species. Stantec provided the USFWS Study Plan Form for Bat Surveys and Monitoring (Study Plan; Attachment A) to the USFWS on July 15, 2024. This memorandum is a summary of the acoustic bat survey findings based on Stantec's field survey conducted in summer 2024.

SURVEY METHODS

The objective of the survey was to determine the presence/probable absence of federally listed NLEB, and tricolored bat, a candidate species for federal listing. Based on the USFWS Guidelines, acoustic surveys for a non-linear project such as the Phase II Expansion of the Juniper Ridge Landfill require a survey effort of 14 detector-nights per 123 acres of suitable summer habitat, with at least two survey sites located more than 200 meters apart. We selected two survey sites within the proposed expansion area (Figure 1), each to be surveyed for seven nights to attain the USFWS's required 14 detector-nights per 123 acres[3]. To be counted as a valid survey night, suitable weather conditions must occur during the first five hours past sunset including temperatures above 50 degrees Fahrenheit, wind speeds not exceeding 9 miles per hour for more than 30 minutes, and no more than 30 minutes of precipitation.

[1] The USFWS considers forested habitat with trees greater than 3 inches in diameter at breast height to be potentially suitable summer habitat for NLEB.
[2] U.S. Fish and Wildlife Service. 2024. Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines. U.S. Fish and Wildlife Service, Region 3, Bloomington, MN. 76 pp.
[3] Even though the Project is less than 123 acres this is the minimum survey effort allowed for small project sites.



Legend

- Bat Detector Location
- Expansion
- Existing Landfill
- Property Boundary
- Municipal Boundary

0 1,500 Feet

(At original document size of 8.5x11)
1" = 1,167'

N

Stantec

Notes

1. Coordinate System: USA/NAD83(2011)/Maine (East)-csref
2. Data Sources: MEGIS, Sevee and Maher Engineers, Inc., Stantec
3. Background: Aerial imagery provided by ArcGIS Online World Imagery Mapping Service.

Project Location
Old Town, Maine

Prepared by PWB on 2024-08-28
TR Review by KWH on 2024-08-28
IR Review by LB on 2024-08-28

Client/Project 195603227
Sevee & Maher Engineers, Inc.
Juniper Ridge Landfill Expansion

Figure No.
1

Title
Rare Bat Survey Map

U:\195601956032270\3_data\gis_cad\gis\MXD\s\3227_01_Juniper_Site.mxd Revised: 2024-09-05 By: pbarbera

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

Reference: Rare Bat Acoustic Survey for the Phase II Expansion of the Juniper Ridge Landfill in Old Town, Maine

We determined the final location of each survey site while in the field based on potential bat habitat availability. Detector 1 was deployed near the proposed location in a small clearing, and Detector 2 was deployed approximately 210 meters west of the location proposed in the Study Plan (and ~240 meters from Detector 1) to survey what appeared to be more suitable foraging habitat. At each survey site, we deployed one full-spectrum acoustic bat detector (Wildlife Acoustics SM4BAT) with an omnidirectional microphone (SMM-U1). We deployed detectors based on preferred criteria identified within the USFWS Guidelines. We deployed the detector microphones 3 meters above the ground on extendable poles and, to the extent possible, more than 10 meters from vegetation that could obstruct or reflect bat calls. Detectors were programmed using default settings, including a 12-decibel gain, 256 kilohertz (kHz) sample rate, 16 kHz minimum trigger frequency, 3-second trigger window, and 15-second maximum file length. The detectors were powered by internal alkaline batteries and equipped with an SD card with a capacity of 128 gigabytes. We recorded detector and habitat conditions data for each detector deployed, and we collected a series of photographs of each detector site. We noted bat roosting, traveling, and foraging habitat at each detector site. Datasheets including photographs and brief habitat descriptions for each survey site are provided in Attachment B.

We programmed detectors to record bat activity from 30 minutes before sunset until 30 minutes after sunrise as determined by the latitude and longitude of the site. Detectors were deployed on July 18, 2024. Once deployed, we monitored weather conditions at a nearby weather station (Station ID: KMEOLDTO34[4]) in Old Town, Maine. We removed detectors from the field after they operated for at least 7 nights with suitable weather conditions, according to records at that weather station.

We processed data from the first seven nights with suitable weather conditions for each survey location using a USFWS approved version of Kaleidoscope Pro (KPro) software (Version 5.6.6) using autoclassifier version 5.4.0 (S/A: -1) with the species set selected for Maine. The automated analysis provides results for each bat species potentially recorded during the survey. We manually vetted each pass classified as NLEB and tricolored bat by KPro for those nights with nightly maximum likelihood estimations (MLEs) indicating presence (i.e., nightly MLE of <0.05). We also reviewed the high frequency bat passes recorded on those nights to verify if any NLEB or tricolored bat passes may have been misclassified on those nights.

Species presence each night was based on a nightly MLE of 0.05 or less, as calculated by KPro, and/or based on visual vetting by experts in acoustic bat identification (Laura Berube and Trevor Peterson, resumes in Attachment C).

SURVEY RESULTS

Acoustic survey nights with suitable weather conditions were collected on July 18–24, 2024. A total of 14 detector-nights were collected, with 7 detector-nights per survey site. KPro did not classify any files as NLEB and did not have any nights at either of the survey sites that had a significant nightly MLE (i.e., nightly MLE of <0.05), indicating unlikely presence of this species at the sampling sites (Table 1). KPro did classify two files as tricolored bats but no nights had a significant nightly MLE, indicating unlikely presence of this species at the sampling sites. Although the USFWS Guidelines did not require manual review of the two files classified by KPro as tricolored bat, Stantec did view these files and determined that one was likely produced by an

[4] Weather Underground, Runaway Weather Station, KMEOLDTO34, https://www.wunderground.com/dashboard/pws/KMEOLDTO34

Reference: **Rare Bat Acoustic Survey for the Phase II Expansion of the Juniper Ridge Landfill in Old Town, Maine**

eastern red bat (*Lasiurus borealis*) and that the other contained only three bat pulses produced by a high frequency bat but did not contain enough call characteristic information to be identified to species.

Although not the targeted species in this study, auto-classification results from KPro found the probable presence of big brown bat (*Eptesicus fuscus*), eastern red bat, hoary bat (*Lasiurus cinereus*), and silver-haired bat (*Lasionycteris noctivagans*; Table 1). Surveys determined presence of eastern small-footed bat (*Myotis leibii*) and little brown bat (*Myotis lucifugus*) to be unlikely based on no nights with nightly MLE values of less than 0.05.

Table 1. Number of nights with significant nightly MLE results (i.e., nightly MLE of <0.05) calculated by KPro automated analysis software by species and site.

Site	Number of Nights with Significant Nightly MLE (<0.05) / Percent of Total Surveyed Nights							
	Target Species[1]		Non-Target Species					
	NLEB	Tricolored	Big Brown	Eastern Red	Hoary	Silver-haired	Eastern Small-footed	Little Brown
1	0 / 0%	0 / 0%	6 / 86%	6 / 86%	3 / 43%	7 / 100%	0 / 0%	0 / 0%
2	0 / 0%	0 / 0%	7 / 100%	5 / 71%	3 / 43%	5 / 71%	0 / 0%	0 / 0%
Project Total	**0 / 0%**	**0 / 0%**	**13 / 93%**	**11 / 79%**	**3 / 43%**	**12 / 86%**	**0 / 0%**	**0 / 0%**

1. Target species include NLEB, federally listed under the Endangered Species Act, and tricolored bat, a species proposed for federal listing under the Endangered Species Act.

SUMMARY AND CONCLUSIONS

The acoustic survey conducted for the Project in summer 2024 followed USFWS Guidelines and resulted in the findings of probable absence of NLEB and tricolored bat at the proposed expansion area of the Phase II Expansion of the Juniper Ridge Landfill in Old Town, Maine at the time of survey. KPro did not calculate a nightly MLE indicating presence at either detector for NLEB or tricolored bat, indicating unlikely presence of both species at the sampling sites pr USFWS Guidelines.

If you have any questions about our survey efforts or results, please feel free to contact me.

Stantec Consulting Services Inc.

Laura Berube

Laura Berube
Project Scientist

Mobile: 207.713.0462
Laura.berube@stantec.com

Cc: Doug Stewart, Stantec Consulting Services Inc.

Reference: **Rare Bat Acoustic Survey for the Phase II Expansion of the Juniper Ridge Landfill in Old Town, Maine**

Attachments: Attachment A – USFWS Study Plan Form
Attachment B – Acoustic Bat Detector Datasheets
Attachment C – Resume for Bat Analysis

Electronic Deliverable: USFWS Bat Reporting Spreadsheet

Attachment A – USFWS Study Plan Form

U.S. Fish and Wildlife Service

Study Plan Form for Bat Surveys and Monitoring (v. 2.1)[1]

PROJECT & SURVEY INFORMATION

Project Name: Juniper Ridge Landfill Phase II Expansion

Proposed Survey Start Date: July 15, 2024

Project Proponent's Name (e.g., client/company/institution): Juniper Ridge Landfill, Phase 2 Expansion

Project Location: State(s): Old Town and Alton, ME

County(s): Penobscot

Latitude: 44.986940°

Longitude: -68.726840°

REQUIRED: Attach or provide links to Google Earth® KMZ files (preferred) and/or shapefiles
(mapping must show project boundaries, impacted forest habitat (if known) and all proposed survey sites)
Files are attached: Yes ☑ No ☐
File Links:

Project Summary. In the space provided below, please provide a description of the proposed action, including any activities that will permanently or temporarily alter the current environment and existing habitat features.

The Juniper Ridge Landfill is a secure landfill located on a 780-acre parcel in Old Town and Alton. It is owned by the Maine Department of Administrative and Financial Services' Bureau of General Services and is operated by NEWSME Landfill Operations, LLC. On behalf of the owners and operators, Sevee & Maher Engineers is proposing the clearing of up to 61 acres of vegetation which may include clearing of trees considered suitable habitat for the federally listed northern long-eared bat and tr-colored bat recently proposed for listing. This tree clearing is necessary for the expansion of the Juniper Ridge Landfill in Old Town and Alton, Maine.

CONTACT INFORMATION

Project Manager/Primary Point of Contact (POC): Doug Stewart

Phone: 207 406-5471

Field Survey Crew Leader (if different from POC): Gabe Pelletier

Cell Phone: 207-720-0171

Institution/Company Name: Stantec Consulting Services Inc.

Mailing Address: 30 Park Drive, Topsham, ME 04086

POC Email Address: Stantec, 30 Park Drive, Topsham, ME 04086

USFWS Sec. 10(a)(1)(A) Permit No.(s) (if applicable): not applicable

State Permit No.(s) (if applicable): not applicable

[1] Unless otherwise directed by the Service, surveyors may complete this fillable form, in lieu of a traditional narrative format, and submit it (and supporting files) to the Ecological Services Field Office in the state(s) where the work is to be completed (https://www.fws.gov/our-facilities). Use of this form is not a requirement at this time. Our goal is to improve pre-survey coordination and to expedite the Field Office review and approval process. Please submit your study plan at least 15 working days in advance of your proposed survey start date. Suggestions for improving this document may be sent to R4_Bat_Survey_Guidance@fws.gov.

Have project proponents been informed that abiding by protective time-of-year restrictions (where available) may be sufficient to avoid take of federally listed bats and (in some cases) may negate the need for a bat survey? Yes☑ No☐

Have project proponents been informed that the Service does not require presence/probable absence surveys for federally listed species and that presence can be assumed in a project area containing suitable habitat? Yes☑ No☐

Will this survey be conducted on private or public lands? *(Check both if applicable)*: Private☐ Public☑

Has permission of all necessary landowners/managing agencies been obtained? Yes☑ No☐

If no, explain: _____

Does this project have a federal nexus[2]? Yes☑ No☐ Unsure☐

If yes, explain: _____

IPaC[3] Consultation Code (if applicable): _____

Purpose of Survey: Official P/A Survey ☑ Research ☐ Monitoring ☐
Educational Outreach/Training Other: _____

Survey Target Species: Indiana bat (IBAT) ☐ Northern long-eared bat (NLEB) ☑
Tricolored bat (TCB) ☑ Other: _____

Has a Phase-1 Habitat Assessment* of the project area been conducted? Yes☐ No☑
If yes, how was the habitat assessment conducted? Field☐ Desktop☐ Combo☐
*(*if available, attach a written report)*

Is suitable habitat[4] present (or assumed present) for all "target" species? Yes☑ No☐

If no, explain: _____

Does this project fall within the outer-tier[5] of any "target" species known home range? Yes☐ No☐ Unsure☑

If yes, which species: _____

Project Configuration

Is this project **linear** (>1 km in total length)? Yes☐ No☑ Combo☐ Unsure☐

If yes, how many 1-km sections containing suitable IBAT/NLEB habitat will be impacted? _____

Is this project **non-linear**? Yes☑ No☐ Combo☐ Unsure☐

If yes, how many acres of suitable IBAT/NLEB habitat is in the overall project area? 61

If yes, how many acres of suitable IBAT/NLEB habitat will be directly impacted/cleared? 61

PROPOSED METHODS & SURVEY LEVEL OF EFFORT[6]

ACOUSTICS

Total number of detector sites proposed to be surveyed: 2 Number of detector nights/site: 7

[2] A project or action that is carried out, authorized, funded, and/or permitted by a federal agency.
[3] https://ipac.ecosphere.fws.gov/
[4] See Appendix A of the Guidelines regarding suitable habitat definitions.
[5] See Appendix G of the Guidelines if you are unclear what the out-tier of a known range includes.
[6] Survey level of effort (acoustic or netting) must be spread over at least two calendar nights/survey site.

Total number of detector nights for entire survey: 14

Total proposed number of calendar nights to complete the entire survey: 7

Detector(s) (Brand, Model): Wildlife Acoustics SM4BAT or BatMini Microphone(s): directional ☐ omnidirectional ☑

Recording Format: Full Spectrum ☑ Zero-Crossing ☐

FWS-Approved[7] Acoustic Bat ID Software: KPro vers. 5.6.6 KPro Classifier, NA vers. 5.4.0 BCID vers.____
Other Candidate Programs (e.g., Sonobat) vers.: _____

Species to be included for automatic software ID classification analysis:

EPFU☑ CORA☐ COTO☐ LABO☑ LACI☑ LANO☑ LASE☐ TABR☐ MYCI☐ MYEV☐ MYGR☐ MYLU☑
MYLE☑ MYSE☑ MYSO☐ MYTH☐ MYVO☐ NYHU☐ PESU☑ Others:_____

Will qualitative analysis (i.e., manual vetting) be used? Yes☑ No☐ Unsure☐

Name(s) of qualified biologist(s) conducting qualitative/manual identifications (attach resume or link with qualifications):
Laura Berube, Caroline Byrne, Trevor Peterson

MIST-NETTING

Total number of net sites to be surveyed: 0 Total number of net nights/site: _____

Total number of net nights for entire survey (No. of sites X No. of net nights/site): _____

Total proposed number of calendar nights to complete the entire survey: _____

A) Maximum number of net set-ups that will be operated/checked (10-min interval) on a given calendar night at a given survey site: _____
B) Minimum Number of personnel present to operate/check X (see A) net set-ups on a given site: _____
C) Proposed Staffing Rate (A divided by B): _____

Staffing Rate

Number of Section 10-permitted biologists per net site (or state-permitted in USFWS R5): _____

Do you propose to band bats? Yes☐ No☐

If yes, please answer the following:

What species will be banded? COTO☐ MYGR☐ MYLU☑ MYSE☑ MYSO☐ PESU☑
Others:_____ All captured bats:
If banding *Myotis* sp. or PESU, specify band size: _____
Describe your proposed bands (color and letter-numbers) and banding scheme: _____
Will banding pliers be used? Yes☐ No☐

Will any biological samples be collected from captured bats (e.g., guano, hair, swab, wing punch)? Yes☐ No☐

If yes, explain: _____

Name of institution or facility to conduct DNA analysis: _____

RADIO-TRACKING

Will any bats be radio-tagged and tracked? Yes☐ No☑

[7] https://www.fws.gov/media/automated-acoustic-bat-id-software-programs

If yes, please answer following:

Which species will be radio-tagged? _____

Name of USFWS Section 10 permitted biologist(s) who will apply transmitter(s): _____

Make/model and approximate weight of transmitter(s) to be used: _____

Manufacturer date and estimated life-span of transmitters to be used: _____

Frequency range (MHz) of transmitters (e.g., 150.xxx or 172.xxx): _____

If radio-tracking multiple targeted bats/species, what criteria will be used in selecting which bats will be tracked?

_____

Will all radio-tagged bats be tracked (min. of 4-hrs. search effort/day) to their diurnal roosts for the minimum recommended period of 7 days? Yes☐ No☐

If no, explain: _____

Will night-time foraging data/telemetry be collected? Yes☐ No☐

Glue used for attaching transmitters: Type: Silicone-based Surgical Adhesive Name: Uro-Bond III 5000

Manufacturer: 3M Other: _____

EMERGENCE SURVEYS

After diurnal roost sites of radio-tagged bats are identified, will emergence surveys be conducted at each identified roost (assuming landowner permission is obtained)? Yes☐ No☐

If yes, how many emergence surveys/roost? _____

Have you identified a small number (e.g., ≤10) of potentially suitable roost trees* that you propose to conduct emergence surveys for? Yes☐ No☐

*(*If yes, provide photographs of each tree documenting that all of the tree can be observed by the surveyor along with coordinates (lat/long and/or KML/shapefile) of all trees to be surveyed.)*

POTENTIAL HIBERNACULA SURVEYS

Are you aware of any known hibernacula used by the target species within the project area itself or nearby?

Yes☐ No☑ Unknown☐

If yes or unknown, list sites or explain: _____

Has your desktop analysis identified any natural or man-made features that could be used as a hibernaculum by any of the target bat species? Yes☐ No☐ Unknown☐

If yes, underground features (e.g., caves, mines, tunnels, bunkers, cisterns) present: Yes☐ No☐

If yes, above-ground features* (e.g., crawl spaces) present: Yes☐ No☐

If unknown, explain: _____

Are you requesting approval of a field survey for potential hibernacula at this time? Yes*☐ No☐

*(*If yes, attach a separate narrative explaining how the project area(s) will be surveyed for potential hibernacula.)*

Are you submitting the results of a Phase 1 Habitat Assessment of potentially suitable hibernacula identified from field surveys? Yes*☐ No☐

*(*If yes, provide a Phase 1 Habitat Assessment Data Sheet for each potential hibernaculum/portal(s)[8] identified to be surveyed.)*

BRIDGE & CULVERT ASSESSMENTS

Will any bridges or culverts be surveyed for bat presence? Yes☐ No☑

If yes, please answer the following:

[8] If multiple cave entrances/portals, please list all locations.

Structure type(s) (check all that apply): Bridge☐ Culvert☐ Other☐
If "other", explain: _____

Survey methodology for structure(s) (check all that apply):
Visual inspection☐ Guano collection☐ Emergence survey☐ Acoustics*☐
Mist-net*☐ Harp-trap*☐ Other _____
*(*Due to site-specific conditions of structures, coordination with the local USFWS Field Office and appropriate state agency(ies) is necessary before proceeding with these survey methodologies)*

Will guano be collected and analyzed to confirm species ID? Yes☐ No☐
If "yes", name of institution/entity performing analysis: _____

ADDITIONAL SURVEY INFORMATION[9]

Will the proposed bat survey deviate from the current version of the USFWS Survey Guidelines?[10] Yes☐ No☑

If yes, provide justification for any departures or modifications to the guidelines (if applicable) below:

Proposed detector locations are >200 m from one another. Potentially suitable habitat occurs throughout the parcel to be surveyed, but potentially suitable detector sites are limited. Should proposed survey points need to be moved to meet suitable criteria outlined in the USFWS guidelines, Stantec will determine final detector locations in the field based on field conditions and document their position.

I hereby acknowledge that the information being provided to the Service is accurate and complete as of today's date.

Signature: Stewart, Doug (Topsham) Digitally signed by Stewart, Doug (Topsham) Date: 2024.07.15 14:01:51 -04'00' Date: _____

[9] Attach additional pages to this form, if needed.

[10] Proposed surveys deviating from the current Range-wide IBAT & NLEB Survey Guidelines will only be accepted with a thoroughly described justification. Coordinate with your local USFWS Field Office (https://www.fws.gov/our-facilities) for acceptable modifications.

********FOR U.S. FISH AND WILDLIFE SERVICE USE ONLY**********

United States Department of the Interior

Fish and Wildlife Service

Generic ES Field Office

Street Address

General Office Phone:

SITE-SPECIFIC AUTHORIZATION - BAT WORK

Our Field Office has reviewed your study plan and found it to contain sufficient information for our approval. When signed, this statement serves as your site-specific authorization to conduct the proposed activities at the specified locations included in the attached Study Plan Form and supporting files and must be carried with your federal permit when conducting work for this project. All activities must be carried out with strict adherence to permit conditions and authorizations specified in your federal permit as well as your state permit(s) (if needed). The section 10(a)(1)(A) permit authorizing the activities must remain with the surveyor at all times. This authorization is not valid if you have not obtained permission from the owner of the lands where activities will occur.

For federal permit reporting purposes, please use the appropriate USFWS bat survey data spreadsheet, available on the IBAT and NLEB Summer Survey Guidance website[1]. To mitigate the risk of humans transmitting viruses (e.g., SARS-CoV-2) to bats or viral transmission from bats to humans, the U.S. Fish and Wildlife Service requests anyone directly handling or working in close proximity to bats follow current guidelines prepared by the CDC[2] and IUCN Bat Specialist Group[3] in addition to the following the standard WNS decontamination protocols[4].

If the work expands beyond the scope of your original study plan or if there are adverse effects to bats that were not anticipated, cease all survey and/or research activities, and contact this office prior to continuing. Additionally, if a federally listed bat is captured, this USFWS Field Office must be notified within 48 hours with information regarding species, sex, age, and whether or not the bat has a transmitter attached.

Field Office POC: _____

email: _____ phone:_____

☐ **Authorized as Proposed**

☐ **Authorized with Conditions** (see below)

You are authorized to proceed provided that the following adjustment(s) and/or conditions are met.

☐ **Not Authorized.**

Comments:

Signature & Date:

NOTE: Please check the appropriate box above before signing/locking the document.

[1] https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines
[2] https://www.cdc.gov/healthypets/covid-19/wildlife.html
[3] https://www.iucnbsg.org/uploads/6/5/0/9/6509077/amp_recommendations_for_researchers_final.pdf
[4] https://www.whitenosesyndrome.org/mmedia-education/national-wns-decontamination-protocol-u-s

Attachment B – Acoustic Bat Detector Datasheets

Stantec Ground-Based Acoustic Bat Detector Datasheet

Site ID: 1	**Project Number:** 195603227	**Project Name:** Juniper Ridge Landfill	
	State: ME	**County:** Penobscot	**Acoustic Survey Type**
Site Selector: Laura Berube	**Lat:**44.98705171642082	**Long:**-68.72812682274099	Summer - Acoustic
Deployer: Laura Berube	**Notes:**		
Date Deployed: July 18, 2024			
Deploy Duration: 7			
Detector #: S4U12628			

Detector Setup

Detector Make:	Wildlife Acoustics	**Detector Model:**	SM4BAT FS	**Dist to Obstruct (m):**	10
Microphone Model:	SMM-U1	**Directionality:**	Omnidirectional	**Mic Height (AGL; m):**	3
Weatherproofing:	None	**Mic Angle:**	0 (parallel w/ ground)	**Call Data Type:**	Full Spectrum
Mic Direction (deg):	340	**In-Field Calibration:**	PASS	**Notes:**	

HABITAT DESCRIPTION

VEGETATION CHARACTERISTICS

Habitat Type: Other

Canopy Closure (%): Open

Habitat Description: Small clear cut with wet woods road running through it, within mixed forest adjacent to Landfill Road. Clear cut made up of regenerating hardwoods.

Habitat Use:	Roosting, Foraging, Traveling

Habitat Notes: See above.

STREAM CHARACTERISTICS

Est. Distance to Water Source (m):	900
Type of Water:	Pond

Detector Startup Notes:

Detector Startup:

Memory A:	0/128
Memory B:	0/NA
Battery:	6.3
Mic 0:	U1
Cal Ch 0:	PASS
Going to Sleep Until:	July 18, 2024 7:46 PM

Additional Site Notes:

Stantec Ground-Based Acoustic Bat Detector Datasheet

Site ID: 2	**Project Number:** 195603227	**Project Name:** Juniper Ridge Landfill	
	State: ME	**County:** Penobscot	**Acoustic Survey Type**
Site Selector: Laura Berube	**Lat:**44.98506104699033	**Long:**-68.72911184864148	Summer - Acoustic
Deployer: Laura Berube	**Notes:**		
Date Deployed: July 18, 2024			
Deploy Duration: 7			
Detector #: S4U00671			

Detector Setup

Detector Make:	Wildlife Acoustics	**Detector Model:**	SM4BAT FS	**Dist to Obstruct (m):**	10
Microphone Model:	SMM-U1	**Directionality:**	Omnidirectional	**Mic Height (AGL; m):**	3
Weatherproofing:	None	**Mic Angle:**	0 (parallel w/ ground)	**Call Data Type:**	Full Spectrum
Mic Direction (deg):	80	**In-Field Calibration:**	PASS	**Notes:** Tons of eagles and crows scavenging here, near the landfill	

HABITAT DESCRIPTION

VEGETATION CHARACTERISTICS

Habitat Type: Other

Canopy Closure (%): Open

Habitat Description: Clear cut between dirt road and mixed forest, next to the landfill. Ferns, gramminoids, and some regenerating hardwoods in clear cut.

Habitat Use:	Roosting, Foraging, Traveling

Habitat Notes: See above.

STREAM CHARACTERISTICS

Est. Distance to Water Source (m):	700
Type of Water:	Pond

Detector Startup Notes:

Detector Startup:

Memory A:	0/128
Memory B:	0/NA
Battery:	6.3
Mic 0:	U1
Cal Ch 0:	PASS
Going to Sleep Until:	July 18, 2024 7:46 PM

Additional Site Notes:

Attachment C – Resumes for Bat Analysis

Laura Berube

Project Environmental Scientist
13 years of experience ·Topsham, Maine

Laura is a Project Environmental Scientist for projects involving avian and bat studies for pre- and post-construction projects in eastern United States and Canada. Laura is a wildlife biologist and is proficient in acoustic bat analysis including manual vetting of rare and threatened species and the use of automated analysis programs: Kaleidoscope, BCID, EchoClass, and Sonobat. She has performed acoustic bat data analysis for projects ranging from West Virginia, United States, north to Newfoundland, Canada. Laura also has strong bird identification skills and the ability to identify bird species by both sight and sound. She has recently performed diverse avian studies for a number of renewable energy projects in the Northeastern United States, with field work including visual raptor surveys, eagle point count surveys, nocturnal migrant radar surveys, breeding bird surveys, and acoustic bat surveys. Laura is proficient in data management, analysis, summary, and vigorous QAQC for a variety of avian wildlife surveys.

Laura is also responsible for conducting vernal pool surveys and natural resource assessments and supporting wetland delineations to assist with the preparation of local, state, and federal permit applications. She has worked on a variety of natural community and rare plant surveys and projects ranging from general reconnaissance observations to quantitative community- and species-specific surveys. These projects have involved natural community mapping and analysis for transportation projects, utility corridors, and development sites.

PROFESSIONAL EXPERIENCE

• Stantec Consulting. 2010-present. Project Environemntal Scientist.
• University of Maine. 2009. Wildlife Department Field Assistant.

EDUCATION

Bachelor of Science, Wildlife Ecology, University of Maine, Orono, Maine, 2010

Bat Conservation and Management - Acoustic Data Management Workshop, Bat Survey Solutions, LLC - Janet Tyburec and John Chenger, Fairfield, Maine, 2015

Wilderness First Aid Certified, SOLO, Topsham, Maine, 2014

40-Hour HAZWOPER Certification, Topsham, Maine, 2014

OSHA 10-Hour Construction Certification, ClickSafety, Topsham, Maine, 2012

MEMBERSHIPS

Secretary/Treasurer, 2014-2019, The Wildlife Society, Maine

PROJECT EXPERIENCE

NATURAL RESOURCE SERVICES

Hand Analysis of Acoustic Bat Data | Topsham, Maine

Over ten years of experience conducting analysis of bat detector data to determine species of bats for multiple project sites in eastern United States and Canada. Analysis results were then provided to clients to assist with their project planning and permit applications in compliance with applicable local, state, and federal natural resource regulations.

Automated Program Analysis of Acoustic Bat Data | Topsham, Maine

Conducted analysis of bat detector data using Kaleidoscope, BCID, and Sonabat software to determine species of bats for multiple project sites for both passive acoustic bat surveys and presence/absence acoustic bat surveys targetting northern long-eared bat (*Myotis septentrionalis*) and Indiana bat (*Myotis sodalis*). Analysis results were provided to clients to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Solar and Infrastructure Update Projects | Vermont | Project Manager

Wrote the proposals and was Project Manager for proposed projects requiring northern long-eared bat surveys. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Post-construction Avian Fatality Monitoring at a Developed Wind Project | New Hampshire | Project Manager

Project Manager of the post-construction monitoring survey conducted at a developed wind project in New Hampshire. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client and applicable state and federal natural resource agencies to assist with the compliance of the permit.

Ichthyoplankton Sampling | Field Technician

Assisted in ichtyoplankton field sampling to characterize the marine egg and larvae community present and potentially susceptible to impingement and entrainment at the cooling water intake structure of a facility withdrawing cooling water from Penobscot Bay, in support of the Clean Water Act 316(b) for a confidential client. The results of the sampling will be included in 316b report and would be used to inform the design of the impingement control system to be eventually installed.

Proposed Wind Project | Maine | Project Manager

Project Manager for proposed wind project requiring pre-construction avian and wildlife surveys. Responsible for client and agency communication, managing of field staff and field survey completion, and the completion of final reports and delivery to client to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Proposed Wind Projects | Maine | Task Manager

Responsible for the staffing and scheduling of field surveys including visual raptor surveys, eagle point count surveys, breeding bird surveys, and acoustic bat surveys. Also responsible for task managing the completion of sections of the final reports to be delivered to clients to assist with their project planning and permit applications in compliance with applicable state and federal natural resource regulations.

Orangeville, Marsh Hill, and Sheldon Wind Projects, Post-Construction Monitoring | Western New York | Technician Supervisor

Supervised four post-construction monitoring technicians. Responsible for timecard and expense approval, tracking completion of safety trainings, and communicating with staff about needs while in the field.

Proposed Wind Project, Down East Maine

Conducted pre-construction wind project development surveys and impact assessments for a proposed wind project in Maine. These assessments included raptor surveys, eagle point count surveys, acoustic bat surveys, nocturnal radar surveys, and breeding bird surveys. Analyzed and reported on data for reporting purposes related to impact assessment and permitting efforts.

Agency Meeting and Site Visit for Proposed Wind Project, Down East Maine

Attended a pre-application agency consultation meeting for a proposed wind project in Down East Maine. Attended a site visit at proposed project area with client and agency representatives. Provided information on pre-construction wildlife field surveys conducted by Stantec at proposed wind project.

Rollins Wind Project Invasive Species Monitoring | Lincoln, Maine

Conducted invasive species surveys along a recently constructed transmission line right-of-way according to the standards and methods developed in the Invasive Species Management Plan.

Schedule Coordinator | Topsham, Maine

Proposed Linear Project | New Brunswick, Canada

Conducted surveys for rare, threatened, and endangered species of plants and wildlife, assessments of existing wildlife habitat values, and mapping of wetland and stream resources.

Proposed Wind Project, Western New York

Conducted eagle point count surveys to determine eagle locations and behavior in relation to proposed wind turbines. Assisted in survey design, mapping, and implementation. Preformed quality assurance and control on data to inform potential collision risk of eagles as a result of the project.

Bull Hill Wind Farm Post-Construction Monitoring, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras. Responsible for searcher efficiency trials, which involved the placement and monitoring of carcass retrieval by other surveyors.

Groton Wind Farm, Raptor Surveys, Breeding Bird Surveys, Nocturnal Migrant Radar Surveys | Grafton County, New Hampshire | Task Manager

Responsible for the staffing and scheduling of field surveys. Also responsible for task managing the completion of sections of the final report to be delivered to the client. Conducted raptor, breeding bird, and nocturnal migrant radar surveys.. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Record Hill Wind Farm Raptor Surveys, Roxbury, Maine

Conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Rollins Wind Farm Post-Construction Mortality Monitoring and Raptor Surveys, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Evaluated as having high searcher efficiency scores for the on-the-ground trials. Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras. Also conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Proposed Wind Project Bird and Bat Surveys, Coye Hill, Connecticut

Conducted pre-construction wind project development surveys and impact assessments for a proposed wind project in Connecticut. These assessments included raptor surveys, acoustic bat surveys, and breeding bird surveys.

Eastern Box Turtle Protection Plan and Construction, Brewster, Massachusetts

Conducted regular fence inspection in accordance with and NHESP-approved Eastern Box Turtle Protection Plan designed to protect box turtles in compliance with MESA during construction of a pump station development project. Responsible for documenting the presence of any box turtles in the vicinity of the fencing and reporting deficiencies in the fencing to appropriate personnel.

Stetson I and II Wind Farms Post-Construction Monitoring, Maine

Conducted bird and bat mortality ground searches (a requirement of utility-scale wind power developments in Maine). Evaluated as having high searcher efficiency scores for the on-the-ground trials. Responsible for scavenger surveys, which involved the placement and monitoring of carcasses and use of game cameras.

Oakfield Wind Project Avian Studies | Maine

Conducted raptor surveys to determine species, locations, and behavior in relation to proposed wind turbines. Analyzed data for reporting purposes related to impact assessment and permitting efforts.

Ecological Characterizations | Coos County, New Hampshire

Conducted surveys for rare, threatened, and endangered species of plants and wildlife, assessments of existing wildlife habitat values, and mapping of wetland and stream resources in a remote area of New Hampshire.

Data Manager | Topsham, Maine

Responsible for managing data related to bird and bat studies conducted by the office. Responsible for the retrieval, and placement of data to assist in effective report writing and limiting of possible liability.

Wind Project | Eastern Maine

Project scientist responsible for organization, progress, and safety of field staff through the field work phase (wetland delineations, vernal pool surveys, and other natural resource mapping) of large-scale wind power development. Responsible for data management and associated reporting of findings to accompany state and federal permit applications.

Beech Hill Wind Project | Aroostook County, Maine

Assisted in wetland delineations, vernal pool surveys, and Global Positioning System surveys for a proposed 34-turbine wind project and associated 67-mile transmission line. Identified streams and Wetlands of Special Significance based on the criteria in the Maine Department of Environmental Protection's Natural Resource Protection Act. Characterized wetland and waterbody resources based the U.S. Fish and Wildlife Service Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et. al 1979). Documented the biological and physical characteristics of potential vernal pool habitat based on the criteria of the Maine Department of Inland Fisheries and Wildlife.

Proposed Wind Project | Northern California

Analyzed crepuscular radar data targeting federally threatened and state endangered marbled murrelets (*Brachyramphus marmoratus)* and reviewed and managed acoustic bat survey data for reporting purposes related to impact assessment and permitting efforts.

Proposed Wind Project | Central Maine

Conducted wetland delineations, vernal pool surveys, and Global Positioning System surveys over an area totaling approximately 6,800 acres for a proposed 55-turbine wind project in Central Maine. Determined wetland boundaries using the technical criteria described in the U.S. Army Corps of Engineers Wetland Delineation Manual (Environmental Laboratory 1987). Identified streams and Wetlands of Special Significance based on the criteria in the Maine Department of Environmental Protection's Natural Resource Protection Act. Characterized wetland and waterbody resources based the U.S. Fish and Wildlife Service Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et. al 1979). Documented the biological and physical characteristics of potential vernal pool habitat based on the criteria of the Maine Department of Inland Fisheries and Wildlife.

Block Island Wind Farm, Offshore | Rhode Island

Conducted analysis of bat detector data using Kaleidoscope software and provided quality review of bat call determinations by the software to determine species of bats. Analysis results were provided to the client to assist with the project’s compliance of applicable state and federal natural resource regulations.

Natural Resource Advisory Role in Oil Spill Response | Large Interstate Oil Spill in Gulf of Mexico | 2010-present | Natural Resource Advisor

Natural Resource Advisor (NRA) conducting environmental oversight of oil spill cleanup activities in compliance with an emergency consultation under Section 7 of the Endangered Species Act. NRAs worked directly with operational cleanup crews to implement Best Management Practices (BMPs). These BMPs served as the formal technical guidance issued under the emergency consultation. The objective of this work was to minimize secondary impacts of the cleanup activities on protected resources, including sea turtles, migratory and nesting shorebirds, beach mice, mangrove wetlands, estuaries, coastal wetlands, and dune systems. Implemented BMPs and conducted surveys for piping plover and sea turtles within designated critical habitats. Conducted training and oversight of cleanup crews and prepared daily reports documenting NRA activities. Worked closely with cleanup operations to provide education on BMPs and documenting daily compliance for use in USFWS consultation process and evaluation of secondary impacts to protected resources as part of the Natural Resources Damage Assessment (NRDA).

Proposed Wind Project, Offshore | Northeast and Mid-Atlantic US

Conducted analysis of bat detector data using Kaleidoscope software and provided quality review of bat call determinations by the software to determine species of bats. Analysis results were provided to the client to assist with planning and permit applications in compliance with applicable state and federal natural resource regulations.

Trevor Peterson PhD

Project Manager, Senior Wildlife Biologist
26 years of experience · Topsham, Maine

Dr. Peterson is a senior wildlife biologist and project manager specializing in renewable energy projects, bird and bat migration, and rare species assessments. He focuses on solutions to quantify and manage turbine-related wildlife impacts at terrestrial and offshore commercial wind projects. Since joining the company in 2003, Trevor's project experience has included a wide range of wide range of wildlife surveys at proposed and existing wind projects, rare bat surveys, breeding bird surveys, raptor surveys, nocturnal radar surveys, vernal pool water quality and ecological monitoring, rare turtle telemetry and demographic studies, natural community characterization, and vegetation monitoring. He earned his PhD in Ecology and Environmental Sciences from the University of Maine for his research on the use of long-term acoustic bat data to study bat migration and predict and manage potential impacts from land-based and offshore wind projects. Before working at Stantec, Trevor worked seasonally for the National Park Service at Acadia National Park and Isle Royale National Park and as an island caretaker for the Maine Island Trail Association. Dr. Peterson serves as Stantec's technical lead for acoustic bat surveys, responsible for updating equipment, survey methods, and data analysis/reporting methods.

EDUCATION

AB, Biology/Environmental Studies, Summa cum Laude, Phi Beta Kappa, Bowdoin College, Brunswick, Maine, US, 2002

Semester Program in Costa Rica, Tropical Field Biology, Environmental Studies, and Spanish, Duke University, Durham, North Carolina, US, 2000

PhD Ecology and Environmental Sciences , University of Maine, Orono, ME, 2020

CERTIFICATIONS & TRAINING

Habitat Conservation Plan Training, US Fish and Wildlife Service National Conservation Training Center, Shepherdstown, WV, United States, 2010

MEMBERSHIPS

Member, Northeast Regional Migration Monitoring Network

Member, Northeast Bat Working Group

Member, The Wildlife Society, Maine, May 2011-present

PROJECT EXPERIENCE

RENEWABLE ENERGY, OFFSHORE

Tracking Bats using Nanotag Telemetry in the Gulf of Maine

Senior Biologist and Project Manager. Developed and implemented survey techniques to track bats along the Maine coast using nanotag technology. Constructed and installed 5 telemetry receivers along the coast to supplement an existing network of monitoring stations. Project was funded by Stantec and supported by federal, state, academic, and NGO partners.

Regional Offshore Acoustic Bat Monitoring | Gulf of Maine, mid-Atlantic, Great lakes

Senior Biologist and Project Manager. Developed and implemented survey techniques and data analysis for long-term (2009–2014) acoustic bat monitoring in the Gulf of Maine, mid-Atlantic, and Great Lakes. Surveys included long-term monitoring at over 40 locations including remote islands, offshore weather buoys, ships, and coastal sites. Project was funded by Stantec, the US Department of Energy, and supported by federal, state, academic, and NGO partners.

RENEWABLE ENERGY

Activity-based Informed Curtailment: Using Acoustics to Design and Validate Smart Curtailment at Wind Farms | US Department of Energy | 2019 - 2022 | Prinicipal Investigator

Dr. Peterson serves as the principal investigator for this multi-year study of the use of acoustic bat data recorded at wind turbines to design and evaluate activity-based informed curtailment alternatives designed to manage risk to bats with minimal loss of renewable energy generation.

Avian and Bat Surveys at New Creek Wind Energy Project | Grant County, West Virginia

Project Manager, Field Supervisor, Expert Witness. Managed pre-construction agency consultation and bird and bat surveys, and coordinated field efforts, including breeding bird surveys, raptor surveys, bat mist-netting surveys, bat telemetry surveys, acoustic bat surveys, carcass monitoring, and curtailment studies. Managed post-construction fatality monitoring and nacelle-height acoustic monitoring to design activity-based informed curtailment programs to reduce impacts to bats.

Avian and Bat Surveys at Laurel Mountain Wind Energy Project | AES | Randolph and Barbour Counties, West Virginia

Project Manager, Field Supervisor, Expert Witness. Conducted bird and bat field surveys within proposed wind project. Coordinated pre-construction and post-construction field efforts, including breeding bird surveys, raptor surveys, bat mist-netting surveys, acoustic bat surveys, carcass monitoring, and curtailment studies. Managed correspondence between the developer, operator, and state and federal wildlife agencies. Prepared survey reports, avian bird and bat risk assessment, testimony, and a site-specific Avian and Bat Protection Plan.

Pre-construction Avian and Bat Surveys at Proposed Wind Energy Project | Texas

Project Manager and Field Supervisor. Developed an innovative work scope to conduct a variety of field surveys focusing on assessing potential impacts to Mexican free-tailed bats and managed a variety of field surveys including nocturnal radar surveys, NEXRAD data analysis, acoustic bat monitoring, and visual night-vision surveys. Mr. Peterson also coordinated discussions between project developers, state wildlife agencies, and non-profit groups.

Avian and Bat Surveys at Armenia Mountain Wind Energy Project | AES | Tioga and Bradford Counties, Pennsylvania

Project Manager and Field Supervisor. Conducted bird and bat field surveys within proposed wind project. Coordinated field efforts, including breeding bird surveys, raptor surveys, bat mist-netting surveys, and acoustic bat surveys. Managed correspondence between the developer and state and federal wildlife agencies. Prepared survey reports and a site-specific bird and bat risk assessment for the project. Managed two years of post-construction monitoring according to Pennsylvania Game Commission protocols.

Post-construction Avian and Bat Mortality Monitoring at Forward and Lookout Wind Projects | Edison-Mission Energy | Somerset County, Pennsylvania

Project Manager and Field Supervisor. As the Project Manager for post-construction bird and bat mortality surveys at two of the first operational wind projects to participate in Pennsylvania's Voluntary Cooperative Wind Energy agreement, Mr. Peterson developed survey work scopes, and coordinated fieldwork for multiple years of monitoring, including daily mortality surveys, acoustic bat surveys, and diurnal raptor surveys. Mr. Peterson also coordinated project-related agency communications with state and federal wildlife agencies.

NATURAL RESOURCE SERVICES

Acoustic Bat Surveys: Proposed Road Corridors | Tennessee Department of Transportation | Tennessee

Technical and Field Supervisor. Conducted acoustic bat surveys in a variety of habitats within 67-kilometer long segments of multiple potential highway corridors within a National Forest for the Tennessee Department of Transportation. Completed data analysis and prepared survey reports.

Indiana Bat and Rare Bird Surveys at Proposed Wind Energy Project | Jefferson and Oswego Counties, New York

Project Manager and Field Supervisor. Coordinated multiple years of habitat evaluations, acoustic bat surveys, and radio telemetry surveys for Indiana bats at a proposed wind project in northwestern New York. Mr. Peterson also coordinated and conducted field surveys for breeding birds and rare birds within the area.

PUBLICATIONS & WHITEPAPERS

Peterson, T.. *Predicting and managing risk to bats at commercial wind farms using acoustics. A dissertation submitted in partial fulfillment of the requirements for the degree of doctor of philosophy, University of Maine.*, 2020.

Peterson, T.S., A. Uesugi, and J. Lichter. Tree recruitment limitation by introduced snowshoe hares, Lepus americanus, on Kent Island, New Brunswick. *Canadian Field Naturalist 119 (4). 569-572*, 2005.

Peterson, T.S., B. Mcgill, C.D. Hein, and A. Rusk. Acoustic exposure to turbine operation quantifies risk to bats at commercial wind energy facilities. . *Wildlife Society Bulletin*, 2021, pp. 552-565.

Johnson, J.S., J.D. Kiser, K.S. Watrous, and T.S. Peterson. Day-roosts of Myotis leibii in the Appalachian Ridge and Valley of West Virginia. *Northeastern Naturalist 18 (1): 95-106.*, 2011.

Peterson, T.S., S.K. Pelletier and M. Giovanni. Long-term bat monitoring on islands, offshore structures, and coastal Sites in the Gulf of Maine, mid-Atlantic, and Great Lakes - final report. *Prepared for the US Department of Energy*, 2016.

Peterson, T.S., S.K. Pelletier, S.A. Boyden, and K.S. Watrous. Offshore acoustic monitoring of bats in the Gulf of Maine. *Northeastern Naturalist 21(1): 86-107*, 2014.

October 21, 2024

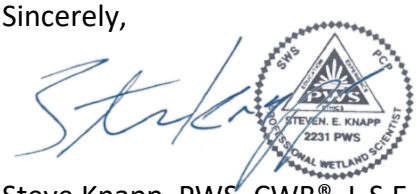
Lisa Turner, P.E., L.S.S
Project Manager
Sevee & Maher Engineers
4 Blanchard Road
Cumberland, ME 04021

RE: Juniper Ridge Landfill Rare, Threatened, and Endangered Species

In 2022, Biodiversity Research Institute (BRI) was retained by Sevee & Maher Engineers (SME) to complete regulated natural resource delineations on an approximately 144-acre survey area located at the Juniper Ridge Landfill in Old Town, Maine. As part of the site due diligence, inquiry letters were sent to the Maine Natural Areas Program (MNAP) on December 12, 2022 and the Maine Department of Inland Fisheries and Wildlife (MDIFW) on December 13, 2022, to identify any state listed rare, threatened, or endangered species that may occur within the Site. MNAP responded on December 12, 2022 and stated there are no rare botanical features documented specifically within the Project Site. The MDIFW responded on December 15, 2022 and specified that they have not mapped any Essential Habitats that would be directly affected by the Juniper Ridge Landfill expansion project.

Field surveys were completed on November 30 and December 1 and 6, 2022. Vernal pool surveys were completed in May of 2023. Wetland areas within the proposed development area were field verified during the growing season on May 24, 2024. While a targeted survey for rare, threatened, or endangered species was not included in our scope of work, BRI staff did not observe any rare or listed species during extensive survey work which occurred throughout the survey area. Information provided by the MNAP and MDIFW was reviewed and informed field crews on possible species that may occur based on habitat. None of these possible species were observed during field work completed in 2022, 2023, or 2024.

Sincerely,



Steve Knapp, PWS, CWB®, L.S.E
Senior Scientist
Biodiversity Research Institute

G-2

MAINE NATURAL AREAS PROGRAM—RARE SPECIES

SME
SEVEE & MAHER
ENGINEERS

December 7, 2022

Maine Natural Areas Program
177 State House Station Lane
Augusta, ME 04333-0177

RE: 0921 Juniper Ridge, ME, Maine Rare Species Site Review

To whom it may concern,

Biodiversity Research Institute (BRI) is performing a natural resource assessment of an approximately 176-acre survey area located at Juniper Ridge Landfill in Old Town, Maine (Site). The goal of this assessment is to identify regulated natural resources (i.e., wetlands, streams, and vernal pools) on Site to inform a proposed solar project. As part of the natural resource assessment, BRI is requesting information regarding the documented or potential presence of rare, threatened, or endangered plant species or other protected communities and habitats from the Maine Natural Areas Program.

We have included a shapefile of the Survey Area boundary to aid in your review. If you have any questions, please contact me at steve.knapp@brienvironmental.org or at 207-570-9462.

Respectfully submitted,

Steve Knapp
Senior Environmental Scientist
BRI Environmental

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
177 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

December 12, 2022

Steve Knapp
BRI Environmental
30 Danforth Street, Suite 213
Portland, ME 04101

Via email: steve.knapp@brienvironmental.org

Re: Rare and exemplary botanical features in proximity to: #0921, Juniper Ridge Landfill Expansion, Old Town, Maine

Dear Mr. Knapp:

I have searched the Maine Natural Areas Program's Biological and Conservation Data System files in response to your request received December 12, 2022 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Old Town, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

Our official response covers only botanical features. For authoritative information and official response for zoological features you must make a similar request to the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Augusta, Maine 04333.

According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. This lack of data may indicate minimal survey efforts rather than confirm the absence of rare botanical features. You may want to have the site inventoried by a qualified field biologist to ensure that no undocumented rare features are inadvertently harmed.

If a field survey of the project area is conducted, please refer to the enclosed supplemental information regarding rare and exemplary botanical features documented to occur in the vicinity of the project site. The list may include information on features that have been known to occur historically in the area as well as recently field-verified information. While historic records have not been documented in several years, they may persist in the area if suitable habitat exists. The enclosed list identifies features with potential to occur in the area, and it should be considered if you choose to conduct field surveys.

This finding is available and appropriate for preparation and review of environmental assessments, but it is not a substitute for on-site surveys. Comprehensive field surveys do not exist for all natural areas in Maine, and in the absence of a specific field investigation, the Maine Natural Areas Program cannot provide a definitive statement on the presence or absence of unusual natural features at this site.

MOLLY DOCHERTY, DIRECTOR
MAINE NATURAL AREAS PROGRAM
BLOSSOM LANE, DEERING BUILDING

DEPARTMENT OF Agriculture Conservation & Forestry

PHONE: (207) 287-804490
WWW.MAINE.GOV/DACF/MNAP

The Maine Natural Areas Program (MNAP) is continuously working to achieve a more comprehensive database of exemplary natural features in Maine. We would appreciate the contribution of any information obtained should you decide to do field work. MNAP welcomes coordination with individuals or organizations proposing environmental alteration or conducting environmental assessments. If, however, data provided by MNAP are to be published in any form, the Program should be informed at the outset and credited as the source.

The Maine Natural Areas Program has instituted a fee structure of $75.00 an hour to recover the actual cost of processing your request for information. You will receive an invoice for $150.00 for two hours of our services.

Thank you for using MNAP in the environmental review process. Please do not hesitate to contact me if you have further questions about the Natural Areas Program or about rare or unique botanical features on this site.

Sincerely,

Lisa St. Hilaire

Lisa St. Hilaire | Information Manager | Maine Natural Areas Program
207-287-8044 | lisa.st.hilaire@maine.gov

Rare and Exemplary Botanical Features within 4 miles of
Project: #0921, Juniper Ridge Landfill Expansion, Old Town, ME

Common Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Awned Flatsedge						
	SC	S2	G5	1942-09-09	1	Non-tidal rivershore (non-forested, seasonally wet)
	SC	S2	G5	1899-09-18	7	Non-tidal rivershore (non-forested, seasonally wet)
Button Sedge						
	SC	S2	G5	1983-08-12	1	
Domed Bog						
		S3	GNR	2014-08-26	6	
Dwarf Shrub Bog						
		S5	G5	2008-09-09	50	
Fall Fimbry						
	SC	S2S3	G5	1899-09-18	14	Open wetland, not coastal nor rivershore (non-forested,
Long-leaved Bluet						
	SC	S2S3	G5TNR	2010-07-13	4	Non-tidal rivershore (non-forested, seasonally wet)
MacGregor's Rye						
	SC	S2	G5	2014-08-19	7	
New England Violet						
	SC	S2	G4	1916-07-01	9	Non-tidal rivershore (non-forested, seasonally wet)
	SC	S2	G4	2010-07-13	10	Non-tidal rivershore (non-forested, seasonally wet)
	SC	S2	G4	1934-10-24	11	Non-tidal rivershore (non-forested, seasonally wet)
Orono Sedge						
	T	S3	G3	1997-07-17	4	Old field/roadside (non-forested, wetland or upland)
	T	S3	G3	1987-06-08	9	Old field/roadside (non-forested, wetland or upland)
	T	S3	G3	2011-07-25	33	Old field/roadside (non-forested, wetland or upland)
	T	S3	G3	1916-07-01	65	Old field/roadside (non-forested, wetland or upland)

Pale Green Orchis					
SC	S2	G4?T4Q	1933-07-06	5	Non-tidal rivershore (non-forested, seasonally wet),Open
Raised Level Bog Ecosystem					
	S4	GNR	2009-07-09	14	
Ram's-head Lady's-slipper					
E	S1	G3	1886-05-30	5	Forested wetland,Hardwood to mixed forest (forest,
Rivershore Outcrop					
	S2	G3	2010-07-13	1	
Shining Ladies'-tresses					
T	S1	G4	1946-07-08	8	Non-tidal rivershore (non-forested, seasonally wet),Open
Showy Lady's-slipper					
SC	S3	G4G5	1943-07-09	22	Forested wetland,Open wetland, not coastal nor
Silver Maple Floodplain Forest					
	S3	GNR	2010-07-13	37	
	S3	GNR	2014-06-16	46	
	S3	GNR	2014-06-16	46	
	S3	GNR	2014-09-03	51	
Sparse-flowered Sedge					
SC	S3	G5	1982-08-30	3	Forested wetland,Open wetland, not coastal nor
Swarthy Sedge					
E	S2	G5	1916-07-01	1	Rocky coastal (non-forested, upland)
Unpatterned Fen Ecosystem					
	S5	GNR	2009	8	

Date Exported: 2022-12-12 17:27

Conservation Status Ranks

State and Global Ranks: This ranking system facilitates a quick assessment of a species' or habitat type's rarity and is the primary tool used to develop conservation, protection, and restoration priorities for individual species and natural habitat types. Each species or habitat is assigned both a state (S) and global (G) rank on a scale of critically imperiled (1) to secure (5). Factors such as range extent, the number of occurrences, intensity of threats, etc., contribute to the assignment of state and global ranks. The definitions for state and global ranks are comparable but applied at different geographic scales; something that is state imperiled may be globally secure.

The information supporting these ranks is developed and maintained by the Maine Natural Areas Program (state ranks) and NatureServe (global ranks).

Rank	Definition
S1 **G1**	**Critically Imperiled** – At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
S2 **G2**	**Imperiled** – At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3 **G3**	**Vulnerable** – At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4 **G4**	**Apparently Secure** – At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5 **G5**	**Secure** – At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
SX **GX**	**Presumed Extinct** – Not located despite intensive searches and virtually no likelihood of rediscovery.
SH **GH**	**Possibly Extinct** – Known from only historical occurrences but still some hope of rediscovery.
S#S# **G#G#**	**Range Rank** – A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem.
SU **GU**	**Unrankable** – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
GNR **SNR**	**Unranked** – Global or subnational conservation status not yet assessed.
SNA **GNA**	**Not Applicable** – A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., non-native species or ecosystems.
Qualifier	**Definition**
S#? **G#?**	**Inexact Numeric Rank** – Denotes inexact numeric rank.
Q	**Questionable taxonomy that may reduce conservation priority** – Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable. The "Q" modifier is only used at a global level.
T#	**Infraspecific Taxon (trinomial)** – The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

State Status: Endangered and Threatened are legal status designations authorized by statute. Please refer to MRSA Title 12, §544 and §544-B.

Status	Definition
E	**Endangered** – Any native plant species in danger of extinction throughout all or a significant portion of its range within the State or Federally listed as Endangered.
T	**Threatened** – Any native plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range in the State or Federally listed as Threatened.
SC	**Special Concern** – A native plant species that is rare in the State, but not rare enough to be considered Threatened or Endangered.
PE	**Potentially Extirpated** – A native plant species that has not been documented in the State in over 20 years, or loss of the last known occurrence.

Element Occurrence (EO) Ranks: Quality assessments that designate viability of a population or integrity of habitat. These ranks are based on size, condition, and landscape context. Range ranks (e.g., AB, BC) and uncertainty ranks (e.g., B?) are allowed. The Maine Natural Areas Program tracks all occurrences of rare plants and natural communities/ecosystems (S1-S3) as well as exemplary common natural community types (S4-S5 with EO ranks A/B).

Rank	Definition
A	**Excellent** – Excellent estimated viability/ecological integrity.
B	**Good** – Good estimated viability/ecological integrity.
C	**Fair** – Fair estimated viability/ecological integrity.
D	**Poor** – Poor estimated viability/ecological integrity.
E	**Extant** – Verified extant, but viability/ecological integrity not assessed.
H	**Historical** – Lack of field information within past 20 years verifying continued existence of the occurrence, but not enough to document extirpation.
X	**Extirpated** – Documented loss of population/destruction of habitat.
U	**Unrankable** – Occurrence unable to be ranked due to lack of sufficient information (e.g., possible mistaken identification).
NR	**Not Ranked** – An occurrence rank has not been assigned.

Visit the Maine Natural Areas Program website for more information
http://www.maine.gov/dacf/mnap

maine DEPARTMENT OF Agriculture Conservation & Forestry
NATURAL AREAS

G-3

MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE—RARE SPECIES

SME
SEVEE & MAHER
ENGINEERS

December 14, 2022

Maine Department of Inland Fisheries and Wildlife
41 State House Station Lane
Augusta, ME 04333-0041

RE: 0921 Juniper Ridge, ME, Maine Rare Species Site Review

To whom it may concern,

Biodiversity Research Institute (BRI) is performing a natural resource assessment of an approximately 176-acre survey area located at Juniper Ridge Landfill in Old Town, Maine (Site). The goal of this assessment is to identify regulated natural resources (i.e., wetlands, streams, and vernal pools) on Site to inform a proposed landfill expansion project. As part of the natural resource assessment, BRI is requesting information regarding the documented or potential presence of rare, threatened, or endangered plant species or other protected communities and habitats from the Maine Department of Inland Fisheries and Wildlife.

We have included a shapefile of the Survey Area boundary to aid in your review. If you have any questions, please contact me at steve.knapp@brienvironmental.org or at 207-570-9462.

Respectfully submitted,

Steve Knapp
Senior Environmental Scientist
BRI Environmental

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

December 15, 2022

Steve Knapp
Biodiversity Research Institute
276 Canco Road
Portland, ME 04103

RE: Information Request – Juniper Ridge Landfill Expansion Project, Old Town

Dear Steve:

Per your request received on December 13, 2022, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and inland fisheries habitat concerns within the vicinity of the *Juniper Ridge Landfill Expansion* project in Old Town.

Our Department has not mapped any Essential Habitats that would be directly affected by your project.

Endangered, Threatened, and Special Concern Species

Bat Species – Of the eight species of bats that occur in Maine, the three *Myotis* species are protected under Maine's Endangered Species Act (MESA) and are afforded special protection under 12 M.R.S §12801 - §12810. The three *Myotis* species include little brown bat (State Endangered), northern long-eared bat (State Endangered), and eastern small-footed bat (State Threatened). The five remaining bat species are listed as Special Concern: big brown bat, red bat, hoary bat, silver-haired bat, and tri-colored bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence it is likely that several of these species occur within the project area during migration and/or the breeding season. However, our Agency does not anticipate significant impacts to any of the bat species as a result of this project.

Wood Turtle - Occurrences of wood turtle, a State Species of Special Concern, have been documented within the vicinity of the search area of the proposed project. Wood turtles use a mix of aquatic and terrestrial habitats throughout the year including riparian meadows, shrub thickets, farmland, and deciduous forests as well as bogs, forested wetlands, vernal pools, and streams. If these habitats are present in the project area, we recommend that they be avoided and adequately buffered with a 300-foot undisturbed, intact vegetative cover.

Significant Wildlife Habitat

Significant Vernal Pools - A mapped Significant Vernal Pool, a Significant Wildlife Habitat under Maine's Natural Resources Protection Act, occurs within the project review area; however, it is unclear if formal surveys for vernal pools have been conducted for the entire project area. If not, we recommend that surveys for vernal pools be conducted within the project boundary by qualified wetland scientists prior to final project design to determine whether there are other Significant Vernal Pools present in the area. These surveys should extend up to 250 feet beyond the anticipated project footprint because of

potential performance standard requirements for off-site Significant Vernal Pools, assuming such pools are located on land owned or controlled by the applicant. Once surveys are completed, survey forms should be submitted to our Agency for review well before to the submission of any necessary permits. Our Department will need to review and verify any vernal pool data prior to final determination of significance.

Fisheries Habitat

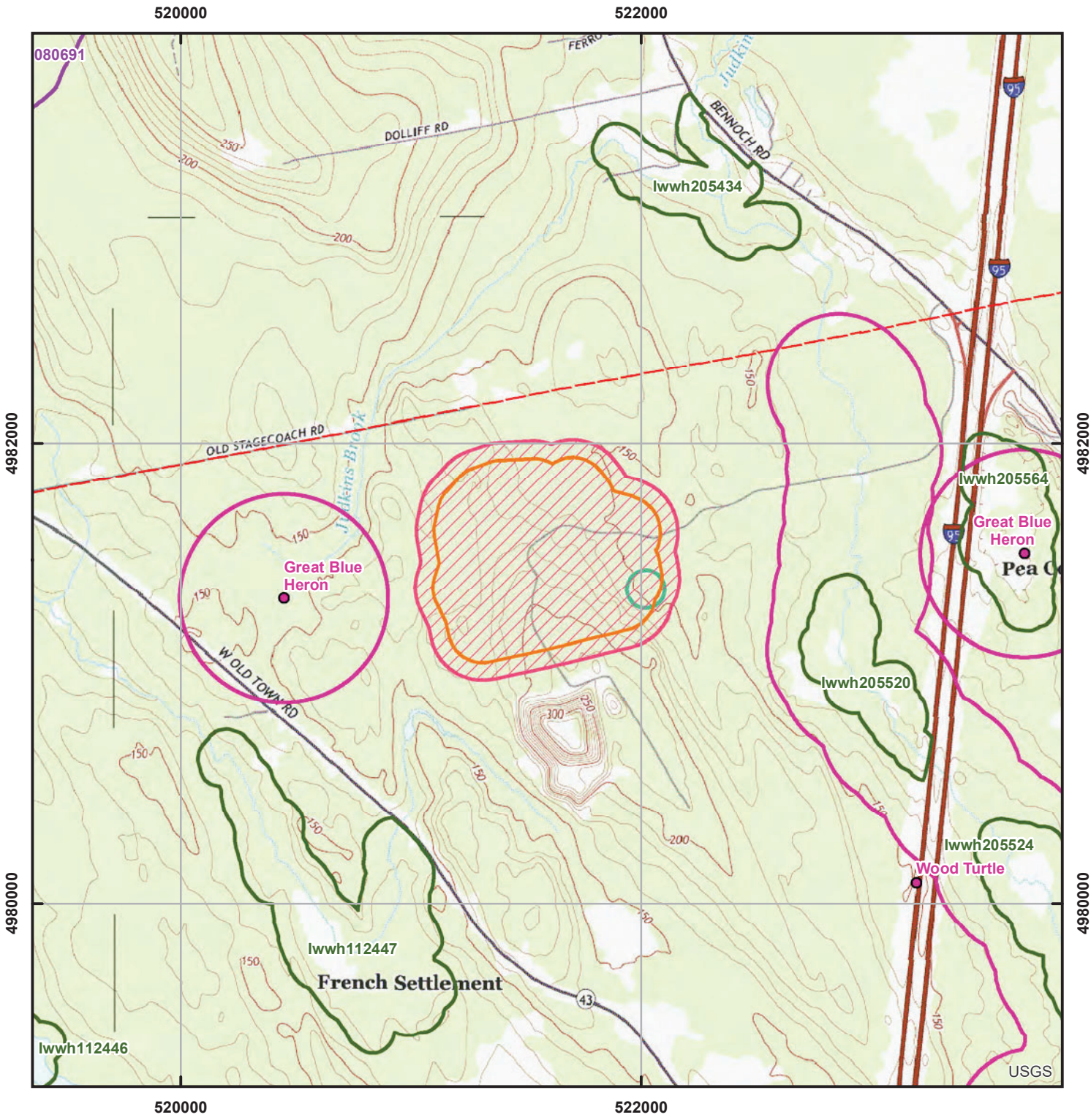
We generally recommend maintaining 100-foot undisturbed vegetated buffers from the upland edge of all intermittent and perennial streams and any contiguous wetlands. Maintaining and enhancing buffers along these resources is critical to the protection of water temperatures, water quality, natural inputs of coarse woody debris, and various forms of aquatic life necessary to support fish and other aquatic species. Riparian buffers also provide critical habitat and important travel corridors for a variety of wildlife species. Stream crossings should be avoided, but if a stream crossing is necessary, or an existing crossing needs to be modified, it should be designed to provide for full aquatic passage. Small streams, including intermittent streams, can provide crucial rearing habitat, cold water for thermal refugia, and abundant food for juvenile salmonids on a seasonal basis. Undersized crossings may inhibit these functions and become a frequent maintenance problem that causes reoccurring damage to the resource. Generally, MDIFW recommends that all new, modified, and replacement stream crossings be sized to span at least 1.2 times the bankfull width of the stream. In addition, we generally recommend that stream crossings be open bottomed (i.e. natural bottom), although embedded structures which are backfilled with representative streambed material have been shown to be effective in providing habitat connectivity for fish and other aquatic organisms. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts as eroding soils can travel significant distances as well as transport other pollutants resulting in direct impacts to fish, other aquatic life, and their habitats. In addition, we recommend that any necessary instream work occur between July 15 and October 1.

This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance we recommend additional consultation with the municipality, and other state resource agencies including the Maine Natural Areas Program, Maine Department of Marine Resources, and Maine Department of Environmental Protection in order to avoid unintended protected resource disturbance.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

Becca Settele
Wildlife Biologist



Environmental Review of Fish and Wildlife Observations and Priority Habitats

Project Name: Juniper Ridge Landfill Expansion, Old Town (Version 1)

Maine Department of Inland Fisheries and Wildlife

0 0.125 0.25 0.5 0.75 1 Miles

Projection: UTM, NAD83, Zone 19N

Date: 12/15/2022

- ProjectSearchAreas - All Versions
- Maine Cliff and Talus Areas
- Deer Winter Area
- LUPC p-fw
- Cooperative DWAs
- Seabird Nesting Islands
- Shorebird Areas
- Inland Waterfowl and Wading Bird
- 2008 Iwwh - Shoreland Zoning
- Tidal Waterfowl and Wading Bird
- Significant Vernal Pools
- Environmental Review Polygons
- Roseate Tern
- Piping Plover and Least Tern
- Aquatic ETSc - 2.5 mi review
- Rare Mussels - 5 mi review
- Maine Heritage Fish Waters
- Arctic Charr Habitat
- Redfin Pickerel and Swamp Darter Habitats - buffer100ft
- Special Concern occupied habitats - 100ft buffer
- Wild Lake Trout Habitats

G-4

MAINE HISTORIC PRESERVATION COMMISSION

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

RECEIVED
MAY 21 2024
By 0975-24

May 20, 2023

VIA EMAIL

Kirk F. Mohney, Director
Maine Historic Preservation Commission

Email: kirk.mohney@maine.gov

Subject: Juniper Ridge Landfill Expansion, Old Town, Maine

Dear Kirk:

The State of Maine acting through the Bureau of General Services is seeking approval for expansion of Juniper Ridge Landfill (JRL) in Old Town, Maine under a Maine Department of Environmental Protection (MEDEP) Secure Landfill Permit. We are requesting a review by the Maine Historic Preservation Commission to support the MEDEP permit application.

PROJECT DESCRIPTION

The Bureau of General Services is proposing a 61-acre expansion on the existing parcel of land in Old Town, Maine. The proposed construction area is primarily undeveloped forested land with an existing access road surrounding the proposed work area. The existing landfill and proposed work area is accessed off Bennoch Road (Route 16). It is understood that the intention is to clear, stump, and grub the entire proposed area for installation of the landfill expansion. The project location is outlined in the attached Figure 1 – Site Location Map.

HISTORICAL FINDINGS

A search of the National Register of Historic Places online maps did not identify any historic places within 2 miles of the parcel.

In addition to searching the National Register of Historic Places, records of neighboring properties within 1,000 feet were searched for any buildings over fifty (50) years old. Five properties were identified. All properties with such buildings and year built are listed below. Historic Building Survey Forms and photographs of the structures are attached to this letter.

- 549 West Old Town Road (1950)
- 584 West Old Town Road (1940)
- 631 West Old Town Road (1950)

SME
SEVEE & MAHER
ENGINEERS

- 649 West Old Town Road (1950)
- 655 West Old Town Road (1973)

Please feel free to contact me at 207.829.5016 or Lisa.Turner@smemaine.com if you have any questions or need additional information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Lisa Turner, P.E., L.S.S.
Project Manager

Attachments:

Figure 1 – Site Location Map
Historic Building Survey Forms

Based on the information submitted, I have concluded that there will be no historic properties affected by the proposed undertaking, as defined by Section 106 of the National Historic Preservation Act. Consequently, pursuant to 36 CFR 800.4(d)(1), no further Section 106 consultation is required unless additional resources are discovered during project implementation pursuant to 36 CFR 800.13.

Kirk F. Mohney, 6/5/24
Kirk F. Mohney, Date
State Historic Preservation Officer
Maine Historic Preservation Commission

MHPC # 0975-24

G-5

MAINE BUREAU OF LAND RESOURCES – VERNAL POOL SIGNIFICANCE DETERMINATION

SME
SEVEE & MAHER
ENGINEERS

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

July 31, 2023

Steve Knapp
Biodiversity Research Institute
30 Danforth Street, Suite 213
Portland, ME 04101

Re: Vernal Pool Significance Determination, Pool ID #s 5200, 5203, 5204, 5205, 5206, 5201, 5202–Old Town

Dear Steve Knapp:

Vernal pools are temporary to semi-permanent wetlands occurring in shallow depressions that typically fill during the spring and dry during the summer or in drought years. They provide important breeding and foraging habitat for a wide variety of specialized wildlife species including several rare, threatened, and endangered species.

Based on your field surveys, it has been determined that the vernal pools identified above on the property of Bureau of General Services are NOT SIGNIFICANT because either: 1. the features do not meet the definition of a vernal pool under the Significant Wildlife Habitat rules, 06-096 CMR 335(9) or 2. the vernal pools do not meet the biological standards for exceptional wildlife use of the Significant Wildlife Habitat rules, 06-096 CMR 335(9)(B). Therefore, activities within 250 feet of the pools are not regulated under the Natural Resources Protection Act (NRPA) unless there are other protected natural resources nearby such as streams or freshwater wetlands. I have attached a copy of the database printout that verifies the State's findings with respect to your surveys.

I want to also advise you that the pool areas on the property can be considered freshwater wetlands and therefore direct pool alterations may require permitting under the NRPA.

The Department will notify the landowner of the pool status under separate cover. If you have any questions or need further clarification, please contact Mark Stebbins at 207-592-4810 or email at: Mark.N.Stebbins@maine.gov

Sincerely,

Robert Wood
Director, Bureau of Land Resources

cc. town file

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
207-941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

WEBSITE: www.maine.gov/dep

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

July 31, 2023

Steve Knapp
Biodiversity Research Institute
30 Danforth Street, Suite 213
Portland, ME 04101

Re: Vernal Pool Significance Determination, Pool ID # 5199–Old Town

Dear Steve Knapp:

Vernal pools are temporary to semi-permanent wetlands occurring in shallow depressions that typically fill during the spring and dry during the summer or in drought years. They provide important breeding and foraging habitat for a wide variety of specialized wildlife species including several rare, threatened, and endangered species.

Based on your field survey, it has been determined that the vernal pool identified above on the property of Bureau of General Services is SIGNIFICANT. I have attached a copy of the database printout that verifies the State's findings with respect to our survey.

As a significant vernal pool, all areas on the Bureau of General Services property within 250 feet of the vernal pool depression, known as the "critical terrestrial habitat", will be subject to the requirements of the Natural Resources Protection Act, 38 M.R.S.A. §§480-A to 480-FF, and the Significant Wildlife Habitat rules, 06-096 CMR 335.

The Department will ensure that the vernal pool's location and status is entered and mapped in the State's vernal pool database. Note that if the pool depression (only) crosses two or more property boundaries the abutter(s) are similarly subject to the requirements of the Natural Resources Protection Act and the Significant Wildlife Habitat rules.

The Department will notify the landowner of the pool status under separate cover. If you have any questions or need further clarification, please contact Mark Stebbins at 207-592-4810 or email at: Mark.N.Stebbins@maine.gov

Sincerely,

Robert Wood
Director, Bureau of Land Resources

cc. town file

IFW Recommendations for Significant Vernal Pool Determinations

The following is a list of pools and IFW's recommendations for whether or not they qualify as Significant Vernal Pools, one of Maine's Significant Wildlife Habitats.

Data current as of: Monday, July 31, 2023

IFW's Pool ID: 5199 Twp: Old Town
Observer's ID: VP-KV-01
UTM Coordinates of Pool Center: 521590 E, 4981869 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023
IFW's Recommendation: GREEN: SIGNIFICANT
IFW Comments: Pool provides significant habitat for spotted salamanders.

IFW's Pool ID: 5200 Twp: Old Town
Observer's ID: VP-SK-01
UTM Coordinates of Pool Center: 521974 E, 4981657 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments: Pool provides some habitat for wood frogs and spotted salamanders but does not meet biological criteria for significance.

IFW's Pool ID: 5201 Twp: Old Town
Observer's ID: VP-SK-02
UTM Coordinates of Pool Center: 521977 E, 4981691 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the vernal pool definition
IFW Comments: Pool provides some habitat for wood frogs and significant habitat for spotted salamanders but does not meet MDEP vernal pool definition (permanent inlet and outlet)

IFW's Pool ID: 5202 Twp: Old Town
Observer's ID: VP-SK-03
UTM Coordinates of Pool Center: 521988 E, 4981713 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the vernal pool definition
IFW Comments: Pool provides some habitat for spotted salamanders but does not meet biological criteria for significance. Pool also does not meet MDEP vernal pool definition (permanent inlet and outlet).

IFW's Pool ID: 5203 Twp: Old Town
Observer's ID: VP-SK-04
UTM Coordinates of Pool Center: 521966 E, 4981740 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments: Pool provides some habitat for spotted salamanders but does not meet biological criteria for significance.

IFW Recommendations for Significant Vernal Pool Determinations

The following is a list of pools and IFW's recommendations for whether or not they qualify as Significant Vernal Pools, one of Maine's Significant Wildlife Habitats.

Data current as of: Monday, July 31, 2023

IFW's Pool ID: 5204 Twp: Old Town
Observer's ID: VP-SK-05
UTM Coordinates of Pool Center: 521936 E, 4981734 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments: Pool provides some habitat for wood frogs and spotted salamanders but does not meet biological criteria for significance.

IFW's Pool ID: 5205 Twp: Old Town
Observer's ID: VP-SK-06
UTM Coordinates of Pool Center: 521783 E, 4981758 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments:

IFW's Pool ID: 5206 Twp: Old Town
Observer's ID: VP-SK-07
UTM Coordinates of Pool Center: 521768 E, 4981760 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments:

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

July 31, 2023

Steve Knapp
Biodiversity Research Institute
30 Danforth Street, Suite 213
Portland, ME 04101

Re: Vernal Pool Significance Determination, Pool ID # 5199–Old Town

Dear Steve Knapp:

Vernal pools are temporary to semi-permanent wetlands occurring in shallow depressions that typically fill during the spring and dry during the summer or in drought years. They provide important breeding and foraging habitat for a wide variety of specialized wildlife species including several rare, threatened, and endangered species.

Based on your field survey, it has been determined that the vernal pool identified above on the property of Bureau of General Services is SIGNIFICANT. I have attached a copy of the database printout that verifies the State's findings with respect to our survey.

As a significant vernal pool, all areas on the Bureau of General Services property within 250 feet of the vernal pool depression, known as the "critical terrestrial habitat", will be subject to the requirements of the Natural Resources Protection Act, 38 M.R.S.A. §§480-A to 480-FF, and the Significant Wildlife Habitat rules, 06-096 CMR 335.

The Department will ensure that the vernal pool's location and status is entered and mapped in the State's vernal pool database. Note that if the pool depression (only) crosses two or more property boundaries the abutter(s) are similarly subject to the requirements of the Natural Resources Protection Act and the Significant Wildlife Habitat rules.

The Department will notify the landowner of the pool status under separate cover. If you have any questions or need further clarification, please contact Mark Stebbins at 207-592-4810 or email at: Mark.N.Stebbins@maine.gov

Sincerely,

Robert Wood
Director, Bureau of Land Resources

cc. town file

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
207-941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

WEBSITE: www.maine.gov/dep

G-6

US FISH AND WILDLIFE SERVICES – LIST OF THREATENED AND ENDANGERED SPECIES

SME
SEVEE & MAHER
ENGINEERS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
Phone: (207) 469-7300 Fax: (207) 902-1588

In Reply Refer To: 09/17/2024 18:30:09 UTC
Project Code: 2024-0145257
Project Name: Juniper Ridge Landfill Expansion Project

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

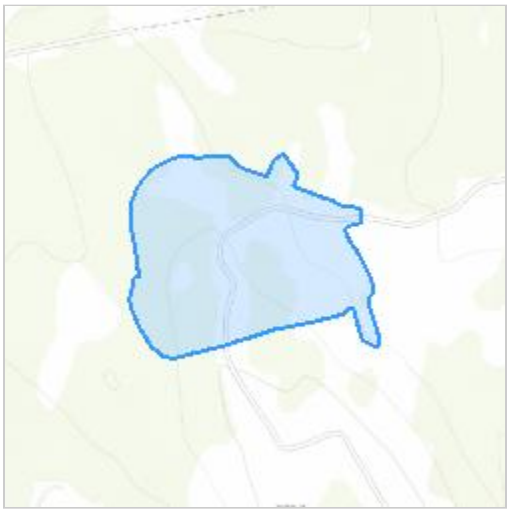
This species list is provided by:

Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
(207) 469-7300

PROJECT SUMMARY

Project Code: 2024-0145257
Project Name: Juniper Ridge Landfill Expansion Project
Project Type: Landfill - Solid Waste
Project Description: Expansion of the Juniper Ridge Landfill in Old Town, Maine.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@44.9865896,-68.726113042305,14z



Counties: Penobscot County, Maine

ENDANGERED SPECIES ACT SPECIES

There is a total of 4 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

FISHES

NAME	STATUS
Atlantic Salmon *Salmo salar* Population: Gulf of Maine DPS There is **final** critical habitat for this species. Your location overlaps the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2097	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

There is 1 critical habitat wholly or partially within your project area under this office's jurisdiction.

NAME	STATUS
Atlantic Salmon *Salmo salar* https://ecos.fws.gov/ecp/species/2097#crithab	Final

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act[1] and the Migratory Bird Treaty Act[2].

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats[3], should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are likely bald eagles present in your project area. For additional information on bald eagles, refer to Bald Eagle Nesting and Sensitivity to Human Activity

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

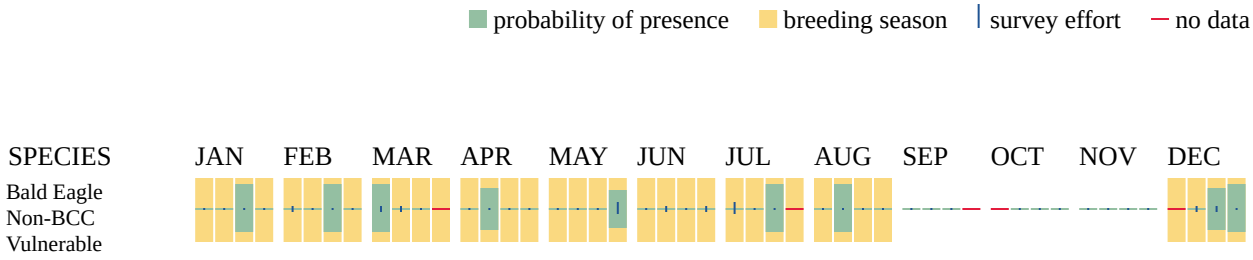
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described in the links below. Specifically, please review the "Supplemental Information on Migratory Birds and Eagles".

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the PROBABILITY OF PRESENCE SUMMARY below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Dec 1 to Aug 31
Black-billed Cuckoo *Coccyzus erythropthalmus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/10678	Breeds May 1 to Aug 20
Evening Grosbeak *Coccothraustes vespertinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9465	Breeds May 15 to Aug 10
Veery *Catharus fuscescens fuscescens* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/11987	Breeds May 15 to Jul 15

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

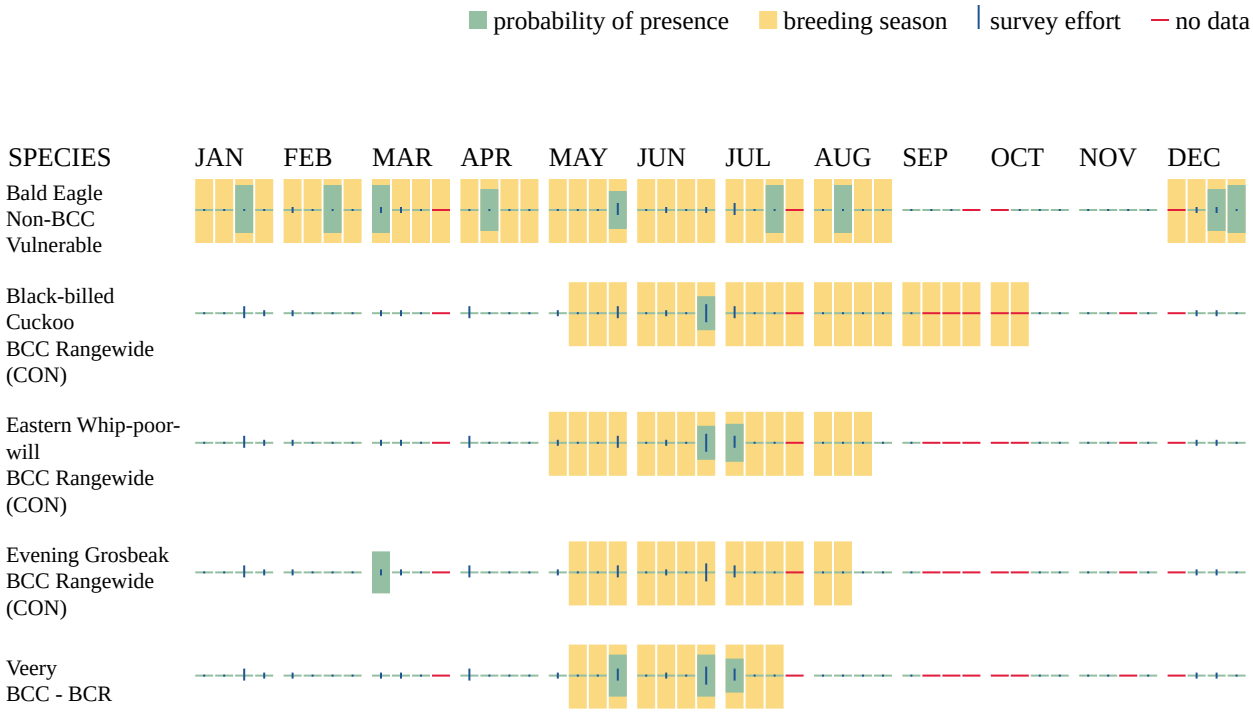
Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPAC USER CONTACT INFORMATION

Agency: Private Entity
Name: CHRIS VONDERWEIDT
Address: 30 PARK DRIVE
City: TOPSHAM
State: ME
Zip: 04086
Email christopher.vonderweidt@stantec.com
Phone: 2072407466

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Army Corps of Engineers

G-7

BRI NATURAL RESOURCES REPORT

SME
SEVEE & MAHER
ENGINEERS

Natural Resources Report

Juniper Ridge Landfill Project

Prepared by BRI Environmental

September 2024

Revised May 2025

Contents

Table of Contents

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Exhibits

Exhibit A: Location Map

Exhibit B: Natural Resources Map

Exhibit C: Natural Resources Photographs

Exhibit D: NRCS Soils Map

Exhibit E: USACE Wetland Determination Forms

Exhibit F: Vernal Pool Survey Forms

Exhibit G: Agency Consultation

1.0 Introduction

Biodiversity Research Institute (BRI) was retained by Sevee & Maher Engineers (SME) to complete regulated natural resource delineations on an approximately 144-acre survey area located at the Juniper Ridge Landfill in Old Town, Maine (Site). The Site is bisected by Juniper Ridge Landfill Road, which is located just south of Bennoch Road. The Site is located approximately two miles west of the Stillwater River on the parcel known as Tax Map 3, Lot 1 in Old Town, Maine. The survey area is shown in **Exhibit A**.

2.0 Geographic Setting

The Site is characterized by areas of large palustrine forested and scrub-shrub wetlands and a few palustrine emergent wetlands. Uplands are primarily forested with a mix of deciduous and coniferous tree species typical of the region. The Site is surrounded by undeveloped forestland and some residential buildings. A portion of the site is within a protective conservation deed restriction (**Exhibit A**).

The Site falls within the US Environmental Protection Agency's (EPA) Eco-region of the Penobscot Lowlands within the Acadian Plains and Hills. The EPA's description of the region is as follows:

The Penobscot Lowlands ecoregion is lower and flatter than surrounding ecoregions. A distinguishing characteristic is its deep fine sediments and many areas of wet flats with swamp and bog deposits. Glaciomarine sediments of silt, clay, sand, and gravel cover many of the flatter lower elevations, deposits formed from marine submergence of lowland areas, or where glacial meltwater streams entered the sea. Some alluvial deposition of deep, coarser sediments occurs along the Penobscot River. Fine and fine-silty, frigid Inceptisols, loamy Spodosols, and Histosols are typical. The region has a relatively moderate climate and diverse flora and fauna. Northern hardwoods and northern hardwoods-spruce forests are major forest types. Second-growth hemlock forests are common with scattered sugar maples, big-tooth aspen, paper birch, and white pine. Areas of red pine occur on some low ridges. Settlement and road patterns are less dense than in Central Maine Embayment to the west. The many open wetlands provide breeding habitat for wetland-dependent birds.[1]

[1] Ecoregions of New England http://ecologicalregions.info/data/vt/new_eng_front.pdf

3.0 Methods

Prior to the initial Site visit, BRI conducted a desktop review of publicly available data, which included the National Wetlands Inventory (NWI)[2], Natural Resources Conservation Service (NRCS) Soil Survey[3], Beginning with Habitat data (BWH)[4], topographic maps, and aerial photos. A natural resources survey was completed to formally map resources on Site using the methodologies described below. These methods represent the current standard of practice for the delineation of regulated natural resources.

3.1 Wetland Delineation

Wetlands on the Site were delineated according to the survey techniques described in the *1987 US Army Corps of Engineers Wetland Delineation Manual*[5] and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, v2.0*[6]. In areas where evidence of hydrology or hydrophytic plants were observed, samples of the soil profile were observed to further investigate evidence of saturated conditions within the upper part of the soil profile. Survey flags were hung along the wetland-upland boundaries. The flags were labeled with a unique alpha-numeric code and sequence denoting the resource type, delineator initials, wetland identification number, and flag number (e.g., W-KV-01-1, W-KV-01-02 etc.).

3.2 Stream Identification

The survey area was reviewed for conditions that meet the definition of river, stream, or brook. Mapped streams meet the definition described in Article 5-A of the Natural Resource Protection Act (NRPA)[7]. Where streams less than 6 feet in bank width were identified, survey flags were hung along the centerline of the stream. For streams with bank width equal to or greater than 6 feet, both banks (i.e., the ordinary high-water mark) of the stream were flagged. Flags were labeled with a unique alpha-numeric code and sequence denoting the resource type, delineator initials, stream identification number, and flag number (e.g., S-KV-01-1, S-KV-01-2 etc.).

3.3 Vernal Pool Survey

During the natural resources survey, potentially significant vernal pool surveys were completed based on methodologies described in detail in the *April 2014 Maine Association of Wetland Scientists Vernal Pool Technical Committee Vernal Pool Survey Protocol*[8]. Chapter 335 of the Maine Department of Environmental Protection (MDEP) NRPA includes the following definition of a vernal pool:

---

[2] U.S. Fish and Wildlife Service National Wetland Inventory Mapper https://www.fws.gov/wetlands/data/mapper.html

[3] U.S NRCS Web Soil Survey https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

[4] Maine Beginning with Habitat Online Mapper https://webapps2.cgis-solutions.com/beginningwithhabitat/

[5] US Army Corps of Engineers Wetland Delineation Manual (1987) https://www.nae.usace.army.mil/Portals/74/docs/regulatory/JurisdictionalLimits/wlman87.pdf

[6] US Army Corps of Engineers *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region, v2.0* https://www.nae.usace.army.mil/Portals/74/docs/regulatory/JurisdictionalLimits/RegionalSupplement2012.pdf

[7] Natural Resource Protection Act, Maine Statute Title 38, Chapter 3, subchapter 1, Article 5-A, §480-B http://www.mainelegislature.org/legis/statutes/38/title38sec480-B.html

[8] Maine Association of Wetland Scientist 2014 Vernal Pool Survey Protocol http://mainewetlands.org/vptc

*"A vernal pool, also referred to as a seasonal forest pool, is a natural, temporary to semi-permanent body of water occurring in a shallow depression that typically fills during the spring or fall and may dry during the summer. Vernal pools have no permanent inlet or outlet and no viable populations of predatory fish. A vernal pool may provide the primary breeding habitat for wood frogs (*Rana [Lithobates] sylvatica*), spotted salamanders (*Ambystoma maculatum*), blue-spotted salamanders (*Ambystoma laterale*), and fairy shrimp (*Eubranchipus *sp.), as well as valuable habitat for other plants and wildlife including several rare, threatened, and endangered species. A vernal pool intentionally created for the purposes of compensatory mitigation is included in this definition."*

The criteria for identifying a Significant Vernal Pool are described in detail in the April 2014 Maine Association of Wetland Scientists Vernal Pool Technical Committee Vernal Pool Survey Protocol[9]. This survey effort focuses on the requirements to meet Maine regulations[10] relating to vernal pools.

The first round of vernal pool surveys was initiated approximately two weeks following reports of full wood frog chorusing (as reported by local area wetland scientists). The Project site is located within the MDIFW Central Region which has a target window for vernal pool surveys conducted for salamander egg masses from April 25 to May 10. Potentially Significant Vernal Pools received a subsequent round of vernal pool surveys (i.e., secondary visits to surveyed pools to assess later breeding or emergence of vernal pool indicator species in naturally occurring pools) approximately two to three weeks after an appropriately timed first visit, depending on weather and reports from proximal field efforts regarding vernal pool activity. The MDIFW target window for secondary egg mass surveys will be between May 5 and May 25, depending on the timing of findings in the first survey.

If pools that appear to meet the definition of a potentially Significant Vernal Pool were encountered, scientists collected GPS points at the edge of the pool (during spring high water conditions). Pools were waded to search for vernal pool indicator species egg masses, presence of fairy shrimp, and/or associated rare, threatened, and endangered (RTE) species. The second round of vernal pools surveys were conducted to assess for later breeding vernal pool indicator species, the presence of fairy shrimp (which often do not emerge until late spring), and/or associated RTE species.

For vernal pools that extended beyond the Project boundary, efforts were made to visually survey the pool for the presence of egg masses to an approximate distance of no greater than 30 feet from the Project boundary. Photographs and notes regarding the potential full extent of these vernal pools (as much as can be ascertained in this manner) were collected. All vernal pools were

[9] MAWS 2014. Maine Association of Wetland Scientists Vernal Pool Technical Committee Vernal Pool Survey Protocol Available online at: http://mainewetlands.org/s/Complete-MAWS-2014-VP-Survey-Protocol v3 05142014-6zs7.pdf

[10] Maine Department of Environmental Protection Natural Resources Protection Act (38 M.R.S.A. §§480-A et seq.) and the Maine Significant Wildlife Habitat Rules (Chapter 335), available at: http://www.maine.gov/dep/land/nrpa/index.html

photographed from various angles. Representative photos of egg masses were taken. Shapefiles of the delineated vernal pool spring high water boundaries will be provided to SME upon completion of the work.

4.0 Results

Field surveys were completed on November 30 and December 1 and 6, 2022. Weather at the time of the survey ranged from sunny to partly cloudy. Temperatures ranged from 35°-45° F. Vernal pool surveys were completed in May of 2023. Wetland areas within the proposed development area were field verified during the growing season on May 24, 2024. **Exhibit B** includes the natural resources identified and mapped on the Site and **Exhibit C** includes representative photographs of mapped natural resources. The NRCS soil survey is included as **Exhibit D**.

4.1 Upland Habitats

Upland habitats on the Site are dominated by forestland that is characteristic of the Penobscot Lowland region. The overstory vegetation was dominated by red maple (*Acer rubrum*), Balsam fir (*Abies balsamea*), eastern hemlock (*Tsuga canadensis*), paper birch (*Betula papyrifera),* red oak (Q*uercus rubra*), white pine (*Pinus strobus*), bigtooth aspen (*Populus grandidentata*), and red spruce (*Picea rubens*). Shrub layer vegetation consisted of primarily overstory species as well as American beech (*Fagus grandifolia*). Herbaceous vegetation includes bracken fern (*Pteridium aquilinum*), Sheep laurel (*Kalmia angustifolia*), American wintergreen (*Gaultheria procumbens*), and bunchberry (*Cornus canadensis*).

There are three common soils on Site: Telos-Chesuncook complex, Monarda-Telos complex, and Pushaw-Swanville complex. Telos-Chesuncook complex ranges from poorly to moderately well-drained soils on till plains, hills, ridges, and mountains. They are shallow and very deep to bedrock. These soils formed in till and dense glacial till. The Monarda-Telos complex consists of poorly drained soils formed in dense till on lower slopes or in slight depressions on till plains, hills, and ridges. They are very deep to bedrock and shallow to dense till. The Pushaw-Swanville complex consists of very deep, somewhat poorly drained soils that formed in glaciolacustrine or glaciomarine deposits on lake plains and marine terraces. Representative upland soils on Site are characterized generally by 0-2” of 10YR 3/2 organic, 2-24” of 10YR 5/3 silt loam. Photo 1 show representative views of upland habitats on the Site.

Photo 1. Representative view of the uplands in the Site (November 30, 2022).

4.2 Wetland Habitats

Thirteen wetlands were delineated on the Site. Wetland W-KV-01 is the largest wetland on Site and is predominantly forested with scrub-shrub and emergent portions. The site is characterized by forested wetlands along the perimeter of the survey area. Within the central portion of the survey area, several smaller pockets of wetland are present.

The scrub-shrub wetlands are dominated by speckled alder (*Alnus* incana), winterberry (*Ilex verticillata*), highbush blueberry (*Vaccinium corymbosum*), balsam fir, maleberry (*Lyonia ligustrina*), witch hazel (*Hamamelis virginiana*), red spruce (*Picea rubens*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea* sensibilis), swamp dewberry (*Rubus hispidus*), woolgrass (*Scirpus cyperinus*), hop sedge (*Carex lupulina*), fringed sedge (*Carex crinita*), cattail (*Typha latifolia*), and Sphagnum moss. Emergent wetlands are dominated by cattail, white meadowsweet (*Spiraea alba*), steeplebush (*Spiraea tomentosa*), hop sedge, fringed sedge, fringed brome (*Bromus ciliatus*), wool grass, cinnamon fern, sensitive fern, swamp dewberry and the presence of random shrubs and trees including alder, paper birch, balsam fir and red maple.

Forested portions of the wetlands are characterized by eastern hemlock (*Tsuga canadensis*), balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), red spruce, paper birch (*Betula papyrifera*), gray birch (*Betula populifolia*), northern white-cedar (*Thuja occidentalis*) and white pine (*Pinus strobus*). The hydric soil indicator within these forested wetlands is typically a

depleted matrix. Photo 3 and 4 show representative views of wetland habitats identified on the Site. USACE Wetland Determination Forms are provided in **Exhibit E**.

Photo 2. Representative view of a scrub-shrub wetland on Site (W-KV-02) (December 1, 2022).

Photo 3. Representative view of a forested wetland on Site (W-KV-01) (December 1, 2022).

Table 1. Juniper Ridge Wetland Summary

Wetland ID	Wetland Type[11]	Wetland of Special Significance	Acreage
W-SK-01	PFO/PEM	Significant vernal pool; Floodplain	5.9
W-SK-01A	PEM*	No	1.7
W-SK-02	PFO*	No	0.08
W-SK-03	PEM*	No	0.27
W-SK-04	PFO/PSS	No	4.17
W-SK-06	PFO*	No	0.30
W-SK-09	PEM*	No	0.13
W-SK-10	PEM*	No	0.03
W-SK-11	PEM*	No	0.06
W-KV-01	PFO/PSS/PEM	Those portions of wetland within 25' of a stream; or within the floodplain	14.64
W-KV-02	PFO/PSS	Significant vernal pool; Floodplain	9.61
W-KV-03	PEM*	No	0.82
W-KV-04	PEM*	No	0.82
Total			**37.00**

*Wetland is either the result of historic landuse (i.e., created within an old road) or impacted by historic ground disturbance.

[11] PFO-Palustrine Forested Wetland, PSS-Palustrine Scrub-Shrub Wetland, PEM-Palustrine Emergent Wetland, PUB-Palustrine Unconsolidated Bottom Wetland

4.3 Streams and Aquatic Habitats

Three MDEP jurisdictional stream segments were identified on Site. Stream S-KV-01 is a small stream within the forested portions of Wetland W-KV-01. The other two streams, S-SK-01 and S-SK-02, are in wetland W-SK-01 and are small stream segments. These streams are the result of concentrated flows in areas with slightly more gradient allowing for the formation of scoured channels. Both streams segments originate in the forested portions of W-SK-01 and terminate prior to leaving the Site.

Photo 4. Representative view of stream S-SK-01 (November 30, 2022).

4.4 Vernal Pools

During the wetland delineation completed on November 30 and December 1 and 6, 2022, some potential pools were observed. These pools were identified outside of the amphibian breeding season and were subsequently surveyed during the 2023 breeding season. A total of eight (8) vernal pools were identified and one was recommended as significant. In addition, the MDIFW agency inquiry (Section 6.0) identified a pervious significant vernal pool which was identified by others during previous resource work. Vernal pools were visited on two separate occasions to capture potential breeding by both wood frogs and salamanders. Initial visits were made on May 3, 2023 and follow up visits on May 16, 2023. Table 2 includes a summary of the vernal pools identified on site. Vernal pool survey forms and MEDEP responses are included as **Exhibit F**. In the MDEP response, dated July 31, 2023, the MDIFW concurred with determinations made during

the field work completed in 2023 which identified one new significant vernal pool (SVP-KV-01) in addition to the significant pool identified by others (associated with wetland W-SK-01).

Table 2. Juniper Ridge Vernal Pool Summary

Vernal Pool ID	First Visit[12]					Second Visit					State Significant
	WF	YSS	BSS	Egg Mass Maturity [13]	Tadpoles	WF	YSS	BSS	Egg Mass Maturity	Tadpoles	
VP-SK-01	16	14	0	M/A/H	No	0	18	0	A	No	No
VP-SK-02	2	25	0	A/H	Yes	0	8	0	A	Yes	No
VP-SK-03	0	12	0	M/A	No	0	1	0	A	No	No
VP-SK-04	0	4	0	M/A	No	0	2	0	A	No	No
VP-SK-05	4	10	0	M/A	No	0	8	0	A	Yes	No
VP-SK-06	0	0	0	-	No	0	0	0	-	No	No
VP-SK-07	0	0	0	-	No	0	0	0	-	No	No
SVP-KV-01	0	35	0	-	No	-	-	-	-	No	Yes

5.0 Agency Consultation

Inquiry letters were sent to the Maine Natural Areas Program (MNAP) on December 12, 2022 and the Maine Department of Inland Fisheries and Wildlife (MDIFW) on December 13, 2022, to identify any rare, threatened, or endangered species that may occur within the Site. MNAP responded on December 12, 2022 and stated there are no rare botanical features documented specifically within the Project Site. The MDIFW responded on December 15, 2022 and specified that they have not mapped any Essential Habitats that would be directly affected by the Juniper Ridge Landfill expansion project. There was one previously identified significant vernal pool from previous resource work completed by others. They recommend formal vernal pool surveys since a significant Wildlife Habitat occurs within the project review area, this was done in the spring of 2023 and results are included in Section 4.4, and vernal pool data forms and MEDEP certification of vernal pools are included in **Exhibit F**. MNAP and MDIFW responses are included in **Exhibit G**.

6.0 Discussion

The center of the Site is dominated by uplands, with some small wetlands present. Within the Site there are also pre-existing gravel roads and historic haul roads which cross wetlands in a number of locations. The uplands in the central portions of the Site are mostly level terrain and consist of early successional forest or open manicured lawn. The largest wetland areas are located along the perimeter of the proposed expansion area and include expansive forested wetlands. The majority of the wetlands located within the central portion of the survey area are isolated and very disturbed by historic land-use activities. Within these smaller wetlands there is

[12] WF-Wood Frog Egg Masses, YSS- Yellow Spotted Salamander Egg Masses, BSS-Blue Spotted Salamander Egg Masses
[13] M – Mature egg mass; A- Advanced egg mass; H – Hatching egg mass

evidence of rutting, moving of soils, and placement of fill. In addition, some wetlands appear to be the direct result of old construction roads or haul roads. Wetlands W-SK-09 and W-SK-10 occur within upland areas and wetland indicators were only observed within the linear portion of the old haul road, it is likely that these wetlands are a direct result of that activity and therefore offer limited functions (Photo 5). Two wetlands and a portion of a third wetland identified on Site are wetlands considered Wetlands of Special Significance (WOSS), which have additional protections under NRPA. The wetland complex W-KV-02, containing significant pool VP-KV-01, as well as wetland W-SK-01, including the significant vernal pool identified in the MDIFW response, are both considered WOSS as they contain Essential Habitat and portions occur within the floodplain. A portion (within 25' of the stream) and areas of W-KV-01 within the floodplain are also considered a WOSS. As is described below there was significant work completed on the Juniper Ridge landfill around 2004. Part of this work included construction of a fence and associated ground disturbance. During this work, portions of wetland W-SK-01 were cleared of trees and the topsoil was bladed off in order to install the project perimeter fence. The result of this work resulted in a habitat break as well as modifications to hydrology associated with the fence installation and a utility right-of-way (ROW) (Photo 6).

Photo 6. View of W-SK-09 which occurs entirely within an old access road (May 34, 2024).

Photo 7. View of habitat break associated with installed fence and utility line in W-SK-01A (November 30, 2022).

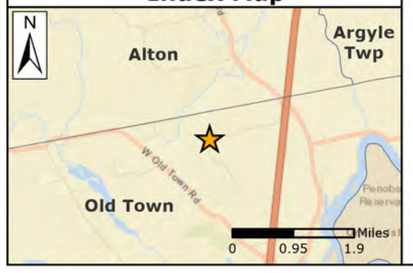
Exhibit A:

Location Map

N

Juniper Ridge Landfill Road

Index Map



Legend

Potentially Developable Area

Proposed Survey Area (500-ft Buffer off Potentially Developable Area)

BIODIVERSITY RESEARCH INSTITUTE
innovative wildlife science

Scale

0 495 990 Feet

1:6,000 when printed on 11 inch by 17 inch media

Project Overview Map

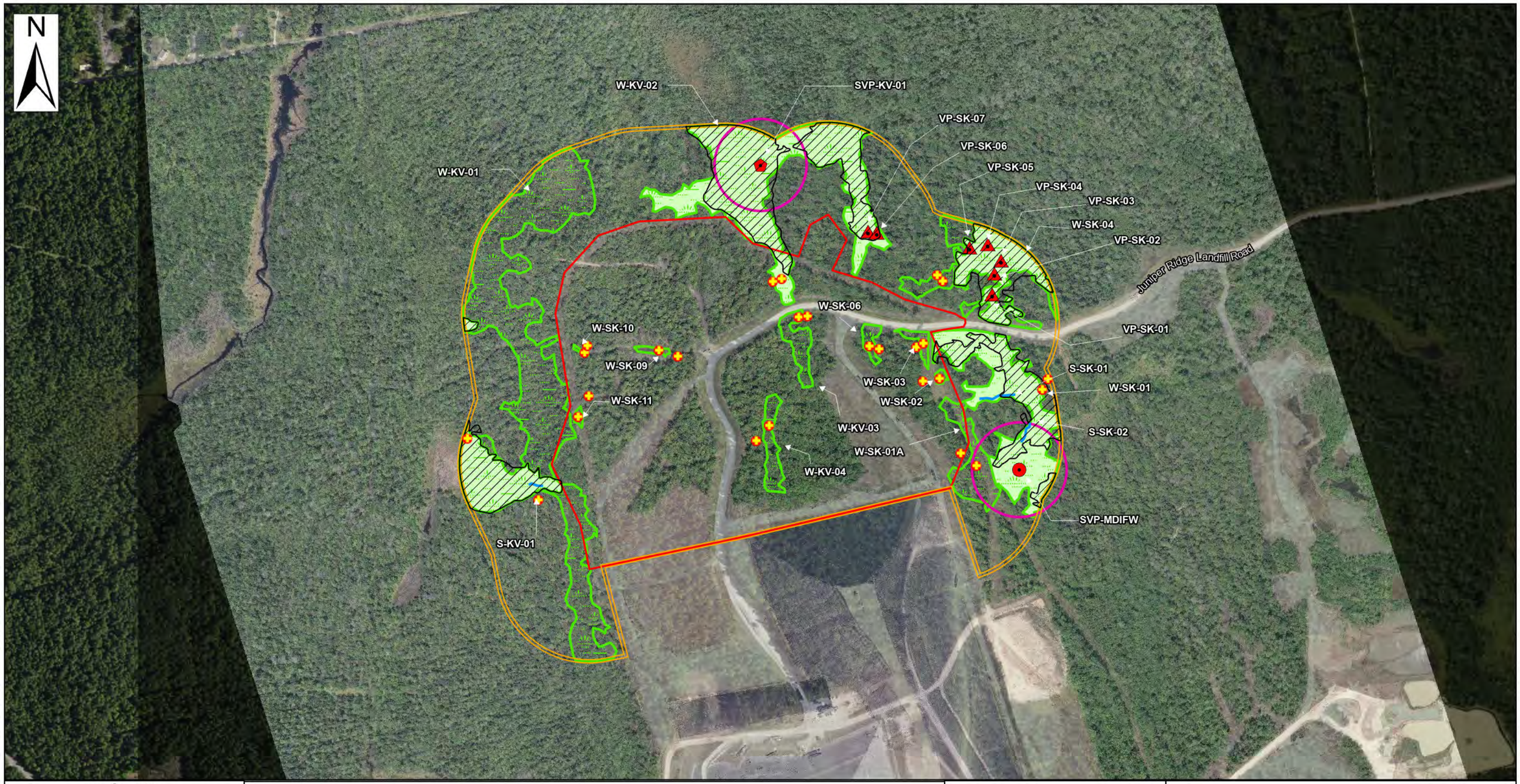
Juniper Ridge Landfill | Old Town, Maine

September 11, 2024

BIODIVERSITY RESEARCH INSTITUTE

Exhibit B:

Natural Resources Map



Index Map

Legend

- USACE Plot
- FEMA 100 YR Floodplain
- Survey Area (Excluding Previously Permitted Areas)
- Potentially Developable Area
- Wetland of Special Significance (WOSS)
- Wetland
- SVP 250ft Buffer
- SVP mapped by others
- Vernal Pool
- Significant Vernal Pool
- Stream

BIODIVERSITY RESEARCH INSTITUTE
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Scale

0 — 495 — 990 Feet

1:6,000 when printed on 11 inch by 17 inch media

Natural Resources Map

Juniper Ridge Landfill | Old Town, Maine

May 30 2025

Exhibit C:

Natural Resources Photographs

Photo 1. View of Wetland W-KV-01 (December 1, 2022)

Photo 2. View of Wetland W-KV-02 (December 1, 2022)

Photo 3. View of Wetland W-KV-03 (December 1, 2022)

Photo 4. View of Wetland W-KV-04 (December 6, 2022)

Photo 5. View of Wetland W-SK-01 (November 30, 2022)

Photo 6. View of Wetland W-SK-03 (November 30, 2022)

Photo 7. View of Wetland W-SK-04 (December 6, 2022)

Photo 8. View of Wetland W-SK-06 (December 6, 2022)

Photo 9. View of Wetland W-SK-09 (December 6, 2022)

Photo 10. View of Wetland W-SK-10 (December 6, 2022)

Photo 11. View of Wetland W-SK-11 (December 6, 2022)

Photo 12. View of Stream S-KV-01 (November 30, 2022)

Photo 13. View of Stream S-SK-01 (November 30, 2022).

Exhibit D:

NRCS Soil Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Penobscot County, Maine, Southern Part

Juniper Ridge

December 7, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

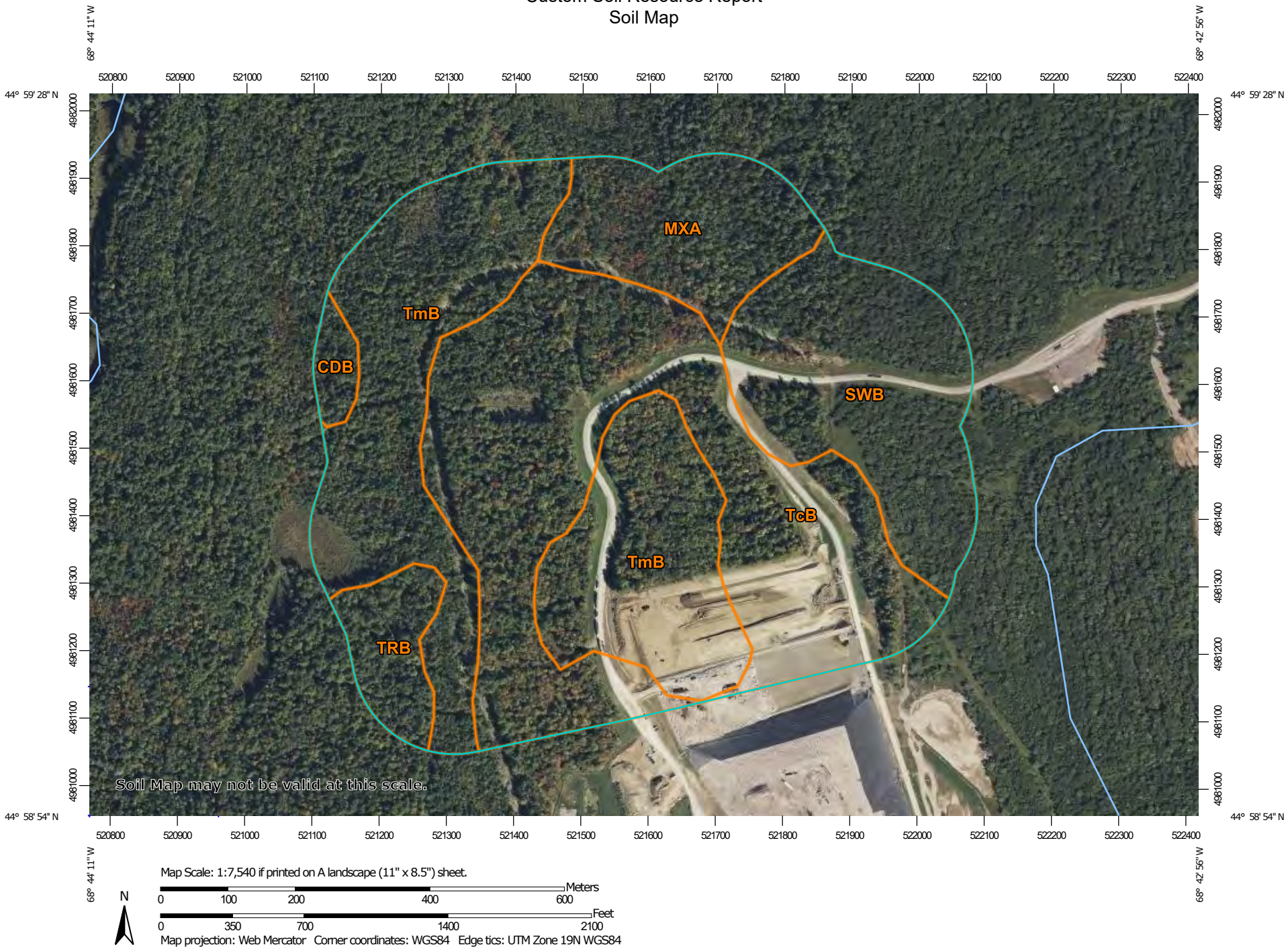
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.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522400
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4981800
4981700
4981600
4981500
4981400
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4981100
4981000
MXA
TmB
CDB
SWB
TcB
TmB
TRB
Soil Map may not be valid at this scale.
Map Scale: 1:7,540 if printed on A landscape (11" x 8.5") sheet.
N
Meters
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100
200
400
600
Feet
0
350
700
1400
2100
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Penobscot County, Maine, Southern Part
Survey Area Data: Version 8, Aug 30, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 11, 2021—Oct 29, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CDB	Colonel-Peru-Brayton complex, 0 to 8 percent slopes, very stony	2.4	1.3%
MXA	Monarda-Burnham complex, 0 to 3 percent slopes, very stony	17.5	9.9%
SWB	Pushaw-Swanville complex, 0 to 8 percent slopes	29.4	16.7%
TcB	Telos-Chesuncook complex, 0 to 8 percent slopes, very stony	63.1	35.8%
TmB	Monarda-Telos complex, 0 to 8 percent slopes, very stony	56.9	32.3%
TRB	Telos-Chesuncook-Ragmuff association, 0 to 8 percent slopes, very stony	7.0	4.0%
Totals for Area of Interest		**176.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a

given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Penobscot County, Maine, Southern Part

CDB—Colonel-Peru-Brayton complex, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: szrs
Elevation: 50 to 1,000 feet
Mean annual precipitation: 39 to 45 inches
Mean annual air temperature: 42 to 45 degrees F
Frost-free period: 115 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Colonel and similar soils: 45 percent
Peru and similar soils: 30 percent
Brayton and similar soils: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Colonel

Setting

Landform: Ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material
E - 3 to 5 inches: fine sandy loam
Bs - 5 to 19 inches: fine sandy loam
BC - 19 to 22 inches: sandy loam
Cd - 22 to 65 inches: sandy loam

Properties and qualities

Slope: 2 to 6 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 14 to 23 inches to densic material
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 6 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144BY502ME - Loamy Till Toeslope, F144BY503ME - Loamy Flat
Hydric soil rating: No

Description of Peru

Setting

Landform: Ground moraines
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till

Typical profile

Oa - 0 to 2 inches: highly decomposed plant material
E - 2 to 3 inches: fine sandy loam
Bs - 3 to 11 inches: fine sandy loam
BC - 11 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 5 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 21 to 33 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)
Depth to water table: About 16 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144BY501ME - Loamy Slope (Northern Hardwoods)
Hydric soil rating: No

Description of Brayton

Setting

Landform: Ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy lodgment till

Typical profile

Oa - 0 to 5 inches: muck
Eg - 5 to 10 inches: gravelly fine sandy loam
Bg - 10 to 16 inches: fine sandy loam
BC - 16 to 23 inches: fine sandy loam
Cd - 23 to 65 inches: fine sandy loam

Properties and qualities

Slope: 0 to 4 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent

Depth to restrictive feature: 16 to 25 inches to densic material
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.01 to 1.42 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144BY502ME - Loamy Till Toeslope, F144BY503ME - Loamy Flat
Hydric soil rating: Yes

MXA—Monarda-Burnham complex, 0 to 3 percent slopes, very stony

Map Unit Setting

National map unit symbol: t1bm
Elevation: 50 to 750 feet
Mean annual precipitation: 39 to 45 inches
Mean annual air temperature: 42 to 45 degrees F
Frost-free period: 115 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Monarda and similar soils: 45 percent
Burnham and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Monarda

Setting

Landform: Ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy lodgment till

Typical profile

Oe - 0 to 3 inches: mucky peat
A - 3 to 8 inches: cobbly silt loam
Bg - 8 to 16 inches: gravelly silt loam
BC - 16 to 19 inches: loam
Cd - 19 to 65 inches: channery silt loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 15 to 24 inches to densic material
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144BY301ME - Loamy Till Swamp
Hydric soil rating: Yes

Description of Burnham

Setting

Landform: Ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Organic material over loamy lodgment till

Typical profile

Oe - 0 to 13 inches: mucky peat
Eg - 13 to 16 inches: channery silt loam
Bg - 16 to 24 inches: channery loam
Cdg - 24 to 65 inches: gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 14 to 35 inches to densic material
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144BY301ME - Loamy Till Swamp
Hydric soil rating: Yes

SWB—Pushaw-Swanville complex, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: szrm
Elevation: 20 to 300 feet
Mean annual precipitation: 39 to 45 inches
Mean annual air temperature: 42 to 45 degrees F
Frost-free period: 115 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Pushaw and similar soils: 50 percent
Swanville and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pushaw

Setting

Landform: Marine terraces, river valleys
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Fine-silty glaciomarine deposits

Typical profile

Oe - 0 to 2 inches: mucky peat
Bw - 2 to 15 inches: silt loam
BCg - 15 to 18 inches: silt loam
C - 18 to 65 inches: silty clay loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 6 to 17 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: C/D
Ecological site: F144BY401ME - Clay Flat
Hydric soil rating: No

Description of Swanville

Setting

Landform: Marine terraces, river valleys
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Fine-silty glaciomarine deposits

Typical profile

Oe - 0 to 2 inches: mucky peat
Bg - 2 to 10 inches: silt loam
BCg - 10 to 20 inches: silt loam
C - 20 to 65 inches: silty clay loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: D
Ecological site: F144BY001ME - Marine Terrace Flat, F144BY304ME - Wet Clay Flat, F144BY401ME - Clay Flat
Hydric soil rating: Yes

TcB—Telos-Chesuncook complex, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2rk0c
Elevation: 50 to 750 feet
Mean annual precipitation: 39 to 45 inches
Mean annual air temperature: 42 to 45 degrees F
Frost-free period: 115 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Telos and similar soils: 45 percent
Chesuncook and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Telos

Setting

Landform: Ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy lodgment till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material
E - 3 to 5 inches: silt loam
Bs - 5 to 11 inches: silt loam
BC - 11 to 16 inches: gravelly loam
Cd - 16 to 65 inches: gravelly loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 14 to 23 inches to densic material
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 6 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144BY501ME - Loamy Slope (Northern Hardwoods), F144BY502ME - Loamy Till Toeslope
Hydric soil rating: No

Description of Chesuncook

Setting

Landform: Ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
E - 2 to 5 inches: silt loam
Bs - 5 to 18 inches: gravelly silt loam
BC - 18 to 24 inches: cobbly silt loam
Cd - 24 to 65 inches: cobbly loam

Properties and qualities

Slope: 5 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 21 to 31 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 16 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144BY501ME - Loamy Slope (Northern Hardwoods)
Hydric soil rating: No

TmB—Monarda-Telos complex, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 1ls63
Elevation: 50 to 750 feet
Mean annual precipitation: 39 to 45 inches
Mean annual air temperature: 42 to 45 degrees F
Frost-free period: 115 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Telos and similar soils: 45 percent
Monarda and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Telos

Setting

Landform: Ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy lodgment till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material
E - 3 to 5 inches: silt loam
Bs - 5 to 11 inches: silt loam
BC - 11 to 16 inches: gravelly loam
Cd - 16 to 65 inches: gravelly loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 14 to 23 inches to densic material
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 6 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144BY502ME - Loamy Till Toeslope
Hydric soil rating: No

Description of Monarda

Setting

Landform: Ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy lodgment till

Typical profile

Oe - 0 to 3 inches: mucky peat
A - 3 to 8 inches: cobbly silt loam
Bg - 8 to 16 inches: gravelly silt loam
BC - 16 to 19 inches: loam
Cd - 19 to 65 inches: channery silt loam

Properties and qualities

Slope: 0 to 5 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 15 to 24 inches to densic material
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144BY502ME - Loamy Till Toeslope, F144BY503ME - Loamy Flat

Hydric soil rating: Yes

TRB—Telos-Chesuncook-Ragmuff association, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 1ls9c
Elevation: 50 to 750 feet
Mean annual precipitation: 39 to 45 inches
Mean annual air temperature: 42 to 45 degrees F
Frost-free period: 115 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Telos and similar soils: 40 percent
Chesuncook and similar soils: 30 percent
Ragmuff and similar soils: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Telos

Setting

Landform: Ground moraines
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loamy lodgment till

Typical profile

Oa - 0 to 3 inches: highly decomposed plant material
E - 3 to 5 inches: silt loam
Bs - 5 to 11 inches: silt loam
BC - 11 to 16 inches: gravelly loam
Cd - 16 to 65 inches: gravelly loam

Properties and qualities

Slope: 0 to 6 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 14 to 23 inches to densic material
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 6 to 20 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144BY501ME - Loamy Slope (Northern Hardwoods), F144BY503ME - Loamy Flat
Hydric soil rating: No

Description of Chesuncook

Setting

Landform: Ground moraines
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
E - 2 to 5 inches: silt loam
Bs - 5 to 18 inches: gravelly silt loam
BC - 18 to 24 inches: cobbly silt loam
Cd - 24 to 65 inches: cobbly loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 21 to 31 inches to densic material
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.01 to 0.14 in/hr)
Depth to water table: About 16 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144BY501ME - Loamy Slope (Northern Hardwoods)
Hydric soil rating: No

Description of Ragmuff

Setting

Landform: Ground moraines
Landform position (two-dimensional): Backslope, footslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till

Typical profile

Oa - 0 to 4 inches: highly decomposed plant material
E - 4 to 9 inches: gravelly very fine sandy loam
Bs - 9 to 20 inches: gravelly loam

BC - 20 to 31 inches: gravelly loam
Cd - 31 to 34 inches: gravelly loam
R - 34 to 79 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 21 to 37 inches to densic material; 23 to 45 inches to lithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: About 16 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144BY501ME - Loamy Slope (Northern Hardwoods), F144BY702ME - Shallow and Moderately-deep Till
Hydric soil rating: No

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Exhibit E:

USACE Wetland Determination Forms

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Juniper Ridge Landfill City/County: Old Town Sampling Date: 12/01/2022

Applicant/Owner: NEWSME Landfill Operations (Applicant) / Bureau of General Services (Owner) State: ME Sampling Point: PLOT-W-KV-01-UP

Investigator(s): Korik Vargas Section, Township, Range: Old Town

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR or MLRA): LRR R Lat: 44.984946° N Long: 68.730759° W Datum: Maine State Plane

Soil Map Unit Name: Telos-Chesuncook-Ragmuff association NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**		
Hydric Soil Present?	Yes ____	No X	**within a Wetland?**	**Yes** ____	**No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____		
Water Table Present?	Yes ____	No X	Depth (inches): ____		
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No Hydrology

VEGETATION – Use scientific names of plants.

Sampling Point: PLOT-W-KV-01-UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	15	No	FAC
2. *Betula papyrifera*	7	No	FACU
3. *Pinus strobus*	7	No	FACU
4. *Abies balsamea*	25	Yes	FAC
5. *Fagus grandifolia*	3	No	FACU
6. *Populus grandidentata*	25	Yes	FACU
7. *Fraxinus pennsylvanica*	5	No	FACW
	87	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Tsuga canadensis*	5	No	FAC
2. *Fagus grandifolia*	10	Yes	FACU
3. *Pinus strobus*	15	Yes	FACU
4.			
5.			
6.			
7.			
	30	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Pteridium aquilinum*	20	Yes	FAC
2. *Cornus canadensis*	15	Yes	FACW
3. *Coptis trifolia*	5	No	FACU
4. *Dendrolycopodium dendroideum*	3	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	43	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	45	x 3 =	135
FACU species	75	x 4 =	300
UPL species	0	x 5 =	0
Column Totals:	140	(A)	475 (B

Prevalence Index = B/A = 3.39

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supportin data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must b present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diamete at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH ar greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PLOT-W-KV-01-UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2						Organic	
2-4	10YR 6/2						Silt Loam	
4-9	7.5YR 5/4						Silt Loam	
9-14	5Y 5/2						Silt Loam	
14-21	5Y 6/2		10YR 8/6	3			Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils versio 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Juniper Ridge Landfill City/County: Old Town Sampling Date: 11/30/22

Applicant/Owner: NEWSME Landfill Operations (Applicant) / Bureau of General Services (Owner) State: ME Sampling Point: PLOT-W-KV-01-WET

Investigator(s): Korik Vargas Section, Township, Range: Old Town

Landform (hillside, terrace, etc.): Flood plain basin Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR or MLRA): LRR R Lat: 44.985857° N Long: 68.732251° W Datum: Maine State Plane

Soil Map Unit Name: Monarda-Telos complex NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**		
Hydric Soil Present?	Yes X	No ____	**within a Wetland?**	**Yes** X	**No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID:	W-KV-01	

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ____ High Water Table (A2)
- X Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- X Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches):	0	
Water Table Present?	Yes X	No ____	Depth (inches):	6	
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches):	0	**Wetland Hydrology Present?** **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: PLOT-W-KV-01-WET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	10	Yes	FAC
2. *Abies balsamea*	7	Yes	FAC
3. *Betula papyrifera*	10	Yes	FACU
4.			
5.			
6.			
7.			
	27	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Pinus strobus*	5	No	FAC
2. *Alnus incana*	25	Yes	FACW
3.			
4. *Betula papyrifera*	5	No	FACU
5.			
6.			
7.			
	35	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Scirpus cyperinus*	10	No	FAC
2. *Bromus diandrus*	15	Yes	FACW
3. *Spiraea alba*	20	Yes	FACW
4. *Carex crinita*	10	No	OBL
5. *Carex lupulina*	10	No	OBL
6. *Spiraea tomentosa*	20	Yes	FACW
7.			
8.			
9.			
10.			
11.			
12.			
	85	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.7% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	80	x 2 =	160
FAC species	22	x 3 =	66
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	137 (A)		306 (B

Prevalence Index = B/A = 2.23

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supportin data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must b present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diamete at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH ar greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PLOT-W-KV-01-WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
1-3	10YR 2/1						Sandy Loam	
3-6	5Y 7/2						Silt Loam	
6-24	5Y 5/3		10YR 5/6	5			Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils versio 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-KV-2UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): gentle/level hillslope Local relief (concave, convex, none): Convex Slope %: 1

Subregion (LRR or MLRA): LRR R Lat: 44.988210°↑ Long: -68.722093° Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Refusal at 12" Boulders

VEGETATION – Use scientific names of plants.

Sampling Point: W-KV-2UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	50	Yes	FAC
2. *Pinus strobus*	15	Yes	FACU
3. *Abies balsamea*	10	No	FAC
4.			
5.			
6.			
7.			
	75	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Abies balsamea*	5	Yes	FAC
2. *Betula papyrifera*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Trientalis borealis*	10	Yes	FAC
2. *Maianthemum canadense*	10	Yes	FACU
3. *Aralia nudicaulis*	5	Yes	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 42.9% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	75	x 3 =	225
FACU species	35	x 4 =	140
UPL species	0	x 5 =	0
Column Totals:	110 (A)		365 (B)

Prevalence Index = B/A = 3.32

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-KV-2UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5YR 3/1	100					Loamy/Clayey	
3-12	7.5YR 4/6	100					Loamy/Clayey	Refusal @12" - Boulders/Stones

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stones/Boulders

Depth (inches): 12

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region** See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R	***OMB Control #: 0710-0024, Exp: 9/30/2027*** ***Requirement Control Symbol EXEMPT:*** ***(Authority: AR 335-15, paragraph 5-2a)***

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-KV-2WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.987670° Long: -68.722093° Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ___ (If no, explain in Remarks.)

Are Vegetation ___, Soil ___, or Hydrology ___ significantly disturbed? Are "Normal Circumstances" present? Yes X No ___

Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ___	**Is the Sampled Area within a Wetland?** **Yes** X **No** ___
Hydric Soil Present?	Yes X	No ___	
Wetland Hydrology Present?	Yes X	No ___	If yes, optional Wetland Site ID: ___

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- X Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ___	Depth (inches): 2
Water Table Present?	Yes X	No ___	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-KV-2WET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	40	Yes	FAC
2. *Abies balsamea*	20	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	60	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus incana*	20	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
	20	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	30	Yes	FACW
2. *Dryopteris carthusiana*	10	Yes	FACW
3. *Rubus hispidus*	5	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	65	x 2 =	130
FAC species	60	x 3 =	180
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	125 (A)		310 (B)

Prevalence Index = B/A = 2.48

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-KV-2WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 3/1	100					Mucky Loam/Clay	
4-19	2.5Y 5/2	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-KV-3UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope %: 2

Subregion (LRR or MLRA): LRR R Lat: 44.987686°↑ Long: -68.725128°↑ Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-KV-3UP

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Herb Stratum (Plot size: 5)			
1. *Cornus canadensis*	15	Yes	FAC
2. *Maianthemum canadense*	10	Yes	FACU
3. *Aralia nudicaulis*	8	Yes	FACU
4. *Vaccinium angustifolium*	5	No	FACU
5. *Osmunda claytoniana*	2	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	17	x 3 =	51
FACU species	23	x 4 =	92
UPL species	0	x 5 =	0
Column Totals:	40 (A)		143 (B

Prevalence Index = B/A = 3.58

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supportir data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardles of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft i height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
Plot occurs along cleared portion of access road - shrub/trees not present within cleared area

SOIL

Sampling Point: W-KV-3UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5YR 5/6	100					Loamy/Clayey	
3-8	10YR 6/3	95	7.5YR 5/6	5	C	M	Loamy/Clayey	Prominent redox concentrations
8-19	10YR 5/4	95	7.5YR 5/6	5	C	M	Loamy/Clayey	Distinct redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-KV-3WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.987670°↑ Long: -68.722093° Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)
Portion of wetland occurs within the maintained right-of-way of the access road - vegetation has been periodically mowed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes X	No ____	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 4

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: W-KV-3WET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Sapling/Shrub Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
		=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	10	Yes	FACW
2. *Calamagrostis canadensis*	10	Yes	OBL
3. *Rubus hispidus*	5	No	FACW
4. *Erythronium americanum*	5	No	UPL
5. *Osmunda claytoniana*	2	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	32	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	15	x 2 =	30
FAC species	12	x 3 =	36
FACU species	0	x 4 =	0
UPL species	5	x 5 =	25
Column Totals:	42	(A)	101 (B

Prevalence Index = B/A = 2.40

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supportir data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardles of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft i height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-KV-3WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 3/1	100					Mucky Loam/Clay	
3-13	2.5Y 5/1	80	7.5YR 5/6	20	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- _X_ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- _X_ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _X_ **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-KV-4UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): hillslope Local relief (concave, convex, none): Convex Slope %: 2

Subregion (LRR or MLRA): LRR R Lat: 44.985842°↑ Long: -68.726190° Datum: WGS84

Soil Map Unit Name: Monarda-Telos complex, 0 to 8 percent slopes, very stony NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: W-KV-4UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Tsuga canadensis*	40	Yes	FACU
2. *Acer rubrum*	30	Yes	FAC
3. *Pinus strobus*	10	No	FACU
4.			
5.			
6.			
7.			
	80	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Betula alleghaniensis*	2	Yes	FAC
2. *Abies balsamea*	2	Yes	FAC
3. *Tsuga canadensis*	2	Yes	FACU
4.			
5.			
6.			
7.			
	6	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Pteridium aquilinum*	10	Yes	FACU
2. *Clintonia borealis*	2	No	FAC
3. *Streptopus lanceolatus*	2	No	FACU
4. *Trientalis borealis*	2	No	FAC
5. *Medeola virginiana*	2	No	FACU
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	18	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	38	x 3 =	114
FACU species	66	x 4 =	264
UPL species	0	x 5 =	0
Column Totals:	104 (A)		378 (B

Prevalence Index = B/A = 3.63

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supportir data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardles of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft i height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-KV-4UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	2.5Y 3/1	100					Loamy/Clayey	
2-10	2.5Y 4/4	100					Loamy/Clayey	
10-15	2.5Y 4/3	95	7.5YR 5/4	5	C	M	Loamy/Clayey	Distinct redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-KV-4WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.986058° Long: -68.722093° Datum: WGS84

Soil Map Unit Name: Monarda-Telos complex, 0 to 8 percent slopes, very stony NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	X Water-Stained Leaves (B9)	___ Aquatic Fauna (B13)
X High Water Table (A2)	___ Marl Deposits (B15)	___ Hydrogen Sulfide Odor (C1)
X Saturation (A3)	___ Oxidized Rhizospheres on Living Roots (C3)	___ Presence of Reduced Iron (C4)
___ Water Marks (B1)	___ Recent Iron Reduction in Tilled Soils (C6)	___ Thin Muck Surface (C7)
___ Sediment Deposits (B2)	___ Other (Explain in Remarks)	
___ Drift Deposits (B3)		
___ Algal Mat or Crust (B4)		
___ Iron Deposits (B5)		
___ Inundation Visible on Aerial Imagery (B7)		
___ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
X Drainage Patterns (B10)
X Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes X	No ____	Depth (inches): 6
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 5

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-KV-4WET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	40	Yes	FAC
2. *Abies balsamea*	10	No	
3. *Betula alleghaniensis*	5	No	FAC
4.			
5.			
6.			
7.			
	55	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Betula alleghaniensis*	2	Yes	FAC
2. *Fagus grandifolia*	2	Yes	FACU
3. *Pinus strobus*	2	Yes	FACU
4.			
5.			
6.			
7.			
	6	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	10	Yes	FACW
2. *Maianthemum canadense*	10	Yes	FACU
3. *Dryopteris carthusiana*	10	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	30	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 57.1% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	47	x 3 =	141
FACU species	14	x 4 =	56
UPL species	0	x 5 =	0
Column Totals:	81	(A)	237 (B

Prevalence Index = B/A = 2.93

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supportir data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardles of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft i height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-KV-4WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 4/1	100					Mucky Loam/Clay	
3-13	2.5Y 5/1	95	7.5YR 5/6	5	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Juniper Ridge Landfill Project City/County: Old Town Sampling Date: 11/30/2022

Applicant/Owner: NEWSME Landfill Operations (Applicant) / Bureau of General Services (Owner) State: ME Sampling Point: PLOT-W-SK-01-UP

Investigator(s): Steve Knapp Section, Township, Range: Old Town

Landform (hillside, terrace, etc.): Hillslope Local relief (concave, convex, none): concave Slope (%): 5

Subregion (LRR or MLRA): LRR R Lat: 44.986606° N Long: 68.720204° W Datum: Maine State Plane

Soil Map Unit Name: Pushaw-Swanville complex NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**		
Hydric Soil Present?	Yes ____	No X	**within a Wetland?**	**Yes** ____	**No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID:		

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ____ Surface Water (A1)
- ____ High Water Table (A2)
- ____ Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- ____ Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____		
Water Table Present?	Yes ____	No X	Depth (inches): ____		
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): 0	**Wetland Hydrology Present?**	**Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No Hydrology

VEGETATION – Use scientific names of plants.

Sampling Point: PLOT-W-SK-01-UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	30	Yes	FAC
2. *Abies balsamea*	20	Yes	FAC
3. *Fagus grandifolia*	10	No	FACU
4.			
5.			
6.			
7.			
	60	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2.			
3.			
4. *Picea rubens*	10	Yes	FACU
5.			
6.			
7.			
	10	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Pteridium aquilinum*	20	Yes	FAC
2. *Cornus canadensis*	10	Yes	FACW
3. *Pinus strobus*	5	No	FACU
4. *Fagus grandifolia*	5	No	FACU
5. *Abies balsamea*	5	No	FAC
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	45	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 60.0% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	10	x 2 =	20
FAC species	55	x 3 =	165
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column Totals:	95 (A)		305 (B

Prevalence Index = B/A = 3.21

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supportin data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must b present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diamete at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH ar greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PLOT-W-SK-01-UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/2						Organic	
2-24	10YR 5/3						Silt Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils versio 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Juniper Ridge Landfill Project City/County: Old Town Sampling Date: 11/30/22

Applicant/Owner: NEWSME Landfill Operations (Applicant) / Bureau of General Services (Owner) State: ME Sampling Point: PLOT-W-SK-01-WET

Investigator(s): Steve Knapp Section, Township, Range: Old Town

Landform (hillside, terrace, etc.): Flood plain basin Local relief (concave, convex, none): concave Slope (%): 0

Subregion (LRR or MLRA): LRR R Lat: 44.986770° N Long: 68.720084° W Datum: Maine State Plane

Soil Map Unit Name: Pushaw-Swanville complex NWI classification: PFO/PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: W-SK-01

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- ____ High Water Table (A2)
- X Saturation (A3)
- ____ Water Marks (B1)
- ____ Sediment Deposits (B2)
- ____ Drift Deposits (B3)
- ____ Algal Mat or Crust (B4)
- ____ Iron Deposits (B5)
- ____ Inundation Visible on Aerial Imagery (B7)
- ____ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ____ Aquatic Fauna (B13)
- ____ Marl Deposits (B15)
- ____ Hydrogen Sulfide Odor (C1)
- ____ Oxidized Rhizospheres on Living Roots (C3)
- ____ Presence of Reduced Iron (C4)
- ____ Recent Iron Reduction in Tilled Soils (C6)
- ____ Thin Muck Surface (C7)
- ____ Other (Explain in Remarks)

Secondary Indicators (minimum of two required

- ____ Surface Soil Cracks (B6)
- ____ Drainage Patterns (B10)
- ____ Moss Trim Lines (B16)
- ____ Dry-Season Water Table (C2)
- ____ Crayfish Burrows (C8)
- ____ Saturation Visible on Aerial Imagery (C9)
- ____ Stunted or Stressed Plants (D1)
- ____ Geomorphic Position (D2)
- ____ Shallow Aquitard (D3)
- ____ Microtopographic Relief (D4)
- ____ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X No ____	Depth (inches):	1
Water Table Present?	Yes X No ____	Depth (inches):	0
Saturation Present? (includes capillary fringe)	Yes X No ____	Depth (inches):	0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: PLOT-W-SK-01-WET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	85	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	85	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1.			
2. *Acer rubrum*	20	Yes	FAC
3. *Ilex verticillata*	10	Yes	FACW
4.			
5.			
6.			
7.			
	30	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Scirpus cyperinus*	40	Yes	FAC
2. *Onoclea sensibilis*	30	Yes	FACW
3. *Glyceria striata*	10	No	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	80	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 80.0% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	40	x 2 =	80
FAC species	105	x 3 =	315
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	155 (A)		405 (B

Prevalence Index = B/A = 2.61

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supportin data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must b present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diamete at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH ar greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PLOT-W-SK-01-WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/1						Organic	
4-18	10YR 5/2		10YR 5/6				Silty Clay Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ Coast Prairie Redox (A16) (**LRR K, L, R**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Mesic Spodic (TA6) (**MLRA 144A, 145, 149B**)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data form is revised from Northcentral and Northeast Regional Supplement Version 2.0 to reflect the NRCS Field Indicators of Hydric Soils versio 7.0 March 2013 Errata. (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051293.docx)

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-01AUP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): terrace Local relief (concave, convex, none): Convex Slope %: 1

Subregion (LRR or MLRA): LRR R Lat: 44.985660°↑ Long: -68.721909° Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-01AUP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Tsuga canadensis*	60	Yes	FACU
2. *Betula alleghaniensis*	10	No	FAC
3.			
4.			
5.			
6.			
7.			
	70	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Populus tremuloides*	5	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	5	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Trientalis borealis*	2	No	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	2	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	12	x 3 =	36
FACU species	65	x 4 =	260
UPL species	0	x 5 =	0
Column Totals:	77	(A)	296 (B

Prevalence Index = B/A = 3.84

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supportir data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardles of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft i height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
Sparse hebr/shrub due to hemlock overstory

SOIL

Sampling Point: W-SK-01AUP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	100					Mucky Loam/Clay	Refusal @ 6"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stones/Boulders

Depth (inches): 6

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

Very stony/Bouldery

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-01AWET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): terrace Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.985472°↑ Long: -68.722093° Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 1
Water Table Present?	Yes X	No ____	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 4

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-01AWET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Betula alleghaniensis*	10	Yes	FAC
2. *Abies balsamea*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	15	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Betula alleghaniensis*	15	Yes	FAC
2. *Abies balsamea*	10	Yes	FAC
3. *Salix nigra*	5	No	OBL
4.			
5.			
6.			
7.			
	30	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	30	Yes	FACW
2. *Dryopteris carthusiana*	20	Yes	FACW
3. *Fragaria vesca*	5	No	UPL
4. *Maianthemum canadense*	2	No	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	57	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	50	x 2 =	100
FAC species	40	x 3 =	120
FACU species	2	x 4 =	8
UPL species	5	x 5 =	25
Column Totals:	102	(A)	258 (B

Prevalence Index = B/A = 2.53

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supportir data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardles of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft i height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-SK-01AWET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-15	2.5Y 5/2	90	7.5YR 5/6	10	C	M	Mucky Loam/Clay	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stone/Boulders @ 15"

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-2UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Terrace Local relief (concave, convex, none): Convex Slope %: 1

Subregion (LRR or MLRA): LRR R Lat: 44.986769° Long: -68.722356° Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-2UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	30	Yes	FAC
2. *Populus tremuloides*	20	Yes	FACU
3. *Betula populifolia*	10	No	FAC
4.			
5.			
6.			
7.			
	60	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Fraxinus americana*	10	Yes	FACU
2. *Acer rubrum*	5	Yes	FAC
3. *Betula populifolia*	2	No	FAC
4.			
5.			
6.			
7.			
	17	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Aralia nudicaulis*	5	Yes	FACU
2. *Trientalis borealis*	2	Yes	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	7	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	49	x 3 =	147
FACU species	35	x 4 =	140
UPL species	0	x 5 =	0
Column Totals:	84 (A)		287 (B)

Prevalence Index = B/A = 3.42

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-SK-2UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 3/2	100					Loamy/Clayey	
4-11	10YR 4/6	100					Loamy/Clayey	
11-18	2.5Y 5/6	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Faint redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-2WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.986769° Long: -68.722356° Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)	X Water-Stained Leaves (B9)	___ Aquatic Fauna (B13)
X High Water Table (A2)	___ Marl Deposits (B15)	___ Hydrogen Sulfide Odor (C1)
X Saturation (A3)	___ Oxidized Rhizospheres on Living Roots (C3)	___ Presence of Reduced Iron (C4)
___ Water Marks (B1)	___ Recent Iron Reduction in Tilled Soils (C6)	___ Thin Muck Surface (C7)
___ Sediment Deposits (B2)	___ Other (Explain in Remarks)	
___ Drift Deposits (B3)		
___ Algal Mat or Crust (B4)		
___ Iron Deposits (B5)		
___ Inundation Visible on Aerial Imagery (B7)		
___ Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
X Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
___ Microtopographic Relief (D4)
X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes X	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-2WET

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix nigra*	2	No	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	2 =Total Cover		
Herb Stratum (Plot size: 5)			
1. *Scirpus cyperinus*	60	Yes	OBL
2. *Juncus effusus*	20	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	80 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	82	x 1 =	82
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	82 (A)		82 (B)

Prevalence Index = B/A = 1.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-SK-2WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	2.5Y 4/1	100					Loamy/Clayey	
6-18	2.5Y 5/1	85	10YR 4/1	15	C	M	Loamy/Clayey	Faint redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-3UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): terrace Local relief (concave, convex, none): convex Slope %: 2

Subregion (LRR or MLRA): LRR R Lat: 44.987205°↑ Long: -68.723626°↑ Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ____	Depth (inches): 0
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-3UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Tsuga canadensis*	20	Yes	FACU
2. *Fagus grandifolia*	10	Yes	FACU
3. *Betula populifolia*	5	No	FAC
4.			
5.			
6.			
7.			
	35	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Betula populifolia*	20	Yes	FAC
2. *Pinus strobus*	10	Yes	FACU
3. *Abies balsamea*	5	No	FAC
4.			
5.			
6.			
7.			
	35	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Aralia nudicaulis*	20	Yes	FACU
2. *Maianthemum canadense*	15	Yes	FACU
3. *Trientalis borealis*	5	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 16.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	35	x 3 =	105
FACU species	75	x 4 =	300
UPL species	0	x 5 =	0
Column Totals:	110 (A)		405 (B)

Prevalence Index = B/A = 3.68

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-SK-3UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 3/2	100					Loamy/Clayey	
3-6	10YR 4/4	100					Loamy/Clayey	
6-8	10YR 5/2	100					Loamy/Clayey	refusal @ 8"

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stony/Bouldry

Depth (inches): 8

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-3WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.987558°↑ Long: -68.722093° Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 4
Water Table Present?	Yes X	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-3WET

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix nigra*	10	Yes	OBL
2. *Alnus incana*	5	Yes	FACW
3. *Acer rubrum*	5	Yes	FAC
4.			
5.			
6.			
7.			
	20 =Total Cover		
Herb Stratum (Plot size: 5)			
1. *Scirpus cyperinus*	40	Yes	OBL
2. *Typha latifolia*	20	Yes	OBL
3. *Onoclea sensibilis*	10	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	70	x 1 =	70
FACW species	15	x 2 =	30
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	90 (A)		115 (B)

Prevalence Index = B/A = 1.28

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-SK-3WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	100					Mucky Loam/Clay	
6-12	10YR 5/2	80	10YR 4/4	20	C	M	Loamy/Clayey	Distinct redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stone/Boulders @ 12"

Depth (inches): ___

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-4UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): gentle hillslope Local relief (concave, convex, none): Convex Slope %: 1

Subregion (LRR or MLRA): LRR R Lat: 44.988309°↑ Long: -68.722414° Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No ____	Depth (inches): 0
Water Table Present?	Yes ____	No ____	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No ____	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-4UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Tsuga canadensis*	40	Yes	FACU
2. *Acer rubrum*	20	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	60	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Abies balsamea*	5	Yes	FAC
2. *Acer rubrum*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Aralia nudicaulis*	10	Yes	FACU
2. *Maianthemum canadense*	5	Yes	FACU
3. *Trientalis borealis*	2	No	FAC
4. *Dryopteris carthusiana*	2	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	19	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	2	x 2 =	4
FAC species	32	x 3 =	96
FACU species	55	x 4 =	220
UPL species	0	x 5 =	0
Column Totals:	89 (A)		320 (B)

Prevalence Index = B/A = 3.60

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-SK-4UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	2.5Y 3/1	100					Loamy/Clayey	
4-10	2.5Y 4/4	100					Loamy/Clayey	
10-18	2.5Y 6/4	100					Loamy/Clayey	
18-20	2.5Y 6/4	95	7.5YR 5/6	5	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-4WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.988211° Long: -68.722093° Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- X Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 1
Water Table Present?	Yes X	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-4WET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	30	Yes	FAC
2. *Abies balsamea*	20	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	50	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Abies balsamea*	2	Yes	FAC
2. *Alnus incana*	2	Yes	FACW
3. *Fraxinus nigra*	2	Yes	FACW
4.			
5.			
6.			
7.			
	6	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	40	Yes	FACW
2. *Dryopteris carthusiana*	5	No	FACW
3. *Trientalis borealis*	2	No	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	47	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	49	x 2 =	98
FAC species	54	x 3 =	162
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	103 (A)		260 (B)

Prevalence Index = B/A = 2.52

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-SK-4WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 3/1	100					Mucky Loam/Clay	
3-5	2.5Y 4/1	100					Loamy/Clayey	
5-13	2.5Y 5/1	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stones

Depth (inches): 13

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-6UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Convex Slope %: 2

Subregion (LRR or MLRA): LRR R Lat: 44.987206°↑ Long: -68.723626° Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants. Sampling Point: W-SK-6UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	30	Yes	FAC
2. *Abies balsamea*	15	Yes	FAC
3. *Fagus grandifolia*	15	Yes	FACU
4.			
5.			
6.			
7.			
	60	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Pinus strobus*	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	10	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Pteridium aquilinum*	25	Yes	FACU
2. *Aralia nudicaulis*	10	Yes	FACU
3. *Maianthemum canadense*	5	No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	45	x 3 =	135
FACU species	65	x 4 =	260
UPL species	0	x 5 =	0
Column Totals:	110 (A)		395 (B

Prevalence Index = B/A = 3.59

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supportir data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardles of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft i height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-SK-6UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	2.5Y 3/1	100					Loamy/Clayey	
1-3	10YR 4/4	100					Loamy/Clayey	
3-9	2.5Y 4/2	100					Loamy/Clayey	
9-16	2.5Y 5/3	95	7.5YR 4/6	5	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-6WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.987247°↑ Long: -68.722093° Datum: WGS84

Soil Map Unit Name: Pushaw-Swanville complex, 0 to 8 percent slopes NWI classification: PFO

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- X Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 1
Water Table Present?	Yes X	No ____	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 4

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-6WET

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	15	Yes	FAC
2. *Abies balsamea*	15	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	30	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus incana*	10	Yes	FACW
2. *Acer rubrum*	10	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	20	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	30	Yes	FACW
2. *Rubus hispidus*	10	Yes	FACW
3. *Dryopteris carthusiana*	5	No	FACW
4. *Osmunda cinnamomea*	5	No	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	50	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	60	x 2 =	120
FAC species	40	x 3 =	120
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	100 (A)		240 (B)

Prevalence Index = B/A = 2.40

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-SK-6WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	2.5Y 4/1	100					Loamy/Clayey	
2-18	2.5Y 5/1	60	7.5YR 5/6	40	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-9UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Convex Slope %: 1

Subregion (LRR or MLRA): LRR R Lat: 44.987206°↑ Long: -68.723626° Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-9UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Tsuga canadensis*	40	Yes	FACU
2. *Quercus rubra*	10	No	FACU
3. *Acer rubrum*	10	No	FAC
4.			
5.			
6.			
7.			
	60	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Pinus strobus*	2	No	FACU
2. *Abies balsamea*	2	No	FAC
3.			
4.			
5.			
6.			
7.			
	4	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Trientalis borealis*	2	No	FAC
2. *Streptopus amplexifolius*	2	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	4	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	16	x 3 =	48
FACU species	52	x 4 =	208
UPL species	0	x 5 =	0
Column Totals:	68 (A)		256 (B)

Prevalence Index = B/A = 3.76

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
Sparse understory due to dense hemlock canopy

SOIL

Sampling Point: W-SK-9UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	2.5Y 3/1	100					Loamy/Clayey	
3-8	7.5YR 4/4	100					Loamy/Clayey	
8-12	10YR 5/3	100					Loamy/Clayey	
12-19	10YR 5/3	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-9WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.987179° Long: -68.728241° Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

X Surface Water (A1)	X Water-Stained Leaves (B9)	____ Surface Soil Cracks (B6)
X High Water Table (A2)	____ Aquatic Fauna (B13)	____ Drainage Patterns (B10)
X Saturation (A3)	____ Marl Deposits (B15)	____ Moss Trim Lines (B16)
____ Water Marks (B1)	____ Hydrogen Sulfide Odor (C1)	____ Dry-Season Water Table (C2)
____ Sediment Deposits (B2)	____ Oxidized Rhizospheres on Living Roots (C3)	____ Crayfish Burrows (C8)
____ Drift Deposits (B3)	____ Presence of Reduced Iron (C4)	____ Saturation Visible on Aerial Imagery (C9)
____ Algal Mat or Crust (B4)	____ Recent Iron Reduction in Tilled Soils (C6)	____ Stunted or Stressed Plants (D1)
____ Iron Deposits (B5)	____ Thin Muck Surface (C7)	____ Geomorphic Position (D2)
____ Inundation Visible on Aerial Imagery (B7)	____ Other (Explain in Remarks)	____ Shallow Aquitard (D3)
____ Sparsely Vegetated Concave Surface (B8)		____ Microtopographic Relief (D4)
		X FAC-Neutral Test (D5)

Secondary Indicators (minimum of two required)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 2
Water Table Present?	Yes X	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-9WET

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Alnus incana*	10	Yes	FACW
2. *Spiraea latifolia*	15	Yes	FACW
3.			
4.			
5.			
6.			
7.			
	25 =Total Cover		
Herb Stratum (Plot size: 5)			
1. *Scirpus cyperinus*	10	Yes	OBL
2. *Juncus effusus*	5	Yes	OBL
3. *Onoclea sensibilis*	5	Yes	FACW
4. *Osmunda claytoniana*	5	Yes	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	25 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	30	x 2 =	60
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	50 (A)		90 (B)

Prevalence Index = B/A = 1.80

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-SK-9WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 5/2	90	7.5YR 5/6	10	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ____

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-10UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Convex Slope %: 2

Subregion (LRR or MLRA): LRR R Lat: 44.987245° Long: -68.728241° Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-10UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Tsuga canadensis*	50	Yes	FACU
2. *Pinus strobus*	30	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	80	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Picea rubens*	20	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	20	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Vaccinium angustifolium*	2	Yes	FACU
2. *Maianthemum canadense*	2	Yes	FACU
3. *Trientalis borealis*	2	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	6	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 16.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	2	x 3 =	6
FACU species	104	x 4 =	416
UPL species	0	x 5 =	0
Column Totals:	106 (A)		422 (B)

Prevalence Index = B/A = 3.98

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-SK-10UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 3/1	100					Loamy/Clayey	
2-13	5YR 3/4	100					Loamy/Clayey	Refusal @ 13" Boulders

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stone/Boulder

Depth (inches): 13

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-10WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.987145° Long: -68.728241° Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 3
Water Table Present?	Yes X	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-10WET

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Acer rubrum*	2	No	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	2 =Total Cover		
Herb Stratum (Plot size: 5)			
1. *Onoclea sensibilis*	20	Yes	FACW
2. *Osmundastrum cinnamomeum*	5	No	FACW
3. *Rubus hispidus*	2	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	27 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	27	x 2 =	54
FAC species	2	x 3 =	6
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	29 (A)		60 (B)

Prevalence Index = B/A = 2.07

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-SK-10WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	2.5Y 5/3	100					Loamy/Clayey	
2-13	2.5YR 5/2	80	7.5YR 5/6	20	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-11UP

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Slope Local relief (concave, convex, none): Convex Slope %: 2

Subregion (LRR or MLRA): LRR R Lat: 44.986492°↑ Long: -68.729716°↑ Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: NONE

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): 0
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-11UP

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Tsuga canadensis*	50	Yes	FACU
2. *Pinus strobus*	30	Yes	FACU
3. *Abies balsamea*	5	No	FAC
4.			
5.			
6.			
7.			
	85	=Total Cover	
Sapling/Shrub Stratum (Plot size: 15)			
1. *Picea rubens*	20	Yes	FACU
2. *Abies balsamea*	5	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	25	=Total Cover	
Herb Stratum (Plot size: 5)			
1. *Vaccinium angustifolium*	2	Yes	FACU
2. *Maianthemum canadense*	2	Yes	FACU
3. *Trientalis borealis*	2	Yes	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	6	=Total Cover	
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
		=Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 28.6% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	12	x 3 =	36
FACU species	104	x 4 =	416
UPL species	0	x 5 =	0
Column Totals:	116 (A)		452 (B)

Prevalence Index = B/A = 3.90

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-SK-11UP

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/1	100					Loamy/Clayey	
4-16	5YR 3/4	100					Loamy/Clayey	Refusal @ 16" Boulders

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Stone/Boulder

Depth (inches): 16

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Northcentral and Northeast Region
See ERDC/EL TR-12-1; the proponent agency is CECW-CO-R

OMB Control #: 0710-0024, Exp: 9/30/2027
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Juniper Ridge Landfill City/County: Penobscot Sampling Date: 5/22/25

Applicant/Owner: SME State: ME Sampling Point: W-SK-11WET

Investigator(s): Steve Knapp, PWS Section, Township, Range: Oldtown

Landform (hillside, terrace, etc.): Basin Local relief (concave, convex, none): Concave Slope %: 0

Subregion (LRR or MLRA): LRR R Lat: 44.986168°↑ Long: -68.729952°↑ Datum: WGS84

Soil Map Unit Name: Telos-Chesuncook complex, 0 to 8 percent slopes, very stony NWI classification: PEM

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	If yes, optional Wetland Site ID: ____

Remarks: (Explain alternative procedures here or in a separate report.)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- X Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 6
Water Table Present?	Yes X	No ____	Depth (inches): 0
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION – Use scientific names of plants.

Sampling Point: W-SK-11WET

Tree Stratum (Plot size: N/A)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Sapling/Shrub Stratum (Plot size: N/A)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	=Total Cover		
Herb Stratum (Plot size: 5)			
1. *Typha latifolia*	20	Yes	OBL
2. *Scirpus cyperinus*	15	Yes	OBL
3. *Carex scoparia*	2	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	37 =Total Cover		
Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
	=Total Cover		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	2	x 2 =	4
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	37 (A)		39 (B)

Prevalence Index = B/A = 1.05

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)
Portions of wetland have been impacted by skidder activity in the past

SOIL

Sampling Point: W-SK-11WET

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	2.5Y 5/3	100					Loamy/Clayey	
2-13	2.5YR 5/2	80	7.5YR 5/6	20	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Mesic Spodic (A17) **(MLRA 144A, 145, 149B)**
- ___ Iron Monosulfide (A18)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) (**LRR R, MLRA 149B**)
- ___ Thin Dark Surface (S9) (**LRR R, MLRA 149B**)
- ___ High Chroma Sands (S11) (**LRR K, L)**
- ___ Loamy Mucky Mineral (F1) (**LRR K, L**)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) (**LRR K, L**)
- ___ Red Parent Material (F21) **(MLRA 145)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) (**LRR K, L, MLRA 149B**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR K, L, R**)
- ___ Polyvalue Below Surface (S8) (**LRR K, L**)
- ___ Thin Dark Surface (S9) (**LRR K, L**)
- ___ Iron-Manganese Masses (F12) (**LRR K, L, R**)
- ___ Piedmont Floodplain Soils (F19) (**MLRA 149B**)
- ___ Red Parent Material (F21) **(outside MLRA 145)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

Some historic disturbance related to the installation of the project fence.

USACE Data Form W-KV-01 – Representative Wetland Photograph

USACE Data Form W-KV-01 – Representative Wetland Soil Profile

USACE Data Form W-KV-01 – Representative Upland Soil Profile

USACE Data Form W-KV-02 – Representative Wetland Photograph

USACE Data Form W-KV-02 – Representative Wetland Soil Profile

USACE Data Form W-KV-02 – Representative Upland Photograph

USACE Data Form W-KV-02 – Representative Upland Soil Profile

USACE Data Form W-KV-03 – Representative Wetland Photograph

USACE Data Form W-KV-03 – Representative Wetland Soil Profile

USACE Data Form W-KV-03 – Representative Upland Photograph

USACE Data Form W-KV-04 – Representative Upland Soil Profile

USACE Data Form W-KV-04 – Representative Wetland Photograph

USACE Data Form W-KV-04 – Representative Wetland Soil Profile

USACE Data Form W-KV-04 – Representative Upland Photograph

USACE Data Form W-KV-04 – Representative Upland Soil Profile

USACE Data Form W-SK-01 – Representative Wetland Photograph

USACE Data Form W-SK-01 – Representative Upland Photograph

USACE Data Form W-SK-01A – Representative Wetland Photograph

USACE Data Form W-SK-01A – Representative Wetland Soil Profile

USACE Data Form W-SK-01A – Representative Upland Photograph

USACE Data Form W-SK-02 – Representative Wetland Photograph

USACE Data Form W-SK-02 – Representative Wetland Soil Profile

USACE Data Form W-SK-02 – Representative Upland Photograph

USACE Data Form W-SK-02 – Representative Upland Soil Profile

USACE Data Form W-SK-03 – Representative Wetland Photograph

USACE Data Form W-SK-03 – Representative Upland Photograph

USACE Data Form W-SK-03 – Representative Upland Soil Profile

USACE Data Form W-SK-04 – Representative Wetland Photograph

USACE Data Form W-SK-04 – Representative Wetland Soil Profile

USACE Data Form W-SK-04 – Representative Upland Photograph

USACE Data Form W-SK-04 – Representative Upland Soil Profile

USACE Data Form W-SK-06 – Representative Wetland Photograph

USACE Data Form W-SK-06 – Representative Wetland Soil Profile

USACE Data Form W-SK-06 – Representative Upland Photograph

USACE Data Form W-SK-06 – Representative Upland Soil Profile

USACE Data Form W-SK-09 – Representative Wetland Photograph

USACE Data Form W-SK-09 – Representative Wetland Soil Profile

USACE Data Form W-SK-09 – Representative Upland Photograph

USACE Data Form W-SK-09 – Representative Upland Soil Profile

USACE Data Form W-SK-10 – Representative Wetland Photograph

USACE Data Form W-SK-10 – Representative Wetland Soil Profile

USACE Data Form W-SK-10 – Representative Upland Photograph

USACE Data Form W-SK-10 – Representative Upland Soil Profile

USACE Data Form W-SK-11 – Representative Wetland Photograph

Exhibit F:

Vernal Pool Data Forms

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: VP-KV-01 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Steve Knapp

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other _____

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Juniper Ridge Landfill

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Bureau of General Services Phone: (207) 624-7345 E-mail: wallace.giakas@maine.gov

Street Address: 77 State House Station City: Augusta State: ME Zip: 04333

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Old Town

Brief site directions to the pool (using mapped landmarks):

Drive down the Juniper Ridge Access Road, vernal pool is located within a large wetland complex north of the access road and just after the gate weight station.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: _____ Latitude/Northing: _____

Coordinate system: _____

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): 5/3/23

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ◉ Natural ○ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pools have leaf litter bottom sparse pool vegetation with predominantly mineral/leaf litter substrate-pit and mound topography within much larger wetland complex.

■ Maximum depth at survey: ○ 0-12" (0-1 ft.) ◉ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 100 ○ m ◉ ft Length: 84 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ○ Mineral soil (sphagnum moss present)
- ◉ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☑ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☐ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☑ Sphagnum moss (anchored or suspended)
- ☐ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☐ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ◉ No inlet or outlet
- ○ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5/3/23

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ◉ Yes ○ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	0			3											
Spotted Salamander	35			3			M/A								
Blue-spotted Salamander															
Fairy Shrimp[3]															

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%
2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching
3-Fairy shrimp: X = present
4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen
**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☑ SVP ☐ Potential SVP ☐ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Photo 1: View of pool VP-KV-01

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: VP-SK-01 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Steve Knapp

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other _____

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Juniper Ridge Landfill

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Bureau of General Services Phone: (207) 624-7345 E-mail: wallace.giakas@maine.gov

Street Address: 77 State House Station City: Augusta State: ME Zip: 04333

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Old Town

Brief site directions to the pool (using mapped landmarks):

Drive down the Juniper Ridge Access Road, vernal pool is located within a large wetland complex north of the access road and just after the gate weight station.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: _____ Latitude/Northing: _____

Coordinate system: _____

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): 5/3/23

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ○ Natural ◉ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

Existing wetland which has been ditched in the past, wetland is associated with a culverted road crossing and it appears that the area was ditched to enhance drainage within the wetland.

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pools have leaf litter bottom with muck in the deeper portions. Majority of the pool is vegetated with herbaceous species such as sensitive fern.

■ Maximum depth at survey: ○ 0-12" (0-1 ft.) ◉ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 65 ○ m ◉ ft Length: 91 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ○ Mineral soil (sphagnum moss present)
- ◉ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☑ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☐ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☑ Sphagnum moss (anchored or suspended)
- ☐ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☐ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ○ No inlet or outlet
- ○ Intermittent inlet or outlet
- ◉ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5/3/23; 5/16/23

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ○ Yes ○ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	16	0					M/H						2		
Spotted Salamander	14	18					M	A					3	3	
Blue-spotted Salamander															
Fairy Shrimp[3]															

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%
2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching
3-Fairy shrimp: X = present
4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen
**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☑ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Vernal pool is within a larger complex, several pools are interconnected by a dug channel that extends from the roadway culvert through the pools to enhance flow into the wetland. This feature did not meet the definition of a stream, but does maintain flow. Photos of the pool and inlet/outlet have been included.

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Photo 1: View of pool inlet into VP-SK-01 (Road with culvert in the photo background)

Photo 2: View of pool inlet into VP-SK-01 (looking toward the VP depression)

Photo 3: View of pool outlet from VP-SK-01 (looking toward the VP depression)

Photo 4: View of pool VP-SK-01 (5/3/23)

Photo 4: View of pool VP-SK-01 (5/16/23)

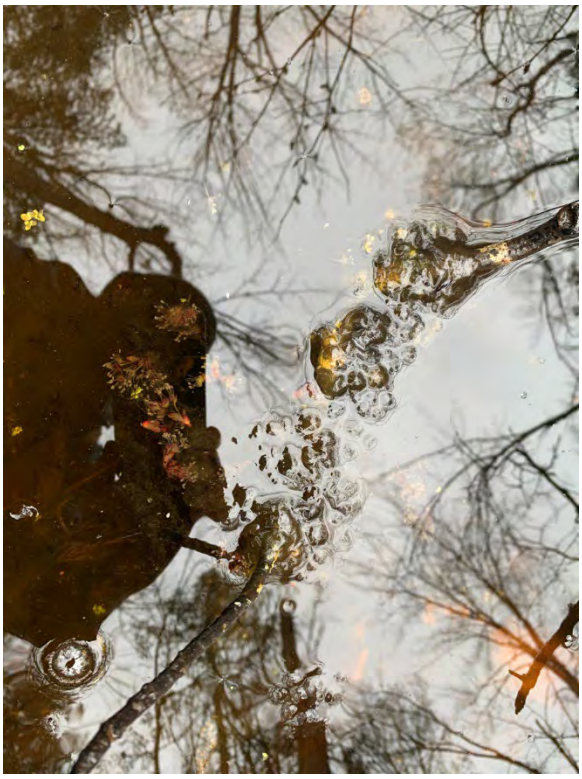

Photo 4: Yellow spotted salamander egg masses (5/3/23)

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: VP-SK-02 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Steve Knapp

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other _____

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Juniper Ridge Landfill

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Bureau of General Services Phone: (207) 624-7345 E-mail: wallace.giakas@maine.gov

Street Address: 77 State House Station City: Augusta State: ME Zip: 04333

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Old Town

Brief site directions to the pool (using mapped landmarks):

Drive down the Juniper Ridge Access Road, vernal pool is located within a large wetland complex north of the access road and just after the gate weight station.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: _____ Latitude/Northing: _____

Coordinate system: _____

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): _____

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ○ Natural ◉ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

Existing wetland which has been ditched in the past, wetland is associated with a culverted road crossing and it appears that the area was ditched to enhance drainage within the wetland.

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ○ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pools have leaf litter bottom with muck in the deeper portions. Majority of the pool is vegetated with herbaceous species such as sensitive fern.

■ Maximum depth at survey: ○ 0-12" (0-1 ft.) ◉ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 40 ○ m ◉ ft Length: 60 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ○ Mineral soil (sphagnum moss present)
- ◉ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☑ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☐ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☑ Sphagnum moss (anchored or suspended)
- ☐ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☐ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ○ No inlet or outlet
- ○ Intermittent inlet or outlet
- ◉ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5/3/23; 5/16/23

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ○ Yes ◉ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	2	0		2	2		H			X	X		3	3	
Spotted Salamander	25	8		3	3		M/A	A							
Blue-spotted Salamander															
Fairy Shrimp[3]															

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%
2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching
3-Fairy shrimp: X = present
4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen
**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☑ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Pool contains significant numbers of salamander egg masses, however this pool has both a perennial inlet and outlet which interconnects with adjacent pools. The channel appears to have been excavated to enhance flow from a culvert.

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Photo 1: View of pool inlet into VP-SK-02 (looking upgradient toward VP-SK-01)

Photo 2: View of pool outlet (looking downgradient toward VP-SK-03)

Photo 3: View of pool VP-SK-02 (5/3/23)

Photo 4: View of pool VP-SK-02 (5/16/23)

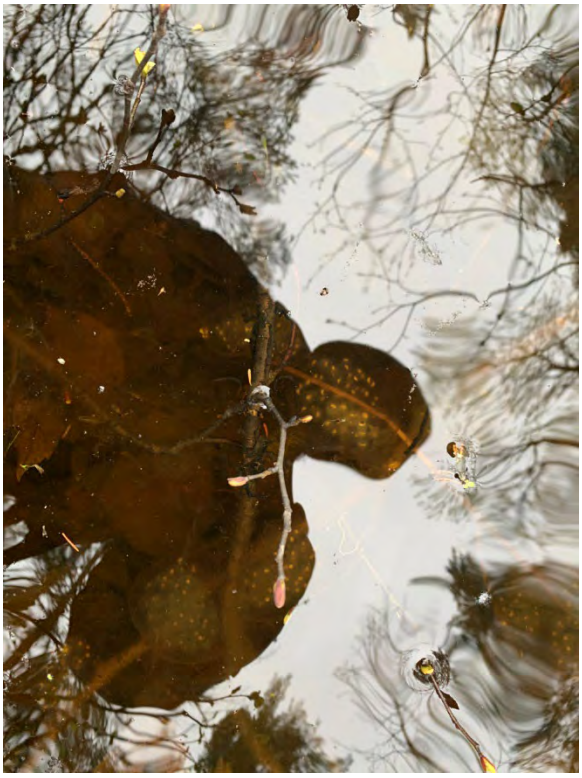

Photo 4: Yellow spotted salamander egg masses (5/3/23)

Photo 4: Wood frog egg mass (5/3/23)

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: VP-SK-03 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Steve Knapp

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other _____

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Juniper Ridge Landfill

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Bureau of General Services Phone: (207) 624-7345 E-mail: wallace.giakas@maine.gov

Street Address: 77 State House Station City: Agusta State: ME Zip: 04333

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Old Town

Brief site directions to the pool (using mapped landmarks):

Drive down the Juniper Ridge Access Road, vernal pool is located within a large wetland complex north of the access road and just after the gate weight station.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: _____ Latitude/Northing: _____

Coordinate system: _____

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): 5/3/23

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ○ Natural ◉ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

Existing wetland which has been ditched in the past, wetland is associated with a culverted road crossing and it appears that the area was ditched to enhance drainage within the wetland.

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pools have leaf litter bottom with muck in the deeper portions. Majority of the pool is vegetated with herbaceous species such as sensitive fern.

■ Maximum depth at survey: ○ 0-12" (0-1 ft.) ◉ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 42 ○ m ◉ ft Length: 40 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ○ Mineral soil (sphagnum moss present)
- ◉ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☑ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☐ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☑ Sphagnum moss (anchored or suspended)
- ☐ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☐ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ○ No inlet or outlet
- ○ Intermittent inlet or outlet
- ◉ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5/3/23; 5/16/23

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ◉ Yes ○ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	0	0		2	2										
Spotted Salamander	12	1		3	3		M/A	A							
Blue-spotted Salamander															
Fairy Shrimp[3]															

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%
2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching
3-Fairy shrimp: X = present
4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen
**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☑ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Vernal pool is within a larger complex, several pools are interconnected by a dug channel that extends from the roadway culvert through the pools to enhance flow into the wetland.

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Photo 1: View of pool inlet into VP-SK-03 (looking upgradient toward VP-SK-02)

Photo 2: View of pool inlet into VP-SK-03 (looking upgradient toward VP-SK-02)

Photo 3: View of pool VP-SK-03 (5/3/23)

Photo 4: View of pool VP-SK-02 (5/16/23)

Photo 4: Yellow spotted salamander egg masses (5/3/23)

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: VP-SK-04 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Steve Knapp

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other _____

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Juniper Ridge Landfill

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Bureau of General Services Phone: (207) 624-7345 E-mail: wallace.giakas@maine.gov

Street Address: 77 State House Station City: Augusta State: ME Zip: 04333

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Old Town

Brief site directions to the pool (using mapped landmarks):

Drive down the Juniper Ridge Access Road, vernal pool is located within a large wetland complex north of the access road and just after the gate weight station.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: _____ Latitude/Northing: _____

Coordinate system: _____

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): 5/3/23

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☐ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ◉ Natural ○ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pools have leaf litter bottom sparse pool vegetation with predominantly mineral/leaf litter substrate

■ Maximum depth at survey: ◉ 0-12" (0-1 ft.) ○ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 20 ○ m ◉ ft Length: 20 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ◉ Mineral soil (sphagnum moss present)
- ○ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☑ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☐ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☐ Sphagnum moss (anchored or suspended)
- ☐ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☐ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ◉ No inlet or outlet
- ○ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5/3/23; 5/16/23

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ◉ Yes ○ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	0	0		2	2										
Spotted Salamander	4	2		3	3		M/A	A							
Blue-spotted Salamander															
Fairy Shrimp[3]															

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%
2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching
3-Fairy shrimp: X = present
4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen
**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☑ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Photo 1: View of pool VP-SK-04 (5/3/23)

Photo 2: View of pool VP-SK-04 (5/16/23)

Photo 3: Yellow spotted salamander eggs in VP-SK-04 (5/3/23)

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: VP-SK-05 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Steve Knapp

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other _____

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Juniper Ridge Landfill

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Bureau of General Services Phone: (207) 624-7345 E-mail: wallace.giakas@maine.gov

Street Address: 77 State House Station City: Augusta State: ME Zip: 04333

c. ☐ Large Projects: check if separate project landowner data file submitted

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4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Old Town

Brief site directions to the pool (using mapped landmarks):

Drive down the Juniper Ridge Access Road, vernal pool is located within a large wetland complex north of the access road and just after the gate weight station.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: _____ Latitude/Northing: _____

Coordinate system: _____

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

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5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): 5/3/23

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
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- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☐ Shrub swamp
- ☐ Peatland (fen or bog)
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- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ◉ Natural ○ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pools have leaf litter bottom sparse pool vegetation with predominantly mineral/leaf litter substrate

■ Maximum depth at survey: ◉ 0-12" (0-1 ft.) ○ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 30 ○ m ◉ ft Length: 35 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ◉ Mineral soil (sphagnum moss present)
- ○ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

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- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
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- ☐ Sphagnum moss (anchored or suspended)
- ☐ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☐ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ◉ No inlet or outlet
- ○ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5/3/23; 5/16/23

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ◉ Yes ○ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	4	0		3	3		A				X			3	
Spotted Salamander	10	8		3	3		M/A	A							
Blue-spotted Salamander															
Fairy Shrimp[3]															

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☑ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Photo 1: View of pool VP-SK-05 (5/3/23)

Photo 2: View of pool VP-SK-05 (5/16/23)

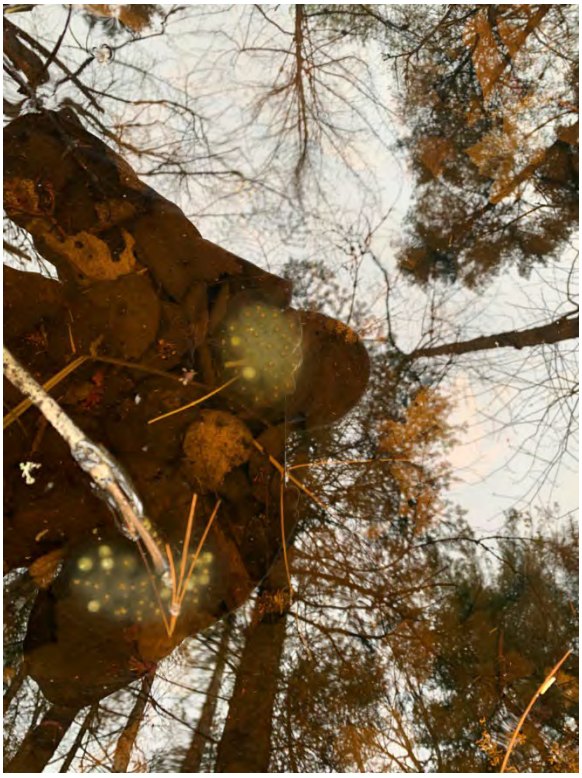


Photo 3: Yellow spotted salamander eggs in VP-SK-05 (5/3/23)

Photo 4: Wood frog egg masses in VP-SK-05 (5/3/23)

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: VP-SK-06 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Steve Knapp

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other _____

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Juniper Ridge Landfill

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Bureau of General Services Phone: (207) 624-7345 E-mail: wallace.giakas@maine.gov

Street Address: 77 State House Station City: Augusta State: ME Zip: 04333

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Old Town

Brief site directions to the pool (using mapped landmarks):

Drive down the Juniper Ridge Access Road, vernal pool is located within a large wetland complex north of the access road and just after the gate weight station.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: _____ Latitude/Northing: _____

Coordinate system: _____

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): 5/3/23

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ◉ Natural ○ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pools have leaf litter bottom sparse pool vegetation with predominantly mineral/leaf litter substrate

■ Maximum depth at survey: ◉ 0-12" (0-1 ft.) ○ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 10 ○ m ◉ ft Length: 20 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ◉ Mineral soil (sphagnum moss present)
- ○ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☑ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☐ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☐ Sphagnum moss (anchored or suspended)
- ☐ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☐ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ◉ No inlet or outlet
- ○ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5/3/23; 5/16/23

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ◉ Yes ○ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	0	0		3	3										
Spotted Salamander	0	0		3	3										
Blue-spotted Salamander															
Fairy Shrimp[3]															

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☑ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Photo 1: View of pool VP-SK-06 (5/3/23)

Photo 2: View of pool VP-SK-06 (5/16/23)

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: VP-SK-07 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Steve Knapp

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other _____

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Juniper Ridge Landfill

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Bureau of General Services Phone: (207) 624-7345 E-mail: wallace.giakas@maine.gov

Street Address: 77 State House Station City: Augusta State: ME Zip: 04333

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Old Town

Brief site directions to the pool (using mapped landmarks):

Drive down the Juniper Ridge Access Road, vernal pool is located within a large wetland complex north of the access road and just after the gate weight station.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: _____ Latitude/Northing: _____

Coordinate system: _____

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): 5/3/23

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ◉ Natural ○ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pools have leaf litter bottom sparse pool vegetation with predominantly mineral/leaf litter substrate

■ Maximum depth at survey: ◉ 0-12" (0-1 ft.) ○ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 10 ○ m ◉ ft Length: 15 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ◉ Mineral soil (sphagnum moss present)
- ○ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☑ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☐ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☐ Sphagnum moss (anchored or suspended)
- ☐ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☐ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ◉ No inlet or outlet
- ○ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 5/3/23; 5/16/23

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ◉ Yes ○ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	0	0		3	3										
Spotted Salamander	0	0		3	3										
Blue-spotted Salamander															
Fairy Shrimp[3]															

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☑ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Photo 1: View of pool VP-SK-07 (5/3/23)

Photo 2: View of pool VP-SK-07 (5/16/23)

Exhibit G:

Agency Correspondence

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

December 15, 2022

Steve Knapp
Biodiversity Research Institute
276 Canco Road
Portland, ME 04103

RE: Information Request – Juniper Ridge Landfill Expansion Project, Old Town

Dear Steve:

Per your request received on December 13, 2022, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and inland fisheries habitat concerns within the vicinity of the *Juniper Ridge Landfill Expansion* project in Old Town.

Our Department has not mapped any Essential Habitats that would be directly affected by your project.

Endangered, Threatened, and Special Concern Species

Bat Species – Of the eight species of bats that occur in Maine, the three *Myotis* species are protected under Maine's Endangered Species Act (MESA) and are afforded special protection under 12 M.R.S §12801 - §12810. The three *Myotis* species include little brown bat (State Endangered), northern long-eared bat (State Endangered), and eastern small-footed bat (State Threatened). The five remaining bat species are listed as Special Concern: big brown bat, red bat, hoary bat, silver-haired bat, and tri-colored bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence it is likely that several of these species occur within the project area during migration and/or the breeding season. However, our Agency does not anticipate significant impacts to any of the bat species as a result of this project.

Wood Turtle - Occurrences of wood turtle, a State Species of Special Concern, have been documented within the vicinity of the search area of the proposed project. Wood turtles use a mix of aquatic and terrestrial habitats throughout the year including riparian meadows, shrub thickets, farmland, and deciduous forests as well as bogs, forested wetlands, vernal pools, and streams. If these habitats are present in the project area, we recommend that they be avoided and adequately buffered with a 300-foot undisturbed, intact vegetative cover.

Significant Wildlife Habitat

Significant Vernal Pools - A mapped Significant Vernal Pool, a Significant Wildlife Habitat under Maine's Natural Resources Protection Act, occurs within the project review area; however, it is unclear if formal surveys for vernal pools have been conducted for the entire project area. If not, we recommend that surveys for vernal pools be conducted within the project boundary by qualified wetland scientists prior to final project design to determine whether there are other Significant Vernal Pools present in the area. These surveys should extend up to 250 feet beyond the anticipated project footprint because of

potential performance standard requirements for off-site Significant Vernal Pools, assuming such pools are located on land owned or controlled by the applicant. Once surveys are completed, survey forms should be submitted to our Agency for review well before to the submission of any necessary permits. Our Department will need to review and verify any vernal pool data prior to final determination of significance.

Fisheries Habitat

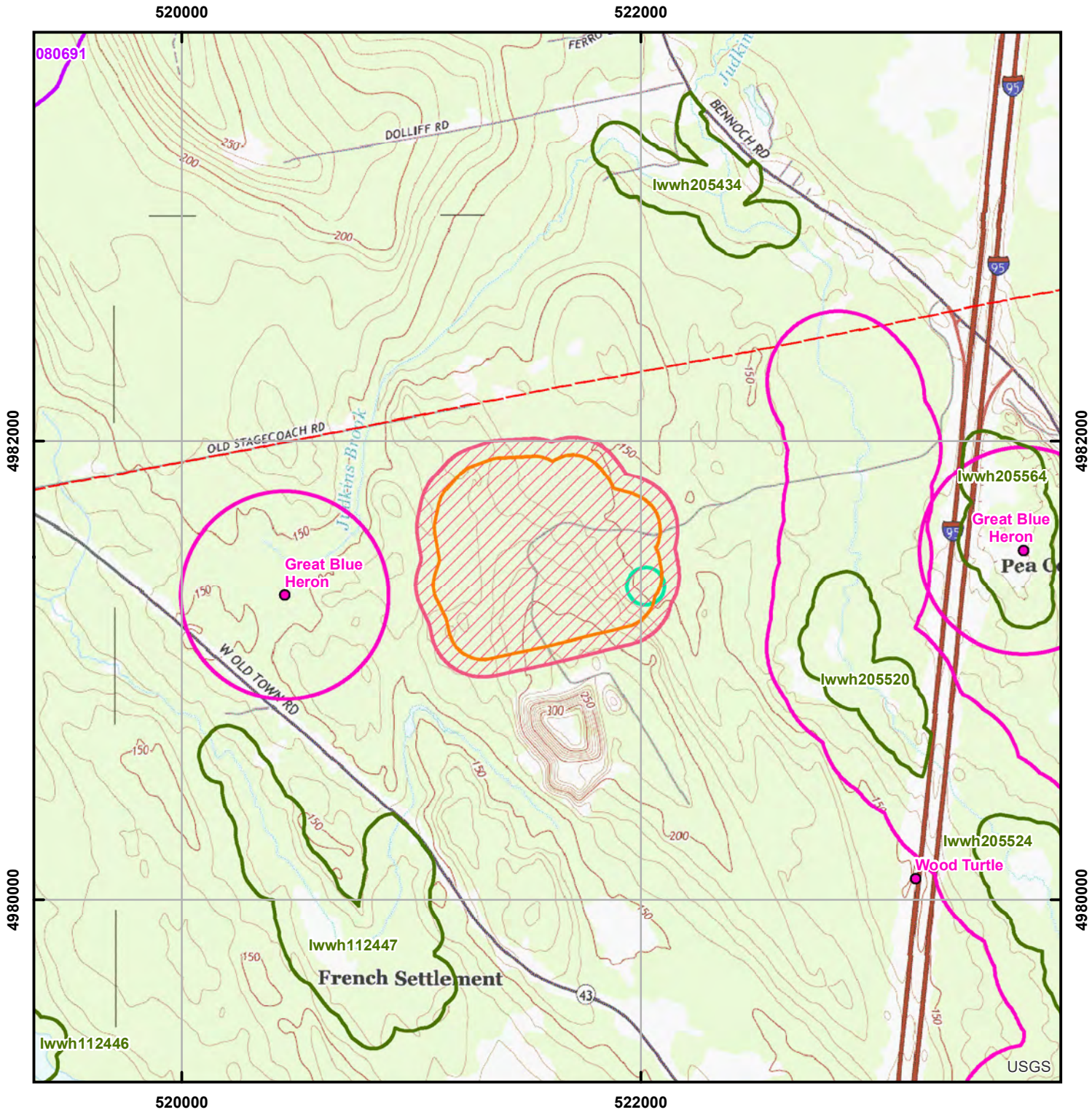
We generally recommend maintaining 100-foot undisturbed vegetated buffers from the upland edge of all intermittent and perennial streams and any contiguous wetlands. Maintaining and enhancing buffers along these resources is critical to the protection of water temperatures, water quality, natural inputs of coarse woody debris, and various forms of aquatic life necessary to support fish and other aquatic species. Riparian buffers also provide critical habitat and important travel corridors for a variety of wildlife species. Stream crossings should be avoided, but if a stream crossing is necessary, or an existing crossing needs to be modified, it should be designed to provide for full aquatic passage. Small streams, including intermittent streams, can provide crucial rearing habitat, cold water for thermal refugia, and abundant food for juvenile salmonids on a seasonal basis. Undersized crossings may inhibit these functions and become a frequent maintenance problem that causes reoccurring damage to the resource. Generally, MDIFW recommends that all new, modified, and replacement stream crossings be sized to span at least 1.2 times the bankfull width of the stream. In addition, we generally recommend that stream crossings be open bottomed (i.e. natural bottom), although embedded structures which are backfilled with representative streambed material have been shown to be effective in providing habitat connectivity for fish and other aquatic organisms. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts as eroding soils can travel significant distances as well as transport other pollutants resulting in direct impacts to fish, other aquatic life, and their habitats. In addition, we recommend that any necessary instream work occur between July 15 and October 1.

This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance we recommend additional consultation with the municipality, and other state resource agencies including the Maine Natural Areas Program, Maine Department of Marine Resources, and Maine Department of Environmental Protection in order to avoid unintended protected resource disturbance.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

Becca Settele
Wildlife Biologist



Environmental Review of Fish and Wildlife Observations and Priority Habitats

Project Name: Juniper Ridge Landfill Expansion, Old Town (Version 1)

Miles

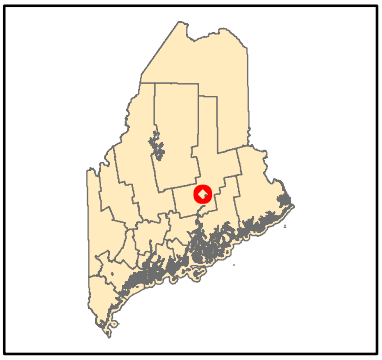
0 0.1250.25 0.5 0.75 1

Projection: UTM, NAD83, Zone 19N

Date: 12/15/2022

Maine Department of Inland Fisheries and Wildlife

- ProjectSearchAreas - All Versions
- Maine Cliff and Talus Areas
- Deer Winter Area
- LUPC p-fw
- Cooperative DWAs
- Seabird Nesting Islands
- Shorebird Areas
- Inland Waterfowl and Wading Bird
- 2008 Iwwh - Shoreland Zoning
- Tidal Waterfowl and Wading Bird
- Significant Vernal Pools
- Environmental Review Polygons
- Roseate Tern
- Piping Plover and Least Tern
- Aquatic ETSc - 2.5 mi review
- Rare Mussels - 5 mi review
- Maine Heritage Fish Waters
- Arctic Charr Habitat
- Redfin Pickerel and Swamp Darter Habitats - buffer100ft
- Special Concern occupied habitats - 100ft buffer
- Wild Lake Trout Habitats



STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

July 31, 2023

Steve Knapp
Biodiversity Research Institute
30 Danforth Street, Suite 213
Portland, ME 04101

Re: Vernal Pool Significance Determination, Pool ID #s 5200, 5203, 5204, 5205, 5206, 5201, 5202–Old Town

Dear Steve Knapp:

Vernal pools are temporary to semi-permanent wetlands occurring in shallow depressions that typically fill during the spring and dry during the summer or in drought years. They provide important breeding and foraging habitat for a wide variety of specialized wildlife species including several rare, threatened, and endangered species.

Based on your field surveys, it has been determined that the vernal pools identified above on the property of Bureau of General Services are NOT SIGNIFICANT because either: 1. the features do not meet the definition of a vernal pool under the Significant Wildlife Habitat rules, 06-096 CMR 335(9) or 2. the vernal pools do not meet the biological standards for exceptional wildlife use of the Significant Wildlife Habitat rules, 06-096 CMR 335(9)(B). Therefore, activities within 250 feet of the pools are not regulated under the Natural Resources Protection Act (NRPA) unless there are other protected natural resources nearby such as streams or freshwater wetlands. I have attached a copy of the database printout that verifies the State's findings with respect to your surveys.

I want to also advise you that the pool areas on the property can be considered freshwater wetlands and therefore direct pool alterations may require permitting under the NRPA.

The Department will notify the landowner of the pool status under separate cover. If you have any questions or need further clarification, please contact Mark Stebbins at 207-592-4810 or email at: Mark.N.Stebbins@maine.gov

Sincerely,

Robert Wood
Director, Bureau of Land Resources

cc. town file

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
207-941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

WEBSITE: www.maine.gov/dep

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

July 31, 2023

Steve Knapp
Biodiversity Research Institute
30 Danforth Street, Suite 213
Portland, ME 04101

Re: Vernal Pool Significance Determination, Pool ID # 5199–Old Town

Dear Steve Knapp:

Vernal pools are temporary to semi-permanent wetlands occurring in shallow depressions that typically fill during the spring and dry during the summer or in drought years. They provide important breeding and foraging habitat for a wide variety of specialized wildlife species including several rare, threatened, and endangered species.

Based on your field survey, it has been determined that the vernal pool identified above on the property of Bureau of General Services is SIGNIFICANT. I have attached a copy of the database printout that verifies the State's findings with respect to our survey.

As a significant vernal pool, all areas on the Bureau of General Services property within 250 feet of the vernal pool depression, known as the "critical terrestrial habitat", will be subject to the requirements of the Natural Resources Protection Act, 38 M.R.S.A. §§480-A to 480-FF, and the Significant Wildlife Habitat rules, 06-096 CMR 335.

The Department will ensure that the vernal pool's location and status is entered and mapped in the State's vernal pool database. Note that if the pool depression (only) crosses two or more property boundaries the abutter(s) are similarly subject to the requirements of the Natural Resources Protection Act and the Significant Wildlife Habitat rules.

The Department will notify the landowner of the pool status under separate cover. If you have any questions or need further clarification, please contact Mark Stebbins at 207-592-4810 or email at: Mark.N.Stebbins@maine.gov

Sincerely,

Robert Wood
Director, Bureau of Land Resources

cc. town file

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
207-941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

WEBSITE: www.maine.gov/dep

IFW Recommendations for Significant Vernal Pool Determinations

The following is a list of pools and IFW's recommendations for whether or not they qualify as Significant Vernal Pools, one of Maine's Significant Wildlife Habitats.

Data current as of: Monday, July 31, 2023

IFW's Pool ID: 5199 Twp: Old Town
Observer's ID: VP-KV-01
UTM Coordinates of Pool Center: 521590 E, 4981869 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023
IFW's Recommendation: GREEN: SIGNIFICANT
IFW Comments: Pool provides significant habitat for spotted salamanders.

IFW's Pool ID: 5200 Twp: Old Town
Observer's ID: VP-SK-01
UTM Coordinates of Pool Center: 521974 E, 4981657 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments: Pool provides some habitat for wood frogs and spotted salamanders but does not meet biological criteria for significance.

IFW's Pool ID: 5201 Twp: Old Town
Observer's ID: VP-SK-02
UTM Coordinates of Pool Center: 521977 E, 4981691 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the vernal pool definition
IFW Comments: Pool provides some habitat for wood frogs and significant habitat for spotted salamanders but does not meet MDEP vernal pool definition (permanent inlet and outlet)

IFW's Pool ID: 5202 Twp: Old Town
Observer's ID: VP-SK-03
UTM Coordinates of Pool Center: 521988 E, 4981713 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the vernal pool definition
IFW Comments: Pool provides some habitat for spotted salamanders but does not meet biological criteria for significance. Pool also does not meet MDEP vernal pool definition (permanent inlet and outlet).

IFW's Pool ID: 5203 Twp: Old Town
Observer's ID: VP-SK-04
UTM Coordinates of Pool Center: 521966 E, 4981740 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments: Pool provides some habitat for spotted salamanders but does not meet biological criteria for significance.

IFW Recommendations for Significant Vernal Pool Determinations

The following is a list of pools and IFW's recommendations for whether or not they qualify as Significant Vernal Pools, one of Maine's Significant Wildlife Habitats.

Data current as of: Monday, July 31, 2023

IFW's Pool ID: 5204 Twp: Old Town
Observer's ID: VP-SK-05
UTM Coordinates of Pool Center: 521936 E, 4981734 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments: Pool provides some habitat for wood frogs and spotted salamanders but does not meet biological criteria for significance.

IFW's Pool ID: 5205 Twp: Old Town
Observer's ID: VP-SK-06
UTM Coordinates of Pool Center: 521783 E, 4981758 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments:

IFW's Pool ID: 5206 Twp: Old Town
Observer's ID: VP-SK-07
UTM Coordinates of Pool Center: 521768 E, 4981760 N
ProjectType: Juniper Ridge Landfill

Landowner:	Contact:
Bureau of General Services	Steve Knapp - Biodiversity Research Institute
77 State House Station	30 Danforth Street, Suite 213
Augusta, ME 04333	Portland, ME 04101
(207) 624-7345 wallace.giakas@maine.gov	(207) 570-9462 steve.knapp@brienvironmental.org

Survey Date: 5/3/2023 Additional Survey Dates: 05/16/2023
IFW's Recommendation: RED: NOT SIGNIFICANT, does not meet the biological criteria
IFW Comments:

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
177 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

December 12, 2022

Steve Knapp
BRI Environmental
30 Danforth Street, Suite 213
Portland, ME 04101

Via email: steve.knapp@brienvironmental.org

Re: Rare and exemplary botanical features in proximity to: #0921, Juniper Ridge Landfill Expansion, Old Town, Maine

Dear Mr. Knapp:

I have searched the Maine Natural Areas Program's Biological and Conservation Data System files in response to your request received December 12, 2022 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Old Town, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

Our official response covers only botanical features. For authoritative information and official response for zoological features you must make a similar request to the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Augusta, Maine 04333.

According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. This lack of data may indicate minimal survey efforts rather than confirm the absence of rare botanical features. You may want to have the site inventoried by a qualified field biologist to ensure that no undocumented rare features are inadvertently harmed.

If a field survey of the project area is conducted, please refer to the enclosed supplemental information regarding rare and exemplary botanical features documented to occur in the vicinity of the project site. The list may include information on features that have been known to occur historically in the area as well as recently field-verified information. While historic records have not been documented in several years, they may persist in the area if suitable habitat exists. The enclosed list identifies features with potential to occur in the area, and it should be considered if you choose to conduct field surveys.

This finding is available and appropriate for preparation and review of environmental assessments, but it is not a substitute for on-site surveys. Comprehensive field surveys do not exist for all natural areas in Maine, and in the absence of a specific field investigation, the Maine Natural Areas Program cannot provide a definitive statement on the presence or absence of unusual natural features at this site.

MOLLY DOCHERTY, DIRECTOR
MAINE NATURAL AREAS PROGRAM
BLOSSOM LANE, DEERING BUILDING

DEPARTMENT OF Agriculture Conservation & Forestry

PHONE: (207) 287-804490
WWW.MAINE.GOV/DACF/MNAP

The Maine Natural Areas Program (MNAP) is continuously working to achieve a more comprehensive database of exemplary natural features in Maine. We would appreciate the contribution of any information obtained should you decide to do field work. MNAP welcomes coordination with individuals or organizations proposing environmental alteration or conducting environmental assessments. If, however, data provided by MNAP are to be published in any form, the Program should be informed at the outset and credited as the source.

The Maine Natural Areas Program has instituted a fee structure of $75.00 an hour to recover the actual cost of processing your request for information. You will receive an invoice for $150.00 for two hours of our services.

Thank you for using MNAP in the environmental review process. Please do not hesitate to contact me if you have further questions about the Natural Areas Program or about rare or unique botanical features on this site.

Sincerely,

Lisa St. Hilaire

Lisa St. Hilaire | Information Manager | Maine Natural Areas Program
207-287-8044 | lisa.st.hilaire@maine.gov

Rare and Exemplary Botanical Features within 4 miles of
Project: #0921, Juniper Ridge Landfill Expansion, Old Town, ME

Common Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Awned Flatsedge						
	SC	S2	G5	1942-09-09	1	Non-tidal rivershore (non-forested, seasonally wet)
	SC	S2	G5	1899-09-18	7	Non-tidal rivershore (non-forested, seasonally wet)
Button Sedge						
	SC	S2	G5	1983-08-12	1	
Domed Bog						
		S3	GNR	2014-08-26	6	
Dwarf Shrub Bog						
		S5	G5	2008-09-09	50	
Fall Fimbry						
	SC	S2S3	G5	1899-09-18	14	Open wetland, not coastal nor rivershore (non-forested,
Long-leaved Bluet						
	SC	S2S3	G5TNR	2010-07-13	4	Non-tidal rivershore (non-forested, seasonally wet)
MacGregor's Rye						
	SC	S2	G5	2014-08-19	7	
New England Violet						
	SC	S2	G4	1916-07-01	9	Non-tidal rivershore (non-forested, seasonally wet)
	SC	S2	G4	2010-07-13	10	Non-tidal rivershore (non-forested, seasonally wet)
	SC	S2	G4	1934-10-24	11	Non-tidal rivershore (non-forested, seasonally wet)
Orono Sedge						
	T	S3	G3	1997-07-17	4	Old field/roadside (non-forested, wetland or upland)
	T	S3	G3	1987-06-08	9	Old field/roadside (non-forested, wetland or upland)
	T	S3	G3	2011-07-25	33	Old field/roadside (non-forested, wetland or upland)
	T	S3	G3	1916-07-01	65	Old field/roadside (non-forested, wetland or upland)

Pale Green Orchis					
SC	S2	G4?T4Q	1933-07-06	5	Non-tidal rivershore (non-forested, seasonally wet),Open
Raised Level Bog Ecosystem					
	S4	GNR	2009-07-09	14	
Ram's-head Lady's-slipper					
E	S1	G3	1886-05-30	5	Forested wetland,Hardwood to mixed forest (forest,
Rivershore Outcrop					
	S2	G3	2010-07-13	1	
Shining Ladies'-tresses					
T	S1	G4	1946-07-08	8	Non-tidal rivershore (non-forested, seasonally wet),Open
Showy Lady's-slipper					
SC	S3	G4G5	1943-07-09	22	Forested wetland,Open wetland, not coastal nor
Silver Maple Floodplain Forest					
	S3	GNR	2010-07-13	37	
	S3	GNR	2014-06-16	46	
	S3	GNR	2014-06-16	46	
	S3	GNR	2014-09-03	51	
Sparse-flowered Sedge					
SC	S3	G5	1982-08-30	3	Forested wetland,Open wetland, not coastal nor
Swarthy Sedge					
E	S2	G5	1916-07-01	1	Rocky coastal (non-forested, upland)
Unpatterned Fen Ecosystem					
	S5	GNR	2009	8	

Date Exported: 2022-12-12 17:27

Conservation Status Ranks

State and Global Ranks: This ranking system facilitates a quick assessment of a species' or habitat type's rarity and is the primary tool used to develop conservation, protection, and restoration priorities for individual species and natural habitat types. Each species or habitat is assigned both a state (S) and global (G) rank on a scale of critically imperiled (1) to secure (5). Factors such as range extent, the number of occurrences, intensity of threats, etc., contribute to the assignment of state and global ranks. The definitions for state and global ranks are comparable but applied at different geographic scales; something that is state imperiled may be globally secure.

The information supporting these ranks is developed and maintained by the Maine Natural Areas Program (state ranks) and NatureServe (global ranks).

Rank	Definition
S1 **G1**	**Critically Imperiled** – At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
S2 **G2**	**Imperiled** – At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3 **G3**	**Vulnerable** – At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4 **G4**	**Apparently Secure** – At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5 **G5**	**Secure** – At very low risk of extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
SX **GX**	**Presumed Extinct** – Not located despite intensive searches and virtually no likelihood of rediscovery.
SH **GH**	**Possibly Extinct** – Known from only historical occurrences but still some hope of rediscovery.
S#S# **G#G#**	**Range Rank** – A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem.
SU **GU**	**Unrankable** – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
GNR **SNR**	**Unranked** – Global or subnational conservation status not yet assessed.
SNA **GNA**	**Not Applicable** – A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., non-native species or ecosystems.
Qualifier	**Definition**
S#? **G#?**	**Inexact Numeric Rank** – Denotes inexact numeric rank.
Q	**Questionable taxonomy that may reduce conservation priority** – Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable. The "Q" modifier is only used at a global level.
T#	**Infraspecific Taxon (trinomial)** – The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

State Status: Endangered and Threatened are legal status designations authorized by statute. Please refer to MRSA Title 12, §544 and §544-B.

Status	Definition
E	**Endangered** – Any native plant species in danger of extinction throughout all or a significant portion of its range within the State or Federally listed as Endangered.
T	**Threatened** – Any native plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range in the State or Federally listed as Threatened.
SC	**Special Concern** – A native plant species that is rare in the State, but not rare enough to be considered Threatened or Endangered.
PE	**Potentially Extirpated** – A native plant species that has not been documented in the State in over 20 years, or loss of the last known occurrence.

Element Occurrence (EO) Ranks: Quality assessments that designate viability of a population or integrity of habitat. These ranks are based on size, condition, and landscape context. Range ranks (e.g., AB, BC) and uncertainty ranks (e.g., B?) are allowed. The Maine Natural Areas Program tracks all occurrences of rare plants and natural communities/ecosystems (S1-S3) as well as exemplary common natural community types (S4-S5 with EO ranks A/B).

Rank	Definition
A	**Excellent** – Excellent estimated viability/ecological integrity.
B	**Good** – Good estimated viability/ecological integrity.
C	**Fair** – Fair estimated viability/ecological integrity.
D	**Poor** – Poor estimated viability/ecological integrity.
E	**Extant** – Verified extant, but viability/ecological integrity not assessed.
H	**Historical** – Lack of field information within past 20 years verifying continued existence of the occurrence, but not enough to document extirpation.
X	**Extirpated** – Documented loss of population/destruction of habitat.
U	**Unrankable** – Occurrence unable to be ranked due to lack of sufficient information (e.g., possible mistaken identification).
NR	**Not Ranked** – An occurrence rank has not been assigned.

Visit the Maine Natural Areas Program website for more information
http://www.maine.gov/dacf/mnap

maine DEPARTMENT OF Agriculture Conservation & Forestry
NATURAL AREAS

G-8

DEPREDATION PERMITS AND FEDERAL AVIATION ADMINISTRATION CORRESPONDENCE

SME
SEVEE & MAHER
ENGINEERS

To:	Lisa Turner Sevee & Maher Engineers, Inc. 4 Blanchard Road, P.O. Box 85A Cumberland, ME 04021	From:	Gabe Pelletier AWB® Stantec 30 Park Drive Topsham ME 04086-1737
Project/File:	195603227	Date:	December 19, 2024

Reference: Wildlife Hazard Site Visit at Juniper Ridge Landfill

Introduction

Sevee & Maher Engineers, Inc. contracted with Stantec Consulting Services, Inc. (Stantec) to conduct a Wildlife Hazard Site Visit (WHSV) in accordance with Federal Aviation Administration (FAA) Advisory Circular (AC) No. 150/5200-33C *Hazardous Wildlife Attractants on or near Airports* associated with the proposed expansion at the Juniper Ridge Landfill (JRL). The primary focus of the WHSV is to gain an understanding of gull activity and potential attractants at JRL, investigating the relationship between gull use at JRL and Dewitt Field/Old Town Municipal Airport (International Air Transport Association (IATA) code: OLD), and determine mitigation strategies to address any potential hazards.

Background

Juniper Ridge Landfill is located within a 780-acre property in Old Town, Maine owned by the State of Maine and managed by the Bureau of General Services (BGS), and operated by NEWSME Landfill Operations, LLC. (NEWSME) a division of Casella Waste Systems Inc. (Casella) based in Rutland, VT. Currently, JRL's permitted solid waste footprint consists of approximately 122 acres, the proposed expansion would expand the landfill footprint by 58 acres. The landfill is located in Old Town, ME approximately 2.2 mi to the northwest from OLD.

Old Town Municipal Airport is a public use airport owned by the city of Old Town. OLD is entirely fenced in and includes two paved runways:

- Runway 4-22 which is 3200' long and 75' wide;
- Runway 12/30, which is 4000' long and 100' wide.

Federal Aviation Administration (FAA) Advisory Circular (AC) No. 150/5200-33C *Hazardous Wildlife Attractants on or near Airports* provides guidance on land uses that may attract hazardous wildlife on or near airports. Due to the proposed expansion of JRL and its proximity to OLD, the FAA requested input on measures which can be taken at JRL to mitigate the risk posed by gulls at JRL on aircraft activity at OLD.

Current Mitigation Strategies and Changes at Juniper Ridge Landfill

NEWSME currently maintains a depredation permit, which allows for the culling of up to 200 herring gulls (*Larus smithsonianus*), 100 ring-billed gulls (*Larus delawarensis*), and 25 great black-backed gulls (*Larus marinus*) per year. NEWSME provided records of depredation events since 2022; the greatest number of gulls killed was in the fall each year. Additionally, the permitted limit of euthanized gulls was not met in any year from 2022-2024 (Table 1).

Table 1. Number of gulls euthanized by species from 2022-2024 under depredation permit number MB670894-0 at Juniper Ridge Landfill.

Species	Gulls Euthanized by Species			Depredation Permit Limit
	2022	2023	2024	
Herring Gull	143	135	104	200
Ring-Billed Gull	21	70	50	100
Great Black-Backed Gull	4	0	1	25

In addition to the depredation permit, JRL staff deter hazardous wildlife by limiting the amount of open waste area and providing daily cover to any open areas of waste at the end of each day. Daily cover is applied as a 9-inch-thick layer, materials generally used for daily cover include fines, sand, or spray-on foam. During the WHSV, JRL staff used foam as a daily cover. Intermediate cover is used over waste that remains in place for 3 months or more. Soil intermediate cover is applied as an 18-inch- thick layer, or a geomembrane cover is used. Once a portion of the landfill reaches near final grades, it is covered with a temporary geomembrane cap (on side slopes) or an 18-inch-thick temporary soil cap on the more level top surface. After the waste has settled for a number of years, the temporary cap is removed, enough waste is added to meet the final grades, and a permanent cap consisting of a geomembrane overlain by 18 inches of soil is placed on the waste and the surface is seeded.

Recent changes to JRL include the increase in municipal solid waste bypass (MSW bypass) to the waste stream. Previously, MSW bypass accounted for 7% of the total disposal at JRL (NEWSME, pers. comm,). In recent years, the amount of MSW bypass in the waste stream at JRL has increased, in 2023 MSW bypass accounted for 32% of the total disposal at JRL. MSW bypass, commonly called “trash” or “garbage”, generally refers to common household waste which can include common gull attractants such as disposable plates/cups, food packaging, and food waste. MSW bypass includes waste that is a highly attractive food source for gulls, American crows (*Corvus brachyrhynchos*), bald eagles (*Haliaeetus leucocephalus*), and other hazardous wildlife. The increase of MSW bypass in the waste stream likely has increased the attraction to JRL for these species.

Methods

The WHSV included visual surveys of JRL, OLD, and 13 additional sites (Figure 1) identified as potential attractants for hazardous wildlife within a 5-mile radius of OLD or as potential gull roosting sites outside

the 5-mile radius. The additional sites were generally comprised of public access points with views of the Penobscot River, Stillwater River, Pushaw Lake, and Perch Pond, all of which are potential roosting sites for gulls. Wildlife attractants include human-made structures, land-use practices, or human-made or natural geographic features that can attract or sustain hazardous wildlife. The primary focus of the WHSV will be to understand gull activity at JRL and identify any relationship between gull activity at JRL and OLD, if possible.

Results

The WHSV was conducted on November 14 and 15, 2024. Weather conditions over the two-day period included clear skies with temperatures ranging from 23-43°F on November 14 and overcast with temperatures ranging from 19-47°F on November 15. Winds were from the north on both days with gusts up to 18mph. The forecasted rain event on November 15 did not materialize.

Gull Presence at Old Town Municipal Airport

Stantec conducted a thorough search of the FAA strike database (FAA 2024) which indicates that there are no records of reported wildlife strikes at OLD. Additionally, Stantec met with Miles Francis, the airport operations manager and wildlife manager at OLD, to discuss wildlife hazards and mitigation efforts at OLD. During the conversation, Mr. Francis mentioned that gulls were regularly observed roosting at OLD and that airport staff utilize pyrotechnics and the physical presence of driving a vehicle along both runways prior to aircraft use to mitigate the hazard posed by gulls. During the WHSV, no gulls were observed roosting at OLD during several visits to the airfield during the two-day survey period.

Gull Presence and Attractions at Juniper Ridge Landfill

Observations at JRL were made at sunrise, mid-morning, mid-day, afternoon, and evening across the 2-day visit to gain an understanding of how gulls used the landfill. During daylight hours, gulls were generally observed circling above the open portion of JRL in large flocks ranging in maximum size from approximately 750-950 individuals. Gull activity was concentrated on the open area of the landfill where new waste was being deposited. The greatest abundance of gulls was observed in the morning, with the flock size decreasing throughout the afternoon when gulls travelled to roosting areas. A large portion of the gulls observed at JRL had immature plumage. Flocks of gulls were also observed roosting on structures, roadways, and permanent cover areas in close vicinity to the open areas at JRL.

Observations at JRL on November 15 began at 5:45 am (45 minutes prior to sunrise) to assess if gulls remained at JRL overnight, and if not, which direction they arrived from. No gulls were observed roosting overnight at JRL. Large flocks (up to ~250 individuals) of gulls began to arrive near sunrise. The daily cover had already been exposed and new waste was being disposed of at JRL upon the arrival of the gull flocks. The majority of gulls arrived from the west in the direction of Perch Pond. Several smaller flocks (up to ~50 individuals) of gulls were also observed entering from the south in the general direction of downtown Old Town and OLD.

Additional Wildlife Observations at Juniper Ridge Landfill

Bald eagles were regularly observed perched on structures nearby the opened portion of JRL and flying low and landing within the open portion. Bald eagles were also observed perched in trees outside the fenced in portion with views of the open area of JRL, the greatest bald eagle count over the two-day survey was 38 individuals. European starlings (*Sturnus vulgaris*) were observed perched in trees surrounding JRL in abundances of ~400 individuals. Flocks of crows were observed at JRL in abundances up to ~35 individuals.

Gull Presence Outside JRL and OLD

Outside of JRL and OLD, wildlife surveys were conducted at 13 additional sites identified as potential attractants for hazardous wildlife within a 5-mile radius of OLD or as potential gull roosting sites outside the 5-mile radius. The additional sites generally were comprised of public access points with views of the Penobscot River, Stillwater River, Pushaw Lake, and Perch Pond, all of which are potential roosting sites for gulls. Observation areas were limited to areas with public access.

Two large concentrations of roosting gulls were observed during the WHSV: one flock of gulls was observed on a small island on the Penobscot River near downtown Old Town and a flock of roosting gulls were observed at Perch Pond. Both flocks consisted of approximately 300-400 individuals.

Discussion

Gull population size at JRL likely fluctuates seasonally due in large part to gull migration and breeding behavior. Although all three species of gulls most abundant at JRL can be found year-round in Maine, their presence at JRL may be seasonally influenced by breeding behavior, available food sources, and migration.

Herring gulls were the most abundant gull observed at JRL during the WHSV. Herring gulls are common island nesting birds (Vickery et al., 2020) with historical observations of herring gulls breeding in nearby Penobscot Bay (Mittelhauser et al., 2016). Ring-billed gulls were also observed during the WHSV. Ring-billed gulls have historically bred in northern and western Maine, with migratory ring-billed gulls likely inflating the population in the spring and fall on their way towards northern breeding areas. Great Black-backed gulls are the third species which is likely to frequent JRL. Similar to herring and ring-billed gulls, the fall and spring migrants from northern Canadian breeding sites are likely to augment local populations. Similar to the results of a full year of surveys at an Ohio landfill (Belant et al. 1995), populations of all *Larus* gull species are expected to be the greatest at JRL in the fall with the influx of immature gulls. Immature gulls typically migrate greater distances than adults (Anderson 2017, Cornell 2019), this trend was observed at JRL during the WHSV with a large proportion of the gulls observed having juvenile plumage.

Two roosting areas were observed during the WHSV, and observations from JRL of gulls entering the landfill from the direction of the roosting areas suggests that gulls utilizing both the Penobscot River and

Perch Pond are also utilizing JRL. The primary overnight roosting area appeared to be Perch Pond due to the large population of gulls entering JRL from the direction of Perch Pond and the observation of a large flock of gulls roosting on Perch Pond during the day. Gulls that are roosting on the Penobscot River near downtown Old Town pose a greater risk to OLD due to their flight paths crossing OLD.

Although the presence of JRL and the increase in MSW bypass to the waste stream has likely inflated the number of gulls present within the vicinity of OLD, OLD's location on the shore of the Penobscot River and the likely use of the Penobscot River corridor as a migration route (McCabe & Olsen 2015) for a wide variety of avian species, including gulls, suggests that JRL is not the sole reason for wildlife hazard issues at OLD. Upon Stantec's conversation with OLD staff, the active mitigation strategies are effective at hazing gulls and should be continued to be implemented along with the current mitigation strategies employed at JRL. Gull activity was concentrated around the open area of the landfill where JRL staff was actively moving waste. Gulls were not observed feeding in areas of intermediate or permanent cover, which suggests that the waste cover strategies are effective at deterring gulls.

Recommendations

To reduce the risk that gulls from JRL pose on aviation activities at OLD, Stantec recommends several mitigation efforts to be implemented from September-December during the fall migration period. These mitigation strategies include:

- Reducing the area of non-covered, open waste;
- Restrict work to one area of the landfill;
- Continue to hold depredation permit and increase effort to reach the quota in the permit;
- Install bird roosting deterrents (e.g., Bird Barrier Daddi Long Legs) on suitable perching areas;
- Install non-lethal auditory hazing devices (e.g., zon gun (blast volume approximately 130 decibels));
- Conduct additional site visits (to include sunrise and sunset) to assess gull abundance at JRL in winter and spring.

Implementing these mitigation strategies during the fall migration when the gull population is expected to peak may help to reduce the overall attraction of JRL to migratory and juvenile gulls. It is imperative that active hazing mitigation (i.e. depredation and auditory hazing) be conducted in conjunction with the reduction of open waste area. Additionally, auditory hazing strategies will be most effective when combined with depredation efforts. The goal is to over time reduce the level of attraction that JRL poses to hazardous wildlife by limiting access to waste and conducting active hazing. Future surveys to assess

the gull abundance during the winter and spring may provide more information on when the gull population is greatest at JRL and to evaluate the effectiveness of the proposed mitigation strategies.

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Vickery, P. D., Duncan, C. D., Wells, J. V., & Sheehan, W. J. (2020). *Birds of Maine*. Princeton University Press.

Respectfully,

Stantec Consulting Services Inc.

Gabe Pelletier AWB®
Qualified Airport Wildlife Biologist
gabriel.pelletier@stantec.com

Appendix A: Site Photos

Appendix B: Site Figure

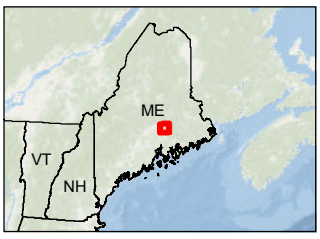
Appendix A Site Photos

Large flock of gulls over open area of Juniper Ridge Landfill. November 14, 2024.

Flock of gulls roosting on the Penobscot River in Old Town, ME. November 14, 2024.

Airfield at Old Town Municipal Airfield. November 15, 2024.

Appendix B Site Figure



Legend

- DeWitt Field/ Old Town Municipal Airport (OLD)
- Gull Roosting Site
- Juniper Ridge Landfill (JRL)
- Observation Area
- 5 Mile Buffer
- Municipal Boundary

0 2 Miles

(At original document size of 8.5x11)
1" = 2 Miles

N

Stantec

Notes

1. Wildlife Hazard conducted by Stantec11/26/2024
2. Coordinate System: USA/NAD83(2011)/Maine (East)-csref
3. Data Sources: MEGIS, Sevee and Maher Engineers, Inc., Stantec
4. Background: Aerial imagery provided by ArcGIS Online World Imagery Mapping Service

Project Location
Old Town, Maine

Prepared by PWB on 2024-12-02
TR Review by KWH on 2024-12-02
IR Review by GP on 2024-12-02

Client/Project 195603227
Sevee & Maher Engineers, Inc.
Juniper Ridge Landfill Expansion

Figure No.
1

Title
Wildlife Hazard Site Visit

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To:	Brian Pierce Sevee & Maher Engineers, Inc. 4 Blanchard Road, P.O. Box 85A Cumberland, ME 04021	From:	Gabe Pelletier AWB® Stantec 30 Park Drive Topsham ME 04086-1737
Project/File:	195603227	Date:	July 18, 2025

Reference: Wildlife Survey at Juniper Ridge Landfill

Introduction

Sevee & Maher Engineers, Inc. contracted with Stantec Consulting Services, Inc. (Stantec) to conduct wildlife surveys to assess wildlife hazards associated with the proposed expansion at Juniper Ridge Landfill (JRL) in Old Town, Maine. The primary focus of this report is to gain further insight into the gull activity and potential attractants at JRL, investigating the relationship between gull use at JRL and Dewitt Field/Old Town Municipal Airport (International Air Transport Association (IATA) code: OLD), and evaluate existing and consider alternative mitigation strategies to address any potential wildlife hazards. This report compares observations made during the Fall 2024 visit with Winter 2025 and Spring 2025 observations, as well as evaluates the effectiveness and implementation of recommended mitigation measures.

Background

Juniper Ridge Landfill is located within a 780-acre property in Old Town, Maine owned by the State of Maine and managed by the Bureau of General Services (BGS), and operated by NEWSME Landfill Operations, LLC. (NEWSME) a division of Casella Waste Systems Inc. (Casella) based in Rutland, VT. Currently, JRL's permitted solid waste footprint consists of approximately 122 acres, the proposed expansion would expand the landfill footprint by 58 acres. The landfill is located in Old Town, ME approximately 2.2 mi to the northwest from OLD.

Current Mitigation Strategies and Changes at Juniper Ridge Landfill

NEWSME currently maintains a depredation permit, which allows for the culling of up to 200 herring gulls (Larus smithsonianus), 100 ring-billed gulls (Larus delawarensis), and 25 great black-backed gulls (Larus marinus) per year. NEWSME provided records of depredation events since 2022; the greatest number of gulls culled was in the fall each year. Additionally, the permitted limit of euthanized gulls was not met in any year from 2022-2024 (Table 1).

Table 1. Number of gulls euthanized by species from 2022-2024 under depredation permit number MB670894-0 at Juniper Ridge Landfill.

Species	Gulls Euthanized by Species			Depredation Permit Limit
	2022	2023	2024	
Herring Gull	143	135	104	200
Ring-Billed Gull	21	70	50	100
Great Black-Backed Gull	4	0	1	25

In addition to the depredation permit, JRL staff deter hazardous wildlife by limiting the amount of open waste area and providing daily cover to any open areas of waste at the end of each day. Daily cover is applied as a 9-inch-thick layer, materials generally used for daily cover include fines, sand, or spray-on foam. During both the spring and winter surveys JRL staff used foam as a daily cover. Intermediate cover is used over waste that remains in place for 3 months or more. Soil intermediate cover is applied as an 18-inch- thick layer, or a geomembrane cover is used. Once a portion of the landfill reaches near final grades, it is covered with a temporary geomembrane cap (on side slopes) or an 18-inch-thick temporary soil cap on the more level top surface. After the waste has settled for a number of years, the temporary cap is removed, enough waste is added to meet the final grades, and a permanent cap consisting of a geomembrane overlain by 18 inches of soil is placed on the waste and the surface is seeded.

JRL continues to take steps to implement mitigation measures recommended by Stantec in their 2024 report including installation of non-lethal auditory hazing devices (i.e. zon-gun) and bird roosting deterrents. Bird roosting deterrents were installed on landfill gas wellheads prior to the Spring 2025 visit (Photo 5) these deterrents appeared to be effective at deterring birds from perching on these structures. Staff at JRL have recently obtained permission to install non-lethal auditory hazing devices (i.e. zon-gun) at JRL and anticipate utilizing these as deterrents.

Recent changes to JRL include the increase in municipal solid waste bypass (MSW bypass) to the waste stream. MSW bypass, commonly called “trash” or “garbage”, generally refers to common household waste which can include common gull attractants such as disposable plates/cups, food packaging, and food waste. MSW bypass includes waste that is a highly attractive food source for gulls, American crows (*Corvus brachyrhynchos*), bald eagles (*Haliaeetus leucocephalus*), and other hazardous wildlife. Previously, MSW bypass accounted for 7% of the total disposal at JRL (NEWSME, pers. comm,). In recent years, the amount of MSW bypass in the waste stream at JRL has increased, in 2023 MSW bypass accounted for 32% of the total disposal at JRL. The increase of MSW bypass in the waste stream likely has increased the attraction to JRL for these species.

Methods

Stantec’s wildlife biologist conducted one-day wildlife surveys at JRL on March 18, 2025 and May 29, 2025. The survey included visual surveys of JRL, OLD, and 13 additional sites (Figure 1) identified as potential attractants for hazardous wildlife within a 5-mile radius of OLD or as potential gull roosting sites

outside the 5-mile radius. The additional sites were generally comprised of public access points with views of the Penobscot River, Stillwater River, Pushaw Lake, and Perch Pond, all of which are potential roosting sites for gulls. Wildlife attractants include human-made structures, land-use practices, or human-made or natural geographic features that can attract or sustain wildlife which may pose a risk to airplanes.

Results

Gull Presence and Attractions at Juniper Ridge Landfill

Observations at JRL were made at sunrise, mid-morning, mid-day, and afternoon during both visits to gain an understanding of seasonal gull use of the landfill.

Winter 2025 Survey

The winter survey was conducted on March 18, 2025. Although late in the season, winter conditions, including ice-covered waterbodies, were still experienced in the area near JRL. Weather conditions for the winter survey were partly cloudy with temperatures ranging from 32-43 °F, the site had experienced rain the previous day. The winter 2025 survey began at 0634, 7 minutes before sunrise, no gulls were observed at the start of surveys suggesting they do not roost overnight at JRL. Peak gull abundance observed was 838 individuals, the majority of gulls arrived at approximately 0800 and remained through the afternoon, herring gulls were the dominant species. Gull activity was concentrated on the open area of the landfill where new waste was being deposited. Flocks of gulls were also observed roosting on permanent cover areas in close vicinity to the open areas at JRL.

Spring 2025 Survey

Weather conditions for the spring survey conducted on May 29, 2025 were partly cloudy with temperatures ranging from 55°F in the morning to 75°F in the afternoon. The survey began at 0500, 6 minutes after sunrise, no gulls were observed upon arrival to the site indicating gulls are not roosting overnight at JRL. At approximately 0600,15 herring gulls arrived at JRL and remained through the day foraging in areas of open waste and perching on covered areas (Photo 4).

Additional Bird Observations at Juniper Ridge Landfill

Bald eagles were regularly observed during both the winter and spring 2025 survey; 22 bald eagles were observed during the winter survey and 15 in the spring survey. Eagles were observed foraging on the open waste and perched in trees and structures surrounding the open waste. European starlings (*Sturnus vulgaris*) were observed flying in large flocks (~50 individuals) throughout JRL. Flocks of crows were observed at JRL in abundances up to 125 individuals during the winter visit and 50 during the spring visit.

Gull Presence Outside JRL

Surveys were conducted at the 13 identified potential attractants within a 5-mile radius of JRL (Figure 1) during the spring and winter surveys.

Winter 2025 Survey

Overall, no concentrations greater than 36 individual gulls were observed during the winter survey outside of JRL, surveys outside of JRL were conducted during the day. The greatest concentration of gulls outside JRL was observed in the parking lots associated with the University of Maine in Orono, where 36 herring gulls were perched. No gulls were observed at OLD during the daytime visit. Perch Pond and other surrounding waterbodies were mostly frozen during the winter survey. During winter daytime visits to Perch Pond, 12 bald eagles were observed perched on the ice. The Penobscot River was also frozen above the Milford Dam. Below the dam, river conditions were high and not suitable for roosting. The Stillwater River was also experiencing high flows during the winter survey, no birds were observed roosting on either the Penobscot or Stillwater rivers during the survey. Approximately 130 Canada geese were observed feeding in the grass near the University of Maine's Steamplant Parking Lot on the bank of the Stillwater River.

Spring 2025 Survey

Surveys were conducted at the 13 potential attractants within 5-mile radius of JRL, no large concentrations of gulls were observed at any of the potential attractants including all areas where gulls had been observed in the winter 2025 or fall 2024 surveys (i.e. the Penobscot River, Perch Pond, and the University of Maine parking lots).

Discussion

The results of the winter and spring 2025 surveys combined with the fall 2024 WHSV show that gull abundance at JRL fluctuates seasonally, likely due to gull migration and breeding behavior. The high abundance counts were similar during both the Fall 2024 and Winter 2025 visits suggesting that a large population of gulls utilize JRL as a food source over the fall and winter months. The significant decrease in abundance of gulls, to only 15 herring gulls, during the Spring 2025 survey aligns with the anticipated migration of herring gulls to coastal breeding grounds (Vickery et al., 2020, Mittelhauser et al., 2016). Herring gulls were the most abundant gull species observed at JRL during all three visits.

Most gull and other hazardous bird activity at JRL was concentrated around the open area of the landfill where JRL staff was actively moving waste. Gulls were not observed feeding in areas of intermediate or permanent cover, which suggests that the waste cover strategies are effective at deterring gulls.

Recommendations

To reduce the attraction JRL poses to gulls and other wildlife, as well as minimize the risk that gulls from JRL pose on aviation activities at OLD, Stantec recommends several mitigation efforts, these include:

- Reducing the area of non-covered open waste to the extent practical;

- Restrict work to one area of the landfill to the extent practical;
- Continue to hold depredation permit and increase effort to reach the quota in the permit;
- Continue installation of bird roosting deterrents (e.g., Bird Barrier Daddi Long Legs) on all landfill gas wellheads around areas of open waste;
- Install non-lethal auditory hazing devices (e.g., zon gun (blast volume approximately 130 decibels));
- Conduct seasonal site visits at JRL to monitor gull abundance and evaluate the effectiveness and implementation of mitigation measures.

Implementing these mitigation strategies during late summer through early spring when the gull population was highest may help to reduce the overall attraction of JRL to gulls. It is imperative that active hazing mitigation (i.e. depredation and auditory hazing) be conducted in conjunction with the reduction of open waste area. Additionally, auditory hazing strategies will be most effective when combined with depredation efforts. The goal should continue to be to reduce the level of attraction that JRL poses to hazardous wildlife by limiting access to waste and conducting active hazing.

References

Mittelhauser, G. H., Allen, R. B., Chalfant, J., Schauffler, R. P., & Welch, L. J., 2016. Trends in the nesting populations of Herring Gulls (Larus argentatus) and Great Black-backed Gulls (Larus marinus) in Maine, USA, 1977–2013. *Waterbirds*, *39*(sp1), 57-67.

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Respectfully,

Stantec Consulting Services Inc.

Gabe Pelletier AWB®
Qualified Airport Wildlife Biologist
gabriel.pelletier@stantec.com

Appendix A: Site Photos

Appendix B: Site Figure

Appendix A Site Photos

Photo 1. Large flock of gulls over open area of Juniper Ridge Landfill. March 18, 2025.

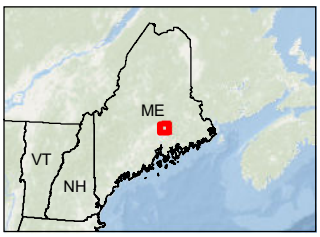
Photo 2. Frozen Perch Pond in Old Town, ME. March 18, 2025.

Photo 3. Spray foam daily cover at Juniper Ridge Landfill. May 29, 2025.

Photo 4. Gulls perched at Juniper Ridge Landfill. May 29, 2025.

Photo 5. Bird roosting deterrents on landfill gas wellhead at Juniper Ridge Landfill. May 29, 2025.

Appendix B Site Figure



Legend

- DeWitt Field/ Old Town Municipal Airport (OLD)
- Gull Roosting Site
- Juniper Ridge Landfill (JRL)
- Observation Area
- 5 Mile Buffer
- Municipal Boundary

0 2 Miles

(At original document size of 8.5x11)
1" = 2 Miles

N

Notes

1. Wildlife Hazard conducted by Stantec11/26/2024
2. Coordinate System: USA/NAD83(2011)/Maine (East)-csref
3. Data Sources: MEGIS, Sevee and Maher Engineers, Inc., Stantec
4. Background: Aerial imagery provided by ArcGIS Online World Imagery Mapping Service

Stantec

Project Location
Old Town, Maine

Prepared by PWB on 2024-12-02
TR Review by KWH on 2024-12-02
IR Review by GP on 2024-12-02

Client/Project 195603227
Sevee & Maher Engineers, Inc.
Juniper Ridge Landfill Expansion

Figure No.
1

Title
Juniper Ridge Wildlife Survey

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Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

U.S. Department of Transportation

Federal Aviation Administration

New England Region

1200 District Avenue
Burlington, MA 01803

June 28, 2025

Brian D. Pierce, PE
Principal / Chief Engineer, Sevee & Maher Engineers, Inc.
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021

Dear Mr. Pierce,

FAA Review of Landfill Expansion, Old Town, ME

The Federal Aviation Administration's New England Region, Airports Division, received your letter requesting input on a proposed 61-acre expansion of the Juniper Ridge Landfill. The Landfill is within 3 miles of Dewitt Field in Old Town, ME.

Project Information

The landfill has been in operation since 1996, initially accepting papermill waste, then accepting a variety of commercial, industrial, and municipal wastes beginning in 2004. Waste is hauled to the landfill in trucks ranging from small waste packer trucks to tractor trailers. The trucks dump the waste materials directly on the landfill, where it is compacted. At the end of each day, all fresh waste is covered with six inches of cover material, in accordance with Maine's Solid Waste Management Rules. Once a portion of the landfill reaches near final grades, it is covered with a temporary geomembrane cap (on sideslopes) or an 18-inch-thick temporary soil cap on the more level top surface. Temporary cap is placed as soon as possible to minimize rainfall collection on the landfill, which must be treated. As such, the open area of the landfill remains relatively constant in size. After the waste has settled for a number of years, the temporary cap is removed, enough waste is added to meet the final grades, and a permanent cap consisting of a geomembrane overlain by 18 inches of soil is placed on the waste and the surface is seeded.

The proposed expansion will be managed in the same manner as has been done for many years. The proposed expansion is to the north of the existing landfill and is therefore slightly further from the airport than the existing landfill. The wildlife attracted to the landfill consists primarily of seagulls and eagles. From time to time, personnel at the landfill eliminate a few individuals of the acceptable species of seagulls, in accordance with their permits and state and federal rules. Any rodent vectors seem to be managed adequately by the eagles.

FAA Project Review

The FAA requested information on the site's operating procedures, types of wildlife hazard attractants, and how those vectors are managed. Additionally, the FAA requested input from the

Dewitt Field Airport Manager, Lance Farrar, who indicated the airfield has had a few reported bird strikes in the previous 24 months but also provided a photo of the airfield after rain events showing the airfield covered in seagulls.

The FAA and the Landfill's project manager agreed to a Wildlife Hazard Site Visit to collect more information on the source of the birds. The study made several recommendations, and the FAA agreed to the solutions including updating the depredation permit numbers to account for the increase in recent years in addition to the proposed expansion. The Wildlife Hazard Site Visit report suggested the following mitigation efforts to be implemented from September-December during the fall migration period.

- Reducing the area of non-covered, open waste.
- Restrict work to one area of the landfill.
- Continue to hold depredation permit and increase effort to reach the quota in the permit.
- Install bird roosting deterrents (e.g., Bird Barrier Daddi Long Legs) on suitable perching areas.
- Install non-lethal auditory hazing devices (e.g., zon gun (blast volume approximately 130 decibels)).
- Conduct additional site visits (to include sunrise and sunset) to assess gull abundance at JRL in winter and spring.

In February 2025, the USFWS issued an updated the depredation permit to account for the additional future activity.

FAA Response

In accordance with Advisory Circular 150/5200-33C (*Hazardous Wildlife Attractants on or near Airports*, 2020), the FAA reviewed information provided about the proposed expansion of the Juniper Ridge Landfill. With the continued implementation of airfield and landfill mitigation strategies, with the implementation of the Wildlife Hazard Site Visit Report's mitigation strategies, and with the landfill agreeing to maximize the annual depredation numbers in the USFWS permit, the FAA accepts the Wildlife Hazard Site Visit report and its recommendations.

Contact Information

Please feel free to reach out if need additional information. You may contact me by telephone at 781-238-7613, or by email at **Cheryl.J.Quaine@faa.gov**.

Sincerely,

Cheryl Quaine Digitally signed by Cheryl Quaine
Date: 2025.06.18 11:58:13 -04'00'

Cheryl Quaine
Environmental Program Manager
New England Regional Office, Airports Division
Federal Aviation Administration

Attachments:
Wildlife Hazard Site Visit Report
USFWS Depredation Permit
Correspondence

To:	Lisa Turner Sevee & Maher Engineers, Inc. 4 Blanchard Road, P.O. Box 85A Cumberland, ME 04021	From:	Gabe Pelletier AWB® Stantec 30 Park Drive Topsham ME 04086-1737
Project/File:	195603227	Date:	December 19, 2024

Reference: Wildlife Hazard Site Visit at Juniper Ridge Landfill

Introduction

Sevee & Maher Engineers, Inc. contracted with Stantec Consulting Services, Inc. (Stantec) to conduct a Wildlife Hazard Site Visit (WHSV) in accordance with Federal Aviation Administration (FAA) Advisory Circular (AC) No. 150/5200-33C *Hazardous Wildlife Attractants on or near Airports* associated with the proposed expansion at the Juniper Ridge Landfill (JRL). The primary focus of the WHSV is to gain an understanding of gull activity and potential attractants at JRL, investigating the relationship between gull use at JRL and Dewitt Field/Old Town Municipal Airport (International Air Transport Association (IATA) code: OLD), and determine mitigation strategies to address any potential hazards.

Background

Juniper Ridge Landfill is located within a 780-acre property in Old Town, Maine owned by the State of Maine and managed by the Bureau of General Services (BGS), and operated by NEWSME Landfill Operations, LLC. (NEWSME) a division of Casella Waste Systems Inc. (Casella) based in Rutland, VT. Currently, JRL's permitted solid waste footprint consists of approximately 122 acres, the proposed expansion would expand the landfill footprint by 58 acres. The landfill is located in Old Town, ME approximately 2.2 mi to the northwest from OLD.

Old Town Municipal Airport is a public use airport owned by the city of Old Town. OLD is entirely fenced in and includes two paved runways:

- Runway 4-22 which is 3200' long and 75' wide;
- Runway 12/30, which is 4000' long and 100' wide.

Federal Aviation Administration (FAA) Advisory Circular (AC) No. 150/5200-33C *Hazardous Wildlife Attractants on or near Airports* provides guidance on land uses that may attract hazardous wildlife on or near airports. Due to the proposed expansion of JRL and its proximity to OLD, the FAA requested input on measures which can be taken at JRL to mitigate the risk posed by gulls at JRL on aircraft activity at OLD.

Current Mitigation Strategies and Changes at Juniper Ridge Landfill

NEWSME currently maintains a depredation permit, which allows for the culling of up to 200 herring gulls (*Larus smithsonianus*), 100 ring-billed gulls (*Larus delawarensis*), and 25 great black-backed gulls (*Larus marinus*) per year. NEWSME provided records of depredation events since 2022; the greatest number of gulls killed was in the fall each year. Additionally, the permitted limit of euthanized gulls was not met in any year from 2022-2024 (Table 1).

Table 1. Number of gulls euthanized by species from 2022-2024 under depredation permit number MB670894-0 at Juniper Ridge Landfill.

Species	Gulls Euthanized by Species			Depredation Permit Limit
	2022	2023	2024	
Herring Gull	143	135	104	200
Ring-Billed Gull	21	70	50	100
Great Black-Backed Gull	4	0	1	25

In addition to the depredation permit, JRL staff deter hazardous wildlife by limiting the amount of open waste area and providing daily cover to any open areas of waste at the end of each day. Daily cover is applied as a 9-inch-thick layer, materials generally used for daily cover include fines, sand, or spray-on foam. During the WHSV, JRL staff used foam as a daily cover. Intermediate cover is used over waste that remains in place for 3 months or more. Soil intermediate cover is applied as an 18-inch- thick layer, or a geomembrane cover is used. Once a portion of the landfill reaches near final grades, it is covered with a temporary geomembrane cap (on side slopes) or an 18-inch-thick temporary soil cap on the more level top surface. After the waste has settled for a number of years, the temporary cap is removed, enough waste is added to meet the final grades, and a permanent cap consisting of a geomembrane overlain by 18 inches of soil is placed on the waste and the surface is seeded.

Recent changes to JRL include the increase in municipal solid waste bypass (MSW bypass) to the waste stream. Previously, MSW bypass accounted for 7% of the total disposal at JRL (NEWSME, pers. comm,). In recent years, the amount of MSW bypass in the waste stream at JRL has increased, in 2023 MSW bypass accounted for 32% of the total disposal at JRL. MSW bypass, commonly called “trash” or “garbage”, generally refers to common household waste which can include common gull attractants such as disposable plates/cups, food packaging, and food waste. MSW bypass includes waste that is a highly attractive food source for gulls, American crows (*Corvus brachyrhynchos*), bald eagles (*Haliaeetus leucocephalus*), and other hazardous wildlife. The increase of MSW bypass in the waste stream likely has increased the attraction to JRL for these species.

Methods

The WHSV included visual surveys of JRL, OLD, and 13 additional sites (Figure 1) identified as potential attractants for hazardous wildlife within a 5-mile radius of OLD or as potential gull roosting sites outside

the 5-mile radius. The additional sites were generally comprised of public access points with views of the Penobscot River, Stillwater River, Pushaw Lake, and Perch Pond, all of which are potential roosting sites for gulls. Wildlife attractants include human-made structures, land-use practices, or human-made or natural geographic features that can attract or sustain hazardous wildlife. The primary focus of the WHSV will be to understand gull activity at JRL and identify any relationship between gull activity at JRL and OLD, if possible.

Results

The WHSV was conducted on November 14 and 15, 2024. Weather conditions over the two-day period included clear skies with temperatures ranging from 23-43°F on November 14 and overcast with temperatures ranging from 19-47°F on November 15. Winds were from the north on both days with gusts up to 18mph. The forecasted rain event on November 15 did not materialize.

Gull Presence at Old Town Municipal Airport

Stantec conducted a thorough search of the FAA strike database (FAA 2024) which indicates that there are no records of reported wildlife strikes at OLD. Additionally, Stantec met with Miles Francis, the airport operations manager and wildlife manager at OLD, to discuss wildlife hazards and mitigation efforts at OLD. During the conversation, Mr. Francis mentioned that gulls were regularly observed roosting at OLD and that airport staff utilize pyrotechnics and the physical presence of driving a vehicle along both runways prior to aircraft use to mitigate the hazard posed by gulls. During the WHSV, no gulls were observed roosting at OLD during several visits to the airfield during the two-day survey period.

Gull Presence and Attractions at Juniper Ridge Landfill

Observations at JRL were made at sunrise, mid-morning, mid-day, afternoon, and evening across the 2-day visit to gain an understanding of how gulls used the landfill. During daylight hours, gulls were generally observed circling above the open portion of JRL in large flocks ranging in maximum size from approximately 750-950 individuals. Gull activity was concentrated on the open area of the landfill where new waste was being deposited. The greatest abundance of gulls was observed in the morning, with the flock size decreasing throughout the afternoon when gulls travelled to roosting areas. A large portion of the gulls observed at JRL had immature plumage. Flocks of gulls were also observed roosting on structures, roadways, and permanent cover areas in close vicinity to the open areas at JRL.

Observations at JRL on November 15 began at 5:45 am (45 minutes prior to sunrise) to assess if gulls remained at JRL overnight, and if not, which direction they arrived from. No gulls were observed roosting overnight at JRL. Large flocks (up to ~250 individuals) of gulls began to arrive near sunrise. The daily cover had already been exposed and new waste was being disposed of at JRL upon the arrival of the gull flocks. The majority of gulls arrived from the west in the direction of Perch Pond. Several smaller flocks (up to ~50 individuals) of gulls were also observed entering from the south in the general direction of downtown Old Town and OLD.

Additional Wildlife Observations at Juniper Ridge Landfill

Bald eagles were regularly observed perched on structures nearby the opened portion of JRL and flying low and landing within the open portion. Bald eagles were also observed perched in trees outside the fenced in portion with views of the open area of JRL, the greatest bald eagle count over the two-day survey was 38 individuals. European starlings (*Sturnus vulgaris*) were observed perched in trees surrounding JRL in abundances of ~400 individuals. Flocks of crows were observed at JRL in abundances up to ~35 individuals.

Gull Presence Outside JRL and OLD

Outside of JRL and OLD, wildlife surveys were conducted at 13 additional sites identified as potential attractants for hazardous wildlife within a 5-mile radius of OLD or as potential gull roosting sites outside the 5-mile radius. The additional sites generally were comprised of public access points with views of the Penobscot River, Stillwater River, Pushaw Lake, and Perch Pond, all of which are potential roosting sites for gulls. Observation areas were limited to areas with public access.

Two large concentrations of roosting gulls were observed during the WHSV: one flock of gulls was observed on a small island on the Penobscot River near downtown Old Town and a flock of roosting gulls were observed at Perch Pond. Both flocks consisted of approximately 300-400 individuals.

Discussion

Gull population size at JRL likely fluctuates seasonally due in large part to gull migration and breeding behavior. Although all three species of gulls most abundant at JRL can be found year-round in Maine, their presence at JRL may be seasonally influenced by breeding behavior, available food sources, and migration.

Herring gulls were the most abundant gull observed at JRL during the WHSV. Herring gulls are common island nesting birds (Vickery et al., 2020) with historical observations of herring gulls breeding in nearby Penobscot Bay (Mittelhauser et al., 2016). Ring-billed gulls were also observed during the WHSV. Ring-billed gulls have historically bred in northern and western Maine, with migratory ring-billed gulls likely inflating the population in the spring and fall on their way towards northern breeding areas. Great Black-backed gulls are the third species which is likely to frequent JRL. Similar to herring and ring-billed gulls, the fall and spring migrants from northern Canadian breeding sites are likely to augment local populations. Similar to the results of a full year of surveys at an Ohio landfill (Belant et al. 1995), populations of all *Larus* gull species are expected to be the greatest at JRL in the fall with the influx of immature gulls. Immature gulls typically migrate greater distances than adults (Anderson 2017, Cornell 2019), this trend was observed at JRL during the WHSV with a large proportion of the gulls observed having juvenile plumage.

Two roosting areas were observed during the WHSV, and observations from JRL of gulls entering the landfill from the direction of the roosting areas suggests that gulls utilizing both the Penobscot River and

Perch Pond are also utilizing JRL. The primary overnight roosting area appeared to be Perch Pond due to the large population of gulls entering JRL from the direction of Perch Pond and the observation of a large flock of gulls roosting on Perch Pond during the day. Gulls that are roosting on the Penobscot River near downtown Old Town pose a greater risk to OLD due to their flight paths crossing OLD.

Although the presence of JRL and the increase in MSW bypass to the waste stream has likely inflated the number of gulls present within the vicinity of OLD, OLD's location on the shore of the Penobscot River and the likely use of the Penobscot River corridor as a migration route (McCabe & Olsen 2015) for a wide variety of avian species, including gulls, suggests that JRL is not the sole reason for wildlife hazard issues at OLD. Upon Stantec's conversation with OLD staff, the active mitigation strategies are effective at hazing gulls and should be continued to be implemented along with the current mitigation strategies employed at JRL. Gull activity was concentrated around the open area of the landfill where JRL staff was actively moving waste. Gulls were not observed feeding in areas of intermediate or permanent cover, which suggests that the waste cover strategies are effective at deterring gulls.

Recommendations

To reduce the risk that gulls from JRL pose on aviation activities at OLD, Stantec recommends several mitigation efforts to be implemented from September-December during the fall migration period. These mitigation strategies include:

- Reducing the area of non-covered, open waste;
- Restrict work to one area of the landfill;
- Continue to hold depredation permit and increase effort to reach the quota in the permit;
- Install bird roosting deterrents (e.g., Bird Barrier Daddi Long Legs) on suitable perching areas;
- Install non-lethal auditory hazing devices (e.g., zon gun (blast volume approximately 130 decibels));
- Conduct additional site visits (to include sunrise and sunset) to assess gull abundance at JRL in winter and spring.

Implementing these mitigation strategies during the fall migration when the gull population is expected to peak may help to reduce the overall attraction of JRL to migratory and juvenile gulls. It is imperative that active hazing mitigation (i.e. depredation and auditory hazing) be conducted in conjunction with the reduction of open waste area. Additionally, auditory hazing strategies will be most effective when combined with depredation efforts. The goal is to over time reduce the level of attraction that JRL poses to hazardous wildlife by limiting access to waste and conducting active hazing. Future surveys to assess

the gull abundance during the winter and spring may provide more information on when the gull population is greatest at JRL and to evaluate the effectiveness of the proposed mitigation strategies.

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Respectfully,

Stantec Consulting Services Inc.

Gabe Pelletier AWB®
Qualified Airport Wildlife Biologist
gabriel.pelletier@stantec.com

Appendix A: Site Photos

Appendix B: Site Figure

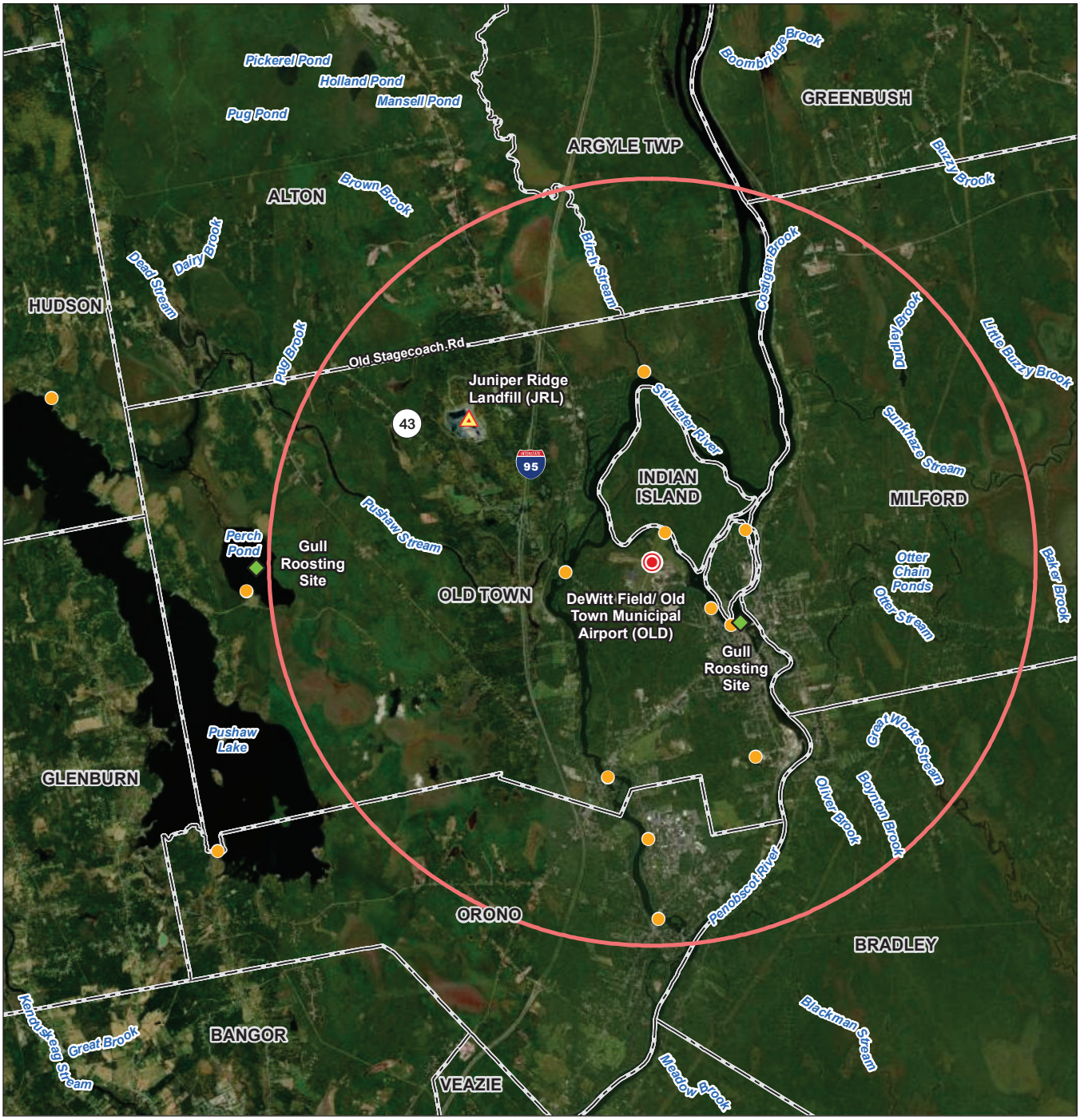
Appendix A Site Photos

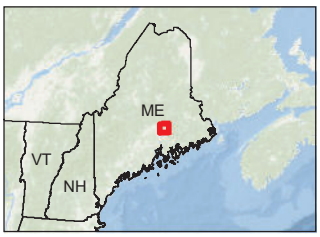
Large flock of gulls over open area of Juniper Ridge Landfill. November 14, 2024.

Flock of gulls roosting on the Penobscot River in Old Town, ME. November 14, 2024.

Airfield at Old Town Municipal Airfield. November 15, 2024.

Appendix B Site Figure





Legend

- DeWitt Field/ Old Town Municipal Airport (OLD)
- Gull Roosting Site
- Juniper Ridge Landfill (JRL)
- Observation Area
- 5 Mile Buffer
- Municipal Boundary

0 2 Miles

(At original document size of 8.5x11)
1" = 2 Miles

N

Stantec

Project Location	Prepared by PWB on 2024-12-02
Old Town, Maine	TR Review by KWH on 2024-12-02
	IR Review by GP on 2024-12-02
Client/Project	195603227

Sevee & Maher Engineers, Inc.
Juniper Ridge Landfill Expansion

Figure No.
1

Title
Wildlife Hazard Site Visit

Notes
1. Wildlife Hazard conducted by Stantec11/26/2024
2. Coordinate System: USA/NAD83(2011)/Maine (East)-csref
3. Data Sources: MEGIS, Sevee and Maher Engineers, Inc., Stantec
4. Background: Aerial imagery provided by ArcGIS Online World Imagery Mapping Service

U:\195\19560322\703_data\gis_cad\gis\MXD\s\3227_01_Juniper_WHSV.mxd Revised: 2024-12-03 By: pbarbera

Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

DEPREDATION

Permit Number: MB670894

Version Number: 3

Effective: 2025-01-01 **Expires:** 2025-12-31

Issuing Office:

Department of the Interior

U.S. FISH AND WILDLIFE SERVICE

MB Hadley Permit Office
300 Westgate Center Drive
Hadley, Massachusetts 01035-0779
permitsR5MB@fws.gov
Tel: 413-253-8643

Digitally signed by

AILEEN LENNON

Digitally signed by AILEEN LENNON
Date: 2025.02.25 08:20:43 -05'00'

Biologist, on behalf of the Permit Chief

Permittee:

CASELLA WASTE SYSTEMS, INC.
358 EMERSON MILL ROAD
HAMPDEN, ME 04444
US

Name and Title of Principal Officer:

Jeffrey Pelletier Compliance Manager

Authority: Statutes and Regulations: 16 U.S.C 703-712 50 CFR Part 13, 50 CFR 21.100

Location where authorized activity may be conducted:

Within the boundaries of: Pine Tree Landfill, 358 Emerson Mill Road, Hampden, ME, and 20 Juniper Ridge Landfill, 2828 Bennoch Road, Old Town, ME

Reporting requirements:

DEPREDATION

Permit Number: MB670894

Version Number: 3

Effective: 2025-01-01 **Expires:** 2025-12-31

ANNUAL REPORT DUE: 1/31 You must upload an annual report to ePermits each year, even if you had no activity. Form can be found at: https://fwsepermits.servicenowservices.com/fws Under "Explore Permits" select your permit type. Annual Report Form is under Permit Details.

Authorizations and Conditions:

Last Wildlife Services Form 37 Submitted: 2023 Next Wildlife Services Form 37 Due: 2026

A. You are authorized to take

(a) TWO HUNDRED (200) Herring gulls;

(b) ONE HUNDRED (100) Ring-billed gulls;

(c) TWENTY FIVE (25) Great black-backed gulls;

and **MUST** destroy carcasses. Lethal take is not to be the primary means of control. Active hazing, harassment or other non-lethal techniques must continue in conjunction with any lethal take of migratory birds.

B. You may use the following method(s) of take: shotgun, in accordance with Standard Condition #6. Use of paint ball guns is prohibited.

C. Anyone who takes birds under the authority of this permit must follow the American Veterinary Medical Association Guidelines on Euthanasia (https://www.avma.org/resources-tools/avma-policies/avma-guidelines-euthanasia-animals).

D. The following subpermittees are authorized: Employees of Pine Tree Landfill and Employees of Juniper Ridge Landfill. In addition, any other person who is (1) employed by or under contract to you for the activities specified in this permit, or (2) otherwise designated a subpermittee by you in writing, may exercise the authority of this permit.

In addition, any other person who is (1) employed by or under contract to you for the activities specified in this permit, or (2) otherwise designated a subpermittee by you in writing, may exercise the authority of this permit.

State Restrictions: In addition to your federal permit, you must obtain a permit from the State of Maine before you take species 1) listed by Maine as endangered or threatened or 2) designated as special concern. All take must be in coordination with and have prior authorization from the Maine Department of Inland Fisheries &Wildlife (Wildlife Division 207-287-5252).

E. You and any subpermittees must comply with the below Standard Conditions. These standard conditions are nationwide and may not be modified for individual permits.

DEPREDATION

Permit Number: MB670894

Version Number: 3

Effective: 2025-01-01 **Expires:** 2025-12-31

1. All of the provisions and conditions of the governing regulations at 50 CFR part 13 and 50 CFR part 21.100 are conditions of your permit. Failure to comply with the conditions of your permit could be cause for suspension of the permit. If you have questions regarding these conditions, refer to the regulations or, if necessary, contact your migratory bird permit issuing office. For copies of the regulations and forms, or to obtain contact information for your issuing office, visit: Migratory Birds Permit Types and Forms (https://www.fws.gov/program/migratory-bird-permit/permit-types-and-forms)

2. General conditions set out in Subpart B of 50 CFR 13, and specific conditions contained in Federal regulations cited above, are hereby made a part of this permit. All activities authorized herein must be carried out in accord with and for the purposes described in the application submitted. Continued validity, or renewal of this permit is subject to complete and timely compliance with all applicable conditions, including the filing of all required information and reports.

3. The validity of this permit is also conditioned upon strict observance of all applicable foreign, state, local tribal, or other federal law.

4. Valid for use by permittee named above.

5. To minimize the lethal take of migratory birds, you are required to continually apply non-lethal methods of harassment in conjunction with lethal control. Note: Explosive Pest Control Devices (EPCDs) are regulated by the Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF). If you plan to use EPCDs, you require a Federal explosives permit, unless you are exempt under 27 CFR 555.141. Information and contacts may be found at Federal Firearms and Explosives License Types Fact Sheet (https://www.atf.gov/resource-center/fact-sheet/fact-sheet-federal-firearms-and-explosives-licenses-types)

6. Shotguns used to take migratory birds can be no larger than 10-gauge and must be fired from the shoulder. You must use nontoxic shot listed in 50 CFR 20.21(j).

7. You may not use blinds, pits, or other means of concealment, decoys, duck calls, or other devices to lure or entice migratory birds into gun range.

8. You are not authorized to take, capture, harass, or disturb bald eagles or golden eagles, or species listed as threatened or endangered under the Endangered Species Act found in 50 CFR 17, without additional authorization. For a list of threatened and endangered species in your state, visit the U.S. Fish and Wildlife Service's Threatened and Endangered Species System (TESS) (https://www.fws.gov/library/collections/endangered-species).

9. If you encounter a migratory bird with a Federal band issued by the U.S. Geological Survey Bird Banding Laboratory, Laurel, MD, report the band number to the Bird Banding Laboratory.

10. This permit does not authorize take or release of any migratory birds, nests, or eggs on Federal lands without additional prior written authorization from the applicable Federal agency, or on State lands or other public or private property without prior written permission or permits from the landowner or custodian.

11. Unless otherwise specified on the face of the permit, migratory birds, nests, or eggs taken under this permit must be:

(a) turned over to the U.S. Department of Agriculture for official purposes, or

(b) donated to a public educational or scientific institution as defined by 50 CFR 10, or

(c) completely destroyed by burial or incineration, or

(d) with prior approval from the permit issuing office, donated to persons authorized by permit or regulation to possess them.

12. A subpermittee is an individual to whom you have provided written authorization to conduct some or all of the permitted activities in your absence. Subpermittees must be at least 18 years of age. As the permittee, you are legally responsible for ensuring that your subpermittees are adequately trained and adhere to the terms of your permit. You are responsible for maintaining current records of who you have designated as a subpermittee, including copies of designation letters you have provided.

13. You and any subpermittees must carry a legible copy of this permit, including these Standard Conditions, and display it upon request whenever you are exercising its authority.

14. You must maintain records as required in 50 CFR 13.46 and 50 CFR 21.100. All records relating to the permitted activities must be kept at the location indicated in writing by you to the migratory bird permit issuing office.

15. Acceptance of this permit authorizes the U.S. Fish and Wildlife Service to inspect any wildlife held, and to audit or copy any permits, books, or records required to be kept by the permit and governing regulations.

16. You may not conduct the activities authorized by this permit if doing so would violate the laws of the applicable State, county, municipal or tribal government or any other applicable law.

For suspected illegal activity, immediately contact USFWS Law Enforcement (https://www.fws.gov/program/office-of-law-enforcement/contact-us) 1-844-FWS-TIPS (397-8477).

From:	Lisa Turner
To:	Quaine, Cheryl J (FAA)
Cc:	Lance Farrar; "karen.knuuti@maine.gov"; "dominique.dispirito@maine.gov"
Subject:	RE: Juniper Ridge Landfill Phase II Expansion, Old Town, ME
Date:	Monday, October 28, 2024 9:00:00 AM

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Hi Cheryl,

We would like to suggest an approach for an initial evaluation of the seagull issue and follow up with some potential mitigation. Is there a time that we could talk to make sure that you are on board with our idea before we proceed? I have a meeting from 10-11 this morning, but am available otherwise, feel free to call, or set up a time if you prefer.

Sincerely,

Lisa Turner, P.E., L.S.S.
Project Manager

SME
SEVEE & MAHER ENGINEERS

Sevee & Maher Engineers, Inc.
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Office: 207.829.5016
Cell: 207.841.8385
Fax: 207.829.5692

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From: Quaine, Cheryl J (FAA) <Cheryl.J.Quaine@faa.gov>
Sent: Tuesday, October 22, 2024 12:40 PM
To: Lisa Turner <Lisa.Turner@smemaine.com>
Cc: Lance Farrar <LFarrar@old-town.org>; 'karen.knuuti@maine.gov' <karen.knuuti@maine.gov>; 'dominique.dispirito@maine.gov' <dominique.dispirito@maine.gov>
Subject: RE: Juniper Ridge Landfill Phase II Expansion, Old Town, ME

Hello Ms. Turner –

I have reached out to the airport to solicit information on bird strikes and wildlife hazards from the land fill. It appears that rain events lead to seagulls leaving the landfill and heading to the airfield to feed on worms etc. You can see from the attached that the hazardous wildlife population is not being properly managed. Before the FAA provides its input on the landfill expansion, can we have a discussion on what efforts could be conducted to reduce these concerns?

Sincerely,
Cheryl Quaine
Environmental Protection Specialist
Federal Aviation Administration
Schedule | Mon-Thur

From: Lisa Turner <Lisa.Turner@smemaine.com>
Sent: Tuesday, October 1, 2024 5:54 AM
To: Quaine, Cheryl J (FAA) <Cheryl.J.Quaine@faa.gov>
Cc: Lance Farrar <LFarrar@old-town.org>
Subject: RE: Juniper Ridge Landfill Phase II Expansion, Old Town, ME

CAUTION: This email originated from outside of the Federal Aviation Administration (FAA). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Good morning Ms. Quaine,

The site has been in operation since 1996, initially accepting papermill waste, then accepting a variety of commercial, industrial, and municipal wastes beginning in 2004. Waste is hauled to the landfill in trucks ranging from small waste packer trucks to tractor trailers. The trucks dump the waste materials directly on the landfill, where it is compacted. At the end of each day, all fresh waste is covered with six inches of a daily cover material, in accordance with Maine's Solid Waste Management Rules. Once a portion of the landfill reaches near final grades, it is covered with a temporary geomembrane cap (on sideslopes) or an 18-inch-thick temporary soil cap on the more level top surface. Temporary cap is placed as soon as possible to minimize rainfall collection on the landfill, which must be treated. As such, the open area of the landfill remains relatively constant in size. After the waste has settled for a number of years, the temporary cap is removed, enough waste is added to meet the final grades, and a permanent cap consisting of a geomembrane overlain by 18 inches of soil is placed on the waste and the surface is seeded.

The additional area will be managed in the same manner as has been done for many years. The proposed expansion is to the north of the existing landfill, and is therefore slightly further from the airport than the existing landfill.

The wildlife attracted to the landfill consists primarily of seagulls and eagles. From time to time, personnel at the landfill eliminate a few individuals of the acceptable species of

seagulls, in accordance with their permits and state and federal rules. Any rodent vectors seem to be managed adequately by the eagles.

Please let me know if you have any additional questions.

Sincerely,

Lisa Turner, P.E., L.S.S.
Project Manager

SME
SEVEE & MAHER ENGINEERS
Sevee & Maher Engineers, Inc.
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Office: 207.829.5016
Cell: 207.841.8385
Fax: 207.829.5692

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From: Quaine, Cheryl J (FAA) <Cheryl.J.Quaine@faa.gov>
Sent: Wednesday, September 25, 2024 3:54 PM
To: Lisa Turner <Lisa.Turner@smemaine.com>
Cc: Lance Farrar <LFarrar@old-town.org>
Subject: Juniper Ridge Landfill Phase II Expansion, Old Town, ME

Good afternoon Ms. Turner –

I have received your letter on the proposed 61-acre expansion of the Juniper Ridge Landfill which is within 3 miles of the Dewitt Field in Old Town, ME. Can you provide me some more information on:

- the site's operating procedures
- will the additional 61 acres operate under those same procedures
- types of wildlife hazard attractants at the site
- how those vectors are managed

Sincerely,
Cheryl Quaine

Environmental Protection Specialist
Federal Aviation Administration
New England Regional Office | Airports Division
Cheryl.J.Quaine@faa.gov
Schedule | Mon-Thur

5:56

G-9

TRIBAL HISTORIC PRESERVATION

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4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

July 17, 2024

VIA EMAIL
Chris Sockalexis, Tribal Historic Preservation Officer
Penobscot Nation
Cultural and Historic Preservation Department
12 Wabanaki Way
Indian Island, ME 04468

Email: Chris.Sockalexis@penobscotnation.org

Subject: Significant Cultural/ Historic Resources Information Request
Juniper Ridge Landfill Expansion

Dear Chris:

The purpose of this letter is to request information on any significant cultural or historic resources associated with the location depicted on the attached figure. We are assisting NEWSME Landfill Operations, LLC with evaluating this site for the proposed expansion of the Juniper Ridge Landfill.

Please review the attached map and let me know if there are any known or suspected cultural or historic resources associated with this potential development area.

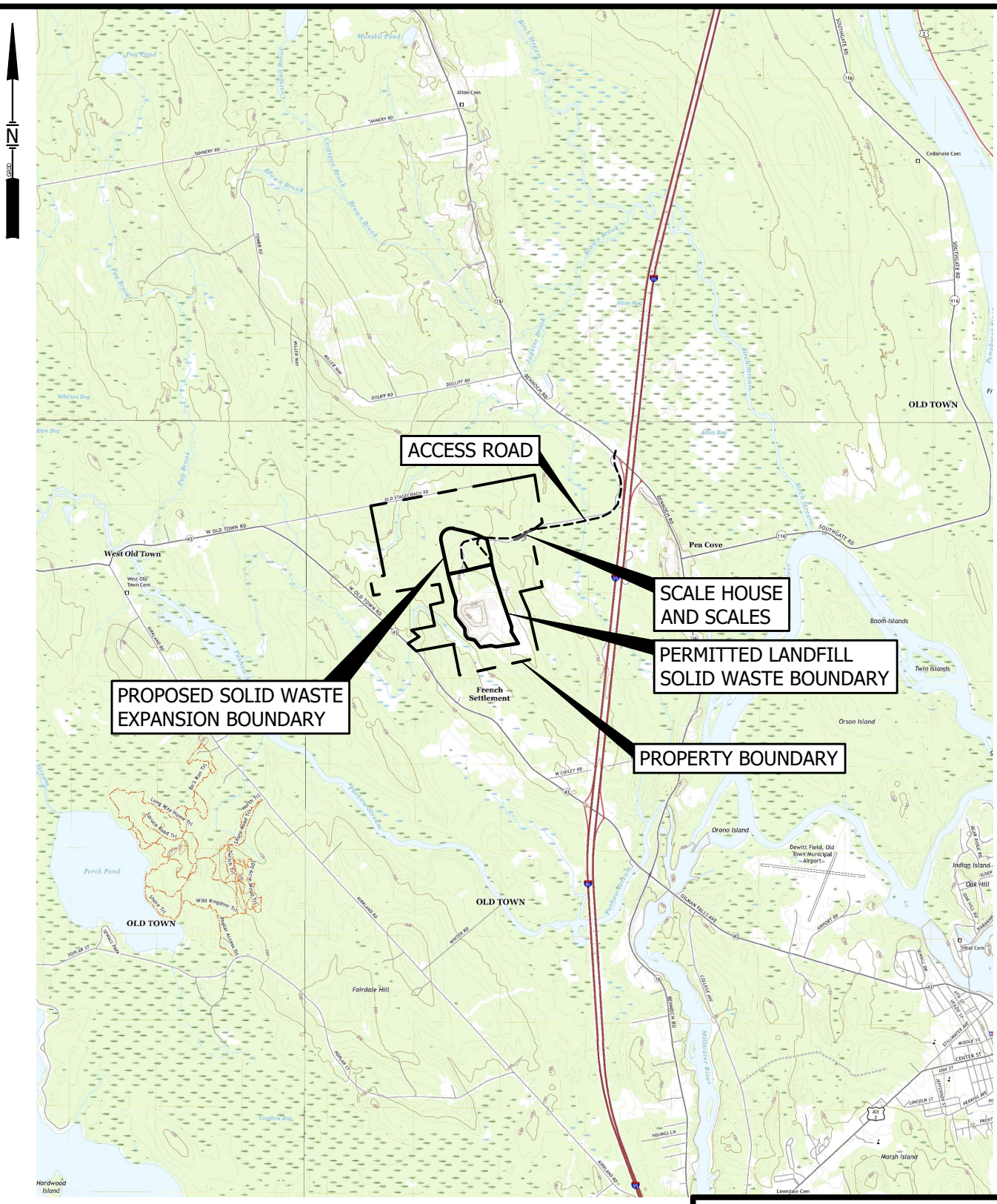
Please feel free to contact me at 207.829.5016 or Lisa.Turner@smemaine.com if you have any questions or need additional information. Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Lisa Turner, P.E., L.S.S.
Project Manager

Attachment: Site Location Map



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE
OLD TOWN, MAINE-2021

NOT TO SCALE

DWG: SITELOC LMN: SITELOC-EXPANSION CTB: SME-STD.CTB REV: 7/1/2024

SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
SEVEE & MAHER
ENGINEERS

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Outlook

FW: JRL Penobscot Nation Correspondence

From Stewart, Doug (Topsham) <doug.stewart@stantec.com>
Date Thu 11/21/2024 2:53 PM
To Lisa Turner <Lisa.Turner@smemaine.com>
Cc Pelletier, Gabriel <Gabriel.Pelletier@stantec.com>

3 attachments (738 KB)

1-27-2017 Jake Riley - Juniper Ridge Landfill.pdf; RE: JRL Applications - follow up to yesterday's call; Juniper Ridge Landfill Expansion Project - Old Town, Maine .pdf;

Thanks Gabe-

Lisa, attached provides the correspondence from the Penobscot's on the least expansion project. Hope this helps!

From: Pelletier, Gabriel <Gabriel.Pelletier@stantec.com>
Sent: Thursday, November 21, 2024 2:39 PM
To: Stewart, Doug (Topsham) <doug.stewart@stantec.com>
Subject: JRL Penobscot Nation Correspondence

Hi Doug,

See the attached memo from the Penobscot Nation dated January 27, 2017.

"This project appears to have no impact on a structure or site of historic, architectural or archaeological significance to the Penobscot Nation as defined by the National Historic Preservation Act of 1966, as amended."

Chris Sockalexis' email to Jake (attached) suggests that there will be further dialog but we don't have any record of further dialog. I've attached two relevant correspondence.

Hope this is helpful. Do we have a date when the expansion scope was minimized?

Gabe Pelletier (he/him), AWB®
Environmental Scientist

Mobile: 207-607-0596
Gabriel.Pelletier@stantec.com

Stantec
30 Park Drive
Topsham ME 04086-1737

Stantec

PENOBSCOT NATION
CULTURAL & HISTORIC PRESERVATION
12 WABANAKI WAY, INDIAN ISLAND, ME 04468

CHRIS SOCKALEXIS – TRIBAL HISTORIC PRESERVATION OFFICER
E-MAIL: chris.sockalexis@penobscotnation.org

NAME	Lisa Turner
ADDRESS	Sevee & Maher Engineers, Inc. 4 Blanchard Road, P.O. Box 85A Cumberland, ME 04021
OWNER'S NAME	NEWSME Landfill Operations, LLC
TELEPHONE	207.829.5016
EMAIL	Lisa.Turner@smemaine.com
PROJECT NAME	Juniper Ridge Landfill Expansion
PROJECT SITE	Old Town, ME
DATE OF REQUEST	July 17, 2024
DATE REVIEWED	February 28, 2025

Thank you for the opportunity to comment on the above referenced project. This project appears to have no impact on a structure or site of historic, architectural or archaeological significance to the Penobscot Nation as defined by the National Historic Preservation Act of 1966, as amended.

If there is an inadvertent discovery of Native American cultural materials during the course of the project, please contact my office at (207) 817-7471. Thank you for consulting with the Penobscot Nation Tribal Historic Preservation Office with this project.

Chris Sockalexis, THPO
Penobscot Nation

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

December 18, 2024

Charles Loring
Penobscot Nation
Cultural and Historic Preservation Department
12 Wabanaki Way
Indian Island, ME 04468

Subject: Significant Cultural/ Historic Resources Information Request
Juniper Ridge Landfill Expansion

Dear Mr. Loring:

The purpose of this letter is to request information on any significant cultural or historic resources associated with the location depicted on the attached figure. We are assisting NEWSME Landfill Operations, LLC with evaluating this site for the proposed expansion of the Juniper Ridge Landfill. We have previously emailed Mr. Sockalexis but have not received an answer (see attached letter sent via email). We have been told that you may be able to provide us with an answer.

Please review the attached map and let me know if there are any known or suspected cultural or historic resources associated with this potential development area.

Please feel free to contact me at 207.829.5016 or Lisa.Turner@smemaine.com if you have any questions or need additional information. Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Lisa Turner, P.E., L.S.S.
Project Manager

Attachment: Letter to Mr. Sockalexis, dated July 17, 2024

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

July 17, 2024

VIA EMAIL
Chris Sockalexis, Tribal Historic Preservation Officer
Penobscot Nation
Cultural and Historic Preservation Department
12 Wabanaki Way
Indian Island, ME 04468

Email: Chris.Sockalexis@penobscotnation.org

Subject: Significant Cultural/ Historic Resources Information Request
Juniper Ridge Landfill Expansion

Dear Chris:

The purpose of this letter is to request information on any significant cultural or historic resources associated with the location depicted on the attached figure. We are assisting NEWSME Landfill Operations, LLC with evaluating this site for the proposed expansion of the Juniper Ridge Landfill.

Please review the attached map and let me know if there are any known or suspected cultural or historic resources associated with this potential development area.

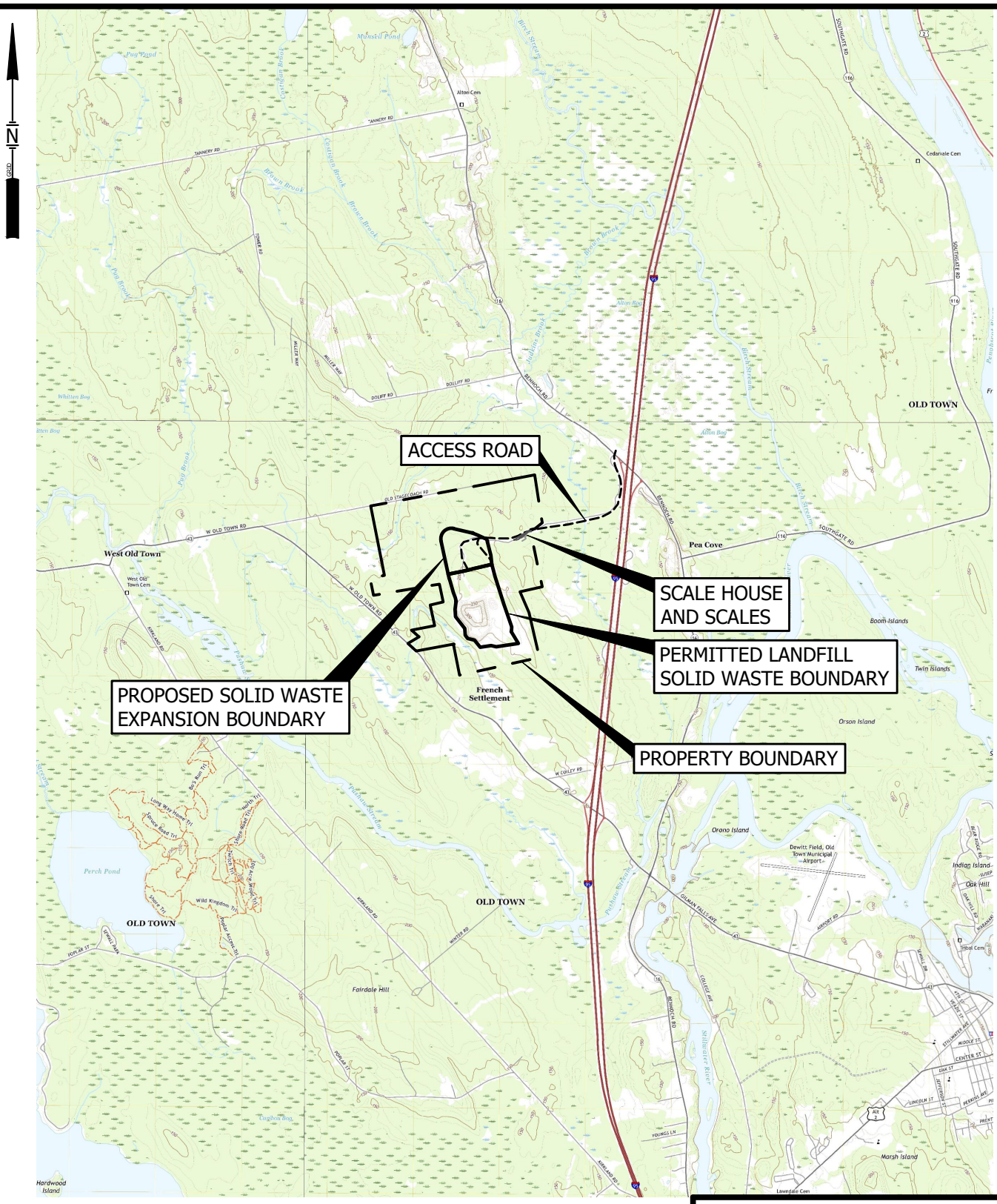
Please feel free to contact me at 207.829.5016 or Lisa.Turner@smemaine.com if you have any questions or need additional information. Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Lisa Turner, P.E., L.S.S.
Project Manager

Attachment: Site Location Map



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OLD TOWN, MAINE

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SEVEE & MAHER
ENGINEERS

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Outlook

Significant Cultural/Historic Resources Information Request for Juniper Ridge Landfill Expansion

From Charlie Loring, Jr. <Charlie.Loring.JR@penobscotnation.org>
Date Fri 1/10/2025 4:19 PM
To Lisa Turner <Lisa.Turner@smemaine.com>

1 attachment (1 MB)
Penobscot Nation_Declaration.pdf;

Greetings,

I am writing in response to a letter I received around Christmas asking about cultural and/or historic resources that are associated with the current location of Juniper Ridge Landfill expansion area. In short, the landfill area is surrounded by two tributaries to the Penobscot River which our ancestors used to thrive on for thousands of years prior to any colonial presence. The River and her tributaries were not only a lifeline to obtain fish and medicines from; they were also a means of transportation to reach lands that had other medicines, and items such as birch bark or brown ash for containers and baskets, but also furbearers for food and warmth as well as more food and medicines for subsistence. Wetlands in many regions are diverse ecosystems which hold dense populations of subsistence species, medicines and forest products that are utilized by native people, so that holds some real significance, but also know, Western science has also backed up their importance by exposing wetlands as ecological marvels that filter water. These areas, however, can lose their benefits by altering hydrology and creating a potential avenue for landfill-derived pollutants to enter groundwater ultimately, which would have adverse effects on all life, be it aquatic, plant or terrestrial life near the areas affected. We have been experiencing the degradation of our River and wetlands for a very long time, exacerbated in no small part by Juniper Ridge Landfill and its leachate. We are continuously trying to stop this mounting harm and restore the River's health.

In addition to this brief summary, the Penobscot Nation issued a signed declaration which presents more details related to our on-going cultural and historic resource concerns associated with Juniper Ridge Landfill.

Respectfully,

Chuck Loring

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

July 17, 2024

VIA EMAIL
Donald Soctomah, Tribal Historic Preservation Officer
Passamaquoddy Tribe of Indians
Indian Township Reservation
P.O. Box 301
Princeton, ME 04668

Email: soctomah@gmail.com

Subject: Significant Cultural/ Historic Resources Information Request
Juniper Ridge Landfill Expansion

Dear Donald:

The purpose of this letter is to request information on any significant cultural or historic resources associated with the location depicted on the attached figure. We are assisting NEWSME Landfill Operations, LLC with evaluating this site for the proposed expansion of the Juniper Ridge Landfill.

Please review the attached map and let me know if there are any known or suspected cultural or historic resources associated with this potential development area.

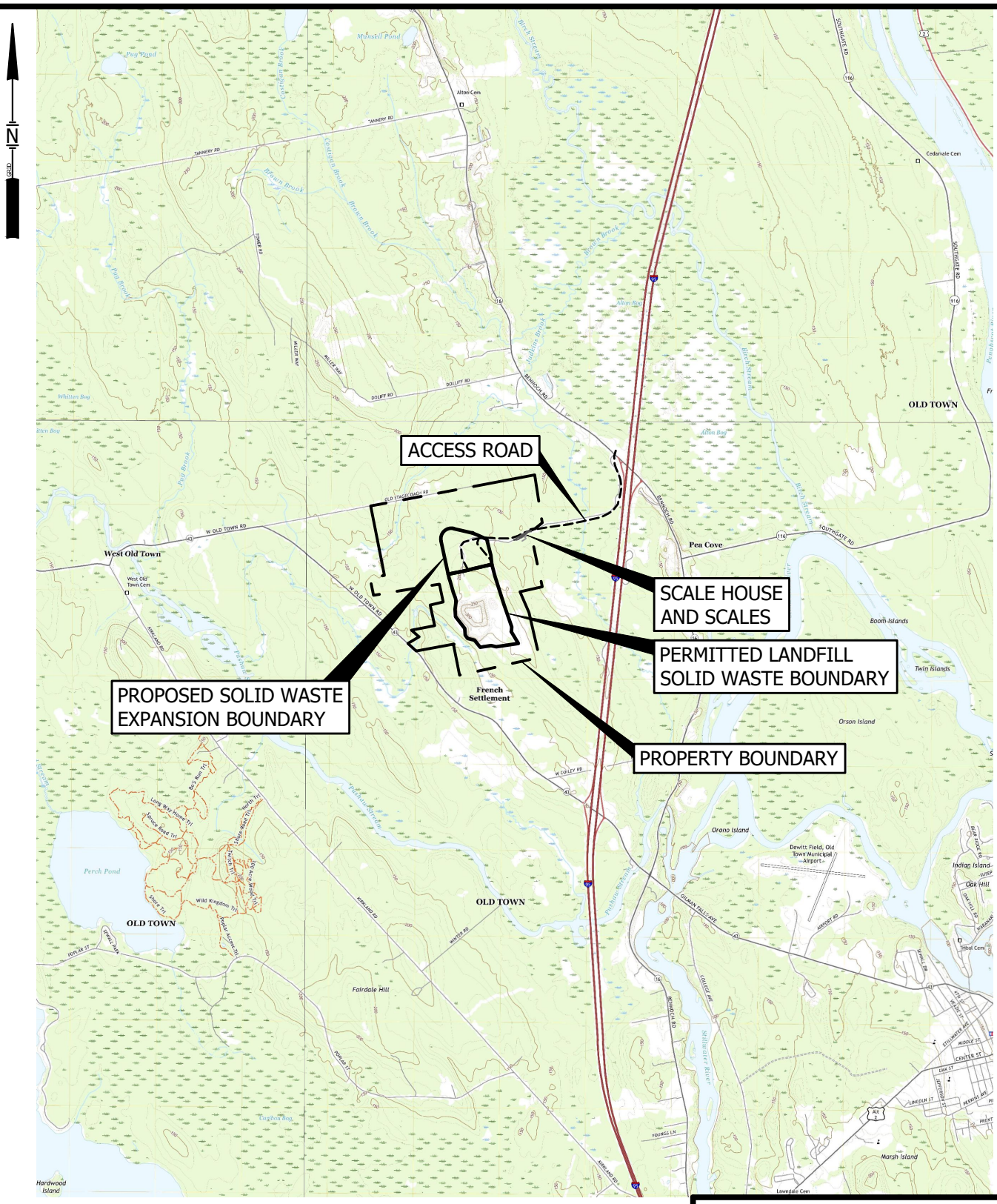
Please feel free to contact me at 207.829.5016 or Lisa.Turner@smemaine.com if you have any questions or need additional information. Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Lisa Turner, P.E., L.S.S.
Project Manager

Attachment: Site Location Map



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ENGINEERS

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Tribal Historic Preservation Office
Passamaquoddy Tribe
PO Box 159 Princeton, Me. 04668
207-214-4051

July 18, 2024

Lisa Turner, P.E., L.S.S.

Project Manager

SME

- Re: Juniper Ridge Landfill Expansion

Dear ***Lisa*** ;

The Passamaquoddy THPO has reviewed the following application regarding the historic properties and significant religious and cultural properties in accordance with NHPA, NEPA, AIRFA, NAGPRA, ARPA, Executive Order 13007 Indian Sacred Sites, Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, and Executive Order 12898 Environmental Justice.

We are in support of the Penobscot THPO comments on this project.

Sincerely;

Donald Soctomah
Soctomah@gmail.com
THPO
Passamaquoddy Tribe

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

August 20, 2024

VIA EMAIL
Donald Soctomah, Tribal Historic Preservation Officer
Pleasant Point Tribe of Indians
Indian Township Reservation
P.O. Box 301
Princeton, ME 04668

Email: soctomah@gmail.com

Subject: Significant Cultural/ Historic Resources Information Request
Juniper Ridge Landfill Expansion

Dear Donald:

On July 17, 2024 Sevee & Maher Engineers, Inc. sent a letter asking you if the Passamaquoddy Tribe of *Indian Township Reservation* knew of any significant cultural or historic resources associated with the location depicted on the attached figure. We are assisting NEWSME Landfill Operations, LLC with evaluating this site for the proposed expansion of the Juniper Ridge Landfill. You very quickly responded by deferring to the Penobscot Nation.

At the risk of being redundant, we would like to ask if the Passamaquoddy Tribe of *Pleasant Point Reservation* know of any significant cultural or historic resources associated with the same location. The attached map depicts the potential development area.

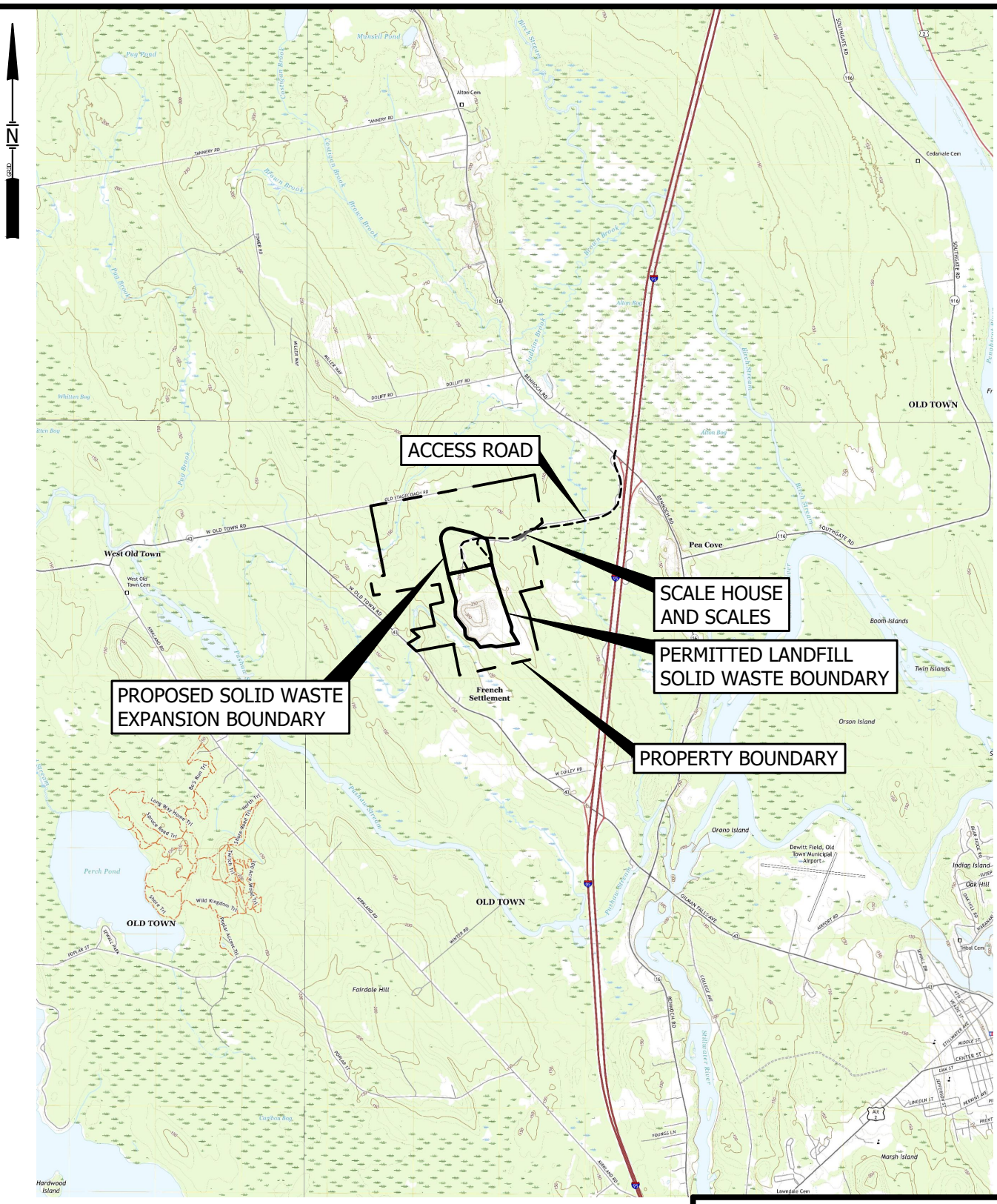
Please feel free to contact me at 207.829.5016 or Lisa.Turner@smemaine.com if you have any questions or need additional information. Thank you for your assistance in obtaining this information, and my apologies if it was unnecessarily time consuming for you to respond to two requests.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Lisa Turner, P.E., L.S.S.
Project Manager

Attachment: Site Location Map



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OLD TOWN, MAINE

SME
SEVEE & MAHER
ENGINEERS

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Tribal Historic Preservation Office
Passamaquoddy Tribe
PO Box 159 Princeton, Me. 04668
207-214-4051

August 22, 2024

Sevee & Maher Engineers, Inc.

4 Blanchard Road, P.O. Box 85A

Cumberland, ME 04021

- Re: Significant Cultural/ Historic Resources Juniper Ridge Landfill Expansion

Dear ***Lisa*** ;

The Passamaquoddy THPO has reviewed the following application regarding the historic properties and significant religious and cultural properties in accordance with NHPA, NEPA, AIRFA, NAGPRA, ARPA, Executive Order 13007 Indian Sacred Sites, Executive Order 13175 Consultation and Coordination with Indian Tribal Governments, and Executive Order 12898 Environmental Justice.

The Project listed above we follow the Penobscot Nations concerns on cultural and historical issues within their Nations homelands.

Sincerely;

Donald Soctomah
Soctomah@gmail.com
THPO
Passamaquoddy Tribe

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

July 17, 2024

VIA EMAIL
Jenny Gaenzle, Tribal Historic Preservation Officer
Aroostook Band of Micmacs
7 Northern Road
Presque Isle, ME 04769

Email: jgaenzle@micmac-nsn.gov

Subject: Significant Cultural/ Historic Resources Information Request
Juniper Ridge Landfill Expansion

Dear Ms. Gaenzle:

The purpose of this letter is to request information on any significant cultural or historic resources associated with the location depicted on the attached figure. We are assisting NEWSME Landfill Operations, LLC with evaluating this site for the proposed expansion of the Juniper Ridge Landfill.

Please review the attached map and let me know if there are any known or suspected cultural or historic resources associated with this potential development area.

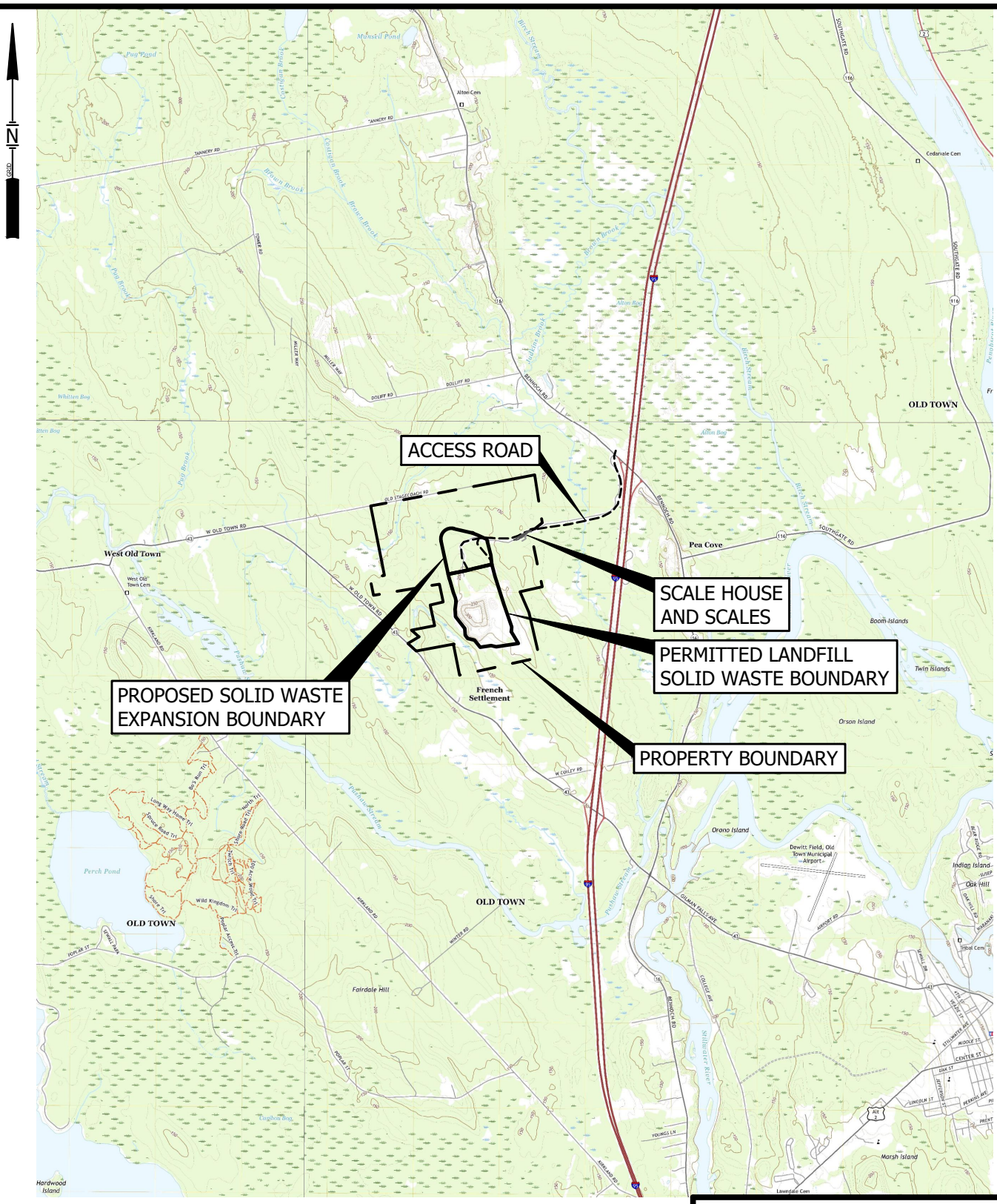
Please feel free to contact me at 207.829.5016 or Lisa.Turner@smemaine.com if you have any questions or need additional information. Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Lisa Turner, P.E., L.S.S.
Project Manager

Attachment: Site Location Map



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ENGINEERS

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Tribal Historic Preservation Office
Mi'kmaq Nation
7 Northern Road
Presque Isle, ME 04769
Phone: (207)764-1972 ext. 161
jgaenzle@micmac-nsn.gov

Mi'kmaq Nation

August 20, 2024

To: Lisa Turner – Sevee & Maher Engineers 4 Blanchard Road, Cumberland, ME 04021
Owner: NEWSME Landfill Operations, LLC
Project Location: Juniper Ridge Landfill Expansion 2828 Bennoch Rd, Alton, ME 04468

Based on the project descriptions, we do not have knowledge of any specific sites or cultural features of significance to the Mi'kmaq Nation that exist at the proposed project location(s) listed above. However, this geographic area does constitute traditional areas that were historically utilized by members of the Mi'kmaq Nation and the other Wabanaki Tribes. As such, any future activities at the location would require a new consultation.

Therefore, we respectfully request that if evidence of Native American presence is discovered during the course of the current project location activities such as, human remains, artifacts, or any other potentially sensitive or culturally significant items, that site activities in the vicinity of the discovery immediately cease, pending notification to us.

In addition, if this project results in wetland disturbances requiring mitigation, we are requesting that black ash (*Fraxinus nigra*) be used as the principal wetland species for wetland restoration activities. The black ash tree has special significance in the culture of the northeastern Tribes and is used extensively for weaving baskets and other Native American crafts. The black ash tree also provides valuable food and habitat for migratory waterfowl and other wildlife. Unfortunately, however, this species is rarely selected by foresters and landowners who favor other tree species. As a result of this, and other environmental factors, the black ash tree is in serious decline in Maine. The Mi'kmaq Nation has completed several black ash wetland restoration projects and have a dependable source for highly-quality seedlings, and the experience and expertise to assist you with black ash wetland restoration projects.

On the subject of human remains, artifacts, or any other evidence of Native American presence, if discovered, the human remains will be reburied with the appropriate respect for the remains, at a distinctive and respectable location on tribal lands. The artifacts and other evidence of Native American discovery will be documented with appropriate detail, analyzed for the precise period of the items by the Tribal Historic Preservation Officer for the Mi'kmaq Nation, and retained for preservation or interred with the ancestor remains.

If you have any questions or comments, please feel free to contact me.

Sincerely,

Jenny Gaenzle
Tribal Historic Preservation Officer

SME
SEVEE & MAHER
ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 • Fax: 207.829.5692
info@smemaine.com
smemaine.com

September 18, 2024

VIA EMAIL
Issac St. John, Tribal Historic Preservation Officer
Houlton Band of Maliseet Indians
88 Bell Road
Littleton, ME 04730

Email: istjohn@maliseets.com

Subject: Significant Cultural/ Historic Resources Information Request
Juniper Ridge Landfill Expansion

Dear Isaac:

The purpose of this letter is to request information on any significant cultural or historic resources associated with the location depicted on the attached figure. We are assisting NEWSME Landfill Operations, LLC with evaluating this site for the proposed expansion of the Juniper Ridge Landfill.

Please review the attached map and let me know if there are any known or suspected cultural or historic resources associated with this potential development area.

Please feel free to contact me at 207.829.5016 or Lisa.Turner@smemaine.com if you have any questions or need additional information. Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Lisa Turner, P.E., L.S.S.
Project Manager

Attachment: Site Location Map

Outlook

RE: Historical Information Request

From Isaac St John <istjohn@maliseets.com>
Date Tue 10/22/2024 9:01 AM
To Lisa Turner <Lisa.Turner@smemaine.com>

Good morning,

We do not have an immediate concern with your project or project site, and do not currently have the resources to fully investigate same. Should any human remains, archaeological properties or other items of historical importance be unearthed while working on this project, we recommend that you stop your project and report your findings to the appropriate authorities including the Houlton Band of Maliseet Indians.

Thank you,

Isaac St. John
Tribal Historic Preservation Officer
Houlton Band of Maliseet Indians
88 Bell Road
Littleton, ME 04730

From: Lisa Turner [mailto:Lisa.Turner@smemaine.com]
Sent: Wednesday, September 18, 2024 10:13 AM
To: istjohn@maliseets.com
Subject: Historical Information Request

Dear Mr. St. John,

Please see the attached information request. Let us know if you have any questions.

Sincerely,

Lisa Turner, P.E., L.S.S.
Project Manager

SME
SEVEE & MAHER ENGINEERS

Sevee & Maher Engineers, Inc.
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Office: 207.829.5016
Cell: 207.841.8385
Fax: 207.829.5692

APPENDIX H

SOUND LEVEL ASSESSMENT REPORT

SME
SEVEE & MAHER
ENGINEERS

SOUND LEVEL ASSESSMENT REPORT

Juniper Ridge Landfill Phase II Expansion
Old Town, Maine

Prepared for:

NEWSME Landfill Operations, LLC, as Operator
2828 Bennoch Road
Old Town, ME 04468

and

Maine Bureau of General Services, as Owner
77 State House Station
Augusta, ME 04333

Prepared by:

Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

April 22, 2025

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1.0 EXECUTIVE SUMMARY

An expansion of the existing Juniper Ridge Landfill (JRL) in Old Town, Maine (Phase II Expansion) is proposed by NEWSME Landfill Operations, LLC (NEWSME) and the Maine Bureau of General Services (BGS). A sound level impact assessment has been conducted by Epsilon Associates, Inc. (Epsilon) for this project.

This sound level assessment consisted of a sound monitoring program, which includes a description of existing sound levels around the operating landfill, computer modeling to predict future sound levels under multiple operating scenarios, and an evaluation of noise limits. The analysis has been prepared to address the requirements of the Maine Department of Environmental Protection (MEDEP) noise regulations from Chapter 400 of the MEDEP Solid Waste Management Rules (Rules), as well as the City of Old Town (Old Town) Chapter 22A Solid Waste Facility Rules.

Sound sensitive receivers in all directions from the Phase II Expansion were evaluated for sound level impacts. Since impacts are predicted to be the greatest from solid waste management mobile noise sources at the closest property line (western), the mobile sources were modeled in the southwest proposed Phase II Expansion area for this assessment under daytime (defined as 7:00 a.m. to 7:00 p.m. in the Rules) and nighttime (defined as 7:00 p.m. to 7:00 a.m. in the Rules) operating scenarios. Under both daytime and nighttime scenarios, sound levels due to the operation of the Thiopaq® plant, the renewable natural gas (RNG) processing facility, and a proposed per- and polyfluoroalkyl substances (PFAS) treatment plant in the southeastern corner of JRL were included.

During periods when activities are occurring in the southwestern area of the Phase II Expansion, all modeling locations will be below the daytime noise limits. During a short segment of nighttime landfill operations (occurring 6 a.m. – 7 a.m.), landfill equipment with combined sound levels of 81 dBA at 50 feet, or less, will meet the nighttime noise limit at a distance of approximately 700 feet (or more) from the closest western property line. For example, a Caterpillar 836G compactor is 72 dBA at 50 feet, and the water truck is 81 dBA at 50 feet. Either one of these pieces of equipment can operate during nighttime hours and meet the nighttime limit. However, both operating at the same time would exceed the limit, so operations of more than one piece of heavy equipment will be limited only until 7:00 a.m. The stationary equipment is not restricted during nighttime hours based on this sound level assessment.

Sound level impacts from activities in the northern, eastern, and southeastern regions of the Phase II Expansion were also considered. Due to the significant distances from these areas to the northern, eastern, and southern property lines, sound levels from landfill equipment in these cells are not anticipated to be higher than the results from the southwestern-modeled scenarios. Therefore, the JRL Phase II Expansion will meet both the local and state regulations with respect to noise when work is conducted in these general areas and with the stationary equipment operating at full load.

In conclusion, based on our modeling, operations in the Phase II Expansion will comply with both the daytime and nighttime local and state regulations with respect to noise. Operational restrictions will be necessary in certain regions of the southwestern area of the Phase II Expansion during the one hour of nighttime solid waste management operations in order to comply with the noise limits.

2.0 INTRODUCTION

NEWSME and BGS propose an expansion to develop additional volume of disposal capacity at the existing Juniper Ridge Landfill in Old Town, Maine. Epsilon has been retained by Sevee & Maher Engineers, Inc. (SME) to conduct a sound level assessment report to examine potential noise impacts due to the expansion.

In addition to the landfill expansion, a new stationary noise source, a PFAS treatment plant, is planned for development on the landfill property in the southeastern corner of the site. Both mobile and stationary sources of sound are analyzed in this report, including the estimated noise from this future PFAS treatment plant.

This analysis has been prepared to address the requirements of the MEDEP noise regulations from Chapter 400 of the MEDEP Rules, as well as the Old Town Chapter 22A Solid Waste Facility rules. The facility is exempt from review under the Maine Site Location of Development Act, 38 M.R.S.A. § 481 et seq., (Site Law) and its associated regulations, including Chapter 375. See 38 M.R.S.A. § 488(21) stating that facilities regulated by the MEDEP under 38 M.R.S.A. § 1310-N are exempt from review under the Site Law.

The existing and proposed landfill equipment were modeled in CadnaA, an environmental sound prediction software, using sound pressure levels measured from existing equipment at the JRL or sound data provided to Epsilon. Sound level modeling results at protected locations were compared to applicable state and local noise regulations. The results of this analysis are found within this report.

3.0 SOUND TERMINOLOGY

There are several ways in which sound levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the sound level terminology used in this analysis.

The decibel scale is logarithmic to accommodate the wide range of sound intensities found in the environment. A property of the decibel scale is that the sound pressure levels of two or more separate sounds are not directly additive. For example, if a sound of 50 dB is added to another sound of 50 dB, the total is only a 3-decibel increase (53 dB), which is equal to doubling in sound energy, but not equal to a doubling in decibel quantity (100 dB). Thus, every 3-dB change in sound level represents a doubling or halving of sound energy. The human ear does not perceive changes in the sound pressure level as equal changes in loudness. Scientific research demonstrates that the following general relationships hold between sound level and human perception for two sound levels with the same or very similar frequency characteristics:[1]

- 3 dB increase or decrease results in a change in sound that is just perceptible to the average person,
- 5 dB increase or decrease is described as a clearly noticeable change in sound level, and
- 10 dB increase or decrease is described as twice or half as loud.

Another mathematical property of decibels is that if one source of sound is at least 10 dB louder than another source, then the total sound level is simply the sound level of the higher-level source. For example, a sound source at 60 dB plus another sound source at 47 dB is equal to 60 dB.

A sound level meter (SLM) that is used to measure sound is a standardized instrument.[2] It contains "weighting networks" (e.g., A-, C-, Z-weightings) to adjust the frequency response of the instrument. Frequencies, reported in Hertz (Hz), are detailed characterizations of sounds, often addressed in musical terms as "pitch" or "tone." The most commonly used weighting network is the A-weighting because it most closely approximates how the human ear responds to sound at various frequencies. The A-weighting network is the accepted scale used for community sound level measurements, including the applicable state and local noise regulation that apply here. Therefore, sounds are frequently reported as detected with a sound level meter using this weighting. A-weighted sound levels emphasize middle frequency sounds (i.e., middle pitched – around 1,000 Hz), and de-emphasize low and high frequency sounds. These sound levels are reported in decibels designated as "dBA." The C-weighting network has a nearly flat response for frequencies between 63 Hz and 4,000 Hz and is noted as dBC. Z-weighted sound levels are

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1 Bies, David, and Colin Hansen. 2009. *Engineering Noise Control: Theory and Practice*, 4th Edition. New York: Taylor and Francis.

2 *American National Standard Electroacoustics – Sound Level Meters – Part 1: Specifications,* ANSI S1.4-2014 (R2019), published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

measured sound levels without any weighting curve and are otherwise referred to as "unweighted." Sound pressure levels for some common indoor and outdoor environments are shown in Figure 3-1.

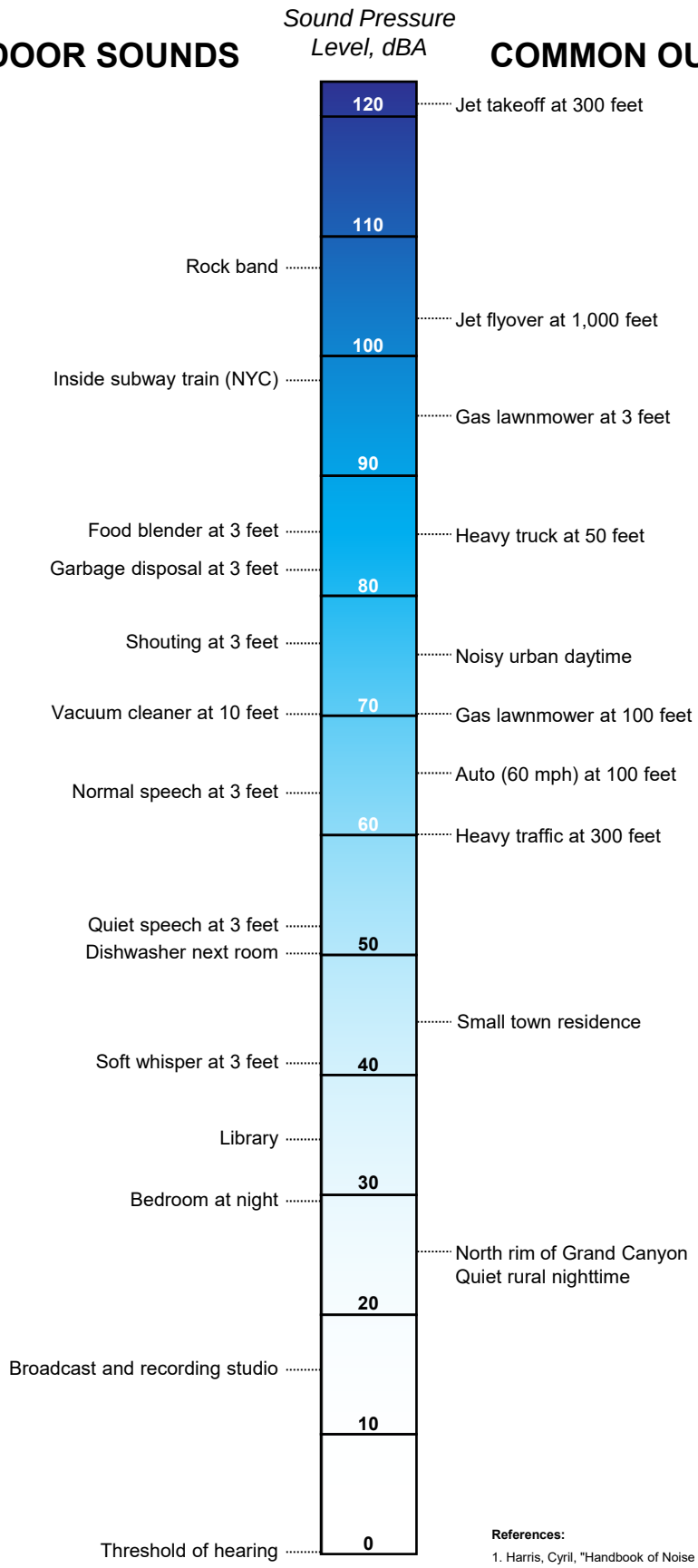
The spectra of noises are also stated in terms of octave band sound pressure levels, in dB, with the octave frequency bands being those established by standard. If noise control treatments are required for a source, it is essential to know something about the frequency spectrum of the noise of interest. Noise control treatments do not function like the human ear, so simple A-weighted levels are not useful for noise-control design.

Because the sounds in our environment vary with time they cannot simply be described with a single number. Two methods are used for describing variable sounds. These are exceedance levels and the equivalent level, both of which are derived from some number of moment-to-moment A-weighted sound level measurements. Exceedance levels are values from the cumulative amplitude distribution of all of the sound levels observed during a measurement period. Exceedance levels are designated L_n, where n can have a value between 0 and 100 in terms of percentage. Several sound level metrics that are commonly reported in community sound studies are described below.

- L_{90} is the sound level exceeded 90 percent of the time during the measurement period. The L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent sound sources.

- L_{eq}, the equivalent level, is the level of a hypothetical steady sound that would have the same energy (i.e., the same time-averaged mean square sound pressure) as the actual fluctuating sound observed. The equivalent level is designated L_{eq} and is typically A-weighted. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with linear mean square sound pressure values, the L_{eq} is mostly determined by loud sounds if there are fluctuating sound levels.

- L_{max} is the maximum sound level observed during the measurement period. The L_{max} is typically due to discrete, identifiable events such as an airplane overflight, car or truck passby, or a dog bark, for example.



References:

1. Harris, Cyril, "Handbook of Noise Acoustical Measurements and Noise Control", p 1-10., 1998
2. "Controlling Noise", USAF, AFMC, AFDTC, Elgin AFB, Fact Sheet, August 1996
3. California Dept. of Trans., "Technical Noise Supplement", Oct, 1998

Figure 3-1

Common Indoor and Outdoor Sound Levels

4.0 NOISE REGULATIONS

4.1 Federal Regulations

There are no federal community noise regulations applicable to this Project.

4.2 Maine State Regulations

Noise is regulated at this facility by the MEDEP under Chapter 400 of the Rules. Section 400.4.F.2 contains the applicable noise regulations for routine operation of a solid waste facility. The hourly equivalent sound level (L_{eq}) from routine operation is limited to 75 dBA at the property line at any time of day. Daytime is defined as 7:00 a.m. to 7:00 p.m., while nighttime is defined as the remaining hours. For "protected locations" (residential or noise sensitive land use), hourly equivalent sound limits are as follows based on zoning or land use. At protected locations, the appropriate hourly sound level limits from routine operation apply anywhere within the parcel. However, protected locations shall only include those locations (defined in subsection 400.1) for which sound levels from the facility will be greater than 45 dBA.

Commercial, Industrial	70 dBA (day)/60 dBA (night)
Residential, Other	60 dBA (day)/50 dBA (night)

The sound from registered and inspected motor vehicles is exempt while operating on public ways, and when they enter the development to make a delivery or pickup, and when they are moving, starting, or stopping, but not when they are parked for over 60 minutes in the development. Sound from warning signals and back-up alarms are also exempt from the noise regulation. The Residential limits (60 dBA daytime; 50 dBA nighttime) are applicable to any protected location for this project.

4.3 Local Regulations

Noise from JRL is regulated under the Old Town Solid Waste Ordinance "Chapter 22A Solid Waste Facilities." The most recent version was approved by the City Council July 6, 2015. Noise-related information required for a solid waste facility permit is contained in §22A-8.j. "Noise," which states:

> *A description of the existing hourly sound levels at the facility site and the anticipated sound levels both within the solid waste facility site and at the property boundary and at any protected location. The applicant shall specify the sources and types of anticipated sounds, including sound from machinery, equipment and motor vehicles and any environmental noise control devices available to reduce anticipated noise levels, both on site and at the property boundaries.*

Noise standards applicable to the JRL facility are found in §22A-12.h. “Noise” and are virtually identical to the MEDEP regulations for solid waste facilities. The term “protected location” in the Old Town noise regulations has the same definition as the MEDEP Rules.

5.0 EXISTING SOUND LEVELS

5.1 Overview

The Phase II Expansion is located in Old Town, Maine, bordered by Interstate Highway 95 (I-95) to the east, State Route 16 (Bennoch Road) to the north, and State Road 43 (Hudson Road / West Old Town Road) to the southwest, and is an expansion of the existing JRL.

The Old Town solid waste regulations require a description of the existing sound levels at the Facility (§22-8.J.). The MEDEP Rules do not require an existing condition sound measurement program as part of this application unless an alternative sound level limit is desired based on existing sound levels that may already be above the noise limits prior to operation of the new sources [§400.4.F(2)(b) or (c)].

5.2 Sound Level Environment

An ambient sound level survey was conducted to characterize the current acoustical environment within and in the vicinity of JRL. Existing sound sources include: bulldozers and trucks on-site, backup alarms, vehicles on I-95 and on other local roads, wind, dogs, rustling vegetation, occasional distant aircraft, frogs, insects, and birds.

5.3 Sound Level Measurement Locations

Sound level measurement locations were selected based on the nearest protected locations to the JRL Phase II Expansion. Additionally, an on-site monitor was utilized on the active cell of the JRL facility for site-related activity identification.

Figure 5-1 shows the actual measurement locations overlaid on an aerial photograph of the surrounding area. Each measurement location is described below. The coordinates for the four locations were obtained by Epsilon staff and are presented in latitude longitude coordinates in reference to the NAD83 datum in Table 5-1. Photographs of the four locations are included in Figures 5-2 through 5-5, respectively.

- Site 1 - This location is representative of the Thomas Dunn & Karen Bertolino property line, which is the closest protected location to the Phase II Expansion. The home is located east of West Old Town Road.

- Site 2 - This location is representative of the residences on Old Stagecoach Road. The nearest homes are to the north of Old Stagecoach Road.

- Site 3 - This location, at the entrance to JRL from Bennoch Road, is representative of the residences on Bennoch Road.

- On-Site Monitor - This site is representative of the sound levels on an active cell at JRL.

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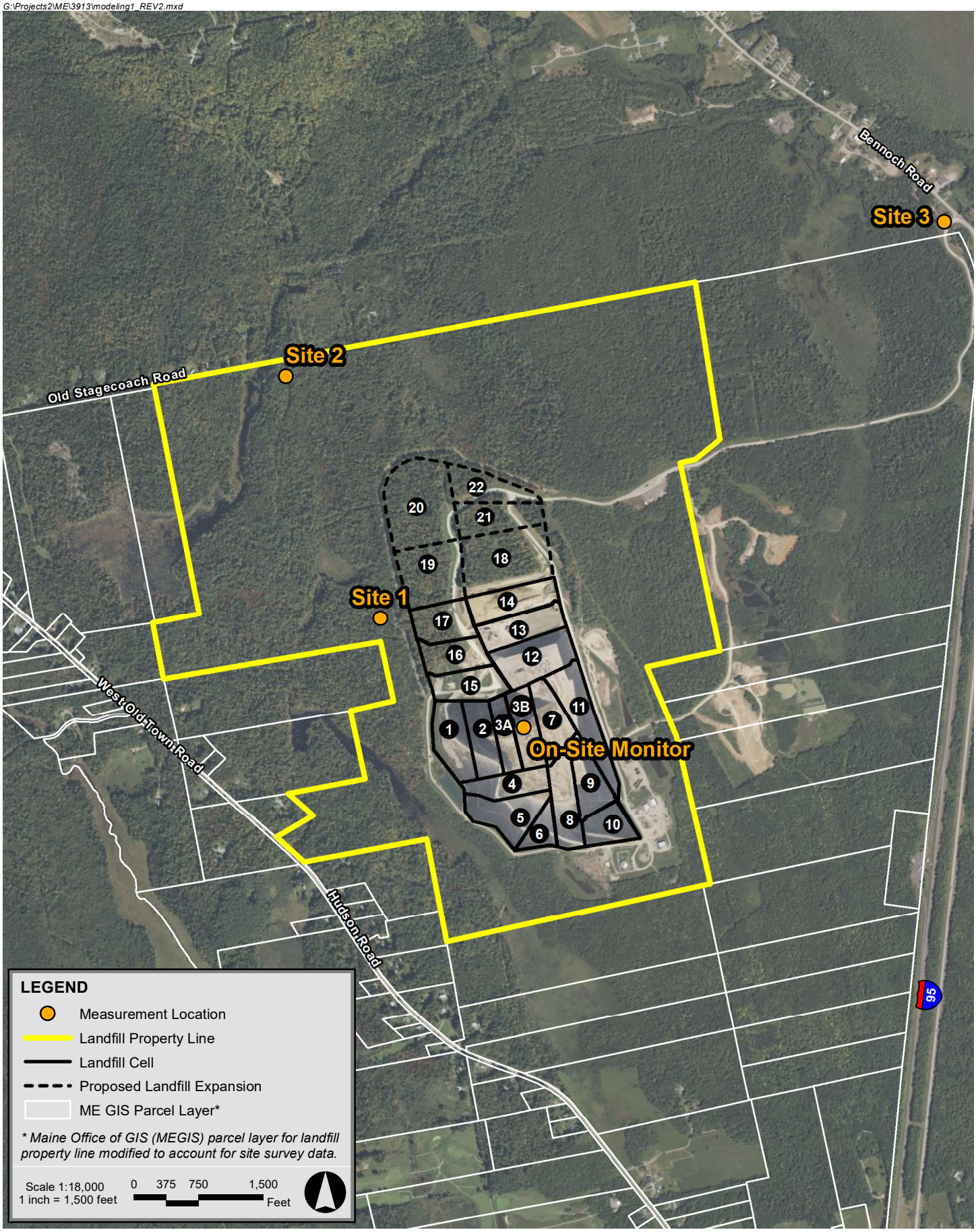


Juniper Ridge Landfill Old Town, Maine

Epsilon ASSOCIATES INC.

Figure 5-1

Sound Level Measurement Locations

Figure 5-2 Photo of Site 1 (facing west)

Figure 5-3 Photo of Site 2 (facing north)

Figure 5-4 Photo of Site 3 (facing west)

Figure 5-5 Photo of On-Site Monitor (facing northeast)

Table 5-1 GPS Coordinates – Sound Level Measurement Locations

Site	Coordinates	
	Latitude (°)	Longitude (°)
1	44.98374	-68.73021
2	44.99142	-68.73447
3	44.99638	-68.70502
On-Site	44.98027	-68.72376

5.4 Sound Measurement Methodology

Programmable unattended sound level meters were placed at Sites 1 through 3 and on-site. These monitors continuously measured sound levels generally from Wednesday, May 1, 2024 to Thursday, May 9, 2024. Sound levels were measured at a height of approximately five feet above the ground at locations where there were no large reflective surfaces to affect the measured levels.

In addition to the collection of sound level data, ground-level wind speeds were continuously measured and logged at one site, collocated with Site 1. Wind speeds remained below 11 mph during the measurement program. Meteorological data collected during the measurement period at the Old Town 2 W National Weather Service (NWS) station in Old Town, ME were also archived from the National Centers for Environmental Information (NCEI). This data was used to determine hourly precipitation periods during the measurement program.

5.5 Measurement Equipment

5.5.1 Sound Level Equipment

Two Larson Davis (LD) model 831C sound level meters, equipped with PCB Piezotronics Type 1 preamplifiers, PCB 377B02 half-inch microphones, and environmental protection kits and two Brüel & Kjær (B&K) model Type 2250 sound level meters, equipped with B&K Type 4952 preamplifiers and microphones, and environmental protection kits were used to collect continuous broadband A-weighted (dBA) and Z-weighted whole octave-band sound pressure level data at the four locations. Each microphone was tripod-mounted at a height of five feet above ground with a 7-inch- diameter windscreen. The meters utilized fast response and were set to log data every hour along with a one-minute time history for A-weighted parameters including: L_{10}, L_{50}, L_{90}, and L_{eq}.

All meters meet Type 1 ANSI S1.4-2014 (R2019) standards for sound level meters and were calibrated and certified as accurate to standards set by the National Institute of Standards and Technology. These calibrations were conducted by an independent laboratory within the prior 12

months of the measurement program. Additionally, all sound level measurement equipment was calibrated in the field before and after the survey with an acoustical calibrator that meets the standards of IEC 942 Class 1L and ANSI S1.40-2006 (R2020).

5.5.2 Meteorological Equipment

A HOBO H21-USB micro-weather station (manufactured by Onset Computer Corporation) was used to continuously measure the ground-level wind speed. The wind sensor was mounted at a height of approximately six feet above the ground and data was logged every hour to be synced with the sound level measurements. This sensor has a measurement range of 0 to 44 m/s (99 mph) and an accuracy of ±1.1 m/s (2.4 mph), or better. The starting threshold was ≤ 1 m/s (2.2 mph).

5.6 Ambient Sound Level Monitoring Results

A brief summary of the measured (A-weighted) sound levels and sound sources at each location is provided in this section. Broadband A-weighted L_{eq} sound levels from each location along with meteorological data are presented graphically in Figure 5-6. One precipitation event during the approximately 8-day measurement program was observed by field personnel. No periods of ground level wind speeds exceeding 11 mph were measured.

5.6.1 Site 1

Based on personal observations, sound levels at Site 1 were influenced by bulldozers, backup alarms, wind, insects, frogs, and birds. The A-weighted L_{eq} sound levels from the continuous measurements, neglecting the period of precipitation, ranged from 34 to 60 dBA during the daytime and from 23 to 46 dBA during the nighttime.

5.6.2 Site 2

Based on personal observations, sound levels at Site 2 were influenced by distant vehicles on I-95, distant trucks at JRL, backup alarms wind, insects, fan noise from farm buildings, pigs, dogs, and birds. The A-weighted L_{eq} sound levels from the continuous measurements, neglecting the period of precipitation, ranged from 30 to 63 dBA during the daytime and from 24 to 47 dBA during the nighttime. There is a single 1-hour sound level that was above 60 dBA, the daytime limit at a protected location. This occurred during the hour of 6:00 p.m. to 7:00 p.m. on May 3, 2024. A trucking activity log provided by JRL indicates that the last truck left the facility at 5:38 p.m. on that day. The on-site monitor did not show an elevated level during this hour. This indicates that this sound level was caused by something other than activity at JRL. Furthermore, a review of additional sound level data collected during this hour indicate that a short duration noise event caused the high L_{eq} sound level for the hour; the maximum sound level (L_{max}) during the hour was 94 dBA. As such, this elevated sound level was likely due to a brief event in close proximity to the sound monitor.

5.6.3 Site 3

Based on personal observations, sound levels at Location 3 were influenced by vehicles on I-95 and Route 16 (Bennoch Road), wind, birds, and trucks entering and leaving Juniper Ridge Landfill. The A-weighted L_{eq} sound levels from the continuous measurements, neglecting the period of precipitation, ranged from 53 to 73 dBA during the daytime and from 46 to 64 dBA during the nighttime. The daytime protected location limit of 60 dBA was exceeded during 64 hours at this location, and nighttime protected location limit of 50 dBA was exceeded during 53 hours at this location. This location is close to both I-95 and Route 16 which are major traffic thoroughfares for the area. Observations by Epsilon personnel and a review of the sound level data during hours when JRL is inactive confirm that the protected location sound level limits are exceeded at this location by sound sources other than JRL.

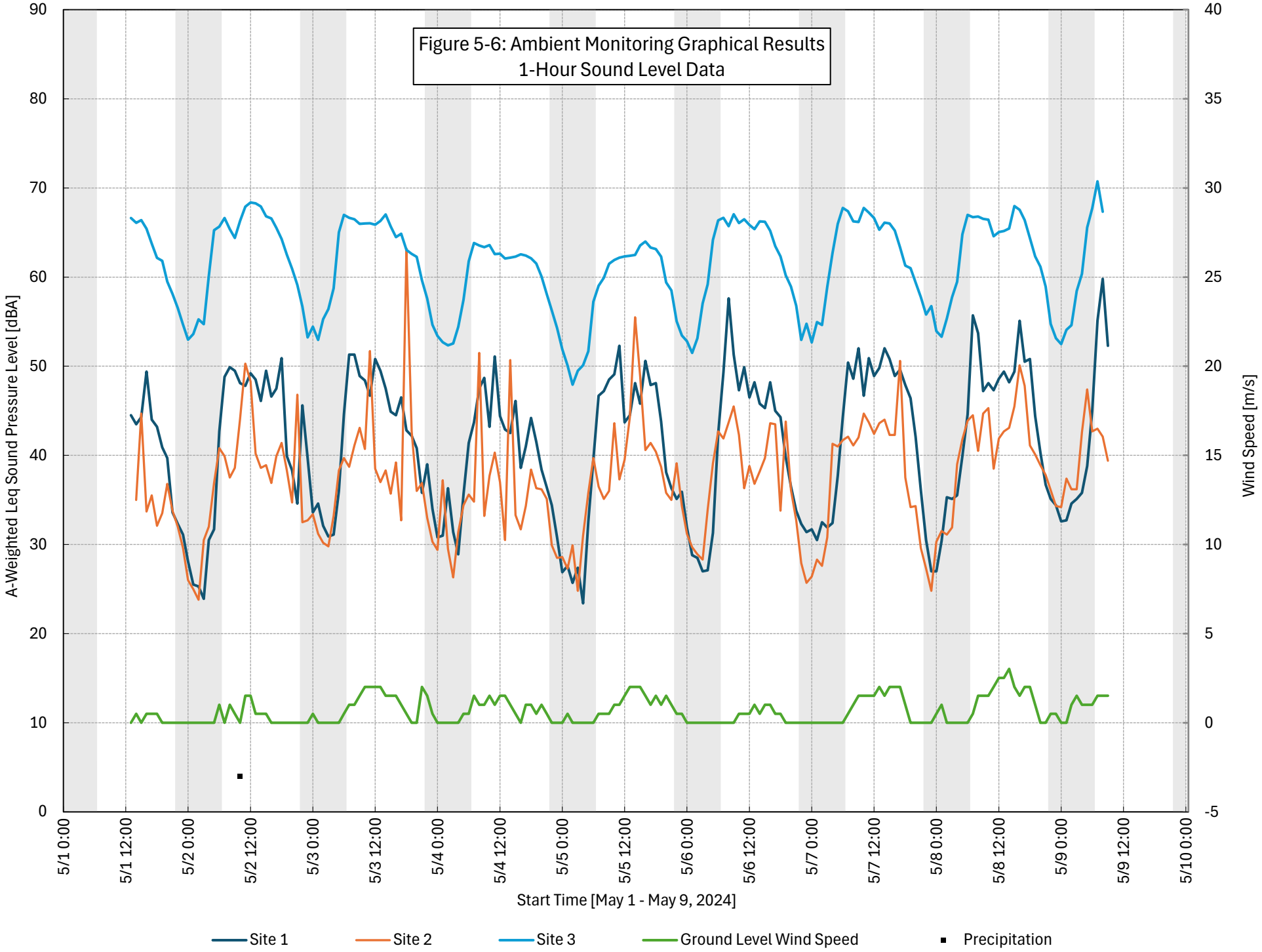


Figure 5-6: Ambient Monitoring Graphical Results
1-Hour Sound Level Data
A-Weighted Leq Sound Pressure Level [dBA]
Wind Speed [m/s]
Start Time [May 1 - May 9, 2024]
Site 1
Site 2
Site 3
Ground Level Wind Speed
Precipitation

6.0 CONSTRUCTION AND MAINTENANCE ACTIVITIES

Both the state [§400.4.F(2)(d)] and local [§22A-12.H.4] solid waste noise rules require equipment used during construction and maintenance activities at the Facility to comply with local/state/federal noise regulations, and include environmental noise control devices. There are no separate quantitative local/state/federal noise limits on these activities.

Some or all of the following equipment may be used during construction and maintenance activities at JRL:

- One 35- to 40-ton excavator,
- One 20- to 25-ton excavator,
- One mini-backhoe,
- One front-end loader,
- Three to five 40- to 45-ton off-road trucks,
- Three bulldozers,
- One to two tracked skid steers,
- Two six-wheelers,
- One telehandler,
- Several small portable generators,
- Pipe fusion equipment,
- One water truck,
- One pad-foot roller,
- One smooth drum roller, and
- Several on-road haul trucks.

Environmental noise control devices on construction and maintenance equipment include:

- Effective exhaust mufflers in proper working condition have been installed on all engine-power construction equipment at the site. Mufflers found to be defective are replaced promptly.

- Construction contractors will be required to ensure that their employees and delivery vehicles are driven slowly when entering and leaving the site.

The majority of all construction and maintenance activities will be limited to daytime hours.

7.0 MODELED SOUND LEVELS

Sources of noise from routine operation of the Phase II Expansion at JRL will primarily arise from the same equipment currently operating at the landfill including mobile sources on the landfill as well as the landfill gas treatment facility (Thiopaq® plant) and recently constructed renewable natural gas (RNG) facility. The one new source of sound will be a PFAS treatment plant proposed to be located in the southeastern corner of the site.

Current operating hours for the landfill are Monday to Friday 6:00 a.m. to 5:00 p.m., and Saturday 7:00 a.m.to 12:00 p.m. The landfill is closed on Sundays. The PFAS plant is expected to operate 24 hours per day, seven days per week along with the Thiopaq® plant and RNG facility.

7.1 Operational Sound Sources

7.1.1 Mobile Sources

The following equipment is currently operating at JRL:

1. Two CAT 836H Compactors,
2. One CAT 836G Compactor,
3. One CAT 966G Loader,
4. One John Deere 744 Loader,
5. Three CAT D6 Bulldozers,
6. Two John Deere 850J Bulldozers (both spare machines),
7. One Water Truck,
8. Two John Deere 400 Haul Trucks, and
9. Two CAT 330 Excavators.

It is important to note that registered and inspected on-road vehicles are exempt from the State and local sound level limits. These include trucks driving on a public way, and trucks entering or exiting JRL to make a delivery or pickup, and that are moving, starting or stopping.[3] Thus, the on-road trucks driving in and out of JRL are not included in the sound level modeling.

A sound level measurement program was conducted on November 18, 2024, at JRL on the above-listed pieces of equipment. The exception is the John Deere 850J bulldozer and water truck. Sound levels of the John Deere 850J bulldozer were collected by Epsilon in 2015, and sound data for a water truck was estimated by Epsilon as the water truck was not operational during the

[3] The one exception is vehicles parked with the engine running for over 60 minutes at a facility; sound from such vehicles would not be exempt.

measurement program. The purpose of the measurements was to obtain reference sound level data of the equipment during their normal duty cycle while working at JRL. The measured sound pressure levels of this equipment at 50 feet are summarized in Table 7-1.

Table 7-1 Reference Sound Pressure Levels at 50 ft. – Mobile Operational Sources at JRL

Source	Broad-band Leq dBA	Sound Level (dB) per Octave Band Center Frequency (Hz)								
		31.5	63	125	250	500	1000	2000	4000	8000
Bulldozer—John Deere 850J	77	72	75	83	71	72	74	70	61	56
Bulldozer – Caterpillar D6	78	67	71	70	72	72	75	71	66	62
Compactor – Caterpillar 836G	72	70	77	76	63	73	64	59	55	51
Compactor – Caterpillar 836H	68	69	82	65	62	64	63	59	57	54
Haul truck—John Deere 400D	72	75	81	78	72	67	67	65	56	47
Front-end loader—Caterpillar 966G	73	67	72	73	71	70	67	65	58	53
Front-end loader – John Deere 744	74	71	85	80	73	69	69	67	60	54
Excavator – Caterpillar 330	79	69	72	68	68	67	68	66	76	70
Water Truck[1]	81	-	-	-	-	-	-	-	-	-

Note: 1. Sound Level based on Concrete Pump Truck from FHWA Highway Construction Noise Handbook

7.1.2 Stationary Sources

A new PFAS treatment plant is proposed in the Phase II Expansion. Sound levels emanating from the proposed plant are anticipated to be approximately 60 dBA at 50 feet from the treatment building based on information from the JRL operator. For modeling purposes, the PFAS building was included in the model with sound radiating from all building facades and located in the model based on a site plan dated November 1, 2024.

The RNG facility was recently constructed at JRL. Epsilon previously modeled this facility for JRL in 2022[4] using data by Archaea Energy (Archaea), who operates the facility. Field measurements were performed of the facility running in December 2024. The load was approximately 80%, and sound levels were lower than predicted in the preconstruction study. Therefore, for purposes of this expansion's sound level assessment, Epsilon modeled the RNG consistently with the preconstruction study[5] which was designed to represent the facility at 100% load.

[4] Epsilon Associates, Inc. Sound Level Assessment Report. Juniper Ridge Landfill Expansion Old Town, Maine. Maynard, Massachusetts. Revised September 1, 2022.

[5] Except for the generators which differ from the pre-construction plan.

Based on the preconstruction study, all equipment at the RNG facility is stationary and consists of a Nitrogen Rejection Unit (NRU) compressor, feed compressors, thermal oxidizer blowers, air fan coolers, oil fan coolers, product compressors, transformers, radiators, a recycle skid, a chiller, a Membrane Skid (MEM), a Temperature Swing Absorption (TSA), vacuum rinse compressors, and a temporary mobile compressor. A total of 4,000 kW of electric power generation also exists at the RNG facility. The sound level model includes four Caterpillar XQ1000 containerized power modules, each rated at 1,000 kW at 100% output. Each power module includes two 500 kW engine-generator sets that are housed in an acoustic enclosure and will remain onsite only until permanent power to the facility is obtained. Table 7-2 lists the sound level data for each piece of RNG equipment included in the model. Note, only a broadband sound level was provided to Epsilon by Archaea for each piece of equipment. In these cases, all sound energy was assigned to the 500 Hz frequency by default. Epsilon estimated octave-band sound power levels of the onsite transformers using the provided MVA rating and methods outlined in the Electric Power Plant Environmental Noise Guide[6] (EEI Noise Guide). Some equipment sound levels were specified by Epsilon to demonstrate compliance though iterative modeling.

In addition to the proposed PFAS plant and existing RNG facility, there is a landfill gas treatment facility (Thiopaq® plant) on-site. This source is 71 dBA at 50 feet based on field measurements conducted in 2015, and this plant was also included as a stationary source in the model.

As part of the Phase II Expansion, JRL proposes to install a non-lethal auditory hazing device, e.g., Zon gun, for seagull deterrent at the landfill. The Zon gun is an impulse sound source that will fire from time to time and will be comparable in sound characteristics to a handgun. It will be positioned near the active face of the landfill and can be aimed in any direction. The MEDEP Rules define the sound level limit as a 1-hour equivalent sound level (L_{eq}), essentially the average sound level over a 1-hour period. Although transient sound events impact an L_{eq}, very brief, impulsive sounds likely would not impact a 1-hour average sound level. Therefore, the Zon gun was excluded from the sound level assessment.

7.2 Environmental Noise Controls

7.2.1 Mobile Source Controls

The only aspect of mobile operations that lend themselves to noise control, other than proper working condition of mufflers, is the back-up alarm on the off-road mobile equipment that stays within the landfill. Back-up alarms are exempt from both State and local noise limits as discussed in Section 4. However, in response to a comment raised at a pre-application meeting in the fall of 2014, NEWSME volunteered to replace the original manufacturer's alarms with a broadband

[6] Bolt Beranek and Newman Inc. (1984). *Electric Power Plant Environmental Noise Guide* (2nd ed.). Edison Electric Institute.

Table 7-2 Reference Sound Levels (per unit) – RNG Facility at JRL

RNG Component	No. of Units	Sound Level Type[1]	Reference Distance (feet)	Broadband Sound Level[2] (dBA)	Sound Level[2] (dB) per Octave Band Center Frequency (Hz)								
					31.5	63	125	250	500	1k	2k	4k	8k
NRU Skid[3]	1	Lp	3	85	-	-	-	-	-	-	-	-	-
Feed Compressor[3,5]	2	Lp	3	84	-	-	-	-	-	-	-	-	-
Thermal Oxidizer Blower[3]	2	Lp	5	85	-	-	-	-	-	-	-	-	-
Air Fan Cooler[3]	5	Lp	3	85	-	-	-	-	-	-	-	-	-
Oil Fan Cooler[3,5]	5	Lp	3	88	-	-	-	-	-	-	-	-	-
Product Compressor[3,5]	4	Lp	3	88	-	-	-	-	-	-	-	-	-
Chiller[3]	1	Lp	3	85	-	-	-	-	-	-	-	-	-
TSA[3]	1	Lp	3	85	-	-	-	-	-	-	-	-	-
MEM[3]	1	Lp	3	85	-	-	-	-	-	-	-	-	-
Vacuum Rinse Compressor[3,5]	2	Lp	3	86	-	-	-	-	-	-	-	-	-
Generator[4]	4	Lw	n/a	106	-	-	-	-	-	-	-	-	-
Transformer	2	Lw	n/a	79	76	82	84	79	79	73	68	63	56
Recycle Skid[3,5]	1	Lp	3	83	-	-	-	-	-	-	-	-	-
Radiator[3]	2	Lp	3	85	-	-	-	-	-	-	-	-	-
Mobile Compressor[3,6]	1	Lp	3.3	92	-	-	-	-	-	-	-	-	-

Notes:

1. Lp = sound pressure; Lw = sound power
2. Sound levels shown on a per unit basis.
3. Sound level information provided by Archaea. No octave band data available.
4. Sound power levels were calculated using sound pressure level data from technical specification sheet for a XQ1000 Caterpillar generator with an enclosure designed to meet 75 dBA at 23'. It is assumed that the sound level includes contribution from all mechanical, exhaust, and ventilation components.
5. Reduced sound level specified by Epsilon.
6. Described as 'mobile' because this is not proposed as a permanent piece of equipment. This compressor will be stationary when in operation at the site

(or “white noise”) alarm on the landfill-controlled equipment. The new back-up alarms, model BBS-TEK 107 manufactured by Brigade Electronics, are both quieter and less tonal than traditional alarms. Additional information on the BBS-TEK 107 is included in Appendix A.

7.2.2 Stationary Source Controls

Several environmental noise controls have been incorporated into the RNG facility. These include the following:

- Engine generator sets housed inside acoustic enclosures,
- Quieter equipment,
- Sound barriers at the RNG facility, and
- Siting to ensure significant distance to the nearest residences.

The RNG facility includes a U-shaped sound barrier surrounding the RNG facility on the western, southern, and eastern sides. The sound barriers have been located to achieve sound level compliance with the MEDEP regulations. The sound model conservatively assumed the sound barriers are completely reflective (no sound absorption) and assumed that the walls are sufficiently robust such that sound transmission through them is negligible.

Finally, the placement of the RNG facility in the southeastern corner of the JRL site puts it more than 2,500 feet from the nearest residences to the southwest along Hudson Road (Rte. 43) and more than 6,000 feet from the Bennoch Road (Rte. 16) residences to the east. Since sound levels decrease with increasing distance from a source, these large distances reduce sound levels from the RNG facility.

The proposed PFAS treatment facility implements two noise control features in its design. One is the significant distance to the nearest residences and the other is that the major sound sources associated with the facility are inside a building.

7.3 Modeling Scenarios

Solid waste operations will occur in various locations and elevations during the proposed timeline for the Phase II Expansion depending on which section is active and how much solid waste has been received. For this impact assessment, sound levels from routine operations were modeled with all mobile sources in close proximity to the nearest noise sensitive receiver to represent the greatest sound level impacts that could be produced by the Phase II Expansion and the landfill as a whole. In addition, sound level limits vary depending on the time of day/night with activities also varying depending on the time of day/night, therefore two distinct conditions (scenarios) were modeled in the area with the greatest sound level impact for daytime and nighttime operation.

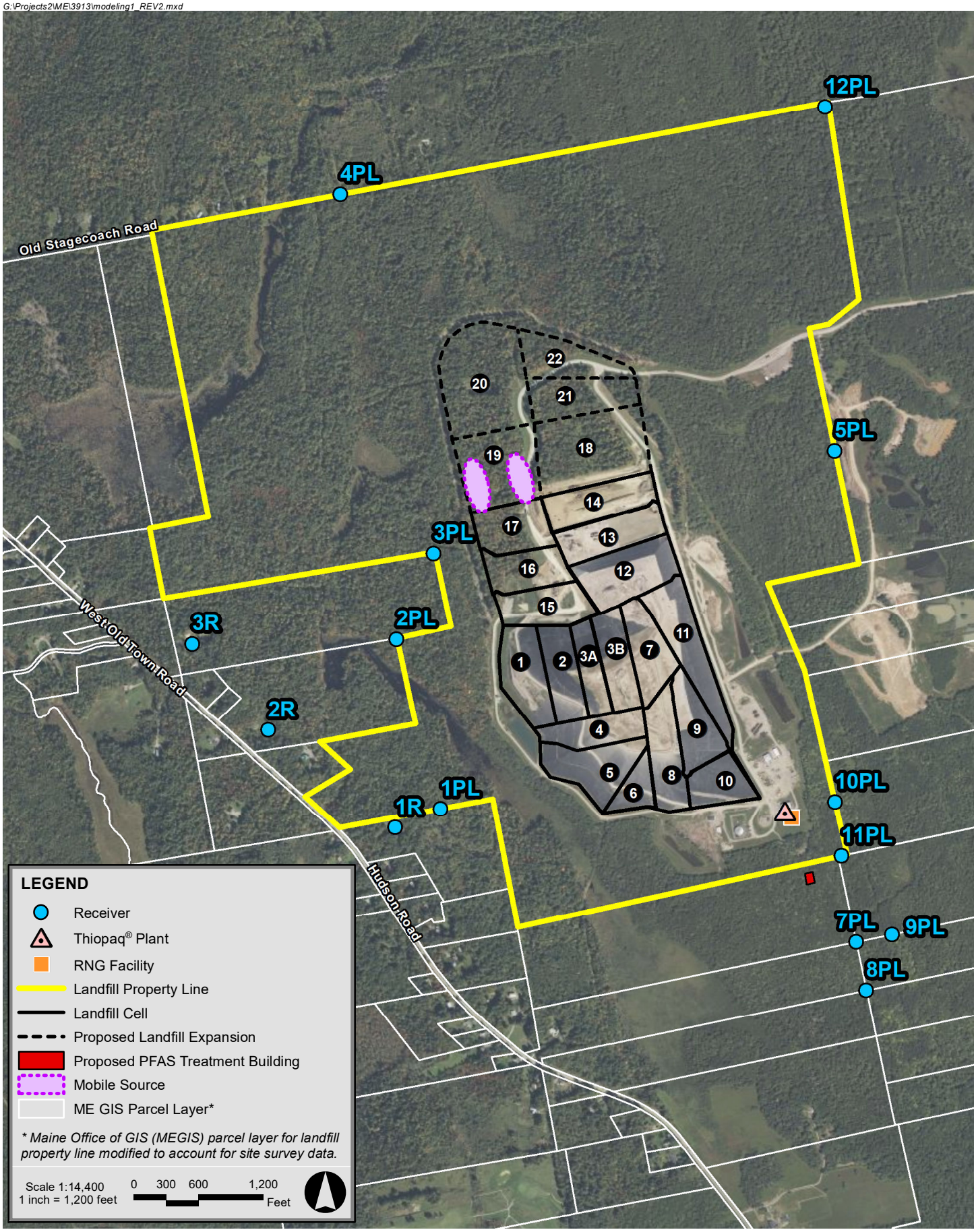
- Scenario 1 Daytime Operations (mobile + stationary sources)
- Scenario 2 Nighttime Operations (mobile + stationary sources)

Both scenarios consider operations along the southwestern side of the Phase II Expansion and calculate the sound level impacts at receivers in all directions relative to the JRL property line. Since the PFAS plant, RNG facility, and Thiopaq® plant all have the potential to operate 24 hours per day, 7 days per week, sound sources associated with these stationary sources were included in both scenarios. The general modeling locations for the mobile and stationary sources are shown in Figures 7-1 and 7-2 for Scenarios 1 and 2, respectively.

Under Scenario 1, it is conservatively assumed that nine mobile source types identified in Table 7-1 with a number of units shown in section 7.1 are operating simultaneously at full power (12 total). In reality, generally, one or two dozers and one or two compactors will be used simultaneously with the other one as a backup. The three compactors and three bulldozers are assumed to be operating in the southwestern region shaded in Figure 7-1. The excavator, front-end loaders, water truck, and haul trucks are assumed to be operating farther to the east as depicted in Figure 7-1. These mobile sources are modeled at approximately 600 feet or greater from the nearest property line.

Scenario 1 does not demonstrate sound level compliance with the lower nighttime limit of 50 dBA because two modeling locations showed results over 50 dBA under this scenario. The JRL facility opens at 6:00 a.m., and nighttime hours are defined in the Rules as 7:00 p.m. to 7:00 a.m. Therefore, operations of more than one piece of heavy equipment will be limited only during the hour from 6:00 a.m. to 7:00 a.m. to meet the noise level requirements defined by the Rules. To model the nighttime operations of mobile sources (Scenario 2), one mobile source (compactor) operating near the western property line with a sound pressure level of 72 dBA at 50 feet is included in Scenario 2. This mobile source is approximately 700 feet from the western property line. No other mobile sources were included in this scenario.

Sound level impacts from the management of solid waste in the northern, eastern, and southeastern regions (i.e., Cells 20, 22, and 18) of the landfill expansion were also considered. Due to the significant distances from these cells to the northern, eastern, and southern properties, sound level results from landfill equipment in these cells are not anticipated to be higher than the results from the southwestern-modeled scenarios. Therefore, the proposed JRL facility expansion will meet both the local and state regulations with respect to noise when work is conducted in these areas. For clarity, only the detailed modeling results for the solid waste management equipment operating near the western property line are presented in this report.



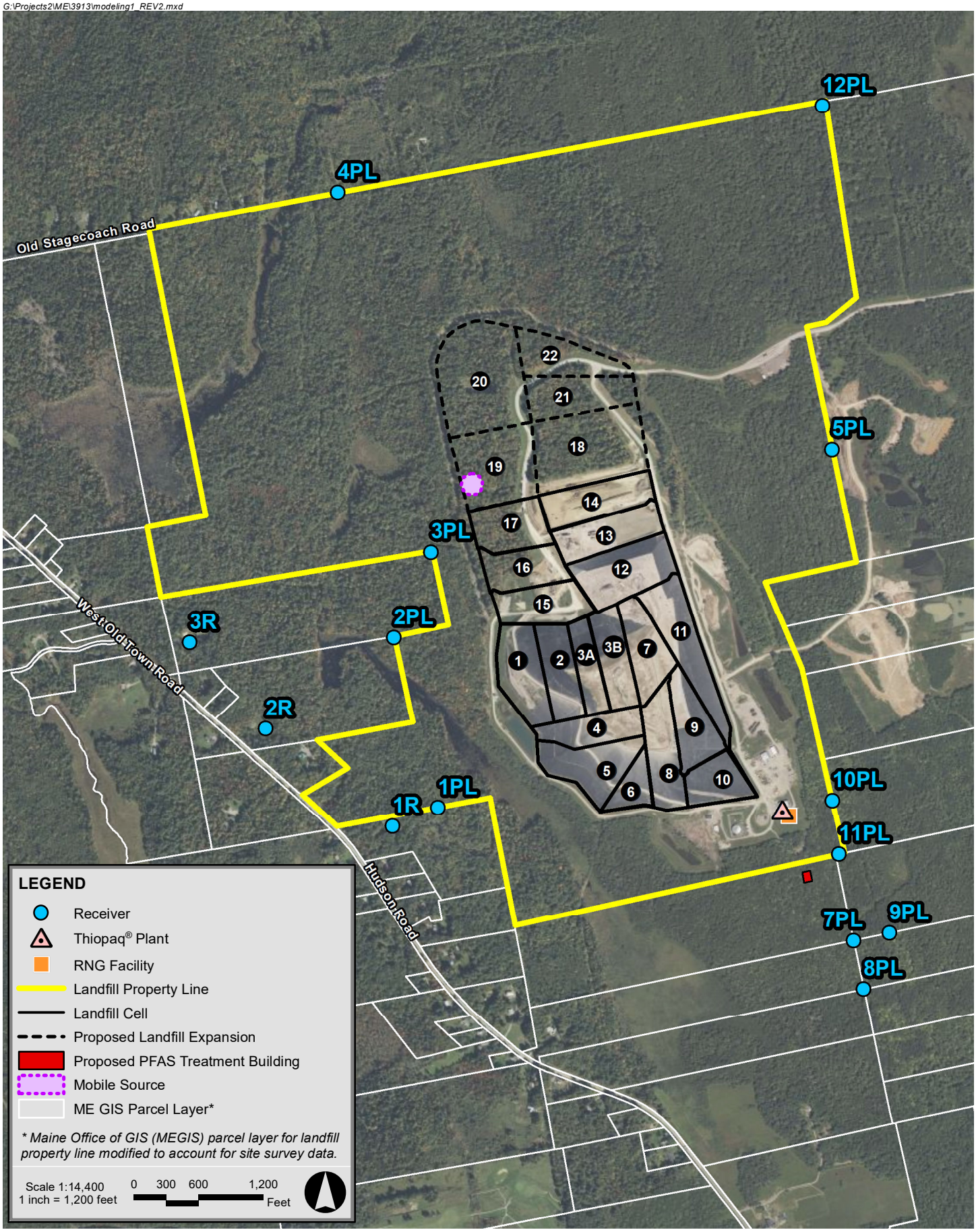
Juniper Ridge Landfill Old Town, Maine

Epsilon ASSOCIATES INC.

Figure 7-1

Sound Level Modeling - Scenario 1

G:\Projects2\ME\3913\modeling1_REV2.mxd



Juniper Ridge Landfill Old Town, Maine

Epsilon ASSOCIATES INC.

Figure 7-2
Sound Level Modeling - Scenario 2

7.4 Modeling Methodology

The sound impacts associated with the proposed expansion were predicted using the CadnaA sound level calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2:1996 International Standard for sound propagation.[7] The benefits of this software are a more refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections (if applicable), drop-off with distance, and atmospheric absorption. The CadnaA software allows for octave band calculation of sound from multiple sources as well as computation of diffraction.

Inputs and significant parameters employed in the model are described below:

- *Project Layout:* A site plan, including the proposed Phase II Expansion, was provided by SME on August 20, 2024. Based on the landfill area presented in the plans and its relative proximity to protected locations, work areas for the sound level modeling as shown in Figures 7-1 and 7-2 were selected. A site plan showing the PFAS building was dated November 1, 2024.

- *Receivers:* The predictive modeling focused on the protected locations and property lines in all directions of the JRL. The protected locations are residences to the west along Hudson Road and West Old Town Road (Rte. 43) and residential parcels north of JRL. The fourteen (14) total modeling locations represent three (3) residences (denoted on Figure 7-1 as 1R, 2R, and 3R) and eleven (11) property lines (denoted on Figure 7-1 as 1PL, 2PL, 3PL, 4PL, 5PL, 7PL, 8PL, 9PL, 10PL, 11PL and 12PL) as identified in Figures 7-1 and 7-2. Receivers 5PL, 10PL, 11PL and 12PL are adjacent to undeveloped land. All fourteen (14) receptors were modeled with a height of 1.5 meters above ground level to mimic the ears of a typical standing observer.

- *Terrain Elevation:* Elevation contours for the modeling domain were directly imported into CadnaA, which allowed for consideration of terrain shielding where appropriate. Environmental Systems Research Institute, Inc.'s (ESRI) ArcGIS software package was utilized to combine existing terrain, simplified terrain for the "at capacity" approved future condition, and simplified terrain for the proposed cells. Existing onsite terrain and the landfill terrain were provided in AutoCAD files received August 20, 2024. Mobile sound sources were modeled at an assumed final ground level elevation of between approximately 220 and 360 feet; the sources were modeled approximately 6 to 8 feet

[7] *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation,* International Standard ISO 9613-2:1996 (International Organization for Standardization, Geneva, Switzerland, 1996).

above the ground. The results will not materially change at other elevations as there is still a direct line-of-sight to the receptor, and the horizontal distance off-site is essentially unaffected by the relatively small changes in vertical elevation at JRL.

- *Source Sound Levels:* Broadband and octave band sound power levels (when available) for the mobile sound sources presented in Table 7-1 and for the stationary sources as documented in Section 7.1.2 were included in the sound level model. The sound levels of the sources under each of the modeling scenarios were consistent; only the placement and number of the mobile sources varied between scenarios.

- *Uncertainty factor:* A value of 2 decibels was added to the modeling results at each measurement location to account for accuracy limitations in the calculation equations incorporated by standard into the modeling software and for uncertainty in the reference sound level data.

- *Ground Attenuation:* Spectral ground absorption was calculated using a G-factor of 0.75 which corresponds to a semi-soft ground because the vast majority of the area is forested.

Several modeling assumptions inherent in the ISO 9613-2:1996 calculation methodology, or selected as conditional inputs by Epsilon, were implemented in the CadnaA model to ensure conservative results (i.e., higher sound levels), and are described below:

- As per ISO 9613-2:1996, the model assumed favorable conditions for sound propagation, corresponding to a moderate, well-developed ground-based temperature inversion, as might occur on a calm, clear night or in the case of downwind propagation.

- Meteorological conditions assumed in the model (T=10°C/RH=70%) were selected to minimize atmospheric attenuation in the 500 Hz and 1 kHz octave bands where the human ear is most sensitive.

- No additional attenuation due to tree shielding, air turbulence, or wind shadow effects was considered in the model.

7.5 Sound Level Modeling Results

Table 7-3 shows the predicted "Project-Only" broadband (dBA) sound levels at the fourteen (14) modeling locations (receivers) for each of the two (2) modeling scenarios under conditions specified in the previous sections. The predicted sound levels at the modeling locations range from 39 to 65 dBA for the daytime (Scenario 1) and from 38 to 65 dBA for the nighttime (Scenario 2). The sound levels presented in the tables do not include any contribution from existing noise sources in the area unaffiliated with the site, e.g. traffic and natural sounds. All modeled sound levels are 1-hour L_{eq}.

Table 7-3 Sound Level Modeling Results

ID	Description	Coordinates NAD83 ME State Plane East		Project Only Broadband Sound Level (dBA)	
		X (m)	Y (m)	Scenario 1 (day)	Scenario 2 (night)
1R	Bergquist Residence	281733.32	145500.84	46	43
2R	Perkins Residence	281374.59	145775.97	46	40
3R	Bertolino Residence	281159.90	146019.46	45	38
1PL	Western Property Line – Bergquist Residence	281860.78	145552.79	48	46
2PL	Western Property Line – Perkins Residence	281736.71	146032.83	51	39
3PL	Western Property Line – Bertolino Residence	281842.15	146275.08	58	45
4PL	Northern Property Line – Residential	281578.61	147290.87	45	35
5PL	Eastern Property Line	282974.61	146565.04	45	44
7PL	Southern Property Line – Residential	283034.86	145176.43	50	50
8PL	Southern Property Line – Residential	283062.99	145039.59	46	46
9PL	Southeastern Property Line – Residential	283136.33	145197.45	50	50
10PL	Eastern Property Line	282975.55	145572.68	65	65
11PL	Southeastern Property Line	282993.96	145420.59	58	58
12PL	Northeastern Property Line	282947.77	147536.58	38	37

8.0 EVALUATION OF SOUND LEVELS

Noise is regulated at this facility by the MEDEP under Section 400.4.F.2 of the Rules. Noise standards applicable to the JRL facility under the City of Old Town Solid Waste Ordinance are nearly identical to the MEDEP Rules for solid waste facilities. At a property line, the hourly equivalent sound level (L_{eq}) from routine operation is limited to 75 dBA at any time. This limit is applicable at the eastern property lines of the site which border undeveloped land (represented by modeling locations 5PL, 10PL, 11PL, and 12PL). For "protected locations" (residential or noise sensitive land use), hourly equivalent sound limits are based on zoning or land use. At protected locations, the appropriate hourly sound level limits apply anywhere within the parcel, and therefore, have been evaluated at parcel property line modeling locations as well as at some homes. The site boundary borders residential use properties to the north and west. The applicable noise limits at these properties are 60 dBA during the day and 50 dBA at night. Daytime is defined in the Rules as 7:00 a.m. to 7:00 p.m. while nighttime is defined as the remaining hours. JRL solid waste management operations are during daytime hours and only one nighttime hour (6 a.m. to 7 a.m.), while the stationary equipment may operate during all hours.

8.1 Daytime Evaluation

For daytime operations (Scenario 1), the potential mobile noise sources were modeled in the southwestern area of the proposed Phase II Expansion, as described in Section 7, in addition to the Thiopaq® plant, the RNG facility, and the proposed PFAS plant. The modeling results as compared to the applicable limits are presented in Table 8-1. During the day the modeling locations are below the noise limits; therefore, the proposed JRL Phase II Expansion will meet both the local and state Rules with respect to noise when work is conducted in this area, or anywhere farther east during the day and with the stationary equipment operating at full load.

Table 8-1 Evaluation of Daytime Hourly Sound Level Limits – Scenario 1

Modeling ID	Description	Zoning / Existing Use	Project Only Broadband Sound Level (dBA)	Sound Level Limit (dBA)	Evaluation
1R	Bergquist Residence	Residential	46	60	Complies
2R	Perkins Residence	Residential	46	60	Complies
3R	Bertolino Residence	Residential	45	60	Complies
1PL	Western Property Line – Bergquist Residence	Residential	48	60	Complies
2PL	Western Property Line – Perkins Residence	Residential	51	60	Complies
3PL	Western Property Line – Bertolino Residence	Residential	58	60	Complies
4PL	Northern Property Line – Residential	Residential	45	60	Complies
5PL	Eastern Property Line	Undeveloped	45	75	Complies
7PL	Southern Property Line – Residential	Residential	50	60	Complies
8PL	Southern Property Line – Residential	Residential	46	60	Complies
9PL	Southeastern Property Line – Residential	Residential	50	60	Complies
10PL	Eastern Property Line	Undeveloped	65	75	Complies
11PL	Southeastern Property Line	Undeveloped	58	75	Complies
12PL	Northeastern Property Line	Undeveloped	38	75	Complies

8.2 Nighttime Evaluation

Based on the operational hours of the solid waste management, the nighttime noise limits will apply for one hour of mobile source operations, 6:00 a.m. – 7:00 a.m.

Scenario 2 considers one piece of equipment operating at approximately 700 feet from the western property line in addition to the Thiopaq® plant, the RNG facility, and the proposed PFAS plant. The modeling results as compared to the applicable limits are presented in Table 8-2. During the night the modeling locations are at or below the noise limits. Therefore, the proposed JRL Phase II Expansion will meet both the local and state regulations with respect to noise when work is conducted in this area during the night with mobile landfill equipment operating at a combined sound pressure level of 81 dBA or less at 50 feet and with the stationary equipment operating at full load.

Table 8-2 Evaluation of Nighttime Hourly Sound Level Limits – Scenario 2

Modeling ID	Description	Zoning / Existing Use	Project Only Broadband Sound Level (dBA)	Sound Level Limit (dBA)	Evaluation
1R	Bergquist Residence	Residential	43	50	Complies
2R	Perkins Residence	Residential	40	50	Complies
3R	Bertolino Residence	Residential	38	50	Complies
1PL	Western Property Line – Bergquist Residence	Residential	46	50	Complies
2PL	Western Property Line – Perkins Residence	Residential	39	50	Complies
3PL	Western Property Line – Bertolino Residence	Residential	45	50	Complies
4PL	Northern Property Line – Residential	Residential	35	50	Complies
5PL	Eastern Property Line	Undeveloped	44	75	Complies
7PL	Southern Property Line – Residential	Residential	50	50	Complies
8PL	Southern Property Line – Residential	Residential	46	50	Complies
9PL	Southeastern Property Line – Residential	Residential	50	50	Complies
10PL	Eastern Property Line	Undeveloped	65	75	Complies
11PL	Southeastern Property Line	Undeveloped	58	75	Complies
12PL	Northeastern Property Line	Undeveloped	37	75	Complies

9.0 CONCLUSIONS

A comprehensive sound level impact assessment was conducted for the JRL Phase II Expansion, which will consist of the operation of existing mobile noise sources within the landfill and a proposed PFAS treatment plant to the south of the existing RNG facility. This analysis has been prepared to address the requirements of the MEDEP noise rules from Chapter 400 of the MEDEP Rules, as well as the Old Town Chapter 22A Solid Waste Facility rules.

Sound sensitive receivers in all directions of the site were evaluated for sound level impacts. Since impacts are predicted to be the greatest from solid waste management mobile noise sources at the closest property line (western), the mobile sources were modeled in the southwestern expansion area (i.e., Cell 19) for this assessment under daytime and nighttime operating scenarios along with all existing and proposed stationary sound sources.[8]

During periods when the management of solid waste is occurring on the southwestern part of the Phase II Expansion (Cell 19), the modeling locations are below the daytime noise limits. During nighttime landfill operations (6 a.m. – 7 a.m.), landfill equipment with combined sound levels of 81 dBA or less at 50 feet will meet the nighttime noise limit at a distance of approximately 700 feet (or more) from the western property line. For example, a Caterpillar 836G compactor is 72 dBA at 50 feet, and the water truck is 81 dBA at 50 feet. Either one of these pieces of equipment can operate during nighttime hours and meet the nighttime limit. However, both operating at the same time would exceed the limit, so operations of more than one piece of heavy equipment will be limited only until 7:00 a.m. The stationary equipment is not restricted during nighttime hours based on this sound level assessment.

Sound level impacts from activities in the northern, eastern, and southeastern expansion regions of the landfill (i.e., Cells 22, 20, and 18) were also considered. Due to the significant distances from these cells to the northern, eastern, and southeastern properties, sound level results from landfill equipment in these cells are not anticipated to be higher than the results from the southwestern-modeled scenarios. Therefore, the proposed JRL Phase II Expansion will meet both the local and state regulations with respect to noise when work is conducted in these areas and with the stationary equipment operating at full load.

In conclusion, operations at JRL are expected to comply with both the daytime and nighttime local and state regulations with respect to noise. Operational restrictions will be necessary in certain regions of the southwestern area of the Phase II Expansion during the one hour of nighttime solid waste management operations in order to comply with the noise limits.

[8] Excludes the proposed Zon gun. See Section 7.1.2 for details.

Appendix A

Broadband Back-up Alarm—BBS-TEK 107

Off-road bbs-tek®

Off-road working environments are commonly dominated by large mobile plant machinery, high noise levels and difficult terrains, making life extremely dangerous for workers. To improve safety, site operators must ensure the best possible warning is given to workers when machinery is reversing.

Heard only where it matters

White sound dissipates quickly meaning the alarm can only be heard in the hazard zone. It also creates a “ssh ssh” sound which is gentler on the ear. The combined effect ensures the warning is treated with respect and prevents workers from becoming desensitised to the alarm sound, tuning it out. It also reduces the likelihood of sabotage from workers disabling alarms.

Beeping tonal alarms can be heard up to thirty times the distance of the hazard zone causing workers to ‘switch off’ due to over-familiarity - putting them gravely at risk.

Instant locatability

White sound reversing alarms use broadband frequencies. These give greater directional information to the ear allowing the listener to instantly locate where the sound is coming from, and time to take evasive action.

Tonal alarms in contrast can cause a head-spinning effect, confusion and disorientation. Vital seconds can be lost resulting in fatal consequences.

An end to confusion

A worker on a road construction site in the Middle East was seriously injured by a road roller. He heard an alarm and saw a truck reversing. The worker was then hit by the roller from behind. The truck did not have an alarm, the roller did – a tonal alarm.

Following locatability trials, the company installed white sound alarms to all their road rollers worldwide.

Smart bbs®
Self adjusting sound level

Continally react to surroundimg noise levels, self-adjusting their warning sound to 5-10dB louder.

Sound level options: 87-107dB, 77-97dB,

Heavy duty
fixed sound level

For mine, quarry and construction machines or environments with high ambient noise.

Sound level options: 102dB, 107dB,

Medium duty
fixed sound level

Ideal for smaller off road vehicles and environments with mid level ambient noise.

Sound level options: 92dB, 97dB

Special applications

Fixed sound level
Electric forklift (36-80Vdc): 97dB, 92dB.

Self adjusting sound level
Electric forklift (36-80Vdc): 77-97dB Smart

All bbs-tek® White Sound® alarms come with a lifetime warranty

Audible to all

Hearing protection devices (HPDs) protect workers from hearing damage, yet it is vital they can hear reversing vehicles to avoid fatality. HPDs mask the effect of some frequencies more than others. With a wide range of frequencies white sound alarms are much more likely to be heard. In the same way, those with hearing impairments stand a better chance of hearing white sound.

By contrast the sound of a narrowband, tonal alarm could easily be masked, dramatically increasing the chance of collision.

Stress free

British Airports Authority (BAA)

A health study by BAA involving noise exposure monitoring resulted in some very high noise readings. Originally thought to be due to faulty meters, a more detailed study identified that the tonal alarms on the passenger terminal electric buggies were being reflected so intensely they created a health problem.

Following further studies and a safety review BAA now specifies white sound alarms.

BBS-TEK 107dB Broadband Backup Alarm

Add to Cart

Cart / Shipping 0 Item(s) $0.00

more info...

BBS White Paper (http://www.sirennet.c
Newsletter (http://www.sirennet.c Nov06.pdf)
NPC Testimonial (http://www.sirennet.c Testimonial.pdf)

A special series of reversing alarms that use broadband sound technology (BBS-TEK) is being built by Bridgade Electronics. The BBS-TEK BACKALARM addresses the two major problems of the conventional backup alarms: difficulty in locating the sound source directionally, and noise pollution. It emits a non-strident sound that is fully directional and, importantly, is equally effective at 5 dB(A) lower than conventional backup alarms.

The BBS-TEK BACKALARM gives an urgent but friendly "Shh ... Shh ... Shh ..." sound. Broadband sound gives the brain many clues as opposed to pure tone sound that cannot be localized. The term broadband is derived from the use of a sound that covers a wide range of frequencies all at the same time. Pure tone emergency sirens, for example, are difficult to localize.

BBS-107 Features:

- Sound Level: 107dB(A) @ 1 meter
- Frequency KHZ: Multi
- Voltage: 12-24 VDC
- Current Amps: 1.0
- Sounder Unit: Driver
- Size (WxDxH): 173mm x 80mm x 95mm
- Hole Centers: 152mm
- Conforms to SAE J994 environmental standards
- Tough, durable, guaranteed waterproof (IP68)
- Solid-state, spark-free electronics, epoxy-sealed against mud, water and vibration
- Can be steam-cleaned and pressure-hosed
- CE and 'e' marked (EMC)

BBS Lifetime Warranty

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APPENDIX I

VISUAL IMPACT ASSESSMENT

SME
SEVEE & MAHER
ENGINEERS

Visual Impact Assessment

JUNIPER RIDGE LANDFILL PHASE II EXPANSION

Old Town, Maine

Prepared By:

VIEWSHED

Landscape Architecture | GIS | Planning

121 West Main Street, Yarmouth, ME 04096

March 2025

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Attachments

Attachment 1: Study Area and Viewshed Mapping

Attachment 2: Pushaw Lake Photosimulation

Attachment 3: Study Area Photographs

1 INTRODUCTION

1.1 Background

Viewshed, a Landscape Architecture, GIS, and Planning firm in Yarmouth, Maine, was retained by Sevee & Maher Engineers (SME) to prepare this Visual Impact Assessment (VIA) on behalf of NEWSME Landfill Operations, LLC and the Maine Bureau of General Services ('Applicant'), , to assess the visual impacts associated with the proposed Juniper Ridge Landfill Phase II Expansion (Project). This VIA has been developed to address the State of Maine Department of Environmental Protection (MDEP) and City of Old Town permitting requirements as they relate to solid waste development and impacts to natural resources.

Juniper Ridge Landfill (JRL) is a secure landfill located on a 780-acre parcel in Old Town and Alton. It is owned by the State of Maine and managed of behalf of the state by the Maine Department of Administrative and Financial Services' Bureau of General Services (BGS), and is operated by NEWSME Landfill Operations, LLC (NEWSME) under a 30-year Operating Services Agreement (OSA).

JRL is located southwest of Route 16 and north of Route 43 (See Maps in **Attachment 1**). It was originally permitted in 1993, constructed in 1996, and operated by James River Paper Company, Inc. as a papermill landfill. The original permit was for approximately 68 acres and provided 3.3 million cubic yards (MCY) of capacity. The State of Maine purchased JRL in 2004 from the Fort James Operating Company, the successor of James River Paper Company. On February 5, 2004, the State of Maine, and Casella Waste Systems (CWS), through its wholly owned subsidiary, NEWSME, entered into an OSA for operation of the Site.

The most recent expansion at the Site was approved in 2017 to provide an additional 9.35 MCY of disposal capacity to meet the State of Maine's long-term solid waste disposal needs. This increased JRL's permitted solid waste footprint by 54 acres to 122 acres. In 2024, JRL's capacity is expected to run out in approximately five years. In the *Maine Materials Management Plan: 2024 State Waste Management and Recycling Plan Update and 2022 Waste Generation and Disposal Capacity Report*, the MDEP stated that "the expansion of Juniper Ridge Landfill in Old Town will be necessary to ensure there is adequate capacity for the entire State of Maine over the next ten years". The Project aims to meet the short-term and long-term solid waste disposal needs of the State of Maine by expanding JRL's current permitted solid waste footprint by approximately 57acres, as depicted in **Attachment 1**.

1.2 Overview of Methodology

The methodology for assessing the potential visual impacts of the Project involves the judgment of experienced landscape architects in the selection of factors chosen to evaluate scenic quality and determine the magnitude of visual impact. This approach, widely used in permitting work in Maine and elsewhere throughout the country, is based upon current studies and statutes of what constitutes scenic landscapes and visual impacts. Specifically, this report was guided by MDEP Chapter 315: *Assessing and Mitigating Impacts to Scenic and Aesthetic Uses,* MDEP Chapter 400.4 F: *No Unreasonable Adverse Effect on Existing Uses and Scenic Character,* and the City of Old Town Code Chapter 24: *Solid Waste Facilities.* These regulatory requirements are discussed further in Section 2. The VIA report and its conclusions are grounded on the completion of the following:

- Determination of the Visual Study Area
- Research, Inventory, and Mapping of Scenic Resources
- Computer-based Viewshed Mapping Analysis
- Fieldwork Studies and Image Collection
- 3D Modeling and Photosimulation Analysis

The Visual Study Area (VSA) is the geographic area around the Project that is assessed for potential visual impacts. The VSA includes all land and water located within a 7-mile radius around the Project, including a total of 10 towns, unorganized territories, and tribal lands. Located within Penobscot County, communities within the VSA include Old Town where the landfill is located, Penobscot Nation Tribal lands on Indian Island and Orson Island, Glenburn, Hudson, Alton, Argyle, Greenbush, Milford, Bradley, and Orono.

The Report is supported by the following Attachments:

- Attachment 1: Study Area and Viewshed Mapping
- Attachment 2: Push Lake Photosimulation
- Attachment 3: Study Area Photographs

2 REGULATORY REQUIREMENTS

The Project will trigger permitting requirements related to visual resources in Chapter 315 of the MDEP Natural Resources Protection Act (NRPA), as well as Chapter 400 of the Maine Solid Waste Management Rules.

2.1 NRPA Chapter 315: *Assessing and Mitigating Impacts to Scenic and Aesthetic Uses*

The guidelines in Chapter 315 require the Applicant to provide evidence that allows MDEP to determine whether the Project will have an unreasonable adverse impact on existing uses and scenic character by identifying and assessing the potential impacts to scenic resources. MDEP defines scenic resources as:

> *Public natural resources or public lands visited by the general public, in part for the use, observation, enjoyment, and appreciation of natural or cultural visual qualities. The attributes, characteristics, and features of the landscape of a scenic resource provide varying responses from, and varying degrees of benefits to, humans.*

Furthermore, Chapter 315.10 classifies scenic resources in the following six categories.

A. *National Natural Landmarks and other outstanding natural and cultural features (e.g., Orono Bog, Meddybemps Heath)*

B. *State or National Wildlife Refuges, Sanctuaries, or Preserves and State Game Refuges (e.g., Rachael Carson Salt Pond Preserve in Bristol, Petit*

Manan National Wildlife Refuge, the Wells National Estuarine Research Reserve)

C. *A State or federally designated trail (e.g., the Appalachian Trail, East Coast Greenway)*

D. *A property on or eligible for inclusion in the National Register of Historic Places pursuant to the National Historic Preservation Act of 1966, as amended (e.g., the Rockland Breakwater Light, Fort Knox)*

E. *National or State Parks (e.g., Acadia National Park, Sebago Lakes State Park)*

F. *Public natural resources or public lands visited by the general public, in part for the use, observation, enjoyment and appreciation of natural or cultural visual qualities. (e.g., great ponds, the Atlantic Ocean).*

Scenic resources identified within the VSA are described in more detail in Section 6 and presented on Maps in **Attachment 1.**

2.2 Chapter 400: Maine Solid Waste Management Rules – *General Provisions*

Chapter 400.4(F) entitled: *No Unreasonable Adverse Effect on Existing Uses and Scenic Character*, provides standards for assessing impacts to "public viewing areas" within 2,000 feet of the Project (400.4(F)(3)(b).

MDEP defines public viewing areas as:

> *"Public viewing area" means an area designated for the public to view scenic areas, historical sites, unusual natural features, or public monuments. These areas include, but are not limited to, scenic highways; public easements; scenic turnouts; public monuments; and national, state or municipal parks.*

Chapter 400.4(F)(3) states that applications must provide evidence that demonstrates that there will be no unreasonable adverse impacts to existing uses and scenic character in relation to these public viewing areas.

2.3 City of Old Town Code Chapter 24: *Solid Waste Facilities*

The City of Old Town's solid waste ordinance largely mirrors the standards in Chapter 400 as they pertain to visual resources. Section 24-8(M) entitled: *Impact on Existing Uses and Scenic Character,* and Section 24-12 (K) entitled: *Criteria for Approving a Solid Waste Facility Permit or Permit Amendment,* provide similar requirements of the assessment of 'established Public Viewing Areas' within 2,000 feet of the Project (§24-12(K)(c).

As stated in Section 1, this VIA Report and supporting attachments are meant to be a comprehensive assessment that meets the standards of all State and local regulations as they apply to visual resources.

3 METHODOLOGY

The following describes the methodology used to assess the visual impacts of the Project.

3.1 Visual Study Area Determination

As noted in Section 1.2, the VSA is the geographic area around the Project in which scenic resources are identified and potential visual impacts are assessed. Both Chapter 400 and Old Town Code Chapter 24 guidance require the applicant to look at public viewing areas within a 2,000 foot radius of the Project.

The Juniper Ridge Landfill has been expanded in both height and area periodically over the last three decades, each time requiring a regulatory permitting process similar to that required by the Phase II Expansion. During the most recent effort to expand the landfill spanning the period from 2014 to 2017, a VIA was completed by SMRT Inc[1]. While initially only required to assess public viewing areas within 2,000 feet of the landfill, public input helped to shed light on the importance of assessing potential views from Pushaw Lake, where the existing landfill is currently visible from some locations. Due to this feedback, the VSA used by SMRT was conservatively expanded to 6-miles, covering much of the lake. Additionally, NRPA Chapter 315.7 states:

> *"The radius of the impact area to be analyzed must be based on the relative size and scope of the proposed activity given the specific location."*

A 7-mile radius around the Project was used to define the extent of this assessment. This determination was based on precedent set in the previous SMRT VIA, existing regulatory statutes, and the current geographic extent of visibility of the existing landfill (particularly on Pushaw Lake).

3.2 Scenic Resource Inventory

Scenic resources were inventoried within the 7-mile VSA using State Geographical Information Systems (GIS) databases, municipal Comprehensive Plans and documents, and online research. As noted in Section 2.1, scenic resources are typically defined as publicly owned and/or accessible places visited by the public, in part for the enjoyment of visual quality. Scenic resources are places that include, but are not limited to parks, conservation lands, trails, scenic byways, elevated viewpoints and overlooks, water bodies, and historic resources. NRPA Chapter 315 provides a framework for evaluating impacts on scenic resources. Section 6 of this report provides an evaluation of visibility from scenic resources. Map 1 in **Attachment 1** displays an inventory of scenic resources found within the VSA**.**

3.3 Computer-Based Viewshed Analysis

A computer-based viewshed analysis is a predictive screening tool to determine areas with potential Project visibility within the VSA. The viewshed analysis was conducted using ESRI ArcGIS Pro software. The analysis relied on a Digital Terrain Model (DTM) to represent topography as well as a Digital Surface Model (DSM) to represent features in the landscape (vegetation and structures). For the majority of the

[1] SMRT Engineers, *Visual Assessment Report – Juniper Ridge Landfill.* Appendix G. 2015

VSA, the DTM and DSM were derived from LiDAR point cloud data, which was taken from The National Map produced by the U.S. Geological Survey (USGS)[2]. LiDAR point cloud data is typically considered to be the most accurate form of surface data that is publicly available. The point cloud data was processed to create 3-foot resolution surface raster models.

For an area covering approximately 21,400 acres (19.6% of the VSA), there was no publicly available LiDAR point cloud data. This data is owned by the Penobscot Nation and there was no obvious way to include the data in this analysis. Within this area, the DSM was created using a combination of the Maine Land Cover Database (2004) and the Maine CCAP High Resolution Impervious and Forest Resource Data (2021)[3], as well as building footprints for the area. The area that was processed with land cover data is identified on Map 2 in **Attachment 1**. These datasets assign an average height to both natural and human created features in the landscape to generate a reasonably accurate digital surface. The following heights were assigned to features in the landscape.

- Forest: 40 Feet
- Low Forest: 20 Feet
- Scrub Shrub: 10 Feet
- Buildings: 30 Feet
- Cleared Ground/Agricultural, Water, Wetlands, and Impervious: 0 Feet

While surface data produced with land cover represents a reasonably accurate dataset, absent the presence of LiDAR point cloud data, the heights used for landscape features are averages. Forest cover exceeding 40 feet was observed within the area substituted with land cover data; especially along the banks of the Penobscot River and Stillwater Rivers, as well as other waterbodies. This method produced a less accurate surface model than using LiDAR data, but does provide a better understanding of the vegetative and human crated surface than just using ground surface data.

Using the LiDAR and landcover datasets described above, a computer-based viewshed analysis was completed relying on both DTM and DSM models. The viewshed analysis is based on a viewer elevation 5.9 ft above the topography, representing visibility from the approximate height of a viewer in the landscape. The viewshed analysis represents potential visibility from the maximum height of the Project, which is expected to have a maximum height of approximately 180 feet above the high point of the existing ground surface, or approximately 380 to 385 feet above sea level. As an initial screening tool, the viewshed analysis was used to determine the geographic extent of Project visibility, identify visually sensitive resources with potential visibility, and select places to conduct field investigations to better understand potential Project visibility.

There are some technological shortcomings to the viewshed analysis. It does not determine the degree of visibility based on distance, weather, or other atmospheric conditions. It also does not determine how much of the landfill would be seen from any one viewpoint, or whether any part of the landfill would be seen silhouetted against the sky. Other visualization techniques, such as 3D modeling and photosimulation analysis, help to create a clearer picture of visual impacts. The results of the viewshed analysis are displayed on Map 2 in **Attachment 1**.

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[2] The National Map produced by the U.S. Geological Survey is available at: https://viewer.nationalmap.gov/basic/

[3] Both land cover datasets are available for download from the Maine Office of GIS at: https://www.maine.gov/geolib/catalog.html

3.4 Field Investigations

Field studies began with an evaluation of the viewshed analysis to determine areas where the Project will be visible in the landscape and from scenic resources. Field investigations were conducted during site visits on May 22 and 23, 2024. Fieldwork concentrated on evaluating and photographing scenic resources and other components of the visible landscape within the VSA, 7-miles of the Project. Fieldwork was conducted by automobile, kayak, and on foot. It was limited to lands, roads, and waterbodies that are considered public or allow for public access.

Photographs were primarily taken with a Nikon D750 camera set to record at the highest resolution (fine). The Nikon D750 (a full-frame camera) was equipped with a 50mm lens. GPS coordinates of the photographs were recorded with a camera-mounted GPS unit. Full-frame photographs were used in the preparation of a photosimulation from Pushaw Lake in **Attachment 2**. An annotated selection of representative views within the VSA are included in **Attachment 3: Study Area Photographs** to provide additional context for the Project and scenic resources.

3.5 Photosimulations

Photosimulations are photo-realistic images of the proposed Project, generated through a combination of field photography aligned to a 3D model of the Project. Photosimulations are prepared for visual impact assessments to help illustrate the anticipated changes in views from scenic resources due to Project visibility.

Photosimulations are prepared by 1) creating digital landscape model (using the same DTM and DSM surfaces described in Section 3.3); 2) creating a 3D digital model of the Project, based on Project data provided by the Applicant, and digitally inserting the Project model into the landscape model; 3) aligning the digital models with GPS-located photograph (the elevation, latitude, and longitude data), matching the lens focal length and aligning existing visible elements in the landscape (e.g., vegetation, ridgelines, roads, buildings) to register the photographs to actual ground conditions; 5) rendering a simulated perspective of the Project using 3D model rending software, taking into consideration date and time of photograph, digital resolution, and lighting conditions of the original photograph. The result of these steps results in highly accurate rendering of the Project that aligns to the scale, lighting, and colors of the original image.

Post-production editing involved eliminating parts of the Project that would be blocked by terrain or vegetation. Images were then modified in Adobe Photoshop to fine tune adjustments that accounted for the time of day, weather conditions, haze, and other environmental factors.

The photosimulation was also merged with adjacent photographs of existing conditions in Adobe Photoshop to create a panorama that gives a more contextual view of the broader landscape as seen from the viewpoint. The legend in the 'panoramic' image provides the latitude and longitude of the viewpoint, view direction, date/time when the photograph was taken, camera make and model and lens focal length, description of view, distance to the Project, and relevant Project specifications. The photosimulation also includes a Project context map and location map. The 'normal view' image describes the distance that the viewer should hold the photosimulation from the eye to accurately replicate real-world conditions. **See Attachment 2**.

3.6 Study Area Photographs

Representative photographs of the VSA are included in **Attachment 3**. The locations of the photographs are indicated on the Visual Study Area Map in **Attachment 1**. The photographs were selected to document the field investigations, give VIA reviewers additional information on the existing character of the surrounding area, and provide context for the photosimulation.

4 PROJECT DESCRIPTION

The following section describes the visible Project components and activities within the Project that may influence visibility.

4.1 Landfill Operation

As previously described, the landfill consists of the originally permitted 68 acres of landfill, the initial 54-acre expansion, and the current project, which is the 57-acre Phase II Expansion. Within the 57 acres, individual cells will be constructed approximately every two years, comprising approximately seven to fifteen acres each. Each cell will have a double composite liner, including (from top to bottom) a leachate collection system consisting of a 12-inch-thick layer of sand over a drainage geocomposite; a primary liner, consisting of a an 80-mil high density polyethylene (HDPE) geomembrane, a geosynthetic clay liner, and a 12-inch-thick compacted barrier soil. The primary liner system overlies the leak detection system, which is constructed like the leachate collection system. The secondary liner underlies the leak detection system and consists of a 60-mil HDPE geomembrane over a 12-inch-thick compacted barrier soil layer.

4.2 Cover System

Once a cell liner is constructed, the cell will be filled with waste to an interim elevation below the final waste grade, at which time it will be covered with a temporary LLDPE geomembrane until the waste can be placed to final grades and the final landfill cover constructed. The Phase II Expansion is expected to last for approximately ten to twelve years.

The final cover system (from top to bottom) consists of 18 inches of vegetative cover soil, 250-mil drainage geocomposite, 40-mil linear low-density polyethylene (LLDPE) textured geomembrane, GCL, and a 12-inch compacted till barrier layer. Slope terraces with a minimum berm height of 1.5 feet will be constructed every 75 feet (horizontally) on the final cover slope to control stormwater and convey runoff to riprap-lined downspouts and ultimately to the stormwater detention ponds.

5 PROJECT VISUAL STUDY AREA (VSA)

5.1 Site Context

The VSA includes all land and water area within a 7-mile radius of the Project, illustrated on maps in **Attachment 1**. The regional context and character can be described by the existing landforms, vegetative patterns, water resources, and cultural characteristics.

5.2 Landform and Vegetative Patterns

Most of the VSA falls within the Central Maine Interior Ecoregion of Maine.[4] This region is defined by mostly flat landforms with occasional rolling hills as well as large wetland and bog systems, lakes and ponds, and the rivers and streams the make up the Penobscot River Watershed. An approximately 14.5 mile long section of the Penobscot River runs through the eastern half of the VSA. Vegetation in the region is primarily made up of large areas of mixed second growth hardwoods and softwoods broken up by lower scrub shrub species inhabiting wetlands and bogs.

5.3 Water Resources

At over 5,000 acres[5], Pushaw Lake is the largest waterbody within the VSA, located approximately 4 miles southwest of the Project. The lake has several public access points allowing recreational use for power boating, canoeing, kayaking, swimming, fishing, and ice fishing. Just east of Pushaw Lake is Perch Pond, located 3 miles southwest of the Project. The undeveloped pond is surrounded by conserved lands and trails and can be accessed via Old Town's Sewall Park. As mentioned above, the Penobscot River, in addition to the Stillwater River, Pushaw Stream, and Birch Stream, are among the most notable linear water features within the VSA.

In addition to lakes and rivers, there are several bog and wetland areas within the VSA that are unique to this area of Maine, including Orono Bog, Sunkhaze Meadows Wildlife Management Area, and Caribou Bog. These publicly accessible protected areas contain trails and educational opportunities that serve as important local and recreational tourism destinations.

5.4 Cultural Characteristics

5.4.1 Population Centers

Population in the VSA is primarily concentrated in the towns of Orono (pop. 11,179) and Old Town (pop. 7,430) located in the central and southern portions of the VSA[6]. Outside of these towns, the majority of the VSA is characterized by woodlands mixed with pockets of small communities and rural residential development.

5.4.2 Cultural and Historic Influences

Many of the communities within the VSA carry rich cultural and historic influences that shape their identity today. One of the most significant historical influences is the presence of the Penobscot Nation,

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[4] Schlawin & Cutko *A Conservation Vision for Maine Using Ecoregions*, Maine Natural Areas Program, Maine Department of Agriculture, Conservation and Forestry. 2014.

[5] Maine IFW Lake Survey: https://www.maine.gov/ifw/docs/lake-survey-maps/penobscot/pushaw_lake.pdf.

[6] Based on 2020 U.S. Census data (https://www.census.gov/data/tables/time-series/demo/popest/2020s-total-cities-and-towns.html)

whose ancestors have inhabited the region for thousands of years. The Penobscot people have a deep connection to the land and waters around the Penobscot River. Their cultural traditions, including language, crafts, and spiritual practices, continue to influence the local community and are celebrated through events and collaborations with the broader region.

The establishment of the University of Maine in Orono in 1865 has had a significant impact on the area's cultural landscape. The University brings youthful energy and diverse perspectives to the region. It serves as a center for education, research, and cultural activities, fostering intellectual engagement and contributing to the community's vibrancy. The University's influence can be seen in the arts, music, and academic events that enrich the cultural life in the area.

5.4.3 Outdoor Recreation

The Central Maine region in the vicinity of the Project VSA is known for its abundant outdoor recreational opportunities for visitors and residents alike. This includes activities such as hiking, biking, snowmobiling, and wildlife viewing in places like the Orono Bog Boardwalk and the Hirundo Wildlife Refuge. Water activities like canoeing, kayaking, and fishing on the Penobscot River, Stillwater River, and Pushaw Lake are also popular.

The City of Old Town Comprehensive Plan, titled *2016 Comprehensive Plan Update* [7], discusses goals to preserve local scenery, and lists scenic viewpoints identified by the community that hold both recreational and visual importance. Existing conditions images from a selection of these locations are included in **Attachment 3** and are shown in the 'Resources Identified by Viewshed' layer on maps in **Attachment 1**. These viewpoints are further discussed in Section 6.

6 EVALUATION OF VISUAL IMPACTS TO SCENIC RESOURCES

This section describes the geographic extent of potential visibility and evaluates the visual impact at the identified scenic resources using the *Appendix A – Maine Department Visual Evaluation Field Survey Checklist (Natural Resources Protection Act, 38 M.R.S. §§ 480 A - Z)*.

6.1 Distance Zones

The concept of distance zones is used as a frame of reference to discuss the characteristics of the visible landscape and the scenic effects of human activities in the surrounding landscape. The concept is based upon the USDA Forest Service visual analysis criteria for forested landscapes and addresses the amount of detail that an observer can differentiate at varying distances.[8] The evaluation of foreground, midground, and background, as defined below, provides a useful framework for evaluating the visual significance of the Project in the larger landscape. The distance zones used for the Project are defined as:

- **Foreground**: 0 to 1/2 mile from the observer. Within the foreground, observers can detect surface textures, details, and a full spectrum of color. The details of the landfill (operations

[7] *2016 Comprehensive Plan Update*. City of Old Town. 2016

[8] Landscape Aesthetics: A Handbook for Scenery Management. USDA Forest Service. Agricultural Handbook Number 701. December 1995.

vehicles and equipment, colors and textures associated with solid waste deposits), and other Project components will be readily apparent.

- **Midground**: 1/2 mile to 3-5 miles from the observer. The midground is a critical part of the natural landscape. Within this zone, the details found in the landscape become subordinate to the whole: individual trees lose their identities and become forests; buildings are seen as simple geometric forms; roads and rivers become lines. Edges define patterns on the ground and hillsides. Development patterns are readily apparent, especially where there is noticeable contrast in scale, form, texture, or line. Colors of structures become somewhat muted, and the details become subordinate to the whole. This effect is intensified in hazy weather conditions, which tend to mute colors and de-sharpen outlines even further. In panoramic views, the midground landscape is the most important element in determining visual impact.
- **Background**: greater than 3–5 miles.[9] Background distances provide the setting for panoramic views that give the observer the greatest sense of the larger landscape. However, the effects of distance and atmospheric haze will obliterate the surface textures, detailing, and form of Project components. Objects in the background will be highly visible only if they present a noticeable contrast in form or line, and when weather and lighting conditions are favorable.

6.2 Geographic Extent of Project Visibility

The landscape within the 7-mile VSA is characterized by largely flat and gently rolling landforms, bogs and wetland areas, lakes and rivers, and low-density rural development. The presence of the Penobscot River running north to south through the eastern portion of VSA influences many of the natural systems that shape the landscape, as well as the scale and density of human development. Compared to other parts of central and western Maine, there are fewer pronounced peaks and ridgelines offering distant views. This relatively flat, mostly wooded landscape works to screen and limit opportunities for Project visibility throughout the VSA.

The Viewshed Analysis displayed on Map 2 in **Attachment 1** indicates that potential Project visibility is mostly limited to a handful of cleared areas and water features in the central and southwestern portions of the VSA. Based on the viewshed analysis, areas of potential visibility account for less than one percent (0.7% of the total area within the VSA).

The largest areas of potential visibility are located in Alton Bog in the vicinity of Interstate 95 located 1.5 miles northeast of the Project, and from the southwest end of Pushaw Lake located approximately 5.2 miles southwest of the Project. Near Orson Island, located approximately 2 miles southeast of the Project in Old Town, the viewshed analysis indicates intermittent pockets of visibility along the Stillwater River to the north and east of Orson Island and along the Penobscot River to the west of Indian Island. Little to no visibility was identified from any of the village and town centers within the VSA. Visibility from local roads was limited to brief openings in vegetation along Route 16 and Route 43 in Old Town. Section 6.3 further discusses visibility from the areas mentioned above. Beyond the lands owned by the Juniper Ridge Landfill itself, there was minimal potential visibility observed from private residential property and commercial businesses within the VSA.

[9] For purposes of this visual impact assessment, the background viewing distance is limited to the extent of the 7-mile VSA.

6.3 Impacts to Scenic Resources: MDEP Visual Evaluation Field Survey Checklist

In order to evaluate visibility from identified scenic resources within the VSA, this assessment was guided by the *MDEP Visual Evaluation Field Survey Checklist (Natural Resources Protection Act, 38 M.R.S. §§ 480 A - Z).*

MDEP Visual Evaluation Field Survey Checklist

Name of Applicant: State of Maine, Bureau of General Services

Application Type: Natural Resources Protection Act

Activity Type: Expansion of Landfill Footprint

Activity Location: Old Town, ME

County: Penobscot

GIS Coordinates, if known: 44.985533°, -68.726147°

Date of Survey: July 23, 2024

Observer: Steve Thompson

Phone: 207-846-0757

6.3.1 Would the activity be visible from:

A. A National Natural Landmark or other outstanding natural feature?

SCENIC RESOURCE(S)	VISIBILITY TABLE Distance Between the Proposed Visible Activity and Resource			
	No Visibility	0 – ¼ mile	¼ - 1 mile	1+ miles
Orono Bog	**X**			

1. Orono Bog

The northern end of Orono Bog is located at the edge of the VSA, approximately 7-miles south of the Project. Managed by the University of Maine, the bog is federally recognized as a National Natural Landmark and includes a popular ADA accessible boardwalk that runs for nearly a mile. The Project will not be visible from the boardwalk, or any lands considered part of the bog due to intervening terrain and vegetation on Kelley Hill, just north of the bog in Orono.

There are no other designated National Natural Landmarks or comparable natural areas with potential Project visibility within the VSA. Alton Bog, located 1.5 miles northeast of the Project, was identified as having potential Project visibility. However, the bog is bisected by Interstate 95, contains no formal trails or access points, and is not considered a scenic resource.

B. A State or National Wildlife Refuge, Sanctuary, or Preserve or a State Game Refuge?

There will be no Project visibility from any State or National Wildlife Refuges, Sanctuaries, Preserves, or State Game Refuges. The most notable scenic resources within the VSA under this category include the following:

SCENIC RESOURCE(S)	VISIBILITY TABLE Distance Between the Proposed Visible Activity and Resource			
	No Visibility	0 – ¼ mile	¼ - 1 mile	1+ miles
Sunkhaze Meadows National Wildlife Refuge (NWR)	**X**			
Caribou Bog Wildlife Management Area (WMA)	**X**			
Hirundo Wildlife Refuge	**X**			

2. Sunkhaze Meadows National Wildlife Refuge (NWR)

The Sunkhaze Meadows NWR is an expansive protected area in Milford of over 10,000 acres that supports a variety of ecosystems, habitats, and wildlife communities.[10] The NWR is located approximately 5.5 miles east of the Project. Managed by the U.S. Fish and Wildlife Service, the NWR contains opportunities for hiking, hunting, scenery, and wildlife viewing. There will be no Project visibility from the NWR due to intervening vegetation and terrain.

3. Caribou Bog Wildlife Management Area (WMA)

Caribou Bog WMA is located 3.7 miles southwest of the Project in Orono and Old Town and is managed by the Maine Department of Inland Fisheries and Wildlife. The bog covers over 2,000 acres of upland and wetland habitat, and while access is limited to foot traffic only, the WMA is open to hikers, hunters, and wildlife observers[11]. The WMA is bordered by several conservation parcels managed by the Orono Land Trust, which include trail networks and access points into the lands within the Caribou Bog. There will be no Project visibility from the WMA due to intervening vegetation and terrain. (For general context photos, see **Attachment 3** *Photo 15 & 18*.)

4. Hirundo Wildlife Refuge

While privately managed by the Hirundo Land Trust, this wildlife refuge is open to the public and borders lands connected to the Caribou Bog WMA. Located 2.4 miles west of the Project in Old Town and Alton, the refuge is an important haven for wildlife, as well as a recreational and educational resource for the region. There will be no Project visibility from the Hirundo Wildlife

[10] https://www.fws.gov/refuge/sunkhaze-meadows

[11] https://www.maine.gov/ifw/blogs/mdifw-blog/caribou-bog-wildlife-management-area

Refuge due to intervening vegetation and terrain. (For general context photos, see **Attachment 3** *Photo 12, 13, & 14*.)

C. *A state or federal trail?*

There will be no Project visibility from State or Federal trail systems within the VSA. Details on ITS 84 are provided below.

SCENIC RESOURCE(S)	VISIBILITY TABLE Distance Between the Proposed Visible Activity and Resource			
	No Visibility	0 – ¼ mile	¼ - 1 mile	1+ miles
ITS 84	**X**			

5. ITS 84

The Maine Interconnected Trail System (ITS) is a snowmobile trail system that covers the State of Maine and is managed in part by the Maine Bureau of Parks and Lands. ITS 84 runs for approximately 3.7 miles within the eastern portion of the VSA approximately 5 miles from the Project. ITS 84 then connects to a network of local snowmobile trails managed by private community clubs. Local snowmobile trails are typically located on private land, and access is granted by private property owners. These local trails are not typically considered scenic resources.

D. *A public site or structure listed on the National Register of Historic Places (NRHP)?*

There are no listed or eligible structures, districts, or other places with potential Project visibility within the VSA.

SCENIC RESOURCE(S)	VISIBILITY TABLE Distance Between the Proposed Visible Activity and Resource			
	No Visibility	0 – ¼ mile	¼ - 1 mile	1+ miles
All Structures and Districts listed below	**X**			

A total of 10 listed structures, 19 eligible structures, and two listed historic districts were identified within the 7-mile VSA. The 10 structures and two historic districts listed on the National Register of Historic Places include:

Structures

- St Anne's Church and Mission Site (4 miles southeast of the Project in Old Town) (For general context photos, see **Attachment 3** *Photo 24*.)
- Milford Congregational Church (4.1 miles southeast of the Project in Milford) (For general context photos, see **Attachment 3** *Photo 26*.)
- Bodwell Water Power Company Plant (4.1 miles southeast of the Project in Milford) (For general context photos, see **Attachment 3** *Photo 30*.)

- US Post Office (4.5 miles southeast of the Project in Old Town) (For general context photos, see **Attachment 3** *Photo 32*.)
- St. James Episcopal Church (4.6 miles southeast of the Project in Old Town) (For general context photos, see **Attachment 3** *Photo 31*.)
- Patch, Edith Marion House (5 miles southeast of the Project in Old Town)
- Maine Experiment Station Barn (6 miles southeast of the Project in Orono)
- Phi Gamma Delta House (6.3 miles south of the Project in Orono)
- Colburn, William House (6.4 miles south of the Project in Orono)
- Old Fire Engine House (6.8 miles southeast of the Project in Orono)

Districts

- University of Maine Historic District (5.4 miles southeast of the Project in Orono)
- Orono Main Street Historic District (6.9 miles south of the Project in Orono)

E. A National or State Park?

There are no National or State Parks within the VSA.

F. Public natural resources or public lands visited by the general public, in part for the use, observation, enjoyment and appreciation of natural or cultural visual qualities.

1. A municipal park or public open space?

There are no municipal parks or similar public open spaces with potential visibility of the Project within the VSA.

SCENIC RESOURCE(S)	VISIBILITY TABLE Distance Between the Proposed Visible Activity and Resource			
	No Visibility	0 – ¼ mile	¼ - 1 mile	1+ miles
All municipal sites listed below	**X**			

Municipal parks and public open spaces within the VSA mostly consist of small parks and playgrounds near village and town centers, water access points and picnic areas along the region's lakes and rivers, as well as nature preserves and recreation areas. Notable parks and open spaces managed locally include, but are not limited to:

- **Gould's Landing** (6.3 miles southwest of the Project in Orono) includes park space and water access to Pushaw Lake. (For general context photos, see **Attachment 3** *Photo 36 & 37*.)
- **Lakeside Landing Park** (5.1 miles southwest of the Project in Glenburn) includes park space and water access to Pushaw Lake. (For general context photos, see **Attachment 3** *Photo 34 & 35*.)

- **Sewall Park** (3.4 miles southwest of the Project in Old Town) includes park space and water access to Perch Pond. (For general context photos, see **Attachment 3** *Photo 16 & 17*.)
- **4th Street Park** (3.7 miles southeast of the Project in Old Town) includes park space and water access to the Penobscot River and Stillwater River. (For general context photos, see **Attachment 3** *Photo 22 & 23*.)
- **Greenfield Boat Ramp** (4.4 miles northeast of the Project in Milford) includes water access to the Penobscot River. (For general context photos, see **Attachment 3** *Photo 3 & 4*.)
- **Greenbush Public Landing** (5.8 miles northeast of the Project in Greenbush) includes water access to the Penobscot River. (For general context photos, see **Attachment 3** *Photo 1 & 2*.)

None of the places listed above, as well as any of the other parks and open spaces identified within the VSA will have Project visibility due to intervening vegetation, structures, and terrain.

2. A publicly owned land visited, in part, for the use, observation, enjoyment, and appreciation of natural or man-made visual qualities?

SCENIC RESOURCE(S)	VISIBILITY TABLE Distance Between the Proposed Visible Activity and Resource			
	No Visibility	0 – ¼ mile	¼ - 1 mile	1+ miles
All established local scenic roads	**X**			

Established Local Scenic Views

The City of Old Town Comprehensive Plan, titled *2016 Comprehensive Plan Update* describes goals related to the preservation of scenic resources and notes scenic views important to the City. The following scenic views were identified in the Plan:

- View from the Milford Dam in the Downtown (For general context photos, see **Attachment 3** *Photo 28 & 29*.)
- View from the Gilman Falls Dam on Route 43 (For general context photos, see **Attachment 3** *Photo 20 & 21*.)
- View from the Stillwater Dam on the Stillwater River (For general context photos, see **Attachment 3** *Photo 40*.)
- View from "high head" (South Main Street heading north from Orono) of the paper mill and site of the former Great Works Dam
- View of Katahdin from outer Kirkland Road
- View of the Stillwater River from Route 116 at Birch Stream
- View from Poplar Street at the bog
- Sewall Park on Mud/Perch Pond (For general context photos, see **Attachment 3** *Photo 16 & 17*.)
- View of the Stillwater River from Bennoch Road (For general context photos, see **Attachment 3** *Photo 10*.)

- View of the Stillwater River from College Road through the University Forest

None of the scenic view locations listed above will have visibility of the Project due to intervening vegetation, structures, and terrain. Photos from several of these scenic view locations are available in **Attachment 3** and identified in the list**.**

Interstate 95

Visibility was identified in the vicinity of Alton Bog along the Interstate 95 highway in Alton. For an approximately 4,200 ft stretch of highway, motorists traveling southbound will have intermittent views of the Project through pockets of roadside vegetation. The posted speed limit in this area is 75 miles per hour, which would allow account for less than a second of interment views along the stretch of highway with potential visibility.

Northbound motorists would have to turn nearly 180 degrees to see potential views of the Project through foreground elements including a vegetated median, the southbound lanes of travel, and roadside vegetation along the southbound lanes. Visibility of the Project from northbound motorists is highly unlikely.

Local Roads

The viewshed analysis and fieldwork confirmed intermittent Project visibility from Route 16 (Bennoch Road) and Route 43 (W Old Town Road). Both public roads serve as linear features from which to enjoy the scenic quality of the lands they traverse. Neither Route 16 or Route 43 have been designated as part of any local, state, or national scenic route or byway. While the City of Old Town Comprehensive Plan does mention scenic views of the Stillwater River from points along Route 16, there are no views of the Stillwater River from locations on the roadway where views of the Project would also be visible (See Map 2 in **Attachment 1**).

All potential Project visibility locations along Route 16 and Route 43 currently have views of the existing Juniper Ridge Landfill. Visibility from most of these locations is brief and intermittent in nature, often seen through small gaps in vegetation and structures. From a stretch of Route 43 (approximately 1,300 foot long) located just south of the Project, arborvitae planted along the road over a decade ago to mitigate views of the existing landfill have now grown to be an effective visual screen. These plantings will continue to mitigate any potential Project views from motorists travelling northbound. Overall, Project visibility from local roads is likely to be minimal and would not cause an unreasonable adverse visual impact to motorists and other users traversing the area. Areas of potential Project visibility are mapped as viewshed analysis in **Attachment 1**. Photographs from areas with Project visibility along Route 16 and Route 43 are presented in **Attachment 3.**

3. A public resource, such as the Atlantic Ocean a great pond or a navigable river?

SCENIC RESOURCE(S)	VISIBILITY TABLE Distance Between the Proposed Visible Activity and Resource

	No Visibility	0 – ¼ mile	¼ - 1 mile	1+ miles
Pushaw Lake, Penobscot River, Stillwater River				**X**
Perch Pond, Pickerel Pond, Holland Pond, Birch Stream, Pushaw Stream	**X**			

Pushaw Lake is the largest Great Pond within the VSA. Other large waterbodies considered Great Ponds in the VSA include Perch Pond, Pickerel Pond, and Holland Pond. The Penobscot River, Stillwater River, Pushaw Stream, and Birch Stream are among the most notable river and stream systems within the VSA. The potential visual impact on public waterbodies is described below.

Pushaw Lake

Pushaw Lake is a Great Pond of over 5,000 acres partially located within the boundaries of four municipalities, including Old Town, Hudson, Glenburn, and Orono. As the largest lake in the Project VSA, and one of the largest lakes in the greater Bangor region, the lake is a vital recreational, environmental, and commercial resource for surrounding communities, visitors, and wildlife. Though the lake is not rated for scenic resources in the *Maine's Finest Lakes Assessment.* The lake is rated for having significant or outstanding physical, fishery, and wildlife characteristics[12].

The computer-based viewshed analysis indicated potential Project visibility from areas in the southwestern corner of the lake, covering approximately 2% of the lake's surface (See Map 2 in **Attachment 1**). According to this analysis, the Project would be seen at distances between 5.2 and 6.7 miles away, within the background viewing distance zone.

In addition to viewshed analysis, a thorough assessment of Pushaw Lake was conducted to understand the potential magnitude of visual effects on the lake. This assessment included fieldwork, 3D modeling, and photosimulation development. The photosimulation from a viewpoint on Pushaw Lake in **Attachment 2** illustrates how the Project at its maximum size (reaching a height of approximately 180 feet above the current high point, or approximately 380 to 385 feet above sea level) might appear from an area of visibility located approximately 6 miles away from the Project. From viewpoints in the southwestern area of Pushaw Lake at distances beyond 5 miles, the Project would be visible in the background. The Project would introduce minimal contrasts in scale, form, line, and color. During the majority of the landfill's operation, once the expansion reaches heights visible above tree line, the Project would appear as a grayish/brownish color. As the Project reaches its final permitted elevations, dark gray/black capping membranes will be applied before a vegetative cap is installed. Though the form and color of the Project will change as it develops over time, these gradual changes will remain inconspicuous to the human eye;

[12] Parkin, Lortie, Humphrey, DiBello; *Maine's Finest Lakes – The Results of the Maine Lakes Study.* Maine State Planning Office Critical Areas Program. 1989

visible just above the foreground and midground tree line of the lake's eastern side. As boaters, swimmers, and other recreational users move closer to the eastern side of the lake, the Project will disappear behind elements in the foreground.

The Project is expected to have little to no spatial dominance in the landscape, when looking east from the lake due to the effects of distance and visual acuity. The Project will appear subordinate to the colors, textures, and other physical landscape characteristics visible in the foreground and midground of the lake. As illustrated in the Pushaw Lake photosimulation, the Project will remain low on the horizon reducing contrasts in form and color against the sky. While overall landscape contrasts will be limited, Project visibility and visual contract with the surrounding landscape will vary as light and weather patterns shift throughout the day. As the seasons change, the surrounding colors and textures of the landscape will act to further subdue or accentuate the Project's appearance.

Ultimately, upon reaching its full size and completed vegetative capping, the Project is expected to align with the natural features of surrounding landscape visible from the lake. As discussed in Section 5.2, the landscape within the VSA is characterized by mostly flat wooded and wetland areas mixed with occasional low, rolling hills that are often visible in the distance from open areas such as Pushaw Lake. For these reasons, the Project is unlikely to have an unreasonable adverse visual impact on those recreating, enjoying scenery, or engaged in other activities on Pushaw Lake.

Perch Pond

Formerly called Mud Pond, Perch Pond is located approximately 2.8 miles southwest of the Project in Old Town. The pond is surrounded by protected lands containing trails and other recreation opportunities, including Sewall Park that allows water access to the pond. There will be no Project visibility from the pond due to intervening vegetation and terrain.

Pickerel Pond and Holland Pond

These two ponds are both located approximately 4.1 miles north of the Project in Alton. There is little evidence to suggest a high degree of recreational use of these ponds. Access appears to be limited and may require permission to cross private land. There will be no Project visibility from either pond due to intervening vegetation and terrain.

Penobscot River

The Penobscot River is the largest river system in the VSA, running north to south for approximately 14.5 miles within the VSA. The river is a major ecological, recreational, cultural, and historical influence on the communities and wildlife that inhabit the region. The portion of the Penobscot River within the VSA is listed as a "C" river and is not rated for scenic quality in the *Maine Rivers Study*[13].

In the Maine Rivers Study, river segments are rated according to the number and significance of overlapping resources. Resource categories included unique natural rivers,

[13] Maine Department of Conservation, et al.; *Maine Rivers Study – Final Report*. 1982

geologic/hydrologic features, scenic/recreational, historic, and ecologic. Classifications range from A – D, with A being the highest ranked. Rivers considered under category C of the Study are those that have received at least three unique/significant river resources ratings such as ecological, fishery, recreational, scenic, etc.

The viewshed analysis indicated potential visibility from the main stem of the Penobscot River in two primary areas. One area is located between Milford and Old Town located approximately 5.1 miles southeast of the Project. Fieldwork and 3D modeling analysis determined that the Project would not be visible due to the mature riparian vegetation along the banks of the river, in addition to man-made structures in the foreground (see photo 33 on page 11 in **Attachment 3**). The viewshed analysis also indicated visibility from an area approximately 3.7 miles southeast of the Project on a stretch of the river that passes the Old Town Municipal Airport. Visibility of the Project in the midground and background viewing distance for this area is not expected to unreasonably interfere with the experience of boaters and paddlers on the river, who are typically focused on foreground elements.

As discussed in Section 3.3, the surface modeling used to generate the viewshed analysis map in the vicinity of the Penobscot River and Stillwater River was based on land cover data. This data does not account for the micro changes and variations in vegetation and structure heights to the degree that LiDAR does. As a result, visibility shown in the viewshed analysis is likely to be somewhat conservative, as vegetation above 40 feet (the average used in the land cover data along most of river's edge) was observed along much of the Penobscot River's edge.

Stillwater River

The Stillwater River is an 11.5 mile long side channel of the Penobscot River, that begins at the east side of Orson Island in Old Town and continues south where it rejoins the main stem of the Penobscot River in Orono. Considered part of the Penobscot River system, the Stillwater River was also listed as a "C" river in the *Maine Rivers Study* and was not rated for having unique scenic quality.

The viewshed analysis indicated potential Project visibility from intermittent areas 2.3 to 3.5 miles east and southeast of the Project (See Map 2 in **Attachment 1**). Visibility was further investigated during fieldwork and 3D modeling exercises, however, due to the presence of mature forest vegetation along the banks of the river, Project visibility from the Stillwater River is expected to be highly limited or negligible from most areas.

Birch Stream and Pushaw Stream

Birch Stream and Pushaw Stream are both part of the greater Penobscot river watershed and are notable recreational resources within the VSA. Though both streams are within 1.5 to 2 miles of the Project, there will be no visibility from either stream due to intervening vegetation and terrain.

Based on the analysis above, the Project is unlikely to have an unreasonable adverse visual impact on the scenic character to users of these waterbodies within the VSA.

6.3.2 What is the closest estimated distance to a similar activity?

There are several solid waste and landfill facilities in this region of Maine[14]. There are three closed landfills within the 7 mile VSA, these include:

- Old Town Landfill (2.2 mi to the southeast)
- Glenburn Municipal C & D Landfill (6.2 mi to the southwest)
- Orono Municipal C & D Debris Landfill (5.2 mi to the south)

The closest active solid waste facility is the Pinetree Landfill and Transfer Station in Hampden (16.3 mi to the south).

6.3.3 Are any of the resources checked in Question 1 used by the public during the time of year during which the activity will be visible?

Yes - Pushaw Lake is used by the public recreationally throughout the year, and the Project is expected to be visible at varying degrees during all seasons.

7 CONCLUSION

In determining whether the Project will have an unreasonable adverse visual impact on public viewing areas, as well as on the scenic and aesthetic character and uses of the surrounding area, the assessment can conclude the following.

- **Geographic Extent of Visibility** – The viewshed analysis has indicated that there will be potential Project visibility from approximately 0.7% of the 7-mile VSA, with some of the largest areas of potential visibility being from places that are inaccessible and/or not considered scenic resources. Other than the Juniper Ridge Landfill property, there are no areas where the Project will be visible in the foreground distance zone. Fieldwork, 3D modeling, and photosimulation analysis has shown that intermittent visibility indicated in the computer viewshed analysis may potentially be overstated due to intervening vegetation, especially from areas of visibility identified along the Penobscot River and Stillwater River due to intervening vegetation. See Map 2 in **Attachment 1**.

- **Visibility from Identified Scenic Resources** – There are no "public viewing areas" within 2,000 feet of the Project as defined in the Maine Chapter 400 and Old Town Chapter 24 rules regulating solid waste management. At a 7-mile VSA, it should be noted that the scope and scale of review in this VIA far exceeds what is required under these rules. Visibility from scenic resources identified under the guidance of NRPA Chapter 315 is limited to a small handful of locations on Pushaw Lake, and potentially from the Penobscot River and Stillwater River.

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[14] *Maine Department of Environmental Protection, EGAD (Environmental and Geographic Analysis Database), https://www.maine.gov/dep/maps-data/egad/, (Accessed August 15, 2024).*

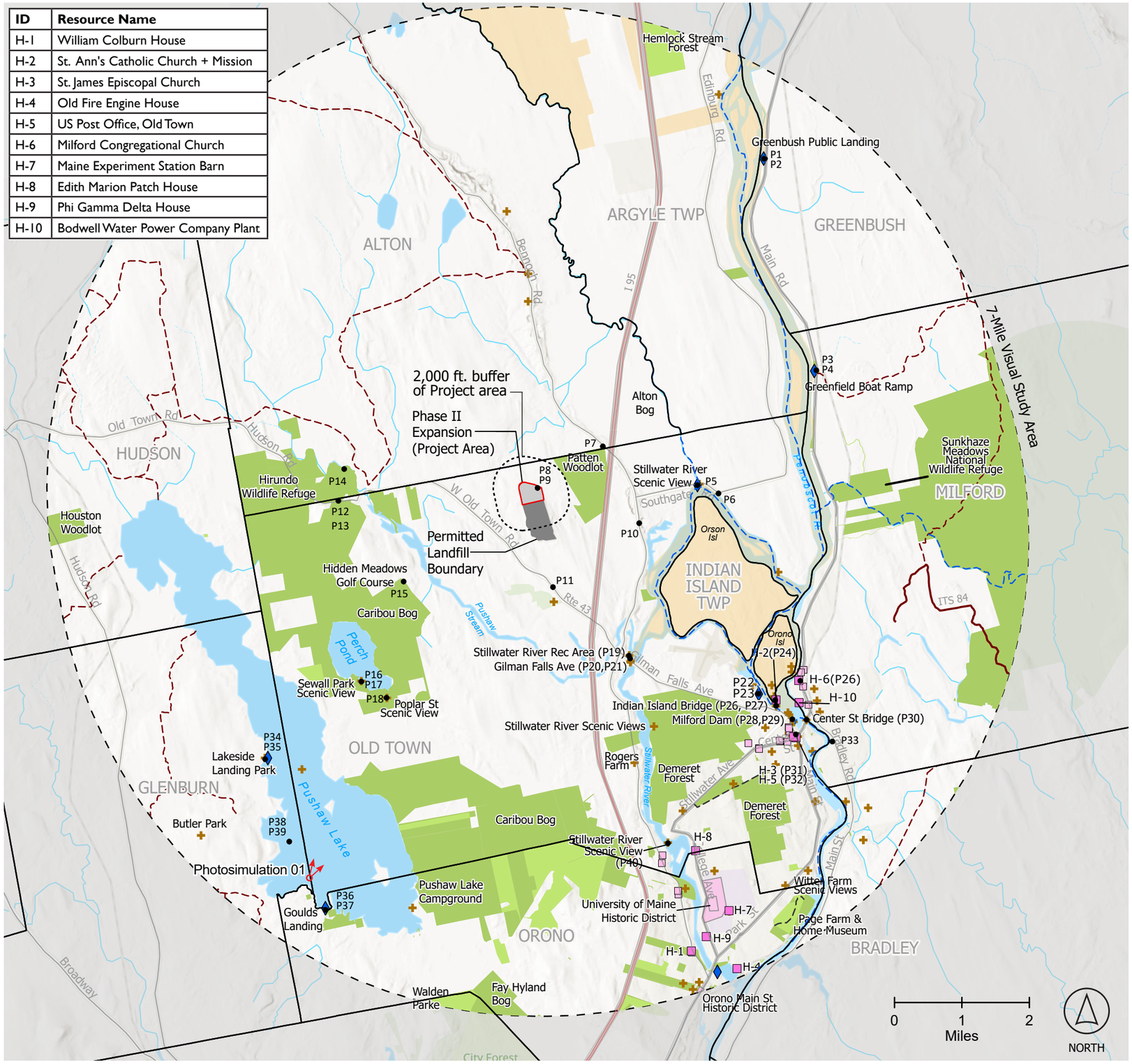
- **Landscape Compatibility** – With all potential Project visibility from scenic resources located within the midground and background viewing distance zones, the Project is expected to have minimal contrasts in color, form, line, and texture. The Project is unlikely to be perceived as a significant change in how the site has been used for nearly three decades. The Project will take on different elements of form and color contrasts as it develops, but once it has reached its final elevations and receives vegetative capping, it is likely be relatively consistent with other elevated landscape features within the VSA when viewed from midground and background distances.

Pursuant to Chapter 400.4(F) of the Maine Solid Waste Rules, and similar language in the City of Old Town Code Chapter 24, the Project will not have an unreasonable adverse impact on existing uses and scenic character related to public viewing areas.

Pursuant to Chapter 315.9 and 38 M.R.S.A. § 480-D of the Natural Resources Protection Act, the Project will not have an unreasonable adverse impact on existing scenic and aesthetic uses.

MAP 01. Visual Study Area Overview

ID	Resource Name
H-1	William Colburn House
H-2	St. Ann's Catholic Church + Mission
H-3	St. James Episcopal Church
H-4	Old Fire Engine House
H-5	US Post Office, Old Town
H-6	Milford Congregational Church
H-7	Maine Experiment Station Barn
H-8	Edith Marion Patch House
H-9	Phi Gamma Delta House
H-10	Bodwell Water Power Company Plant



LEGEND

- Municipal Boundary

Project Data

- Project Study Area (7 mi)
- Project Area (Landfill Phase II Expansion)
- Extent of Existing Juniper Ridge Landfill
- P# Study Area Photo Location
- Photosimulation Location

Lands & Conservation Areas

- Public Conserved Land
- Private Conserved Land
- Tribal Territory

Historic Resources

- Listed NRHP Structure (labeled H1-H10 and identified in Resource Table)
- Eligible NRHP Structure

Other Resources

- Local Resource
- Boating Access Site

Roads and Trails

- Water Trail
- Interconnected Trail System (ITS)
- Local Snowmobile Trail

MAP NOTES

Map shows the extent and context of the 7-Mile Visual Study Area, identified scenic and recreational resources, photograph locations, and photosimulation location.

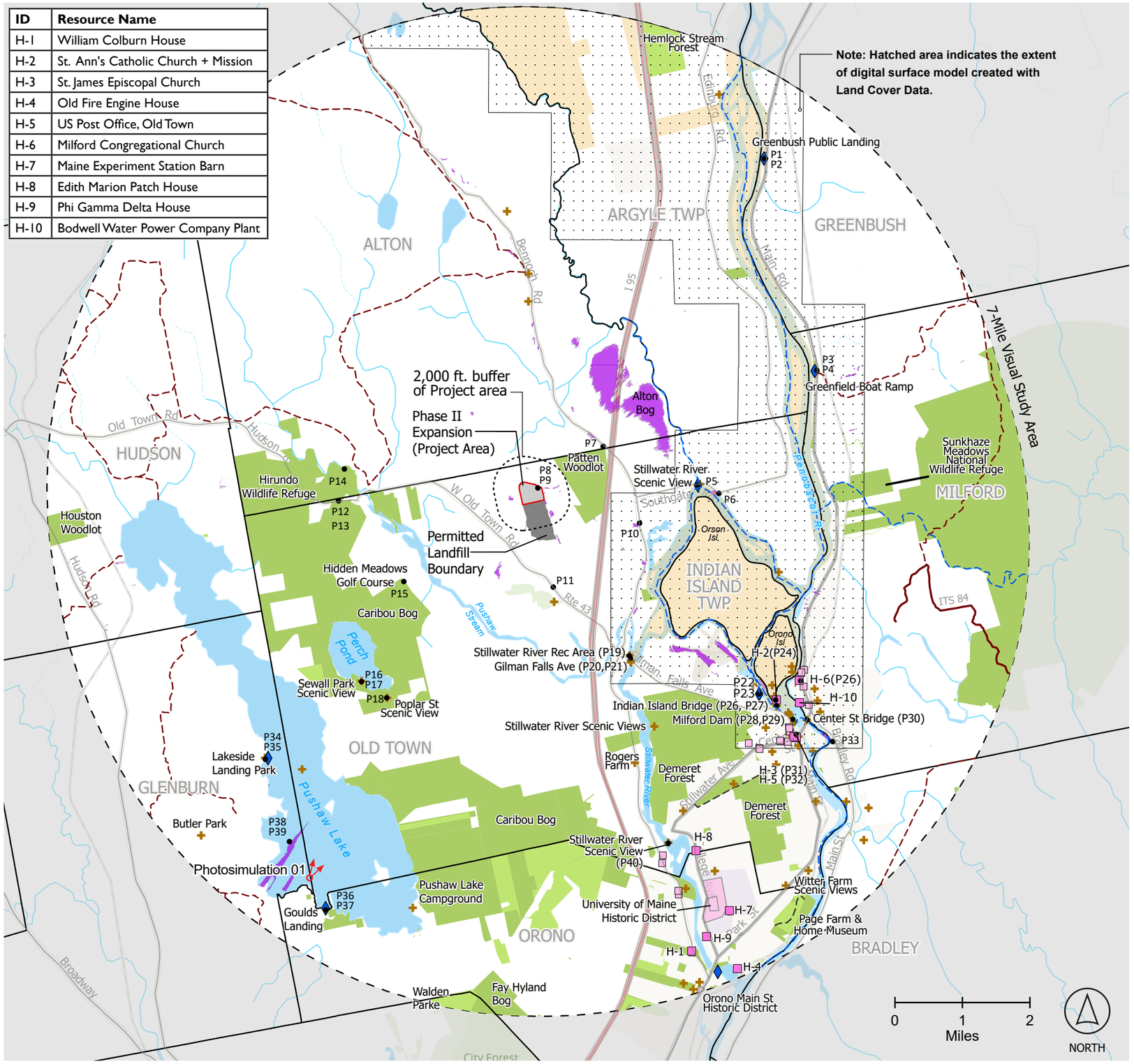
JUNIPER RIDGE LANDFILL

VIEWSHED

August 2024
Attachment 1
Page 1 of 2

MAP 02. Viewshed Analysis of Phase II Expansion Based On Topography & Surface Data

ID	Resource Name
H-1	William Colburn House
H-2	St. Ann's Catholic Church + Mission
H-3	St. James Episcopal Church
H-4	Old Fire Engine House
H-5	US Post Office, Old Town
H-6	Milford Congregational Church
H-7	Maine Experiment Station Barn
H-8	Edith Marion Patch House
H-9	Phi Gamma Delta House
H-10	Bodwell Water Power Company Plant



LEGEND

- Municipal Boundary

Project Data

- Project Study Area (7 mi)
- Project Area (Landfill Phase II Expansion)
- Extent of Existing Juniper Ridge Landfill
- P# Study Area Photo Location
- Photosimulation Location

Lands & Conservation Areas

- Public Conserved Land
- Private Conserved Land
- Tribal Territory

Historic Resources

- Listed NRHP Structure (labeled H1-H10 and identified in Resource Table)
- Eligible NRHP Structure

Other Resources

- Local Resource
- Boating Access Site

Roads and Trails

- Water Trail
- Interconnected Trail System (ITS)
- Local Snowmobile Trail

Viewshed Analysis Based On Topography & Surface Data

- Potential Visibility of Landfill Phase II Expansion

MAP NOTES

Map shows the potential visibility of the landfill expansion within the Visual Study Area based on the screening effects of topography and surface features (structures and vegetation).

The analysis relies on a Digital Terrain Model (DTM) and a Digital Surface Model (DSM), processed at 3 ft. resolution from LiDAR data acquired from USGS. A portion of the DSM was developed using landcover data because LiDAR data was not available. This area is noted in a hatch on the map.

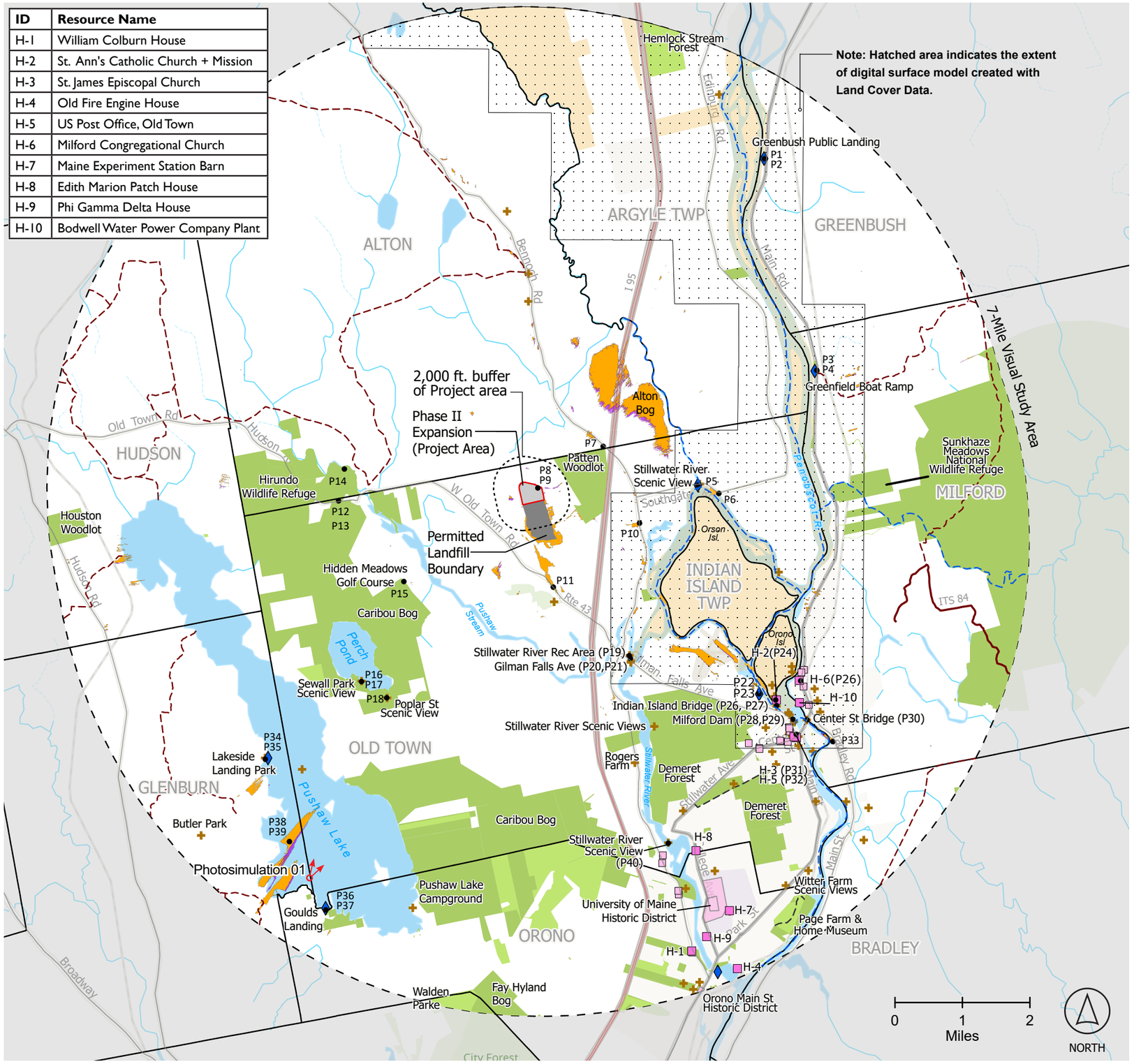
The viewshed represents where a viewer, with an eye level of 5.9ft, may see any portion of the landfill expansion area, accounting for the screening effects of both topography and surface features.

JUNIPER RIDGE LANDFILL

VIEWSHED

August 2024
Attachment 1

ID	Resource Name
H-1	William Colburn House
H-2	St. Ann's Catholic Church + Mission
H-3	St. James Episcopal Church
H-4	Old Fire Engine House
H-5	US Post Office, Old Town
H-6	Milford Congregational Church
H-7	Maine Experiment Station Barn
H-8	Edith Marion Patch House
H-9	Phi Gamma Delta House
H-10	Bodwell Water Power Company Plant



MAP 03. Viewshed Analysis of Phase II Expansion & Permitted Landfill Based On Topography & Surface Data

LEGEND

- Municipal Boundary

Project Data

- Project Study Area (7 mi)
- Project Area (Landfill Phase II Expansion)
- Extent of Existing Juniper Ridge Landfill
- P# Study Area Photo Location
- Photosimulation Location

Lands & Conservation Areas

- Public Conserved Land
- Private Conserved Land
- Tribal Territory

Historic Resources

- Listed NRHP Structure (labeled H1-H10 and identified in Resource Table)
- Eligible NRHP Structure

Other Resources

- Local Resource
- Boating Access Site

Roads and Trails

- Water Trail
- Interconnected Trail System (ITS)
- Local Snowmobile Trail

Viewshed Analysis Based On Topography & Surface Data

- Potential Visibility of Landfill Phase II Expansion
- Potential Visibility of Permitted Landfill

MAP NOTES

Map shows the potential visibility of the landfill expansion and the current permitted landfill within the Visual Study Area based on the screening effects of topography and surface features (structures and vegetation).

The analysis relies on a Digital Terrain Model (DTM) and a Digital Surface Model (DSM), processed at 3 ft. resolution from LiDAR data acquired from USGS. A portion of the DSM was developed using landcover data because LiDAR data was not available. This area is noted in a hatch on the map.

The viewshed represents where a viewer, with an eye level of 5.9ft, may see any portion of the landfill expansion area, accounting for the screening effects of both topography and surface features.

JUNIPER RIDGE LANDFILL

VIEWSHED

Juniper Ridge Landfill
Pushaw Lake, Glenburn
Panoramic Photosimulation

VIEWSHED

VIEWPOINT

Juniper Ridge Landfill (the Project) would be visible directly across the lake from the viewpoint. The Project would be seen projecting slightly above the tree line at a distance of six miles.

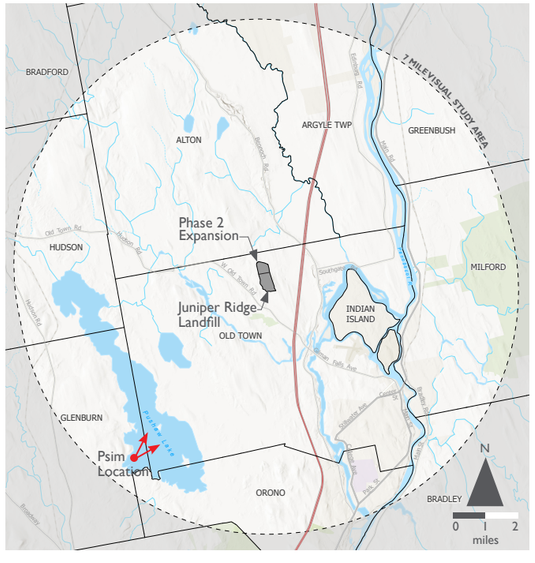
PROJECT VIEW

Size of Project Area	61 Acres
Distance to Project	6.0 Miles
Horizontal Field of View of the visible portion of the Project	1.5°

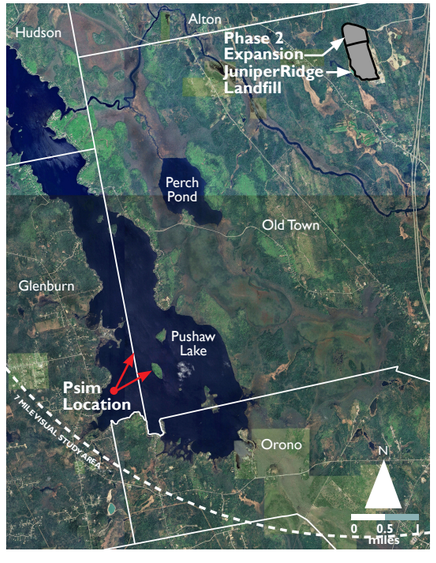
IMAGE DATA

Location Coordinates	44.907475°N, -68.801707°W
Date	05/22/2024
Time	1:13 pm
Viewer Elevation	119 ft
Direction of View	Northeast
Focal Length	50mm
Camera Model	NIKON D750
Image Resolution	300 ppi
Weather Conditions	Clear

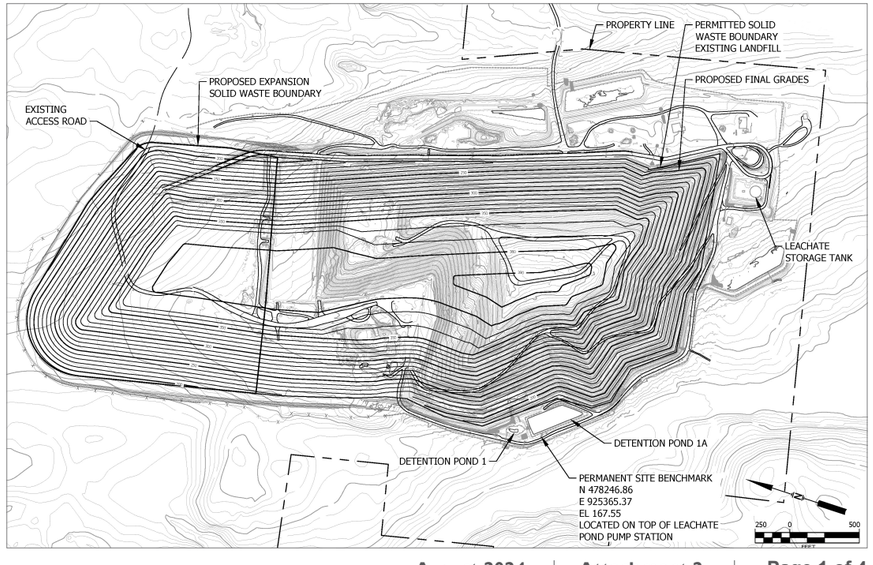
CONTEXT MAP



LOCATION MAP



PROJECT SITE PLAN



Juniper Ridge Landfill
Pushaw Lake, Glenburn

VIEWSHED

NORMAL VIEW
EXISTING CONDITIONS

VIEWING DISTANCE

To replicate the actual view, position your eyes at a distance of 1.5 times the full width of the image.

Printed View:
Print on 11x17 inch (tabloid) paper. The image will be 14 inches wide. Hold image 21 inches from eyes. (14 inches x 1.5=21 inches).

Screen View:
To replicate the printed viewing distance (described above), make the line below measure to 1 inch on screen.

1 INCH LINE

Juniper Ridge Landfill
Pushaw Lake, Glenburn

VIEWSHED

NORMAL VIEW PHOTOSIMULATION

VIEWING DISTANCE

To replicate the actual view, position your eyes at a distance of 1.5 times the full width of the image.

Printed View:
Print on 11x17 inch (tabloid) paper. The image will be 14 inches wide. Hold image 21 inches from eyes. (14 inches x 1.5=21 inches).

Screen View:
To replicate the printed viewing distance (described above), make the line below measure to 1 inch on screen.

1 INCH LINE

Juniper Ridge Landfill
Pushaw Lake, Glenburn

VIEWSHED

NORMAL VIEW PHOTOSIMULATION (4X ZOOM)

VIEWING DISTANCE

To replicate the actual view, position your eyes at a distance of 1.5 times the full width of the image.

Printed View:
Print on 11x17 inch (tabloid) paper. The image will be 14 inches wide. Hold image 21 inches from eyes. (14 inches x 1.5=21 inches).

Screen View:
To replicate the printed viewing distance (described above), make the line below measure to 1 inch on screen.

1 INCH LINE

P1 - View looking southwest across the Penobscot River from the Greenbush Public Landing in Greenbush. The Project is located 5.8 miles away and will not be visible from this location due to intervening vegetation and terrain.

P2 - Parking area at the Greenbush Public Landing.

P3 - View looking west across the Penobscot River from the Greenfield Boat Ramp in Milford. The Project is located 4.8 miles away and will not be visible from this location due to intervening vegetation and terrain.

P4 - Informational kiosk at Greenfield Boat Ramp.

P5 - View looking southeast from the Birch Stream Paddle Access on Route 116 (Southgate Road) toward the Stillwater River in Old Town. The Project is 2.5 miles away and will not be visible from this location due to intervening vegetation and terrain.

P6 - View looking west from the Stillwater River off of Route 116 (Southgate Road), 0.33 miles upstream of where the Stillwater River intersects with Birch Stream. The Project is located 2.8 miles away from this location and will not be visible due to intervening vegetation and terrain.

P7 - Sign at the entrance of the Juniper Ridge Landfill, located off of Route 16 (Bennoch Road) in Old Town.

P8 - View from an on-site access road looking south toward the existing Juniper Ridge Landfill showing a portion of the site where a capping membrane has been installed.

P9 - View from an on-site access road looking southwest toward the existing Juniper Ridge Landfill showing landfill deposit operations vehicles at work, as well as capping membranes in the foreground.

P10 - View looking west from Route 16 (Bennoch Road) toward the existing Juniper Ridge Landfill. The Project is located 1.4 miles away from this location and may be partially visible behind foreground vegetation and structures.

P11 - View looking north from Route 43 (W Old Town Road) toward the existing Juniper Ridge Landfill. Though the previously installed tree plantings show some signs of damage, they continue to provide an adequate screening from views of the existing landfill.

P12 - Entry signage and kiosk at the Hirundo Wildlife Refuge, located off of Route 43 (W Old Town Road) in Old Town. The Project is located 2.6 miles east of this location and will not be visible from anywhere within the refuge due to intervening vegetation and terrain.

P13 - Trails bring visitors through fields and forests within the Hirundo Wildlife Refuge.

P14 - Pushaw Stream, viewed from the Hirundo Wildlife Refuge.

P15 - Entrance at the Perch Pond Recreational Trails on Kirkland Road in Old Town. The Project is located 2 miles north of this location and will not be visible due to intervening vegetation and terrain.

P16 - Entrance to Sewall Park on Poplar Street in Old Town. The Project is located 3.3 miles away from this location and will not be visible due to intervening vegetation and terrain.

P17 - View looking north from Sewall Park toward Perch Pond. The Project is located 2.8 miles away from the pond and will not be visible due to intervening vegetation and terrain. This view is noted as a scenic in the Old Town Comprehensive Plan.

P18 - View looking northeast from Poplar Street in Old Town, across Caribou Bog. The Project is located 3.3 miles from this location and will not be visible due to intervening vegetation and terrain. Views of the bog from this section of Poplar Street are noted as scenic in the Old Town Comprehensive Plan.

P19 - View looking north from the Stillwater River Recreation Facility in Old Town. The Project is 2.3 miles from this location and will not be visible due to intervening vegetation and terrain.

P20 - View looking northeast of the Gilman Falls Dam from Route 43 (Gilman Falls Avenue) in Old Town. The Project is located 2.4 miles away from this location and will not be visible due to intervening vegetation and terrain.

P21 - View looking southwest across the Stillwater River from Route 43 (Gilman Falls Avenue) in Old Town. The Project is located 2.4 miles away from this location and will not be visible due to intervening vegetation and terrain. Views like this from Gilman Falls Dam are listed as scenic in the Old Town Comprehensive Plan.

P22 - Kiosk at the Fourth Street Park boat launch on the Penobscot River in Old Town. The Project is 4 miles from this location and there will be no visibility due to intervening vegetation and terrain.

P23 - View of the Penobscot River looking north from Fourth Street Park in Old Town.

P24- View looking southeast at St. Ann's Catholic Church on Down Street in Indian Island. The Project is located 4.3 miles from this location and will not be visible due to intervening vegetation and terrain. St. Ann's Catholic Church is listed on the National Register of Historic Places.

P25 - View looking southwest at the Milford First Congregational Church on U.S. Route 2. The Project is 4.5 miles away and will not be visible from this location due to intervening vegetation and terrain. The Milford First Congregational Church is listed on the National Register of Historic Places.

P26 - View looking southeast across the Penobscot River from the West Street Bridge in Old Town. The Project is 4.4 miles away from this location and will not be visible due to intervening vegetation and terrain. Views from this bridge are noted as scenic views in the Old Town Comprehensive Plan.

P27 - View looking northwest across the Penobscot River from the West Street Bridge in Old Town. The Project is 4.4 miles away from this location and will not be visible due to intervening vegetation and terrain. Views from this bridge are noted as scenic views in the Old Town Comprehensive Plan.

P28 - View looking northeast toward the Penobscot River from Old Town Park in Old Town. The Project is located 4.7 miles from this location and is and will not be visible due to intervening vegetation and terrain. Views from this area are designated as scenic in the Old Town Comprehensive Plan.

P29 - View looking south at Old Town Park. The Project is located 4.7 miles from this location and is and will not be visible due to intervening vegetation and terrain.

P30 - View looking southeast across the Penobscot River toward the Milford Dam from the Center Street Bridge in Old Town. The Project is located 4.8 miles from this location and is and will not be visible due to intervening vegetation and terrain. Views from this bridge are listed as scenic in the Old Town Comprehensive Plan.

P31 - View looking northwest toward Old Town City Hall from Main Street in Old Town. The Project is 4.9 miles away from this location and will not be visible due to intervening vegetation, structures, and terrain.

P 32 - View looking southeast toward Main Street in downtown Old Town. The Project is 4.9 miles away from this location and will not be visible due to intervening vegetation, structures, and terrain.

P 33 - View looking northwest from the Penobscot River off of Bradley Road in Milford. The Project is located 5.1 miles away and will not be visible from this location due to intervening vegetation and terrain.

P34 - View looking southeast across Pushaw Lake from the boat launch at Lakeside Landing Park in Glenburn. The Project is 5.2 miles away and will not be visible from this location due to intervening vegetation and terrain.

P35 - View looking east across Lakeside Landing Park in Glenburn. The Project is 5.2 miles away and will not be visible from this location due to intervening vegetation and terrain.

P36 - View looking east at Gould's Landing in Orono. The Project is 6.4 miles away and will not be visible from this location due to intervening vegetation and terrain.

P37 - View looking north across Pushaw Lake from Gould's Landing in Orono. The Project is 6.4 miles away and will not be visible from this location due to intervening vegetation and terrain.

P38 - View looking northeast from Pushaw Lake in Glenburn toward the Project (center of photo). The Project is located 6 miles away from this location and will be minimally visible. See photosimulation in Attachment 2.

P39 - View looking southeast from the water on the southwestern corner of Pushaw Lake in Glenburn showing the typical development pattern of camps and year round homes on the Lake. The Project is located 6 miles away from this location and will be minimally visible when facing northeast (this view is represented above in P38).

P40 - View looking northwest from the Stillwater Avenue Bridge across the Stillwater River. The Project is 5 miles away and will not be visible from this location due to intervening vegetation and terrain. Views from the Stillwater Avenue Bridge are noted as scenic in the Old Town Comprehensive Plan.

APPENDIX J

AIR QUALITY EXHIBIT: MEDEP BUREAU OF AIR QUALITY PERMIT

SME
SEVEE & MAHER
ENGINEERS

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

State of Maine and **NEWSME Landfill Operations, LLC** **d/b/a Juniper Ridge Landfill** **Penobscot County** **Old Town, Maine** **A-921-70-F-R**	**Departmental** **Findings of Fact and Order** **Part 70 Air Emission License** **Renewal**

FINDINGS OF FACT

After review of the Part 70 License renewal application, staff investigation reports, and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 Maine Revised Statutes (M.R.S.) § 344 and § 590, the Maine Department of Environmental Protection (Department) finds the following facts:

I. REGISTRATION

A. Introduction

FACILITY	State of Maine and NEWSME Landfill Operations, LLC d/b/a Juniper Ridge Landfill
LICENSE TYPE	Part 70 License Renewal
NAICS CODES	562212
NATURE OF BUSINESS	Solid Waste Landfill
FACILITY LOCATION	Old Town, Maine

Juniper Ridge Landfill (JRL) is a solid waste disposal facility currently owned by the State of Maine (Bureau of General Services) and operated by NEWSME Landfill Operations, LLC.

JRL has the potential to emit more than 100 tons per year (tpy) of sulfur dioxide (SO_2) and carbon monoxide (CO); therefore, the source is classified as a major source for criteria pollutants.

JRL does not have the potential to emit 10 tpy or more of a single hazardous air pollutant (HAP) or 25 tpy or more of combined HAP; therefore, the source is classified as an area source for HAP.

B. Emission Equipment

The following emission units are addressed by this Part 70 License:

Process Equipment

Equipment	Capacity	Maximum Flow Rate (scfm)
Flare #2	22.5 MMBtu/hr	750
Flare #3	40.5 MMBtu/hr	1,350
Flare #4	106.5 MMBtu/hr	3,550
Solid Waste Landfill	19.63 MM cubic yards (approx.)	n/a

Generators

Equipment	Maximum Heat Input Capacity (MMBtu/hr)	Max. Firing Rate (gal/hr)	Fuel Type, % sulfur	Mfr. Date	Install. Date
Generator #1	2.33	17.0	distillate fuel, 0.0015%	3/16/2006	8/21/2006

JRL has additional insignificant activities which do not need to be listed in the table above. The list of insignificant activities can be found in the Part 70 license application and in Appendix B of *Part 70 Air Emission License Regulations*, 06-096 C.M.R. ch. 140.

C. Acronyms and Units of Measure

ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
BPT	Best Practical Treatment
C.F.R.	Code of Federal Regulations
C.M.R.	Code of Maine Rules
CAM	Compliance Assurance Monitoring
CEMS	Continuous Emissions Monitoring System
CO	Carbon Monoxide
COMS	Continuous Opacity Monitoring System
EPA or US EPA	United States Environmental Protection Agency
GHG	Greenhouse Gases
H_2S	Hydrogen Sulfide

HAP	Hazardous Air Pollutants
lb	pound
lb/hr	pounds per hour
lb/MMBtu	pounds per million British Thermal Units
LFG	Landfill Gas
M.R.S.	Maine Revised Statutes
MMBtu	Million British Thermal Units
MMBtu/hr	Million British Thermal Units per hour
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NMOC	Non-methane Organic Compounds
NO_x	Nitrogen Oxides
NSPS	New Source Performance Standards
NSR	New Source Review
O_2	Oxygen
PM	Particulate Matter less than 100 microns in diameter
PM_{10}	Particulate Matter less than 10 microns in diameter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
ppmv	parts per million on a volume basis
RACT	Reasonably Available Control Technology
RICE	Reciprocating Internal Combustion Engine
SO_2	Sulfur Dioxide
ton/hr	ton per hour
tpy	ton per year
TRS	Total Reduced Sulfur
VOC	Volatile Organic Compounds

D. Definitions

Distillate Fuel means the following:

- Fuel oil that complies with the specifications for fuel oil numbers 1 or 2, as defined by the American Society for Testing and Materials (ASTM) in ASTM D396;
- Diesel fuel oil numbers 1 or 2, as defined in ASTM D975;
- Kerosene, as defined in ASTM D3699;
- Biodiesel, as defined in ASTM D6751; or
- Biodiesel blends, as defined in ASTM D7467.

Portable Engine means an internal combustion engine which is portable or transportable, meaning designed to be and capable of being carried or moved from one location to another. Indicia of transportability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform. This definition does NOT include engines which remain or will remain at a location (excluding storage locations) for more than 12 consecutive months or a shorter period of time for an engine located at a seasonal source. A location is any single site at a building, structure, facility, or installation. Any engine that replaces an engine at a location and that is intended to perform the same or similar function as the engine replaced will be included in calculating the consecutive time period.

An engine is not a non-road (portable) engine if it remains or will remain at a location for more than 12 consecutive months or for a shorter period of time if sited at a seasonal source. A seasonal source is a source that remains in a single location for two years or more and which operates for fewer than 12 months in a calendar year. If an engine operates at a seasonal source for one entire season, the engine does not meet the criteria of a non-road (portable) engine and is subject to applicable stationary engine requirements.

E. Application Classification

All rules, regulations, or statutes referenced in this air emission license refer to the amended version in effect as of the issued date of this license.

The application for JRL does not include the licensing of increased emissions or the installation of new or modified equipment; therefore, the license is considered to be a Part 70 License renewal issued under *Part 70 Air Emission License Regulations*, 06-096 C.M.R. ch. 140.

F. Facility Description

The State of Maine (Bureau of General Services) owns the Juniper Ridge Landfill which is currently operated by NEWSME Landfill Operations, LLC. Gases formed from the decomposition of the landfill materials are collected and controlled by the facility's three flares. JRL has installed and operates equipment for the control of the total reduced sulfur (TRS) compounds in the landfill gas (LFG) prior to the LFG being combusted in the flares.

An independent facility (Archaea) is planned and permitted to be co-located with JRL. Archaea will process JRL's LFG for sale or beneficial use. The processing of the LFG at the Archaea facility is considered a treatment system equivalent to the facility's flares.

G. General Facility Requirements

JRL is subject to the following state and federal regulations listed below in addition to the regulations listed for specific units as described further in this license.

Citation	Requirement Title
06-096 C.M.R. ch. 101	Visible Emissions Regulation
06-096 C.M.R. ch. 102	Open Burning
06-096 C.M.R. ch. 103	Fuel Burning Equipment Particulate Emission Standard
06-096 C.M.R. ch. 109	Emergency Episode Regulations
06-096 C.M.R. ch. 110	Ambient Air Quality Standards
06-096 C.M.R. ch. 116	Prohibited Dispersion Techniques
06-096 C.M.R. ch. 137	Emission Statements
06-096 C.M.R. ch. 140	Part 70 Air Emission License Regulations
06-096 C.M.R. ch. 143	New Source Performance Standards
06-096 C.M.R. ch. 144	National Emission Standards for Hazardous Air Pollutants
40 C.F.R. Part 60, Subpart XXX	Standards of Performance for Municipal Solid Waste Landfills that Commenced Construction, Reconstruction, or Modification After July 17, 2014
40 C.F.R. Part 63, Subpart AAAA	National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills
40 C.F.R. Part 63, Subpart ZZZZ	National Emission Standard for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines
40 C.F.R. Part 70	State Operating Permit Programs
40 C.F.R. Part 98	Mandatory Greenhouse Gas Reporting

II. BEST PRACTICAL TREATMENT (BPT) AND EMISSION STANDARDS

A. Introduction

In order to receive a license, the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in *Definitions Regulation*, 06-096 C.M.R. ch. 100. Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas.

BPT for existing emissions equipment means that method which controls or reduces emissions to the lowest possible level considering:

- the existing state of technology;
- the effectiveness of available alternatives for reducing emission from the source being considered; and
- the economic feasibility for the type of establishment involved.

B. NO_x RACT (Reasonably Available Control Technology)

Reasonably Available Control Technology for Facilities that Emit Nitrogen Oxides, 06-096 C.M.R. ch. 138 (NO_x RACT) is applicable to sources that have the potential to emit quantities of NO_x equal to or greater than 100 tpy. Annual emissions of NO_x from JRL are limited to less than 100 tpy. Therefore, NO_x RACT does not apply to this facility.

C. VOC RACT (Reasonably Available Control Technology)

Reasonably Available Control Technology for Facilities that Emit Volatile Organic Compounds, 06-096 C.M.R. ch. 134 (VOC RACT) is applicable to sources that have the potential to emit quantities of VOC equal to or greater than 40 tpy from non-exempt equipment. Annual emissions of VOC from JRL are limited to less than 40 tpy. Therefore, NO_x RACT does not apply to this facility.

D. Mandatory Greenhouse Gas (GHG) Reporting

Federal regulation *Mandatory Greenhouse Gas Reporting,* 40 C.F.R. Part 98, which contains GHG reporting and related monitoring and recordkeeping requirements, is applicable to the owners/operators of any facility which falls into any one of the following three categories, per *General Provisions, Who must report?*, 40 C.F.R. § 98.2.

(a)(1) A facility that contains any source category that is listed in Table A–3 of this subpart in any calendar year starting in 2010.

(a)(2) A facility that contains any source category that is listed in Table A–4 of this subpart and that emits 25,000 metric tons CO_2e or more per year in combined emissions from stationary fuel combustion units, miscellaneous uses of carbonate, and all applicable source categories that are listed in Table A–3 and Table A–4 of this subpart.

(a)(3) A facility that in any calendar year starting in 2010 meets all three of the conditions listed in this paragraph (a)(3). For these facilities, the annual GHG report must cover emissions from stationary fuel combustion sources only.

(i) The facility does not meet the requirements of either paragraph (a)(1) or (a)(2) of this section.

(ii) The aggregate maximum rated heat input capacity of the stationary fuel combustion units at the facility is 30 MMBtu/hour or greater.

(iii) The facility emits 25,000 metric tons CO_2e or more per year in combined emissions from all stationary fuel combustion sources.

Table A-3 of Subpart 98 requires reporting for municipal solid waste landfills that generate methane (CH_4) in amounts equivalent to 25,000 metric tons CO_2e or more per year. JRL meets this criteria. Therefore, pursuant to 40 C.F.R. § 98.2(a)(1), JRL shall fulfill the recordkeeping and reporting requirements of 40 C.F.R. Part 98.

E. Compliance Assurance Monitoring (CAM)

Compliance Assurance Monitoring, 40 C.F.R. Part 64 is applicable to units at major sources if the unit has emission limits, a control device to meet the limits, and pre-control emissions greater than 100% of the major source threshold (50 tons/year for VOC and 100 tpy for any other pollutant).

This regulation's 40 C.F.R. § 64.2(b)(1)(vi) specifies the exemption from specific CAM requirements for any emission unit subject to emission limitations or standards for which a Part 70 air emission license specifies a continuous compliance determination method. Furthermore, 40 C.F.R. § 64.2(b)(1)(i) specifies the exemption from specific CAM requirements for any emission unit subject to emission limitations or standards in a NSPS or NESHAP regulation proposed by the Administrator after November 15, 1990. [40 C.F.R. Part 64 § 64.2(b)]

The following table lists all the specific pollutants for each unit meeting CAM applicability criteria and the determination of the applicability of CAM requirements for each.

40 C.F.R. Part 64 Applicability Table

Unit	Pollutant	CAM Required	Reason	Regulatory Authority
Landfill	VOC	No	Subject to standard in NESHAP 40 C.F.R. Part 63, Subpart AAAA proposed after Nov. 15, 1990	40 C.F.R. § 64.2(b)(1)(i)
Flares	SO_2	Yes	Thiopaq® system is used to meet short-term (lb/hr) and annual (tpy) emission limits for SO_2. Pre-control emissions exceed 100 tpy.	40 C.F.R. § 64.2(a)

JRL submitted a CAM plan for emissions of SO_2 as summarized below.

Unit	Eligible Pollutant	Indicator	Recording Frequency
Flares	SO_2	TRS concentration exiting TRS control equipment	See Note 1
		LFG flow to each flare and to the Archaea facility	Totalized Monthly; See Note 1

Note 1: JRL shall sample the TRS content of the landfill gas to be flared three times during a single day (i.e., three samples at the inlet to the scrubber and three samples at the scrubber outlet) once per month using a test method approved

by the Department. JRL shall record the gas flow rate on the days of sampling events. The average of the sampling results for each month, along with the associated gas flow rates, shall be used to estimate the monthly SO_2 emissions based on the assumption that TRS compounds are converted to SO_2 during combustion. Records of SO_2 emissions shall be kept on a monthly and 12-month rolling total basis.

The CAM requirements are incorporated in this license.

F. Fuel Sulfur Content Requirements

Generator #1 is licensed to fire distillate fuel which, by definition, has a sulfur content of 0.5% or less by weight. Per 38 M.R.S. § 603-A(2)(A)(3), as of July 1, 2018, no person shall import, distribute, or offer for sale any distillate fuel with a sulfur content greater than 0.0015% by weight (15 ppm). Therefore, the distillate fuel purchased or otherwise obtained for use at this facility shall not exceed 0.0015% by weight (15 ppm).

G. Solid Waste Landfill

JRL operates a municipal solid waste landfill with a design capacity greater than 2.5 million megagrams and 2.5 million cubic meters with a calculated non-methane organic compound (NMOC) emission rate greater than 34 megagrams per year.

1. Clarification of Terms – TRS, H_2S, and SO_2

   This license addresses the control of total reduced sulfur (TRS) present in the landfill gas. Based on actual periodic TRS grab sample tests performed at the facility, the speciation results show that hydrogen sulfide (H_2S) is the primary TRS constituent of the landfill gas (approximately 99%) with the remaining 1% consisting of additional various sulfur containing compounds. This license includes requirements for total TRS as well as TRS measured as H_2S.

   The combustion of TRS gases results in the formation of sulfur dioxide (SO_2). The SO_2 emissions are directly correlated to the amount of sulfur in the landfill gas prior to combustion.

2. Control Equipment

   The LFG generated at JRL is collected and then flared or sent to the Archaea facility for treatment. JRL is equipped with an active gas collection and control system which consists of gas extraction wells and horizontal gas collection trenches that connect by a system of gas conveyance lines to a vacuum blower and then to the flares.

The primary flare at JRL is Flare #4, rated at 106.5 MMBtu/hr (3,550 scfm). Flares #2 and #3 are to be used as back-up and are rated at 22.5 MMBtu/hr (750 scfm) and 40.5 MMBtu/hr (1,350 scfm), respectively. The flare LFG flow rates were calculated assuming the LFG consists of approximately 50% methane and has a heat content of 500 Btu/scf. Flares #2 and #3 are not licensed to operate simultaneously with Flare #4. Flares #2 and #3 are expected to be operated together to handle the gas flow when used as back-up to Flare #4 and shall be limited to 100 hours of operation per calendar year each. All flares are located on the southeast end of the facility when in operation. Flares may be stored in other locations when not operating.

SO_2 is emitted as a result of combustion of TRS compounds in the LFG. As part of New Source Review (NSR) Amendment A-921-77-3-M (issued 2/7/2014), JRL agreed to install and operate a sulfur treatment system to maintain concentration of TRS compounds in LFG to less than or equal to 1,000 ppmv.

In January 2015, JRL installed and began operating a Thiopaq® sulfur treatment system as part of the gas control system to remove TRS compounds from the LFG prior to combustion in the flares. The Thiopaq® system is also required to be used if the LFG is sent to Archaea for treatment.

JRL maintains the flexibility to operate other temporary or additional TRS control equipment (e.g., SulfaTreat) for cases of scrubber downtime or temporary surges in LFG flow or TRS concentration, provided licensed limits are met.

The flares, in conjunction with the sulfur treatment system, have previously been determined to meet BACT for all criteria pollutants.

3. New Source Performance Standards (NSPS) and National Emissions Standards for Hazardous Air Pollutants (NESHAP)

JRL commenced construction on a design capacity increase on May 7, 2018, making the facility subject to NSPS *Standards of Performance for Municipal Solid Waste Landfills That Commenced Construction, Reconstruction, or Modification After July 17, 2014*, 40 C.F.R. Part 60, Subpart XXX. JRL is also subject to *National Emission Standards for Hazardous Air Pollutants (NESHAP): Municipal Solid Waste Landfills*, 40 C.F.R. Part 63, Subpart AAAA.

Many of the requirements in Subpart XXX and Subpart AAAA are duplicative, overlapping or referring to the other regulation for compliance. Therefore, the requirements of these two regulations will be addressed simultaneously in this license amendment.

On March 26, 2020, NESHAP Subpart AAAA was updated with some changes not required to take effect until September 2021. However, JRL was required to begin operating pursuant to NSPS Subpart XXX no later than January 31, 2021. Therefore, JRL agreed to begin complying with both changes in applicable requirements as of the issuance date of air emission license A-921-70-H-A (1/6/2021).

JRL shall comply with all applicable requirements of 40 C.F.R. Part 60, Subpart XXX and 40 C.F.R. Part 63, Subpart AAAA including, but not limited to, the following:

a. Standards

JRL shall install and operate an active collection and control system that meets the requirements of 40 C.F.R. §§ 60.762(b)(2)(ii)(C) and 60.762(b)(2)(iii).
[40 C.F.R. § 60.762(b)(2)(ii)]

JRL has elected to control emissions of NMOC through use of either a non-enclosed flare (Flares #2, #3, and #4) pursuant to § 60.762(b)(2)(iii)(A) or by routing the gas to a treatment system that processes the gas for sale or beneficial use (Archaea facility) pursuant to § 60.762(b)(2)(iii)(C).

b. Operation

JRL has elected to comply with the operational standards, compliance provisions, and monitoring requirements of NSPS §§ 60.763, 60.765, and 60.766 by complying with the similar provisions of NESHAP §§ 63.1958, 63.1960, 63.1961. However, by electing to comply with the NESHAP Subpart AAAA requirements, JRL must continue to operate the collection and control devices pursuant to those requirements and cannot return to the provisions of NSPS §§ 60.763, 60.765, and 60.766. [40 C.F.R. § 60.762(b)(2)(iv)]

(1) JRL shall operate the collection system with negative pressure at each wellhead except under the following conditions:

(i) A fire or increased well temperature (i.e., > 145 °F). JRL must record instances when positive pressure occurs in efforts to avoid a fire. These records must be submitted with the semi-annual reports.
(ii) Areas of the landfill where a geomembrane or synthetic cover is being used and acceptable pressure limits as specified in the design plan are maintained.
(iii)A decommissioned well.
[40 C.F.R. § 63.1958(b)]

(2) JRL shall operate each interior wellhead in the collection system with a landfill gas temperature less than 145 °F. JRL may establish a higher operating temperature value for a particular well(s) by submitting a request to the Department demonstrating that the elevated temperature neither causes fires nor significantly inhibits anaerobic decomposition by killing methanogens. [40 C.F.R. § 63.1958(c)]

(3) JRL shall operate the collection system so that the methane concentration is less than 500 parts per million (ppm) above background at the surface of the landfill. [40 C.F.R. § 63.1958(d)(1)]

Background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the perimeter wells. [40 C.F.R. § 63.1960(c)(2)]

(4) If monitoring demonstrates that the operational requirements listed above are not met, corrective action shall be taken as specified in 40 C.F.R. §§ 63.1960(a)(3) and (c)(4). As long as the specified actions are taken, the monitored exceedance is not a deviation of the operational requirements. [40 C.F.R. § 63.1958(g)]

(5) JRL shall operate the control system at all times when the collected gas is routed to the system. [40 C.F.R. § 63.1958(f)]

(6) The collection and control requirements apply at all times, including periods of startup, shutdown, and malfunction (SSM). During periods of SSM, JRL shall comply with the following work practice standards [40 C.F.R. § 63.1960(e)(2)]:

In the event the collection or control system is not operating:

(i) The gas mover system must be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere must be closed within 1 hour.
(ii) Efforts to repair the collection or control system must be initiated and completed in a manner such that downtime is kept to a minimum, and the collection and control system must be returned to operation.

[40 C.F.R. § 63.1958(e)]

c. Monitoring

(1) For the purpose of demonstrating whether the gas collection system flow rate is sufficient, JRL shall measure gauge pressure monthly in the gas collection header applied to each individual well. If a positive pressure exists, JRL shall initiate action to correct the exceedance as specified in 40 C.F.R. § 63.1960(a)(3)(i). [40 C.F.R. §§ 63.1960(a)(3) and 63.1961(a)(1)]

(2) JRL shall monitor each wellhead monthly for nitrogen or oxygen concentration in the landfill gas as specified in 40 C.F.R. § 63.1961(a)(2).

(3) For the purpose of identifying whether excess air infiltration into the landfill is occurring, JRL shall monitor each well monthly for temperature. [40 C.F.R. §§ 63.1960(a)(4) and 63.1961(a)(4)]

(4) If a well exceeds the operating parameter (or approved higher operating value) for temperature, JRL shall:
(i) Initiate action to correct the exceedance as specified in 40 C.F.R. § 63.1960(a)(4)(i); and
(ii) Initiate enhanced monitoring as described in 40 C.F.R. § 63.1961(a)(5).
[40 C.F.R. §§ 63.1960(a)(4) and 63.1961(a)(5)]

(5) JRL shall monitor surface concentrations of methane on a quarterly basis along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30-meter intervals using a monitor specified in 40 C.F.R. § 63.1960(d) and the procedures in 40 C.F.R. § 63.1960(c). [40 C.F.R. §§ 63.1960(c)(1) and 63.1961(f)]

Areas with steep slopes or other dangerous areas may be excluded from the surface testing. [40 C.F.R. § 63.1958(d)(1)]

(6) JRL shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis. [40 C.F.R. § 63.1960(c)(5)]

(7) JRL shall install, calibrate, maintain, and operate according to the manufacturer's specifications:

(i) A heat sensing device at the pilot light or the flame itself of each flare; and
(ii) A device which records the flow to each flare, the landfill gas treatment system (i.e., Archaea facility), and any bypass of these systems.
[40 C.F.R. §§ 63.1961(c) and (g)]

d. Notifications and Reports

(1) JRL submitted an Initial Design Capacity Report and NMOC Emission Rate Report on July 31, 2018.
[40 C.F.R. §§ 60.767(a) and (b) and 40 C.F.R. §§ 63.1981(a) and (c)]

(2) JRL submitted a Gas Collection and Control System Design Plan on July 31, 2019. [40 C.F.R. § 60.767(c) and 40 C.F.R. § 63.1981(d)]

(3) JRL shall submit a revised design plan to the Department and EPA for approval:
(i) At least 90 days before expanding operations to an area not covered by the previously approved design plan; or
(ii) Prior to installing or expanding the gas collection system in a way that is not consistent with the design plan that was previously submitted.
[40 C.F.R. §§ 60.767(d) and 63.1981(e)]

(4) JRL shall submit an Initial Performance Test Report to the Department and EPA by September 30, 2021, which contains the information listed in 40 C.F.R. §§ 60.767(h) and 63.1981(i). [40 C.F.R. §§ 63.7, 60.767(h), and 63.1981(i)]

(5) JRL shall submit to the Department and EPA semi-annual reports which contain the information listed in 40 C.F.R. § 63.1981(h). The initial semi-annual report is due July 31, 2021. [40 C.F.R. § 63.1981(h)]

As described in 40 C.F.R. § 60.767(g), the semi-annual report takes the place of the annual report required by Subpart XXX.

(6) Reports shall be submitted electronically pursuant to 40 C.F.R. §§ 60.767(i) and 63.1981(l), (m), and (n).

(7) Unless a higher operating temperature value has been approved by the Department under Subpart XXX, if a landfill gas temperature measured at the wellhead or at any point in the well is greater than or equal to 170 °F and the carbon monoxide concentration measured is greater than or equal to 1,000 ppm, JRL shall submit a report to the Department via email within 24 hours. The report shall contain the date, time, well identifier, temperature, and carbon monoxide reading. [40 C.F.R. § 63.1981(k)]

e. Records

(1) JRL shall keep for at least five years up-to-date, readily accessible, on-site records of the design capacity report, the current amount of solid waste in-place, and the year-by-year waste acceptance rate. Off-site records may be maintained if they are retrievable within four hours. Either paper copy or electronic formats are acceptable. [40 C.F.R. §§ 60.768(a) and 63.1983(a)]

(2) JRL shall keep up-to-date, readily accessible records of the following:

(i) The date upon which JRL began complying with the provisions of 40 C.F.R. §§ 63.1958, 63.1960, and 63.1961 in lieu of §§ 60.763, 60.765, and 60.766; [40 C.F.R. § 60.768(e)(6)]
(ii) The applicable data listed in 40 C.F.R. §§ 60.768(b)(1) and 63.1983(b);
(iii) Indication of flow to the control system and the indication of bypass flow; [40 C.F.R. §§ 60.768(c)(2) and 63.1983(c)(2)]
(iv) Monitoring of each flare flame or pilot flame including all periods of operation in which the flame or flare pilot flame were absent; [40 C.F.R. §§ 60.768(c)(4) and 63.1983(c)(4)]
(v) Periods when the collection system or control device is not operating; [40 C.F.R. §§ 60.768(c)(5) and 63.1983(c)(5)]
(vi) Date and time of any SSM event in which the collection and control system was not operated, including the times the gas mover system was shut down and all venting ceased. [40 C.F.R. § 63.1958(e)]
(vii) Date, time, and duration of each startup and/or shutdown period for each control device; [40 C.F.R. § 63.1983(c)(6)]
(viii) The information contained in 40 C.F.R. § 63.1983(c)(7) for periods when a control device fails to operate as required;
(ix) Maps showing each existing and planned collector in the system providing a unique identification location label for each collector, for the life of the collection system; [40 C.F.R. §§ 60.768(d) and 63.1983(d)]
(x) All collection and control system exceedances of the operational standards, the reading in the subsequent month whether or not the second reading is an exceedance, and the location of each exceedance; [40 C.F.R. § 63.1983(e)(1)]
(xi) Each wellhead temperature monitoring value of 145 °F or above; [40 C.F.R. § 63.1983(e)(2)(i)]
(xii) All enhanced monitoring activities due to an exceedance of the operating parameter for temperature; [40 C.F.R. § 63.1983(e)(2)(ii)]
(xiii) Email transmissions of 24-hour high temperature reports; [40 C.F.R. § 63.1983(e)(2)(iii)]

(xiv) Any root cause analysis as specified in 40 C.F.R. §§ 63.1983(e)(3) and (4); and

(xv) All collection and control system monitoring data required by 40 C.F.R. § 63.1961(a)(1) thru (6). [40 C.F.R. § 63.1983(g)]

4. Emission Limits and Streamlining

a. Criteria Pollutants and Hazardous Air Pollutants

For the Solid Waste Landfill, a listing of potentially applicable emission standards, the origin and authority of the standards, notation if streamlining of the standards has been requested (* denotes a request for streamlining), and the applicable emission limits can be found below. Limits are on a 1-hour block average basis unless otherwise stated.

Solid Waste Landfill (facility-wide)			
Pollutant	**Applicable Emission Standards**	**Origin and Authority**	**Licensed Emission Limits**
VOC	39.9 tpy	06-096 C.M.R. ch. 140, BPT **Enforceable by State-only**	39.9 tpy
Single HAP	9.9 tpy	06-096 C.M.R. ch. 140, BPT (A-921-70-B-R, 10/7/2014) **Enforceable by State-only**	9.9 tpy
Total HAP	24.9 tpy	06-096 C.M.R. ch. 140, BPT (A-921-70-B-R, 10/7/2014) **Enforceable by State-only**	24.9 tpy

All Flares Combined			
Pollutant	**Applicable Emission Standards**	**Origin and Authority**	**Licensed Emission Limits**
SO_2 (All flares combined)	449.0 tpy	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	449.0 tpy

Flare #2			
Pollutant	**Applicable Emission Standards**	**Origin and Authority**	**Licensed Emission Limits**
PM	0.38 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	0.38 lb/hr
PM_{10}	0.38 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	0.38 lb/hr
$PM_{2.5}$	0.38 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	0.38 lb/hr
SO_2	33.09 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	33.09 lb/hr
NO_x	1.53 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	1.53 lb/hr
CO	8.33 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	8.33 lb/hr
VOC	0.07 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	0.07 lb/hr

Flare #3			
Pollutant	**Applicable Emission Standards**	**Origin and Authority**	**Licensed Emission Limits**
PM	0.69 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	0.69 lb/hr
PM_{10}	0.69 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	0.69 lb/hr
$PM_{2.5}$	0.69 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	0.69 lb/hr
SO_2	59.56 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	59.56 lb/hr
NO_x	2.75 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	2.75 lb/hr
CO	14.99 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	14.99 lb/hr
VOC	0.12 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	0.12 lb/hr

Flare #4			
Pollutant	**Applicable Emission Standards**	**Origin and Authority**	**Licensed Emission Limits**
PM	1.81 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	1.81 lb/hr
PM_{10}	1.81 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	1.81 lb/hr
$PM_{2.5}$	1.81 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	1.81 lb/hr
SO_2	157.0 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	157.0 lb/hr
NO_x	7.24 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	7.24 lb/hr
CO	39.41 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	39.41 lb/hr
VOC	0.32 lb/hr	06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)	0.32 lb/hr

b. Visible Emissions

Visible emissions from Flares #2, #3, and #4 shall each not exceed 20% opacity on a 6-minute block average basis. [06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)]

The BACT visible emission limit listed above is determined to be more stringent than the applicable limit in 06-096 C.M.R. ch. 101. Therefore, the visible emission limit for the flares has been streamlined to the more stringent BACT limit and only the more stringent limit shall be included in this air emission license.

Visible emissions from a fugitive emission source (including stockpiles and roadways) shall not exceed 20% opacity on a 5-minute block average basis. [06-096 C.M.R. ch. 101, § 3(C)]

5. Emission Limit Compliance Methods

Compliance with the SO_2 lb/hr and tpy limits and the TRS ppmv limit shall be based on sampling of the landfill gas entering and exiting the control equipment three times during a single day (i.e. three samples at the inlet to the scrubber and three samples at the scrubber outlet) once per month using a test method approved by the Department. JRL shall record the gas flow rate on the days of sampling events. The average of the sampling results for each month, along with the associated gas flow rates, shall be used

to estimate the monthly SO_2 emissions based on the assumption that TRS compounds are converted to SO_2 during combustion. Compliance with the SO_2 lb/hr and tpy limits and the TRS ppmv limit shall be based on a 12-month rolling average. [060-96 C.M.R. ch. 115, BACT (A-921-77-4-M, 5/9/2014)]

Compliance with all other emission limits associated with the flares shall be demonstrated upon request by the Department.

Compliance with the facility-wide VOC and HAP emission limits shall be demonstrated by calculating actual emissions at least once annually as required by *Emission Statements*, 06-096 C.M.R. ch. 137.

6. Compliance Assurance Monitoring

CAM is applicable to SO_2 emissions from the flares. The CAM monitoring requirements are included in the monitoring sections below.

7. Periodic Monitoring

JRL shall record data and maintain records for the following periodic monitoring values in addition to the monitoring required by 40 C.F.R. Part 60, Subpart XXX and 40 C.F.R. Part 63, Subpart AAAA.

Item to be Monitored	Units of Measure	Monitoring Tool/Method	Frequency
TRS concentration entering TRS control equipment	ppmv	Periodic TRS grab sample tests (or equivalent method)	See Note 1
LFG flow entering TRS control equip (daily average)	scfm	Flow meter	See Note 2
LFG flow exiting TRS control equip (daily average)	scfm	Flow meter	See Note 2
H_2S concentration entering TRS control equip	ppmv	Colorimetric tubes	See Note 2
H_2S concentration exiting TRS control equip	ppmv	Colorimetric tubes	See Note 2
Control Equipment Downtime	Hours	Record in logbook with explanation	As occurs
Unscrubbed bypass	Hours	Record in logbook with explanation	As occurs

Item to be Monitored	Units of Measure	Monitoring Tool/Method	Frequency
Calibration of flow meters	Dates	As specified by manufacturer	Once per year
Propane fuel use	gal	Purchase records	Monthly
Hours of Operation for each flare	Dates & Hours	Logbook	As occurs

Note 1: JRL shall sample the TRS content of the landfill gas to be flared three times during a single day (i.e., three samples at the inlet to the scrubber and three samples at the scrubber outlet) once per month using a test method approved by the Department. JRL shall record the gas flow rate on the days of sampling events. The average of the sampling results for each month, along with the associated gas flow rates, shall be used to estimate the monthly SO_2 emissions based on the assumption that TRS compounds are converted to SO_2 during combustion. Records of SO_2 emissions shall be kept on a monthly and 12-month rolling total basis.

Note 2: JRL shall sample the landfill gas H_2S concentration (both entering and exiting the control equipment) twice in the same day (morning and afternoon, with at least four hours between the two sample times) using colorimetric tubes and average the samples for that day. This sampling method shall occur at least two times per week with at least three days between samples. The colorimetric tube data shall be used as an operational tool and not for determining compliance with numerical emission limits.

8. Parameter Monitors

During all operating times, JRL shall operate, record data, and maintain records from the following parameter monitors in accordance with JRL's approved CAM plan:

Item to be Monitored	Units of Measure	Monitoring Tool/Method	Frequency
TRS concentration exiting TRS control equipment	ppmv (12-month rolling average basis)	Periodic TRS grab sample tests (or equivalent method)	See Note 1
LFG flow to each flare and to the Archaea facility	scf	Flow meter	Totalized Monthly; See Note 1

[40 C.F.R. Part 64]

Note 1: JRL shall sample the TRS content of the landfill gas to be flared three times during a single day (i.e. three samples at the inlet to the scrubber and three samples at the scrubber outlet) once per month using a test method approved by the Department. JRL shall record the gas flow rate on the days of sampling events. The average of the sampling results for each month, along with the associated gas flow rates, shall be used to estimate the monthly SO_2 emissions based on the assumption that TRS compounds are converted to SO_2 during combustion. Records of SO_2 emissions shall be kept on a monthly and 12-month rolling total basis.

9. CEMS and COMS

There are no CEMS or COMS associated with the Solid Waste Landfill.

H. Generator #1

JRL operates one stationary emergency generator (Generator #1). It is a generator set consisting of an engine and an electrical generator. Generator #1's engine is rated at 2.33 MMBtu/hr firing distillate fuel with a maximum sulfur content of 0.0015% by weight. The engine was manufactured on March 16, 2006.

1. New Source Performance Standards (NSPS)

Generator #1 is not subject to *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines*, 40 C.F.R. Part 60, Subpart IIII, because it was manufactured prior to April 1, 2006.

2. National Emissions Standards for Hazardous Air Pollutants (NESHAP)

National Emission Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines 40 C.F.R. Part 63, Subpart ZZZZ is applicable to Generator #1. The unit is considered an existing, emergency stationary reciprocating internal combustion engines (RICE) at an area HAP source and is not subject to New Source Performance Standards regulations. EPA's August 9, 2010 memo (*Guidance Regarding Definition of Residential, Commercial, and Institutional Emergency Stationary RICE in the NESHAP for Stationary RICE*) specifically does not exempt these units from the federal requirements.

a. Emergency Engine Designation and Operating Criteria

Under Subpart ZZZZ, a stationary reciprocating internal combustion engine (RICE) is considered an **emergency** stationary RICE (emergency engine) as long as the engine is operated in accordance with the following criteria. Operation of an engine outside of the criteria specified below may cause the engine to no longer be considered an emergency engine under Subpart ZZZZ, resulting in the engine being subject to requirements applicable to **non-emergency** engines.

(1) Emergency Situation Operation (On-Site)

There is no operating time limit on the use of an emergency engine to provide electrical power or mechanical work during an emergency situation. Examples of use of an emergency engine during emergency situations include the following:

- Use of an engine to produce power for critical networks or equipment (including power supplied to portions of a facility) because of failure or interruption of electric power from the local utility (or the normal power source, if the facility runs on its own power production);
- Use of an engine to mitigate an on-site disaster or equipment failure;
- Use of an engine to pump water in the case of fire, flood, natural disaster, or severe weather conditions; and
- Similar instances.

(2) Non-Emergency Situation Operation

An emergency engine may be operated up to a maximum of 100 hours per calendar year for maintenance checks, readiness testing, and other non-emergency situations as described below.

(i) An emergency engine may be operated for a maximum of 100 hours per calendar year for maintenance checks and readiness testing, provided that the tests are recommended by federal, state, or local government; the

manufacturer; the vendor; the regional transmission organization or equivalent balancing authority and transmission operator; or the insurance company associated with the engine. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that federal, state, or local standards require maintenance and testing of emergency RICE more than 100 hours per calendar year.

(ii) An emergency engine may be operated for up to 50 hours per calendar year for other non-emergency situations. **However, these operating hours are counted as part of the 100 hours per calendar year operating limit described in paragraph (2) and (2) (i) above.**

The 50 hours per calendar year operating limit for other non-emergency situations cannot be used for peak shaving, demand response, or to generate income for a facility by providing power to an electric grid or otherwise supply power as part of a financial arrangement with another entity.

Generator #1 shall be limited to the usage outlined in 40 C.F.R. § 63.6640(f) and therefore may be classified as an existing emergency stationary RICE as defined in 40 C.F.R. Part 63, Subpart ZZZZ. Failure to comply with all of the requirements listed in 40 C.F.R. § 63.6640(f) may cause this engine to not be considered an emergency engine and therefore subject to all applicable requirements for non-emergency engines.

b. 40 C.F.R. Part 63, Subpart ZZZZ Requirements

(1) Operation and Maintenance Requirements
(40 C.F.R. § 63.6603(a) and Table 2(d))

	Operating Limitations
Compression ignition (distillate fuel) units:	- Change oil and filter every 500 hours of operation or annually, whichever comes first; - Inspect the air cleaner every 1000 hours of operation or annually, whichever comes first, and replace as necessary; and - Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

The engine shall be operated and maintained according to the manufacturer's emission-related written instructions, or JRL shall develop a maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions. [40 C.F.R. § 63.6625(e)]

(2) Optional Oil Analysis Program
JRL has the option of utilizing an oil analysis program which complies with the requirements of § 63.6625(i) in order to extend the specified oil change requirement. If this option is used, JRL must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine. [40 C.F.R.§ 63.6625(i)]

(3) Non-Resettable Hour Meter Requirement
A non-resettable hour meter shall be installed and operated on the engine.
[40 C.F.R. § 63.6625(f)]

(4) Startup Idle and Startup Time Minimization Requirements
During periods of startup the facility must minimize the engine's time spent at idle and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes.
[40 C.F.R. § 63.6625(h) and 40 C.F.R. Part 63, Subpart ZZZZ Table 2d]

(5) Annual Time Limit for Maintenance and Testing
As an emergency engine, the unit shall be limited to 100 hours/year for maintenance checks and readiness testing. Up to 50 hours/year of the 100 hours/year may be used in non-emergency situations (this does not include peak shaving, demand response, or to generate income for a facility by providing power to an electric grid or otherwise supply power as part of a financial arrangement with another entity). [40 C.F.R. § 63.6640(f)]

(6) Recordkeeping
JRL shall keep records that include maintenance conducted on the engine and the hours of operation of the engine recorded through the non-resettable hour meter. Documentation shall include the number of hours the unit operated for emergency purposes, the number of hours the unit operated for non-emergency purposes, and the reason the engine was in operation during each time.
[40 C.F.R. § 63.6655(f)]

3. Emission Limits and Streamlining

a. Criteria Pollutants

For Generator #1, a listing of potentially applicable emission standards, the origin and authority of the standards, notation if streamlining of the standards has been requested ("*" denotes a request for streamlining), and the applicable emission limits can be found below. Limits are on a 1-hour block average basis unless otherwise stated.

Pollutant	Applicable Emission Standards	Origin and Authority	Licensed Emission Limits
PM	0.72 lb/hr	06-096 C.M.R. ch. 140, BPT **Enforceable by State-only**	0.72 lb/hr
PM_{10}	0.72 lb/hr	06-096 C.M.R. ch. 140, BPT **Enforceable by State-only**	0.72 lb/hr
$PM_{2.5}$	0.72 lb/hr	06-096 C.M.R. ch. 140, BPT **Enforceable by State-only**	0.72 lb/hr
SO_2	considered negligible based on 0.0015% sulfur fuel		
NO_x	10.28 lb/hr	06-096 C.M.R. ch. 140, BPT **Enforceable by State-only**	10.28 lb/hr
CO	2.21 lb/hr	06-096 C.M.R. ch. 140, BPT **Enforceable by State-only**	2.21 lb/hr
VOC	0.82 lb/hr	06-096 C.M.R. ch. 140, BPT **Enforceable by State-only**	0.82 lb/hr

b. Visible Emissions

Visible emissions from Generator #1 shall not exceed 20% opacity on a six-minute block average basis except for periods of startup during which time JRL may comply with the following work practice standards in lieu of the numerical visible emissions standard. [06-096 C.M.R. ch. 101, § 3(A)(4)]

(1) Maintain a log (written or electronic) of the date, time, and duration of all generator startups.

(2) Operate Generator #1 in accordance with the manufacturer's emission-related operating instructions.

(3) Minimize the engine's time spent at idle during startup and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the non-startup emission limitations shall apply.

(4) Operate Generator #1, including any associated air pollution control equipment, at all times in a manner consistent with safety and good air pollution control practices for minimizing emissions. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Department that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the unit.

4. Emission Limit Compliance Methods

Compliance with the emission limits associated with Generator #1 shall be demonstrated in accordance with the appropriate test methods upon request of the Department.

5. Compliance Assurance Monitoring

CAM is not applicable to Generator #1.

6. Periodic Monitoring

JRL shall record data and maintain records for the following periodic monitoring values for Generator #1.

a. Hours of operating time on a calendar year basis. [06-096 C.M.R. ch. 137]
b. Log of the duration and reasons for all operating times as they occur. [40 C.F.R. §§ 63.6655(f)]
c. Records of all maintenance conducted. [40 C.F.R. §§ 63.6655(e)]
d. Sulfur content of the distillate fuel fired. [06-096 C.M.R. ch. 140, BPT]

I. Portable Engines

Facility may operate portable engines on-site for maintenance and emergency-only purposes. Depending on their size and age, these engines may be subject to *Visible Emissions Regulation*, 06-096 C.M.R. ch. 101 and *Fuel Burning Equipment Particulate Emission Standard*, 06-096 C.M.R. ch. 103.

Any engine which cannot meet the definition of "portable engine" as defined by this license may be subject to additional State and Federal regulations. A license amendment may be necessary for a portable engine to be reclassified as stationary.

J. Emission Statements

JRL is subject to emissions inventory requirements contained in *Emission Statements*, 06-096 C.M.R. ch. 137. JRL shall maintain the following records in order to comply with this rule:

1. Hours each flare is operating on a monthly and calendar year basis;
2. Hours of operation of Generator #1 on a monthly and calendar year basis;
3. Amount of distillate fuel fired in Generator #1 on a calendar year basis;
4. The sulfur content of the distillate fuel fired in Generator #1;
5. LFG flow to each flare and the Archaea facility on a monthly and calendar year basis;
6. Site-specific sampling data on the NMOC concentration of the LFG;
7. TRS concentration of the LFG measured on a monthly basis; and
8. Calculations of the VOC and HAP emissions from the facility on a calendar year total basis.

In reporting year 2020 and every third year thereafter, JRL shall report to the Department emissions of hazardous air pollutants as required by 06-096 C.M.R. ch. 137, § (3)(C). The Department will use these reports to calculate and invoice for the applicable annual air quality surcharge for the subsequent three billing periods. JRL shall pay the annual air quality surcharge, calculated by the Department based on these reported emissions of hazardous air pollutants, by the date required in Title 38 M.R.S. § 353-A(3).
[38 M.R.S. § 353-A(1-A)]

K. Facility Annual Emissions

The table below provides an estimate of facility-wide annual emissions for the purposes of calculating the facility's annual air license fee. Only licensed equipment is included, i.e., emissions from insignificant activities are excluded. Similarly, unquantifiable fugitive particulate matter emissions are not included. Maximum potential emissions were calculated based on the following assumptions:

- Firing Flare #4 at its rated capacity (106.5 MMBtu/hr, 3,550 scfm of landfill gas with 50% methane) for 8,760 hr/year;
- Prohibition of Flares #2 and #3 firing simultaneously with Flare #4;
- A facility-wide limit on SO_2 and VOC; and
- Operating Generator #1 for 100 hrs/yr

Please note, this information provides the basis for fee calculation only and should not be construed to represent a comprehensive list of license restrictions or permissions. That information is provided in the Order section of this license.

Total Licensed Annual Emissions for the Facility
Tons/year
(used to calculate the annual license fee)

	PM	PM_{10}	$PM_{2.5}$	SO_2	NO_x	CO	VOC
Flares	7.9	7.9	7.9	–	31.7	172.6	–
Generator #1	0.1	0.1	0.1	–	0.5	0.1	–
Facility-wide limit	–	–	–	449.0	–	–	39.9
Total TPY	**8.0**	**8.0**	**8.0**	**449.0**	**32.2**	**172.7**	**39.9**

Pollutant	Tons/year
Single HAP	9.9
Total HAP	24.9

III. AMBIENT AIR QUALITY ANALYSIS

JRL previously submitted an ambient air quality analysis demonstrating that emissions from the facility, in conjunction with all other sources, do not violate ambient air quality standards (see license A-921-77-2-A, issued 11/26/2012). An additional ambient air quality analysis is not required for this Part 70 License.

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that emissions from this source:

- will receive Best Practical Treatment;
- will not violate applicable emissions standards; and
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants the Part 70 License A-921-70-F-R pursuant to 06-096 C.M.R. ch. 140 and the preconstruction permitting requirements of 06-096 C.M.R. ch. 115 and subject to the standard and specific conditions below.

All federally enforceable and State-only enforceable conditions in existing air licenses previously issued to JRL pursuant to the Department's preconstruction permitting requirements have been incorporated into this Part 70 license, except for such conditions that the Department has determined are obsolete, extraneous, or otherwise environmentally insignificant, as explained in

the Findings of Fact accompanying this Order. As such, the conditions in this license supersede all previously issued air license conditions.

Federally enforceable conditions in this Part 70 license must be changed pursuant to the applicable requirements in *Major and Minor Source Air Emission License Regulations*, 06-096 C.M.R. ch. 115 for making such changes and pursuant to the applicable requirements in 06-096 C.M.R. ch. 140.

For each standard and specific condition which is state enforceable only, state-only enforceability is designated with the following statement: **Enforceable by State-only**.

Severability. The invalidity or unenforceability of any provision of this License or part thereof shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

STANDARD STATEMENTS

(1) Approval to construct shall become invalid if the source has not commenced construction within eighteen (18) months after receipt of such approval or if construction is discontinued for a period of eighteen (18) months or more. The Department may extend this time period upon a satisfactory showing that an extension is justified, but may condition such extension upon a review of either the control technology analysis or the ambient air quality standards analysis, or both. [06-096 C.M.R. ch. 140]

(2) The Part 70 license does not convey any property rights of any sort, or any exclusive privilege. [06-096 C.M.R. ch. 140]

(3) All terms and conditions are enforceable by EPA and citizens under the CAA unless specifically designated as state enforceable. [06-096 C.M.R. ch. 140]

(4) The licensee may not use as a defense in an enforcement action that the disruption, cessation, or reduction of licensed operations would have been necessary in order to maintain compliance with the conditions of the air emission license. [06-096 C.M.R. ch. 140]

(5) Notwithstanding any other provision in the State Implementation Plan approved by the EPA or Section 114(a) of the CAA, any credible evidence may be used for the purpose of establishing whether a person has violated or is in violation of any statute, regulation, or Part 70 license requirement. [06-096 C.M.R. ch. 140]

(6) Compliance with the conditions of this Part 70 license shall be deemed compliance with any Applicable requirement as of the date of license issuance and is deemed a permit shield, provided that:

A. Such Applicable and state requirements are included and are specifically identified in the Part 70 license, except where the Part 70 license term or condition is specifically identified as not having a permit shield; or

B. The Department, in acting on the Part 70 license application or revision, determines in writing that other requirements specifically identified are not applicable to the source, and the Part 70 license includes the determination or a concise summary, thereof.

Nothing in this section or any Part 70 license shall alter or affect the provisions of Section 303 of the CAA (emergency orders), including the authority of EPA under Section 303; the liability of an owner or operator of a source for any violation of Applicable requirements prior to or at the time of permit issuance; or the ability of EPA to obtain information from a source pursuant to Section 114 of the CAA.

The following requirements have been specifically identified as not applicable based upon information submitted by the licensee in their application.

Permit Shield Table

Source	Citation	Description	Basis for Determination
Flares	06-096 C.M.R. ch. 102	Open Burning	These units are not considered open burning within the prohibition of 06-096 C.M.R. ch. 102.
Flares	06-096 C.M.R. ch. 103	Fuel Burning Equipment Particulate Emission Standard	No applicable requirements for equipment burning non-petroleum gas
Generator #1	06-096 C.M.R. ch. 103	Fuel Burning Equipment Particulate Emission Standard	Generator #1 is smaller than 3.0 MMBtu/hr heat input.
Flares	06-096 C.M.R. ch. 104	Incinerator Particulate Emission Standard	Landfill flares are not considered incinerators.
Facility	06-096 C.M.R. ch. 105	General Process Source Particulate Emission Standard	All sources of PM at the facility are considered fugitive.
Facility	06-096 C.M.R. ch. 134	VOC RACT	Source's potential to emit for VOC is less than 40 tpy.
Facility	06-096 C.M.R. ch. 138	NO_x RACT	Source's potential to emit for NO_x is less than 100 tpy.

Source	Citation	Description	Basis for Determination
Solid Waste Landfill	40 C.F.R. Part 60, Subpart WWW	Standards of Performance for Municipal Solid Waste Landfills That Commenced Construction, Reconstruction, or Modification on or After May 30, 1991, but Before July 18, 2014	JRL commenced construction on a design capacity increase on May 7, 2018.
Generator #1	40 C.F.R. Part 60, Subpart IIII	Standards of Performance for Stationary Compression Ignition Internal Combustion Engines	Generator #1 was manufactured prior to April 1, 2006.

[06-096 C.M.R. ch. 140]

(7) The Part 70 license shall be reopened for cause by the Department or EPA, prior to the expiration of the Part 70 license, if:

A. Additional Applicable requirements under the CAA become applicable to a Part 70 major source with a remaining Part 70 license term of three or more years. However, no opening is required if the effective date of the requirement is later than the date on which the Part 70 license is due to expire, unless the original Part 70 license or any of its terms and conditions has been extended pursuant to 06-096 C.M.R. ch. 140;

B. Additional requirements (including excess emissions requirements) become applicable to a Title IV source under the acid rain program. Upon approval by EPA, excess emissions offset plans shall be deemed to be incorporated into the Part 70 license;

C. The Department or EPA determines that the Part 70 license contains a material mistake or that inaccurate statements were made in establishing the emissions standards or other terms or conditions of the Part 70 license; or

D. The Department or EPA determines that the Part 70 license must be revised or revoked to assure compliance with the Applicable requirements.

The licensee shall furnish to the Department within a reasonable time any information that the Department may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the Part 70 license or to determine compliance with the Part 70 license.

[06-096 C.M.R. ch. 140]

(8) No license revision or amendment shall be required, under any approved economic incentives, marketable licenses, emissions trading, and other similar programs or processes for changes that are provided for in the Part 70 license. [06-096 C.M.R. ch. 140]

STANDARD CONDITIONS

(1) Employees and authorized representatives of the Department shall be allowed access to the licensee's premises during business hours, or any time during which any emissions units are in operation, and at such other times as the Department deems necessary for the purpose of performing tests, collecting samples, conducting inspections, or examining and copying records relating to emissions and this license (38 M.R.S. § 347-C).

(2) The licensee shall acquire a new or amended air emission license prior to commencing construction of a modification, unless specifically provided for in 06-096 C.M.R. ch. 140. [06-096 C.M.R. ch. 140]

(3) The licensee shall establish and maintain a continuing program of best management practices for suppression of fugitive particulate matter during any period of construction, reconstruction, or operation which may result in fugitive dust, and shall submit a description of the program to the Department upon request. [06-096 C.M.R. ch. 140]
Enforceable by State-only

(4) The licensee shall pay the annual air emission license fee to the Department, calculated pursuant to 38 M.R.S. § 353-A.

(5) The licensee shall maintain and operate all emission units and air pollution control systems required by the air emission license in a manner consistent with good air pollution control practice for minimizing emissions. [06-096 C.M.R. ch. 140]
Enforceable by State-only

(6) The licensee shall maintain sufficient records to accurately document compliance with emission standards and license conditions and shall maintain such records for a minimum of six (6) years. In addition, the licensee shall retain records of all required monitoring data and support information for a period of at least six (6) years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by the Part 70 license. The records shall be submitted to the Department upon written request or in accordance with other provisions of this license. [06-096 C.M.R. ch. 140]

(7) The licensee shall comply with all terms and conditions of the air emission license. The submission of notice of intent to reopen for cause by the Department, the filing of an appeal by the licensee, the notification of planned changes or anticipated noncompliance by the licensee, or the filing of an application by the licensee for the renewal of a Part 70 license or amendment shall not stay any condition of the Part 70 license. [06-096 C.M.R. ch. 140]

(8) In accordance with the Department's air emission compliance test protocol and 40 C.F.R. Part 60 or other method approved or required by the Department, the licensee shall:

A. Perform stack testing under circumstances representative of the facility's normal process and operating conditions:

1. Within sixty (60) calendar days of receipt of a notification to test from the Department or EPA, if visible emissions, equipment operating parameters, staff inspection, air monitoring, or other cause indicate to the Department that equipment may be operating out of compliance with emission standards or license conditions;

2. To demonstrate compliance with the applicable emission standards; or

3. Pursuant to any other requirement of this license to perform stack testing.

B. Install or make provisions to install test ports that meet the criteria of 40 C.F.R. Part 60, Appendix A, and test platforms, if necessary, and other accommodations necessary to allow emission testing; and

C. Submit a written report to the Department within thirty (30) days from date of test completion.

[06-096 C.M.R. ch. 140] **Enforceable by State-only**

(9) If the results of a stack test performed under circumstances representative of the facility's normal process and operating conditions indicates emissions in excess of the applicable standards, then:

A. Within thirty (30) days following receipt of such test results, the licensee shall re-test the non-complying emission source under circumstances representative of the facility's normal process and operating conditions and in accordance with the Department's air emission compliance test protocol and 40 C.F.R. Part 60 or other method approved or required by the Department; and

B. The days of violation shall be presumed to include the date of stack test and each and every day of operation thereafter until compliance is demonstrated under normal and representative process and operating conditions, except to the extent that the facility can prove to the satisfaction of the Department that there were intervening days during which no violation occurred or that the violation was not continuing in nature; and

C. The licensee may, upon the approval of the Department following the successful demonstration of compliance at alternative load conditions, operate under such

alternative load conditions on an interim basis prior to a demonstration of compliance under normal and representative process and operating conditions.

[06-096 C.M.R. ch. 140] **Enforceable by State-only**

(10) The licensee shall maintain records of all deviations from license requirements. Such deviations shall include, but are not limited to malfunctions, failures, downtime, and any other similar change in operation of air pollution control systems or the emission unit itself that is not consistent with the terms and conditions of the air emission license.

A. The licensee shall notify the Commissioner within 48 hours of a violation of any emission standard and/or a malfunction or breakdown in any component part that causes a violation of any emission standard, and shall report the probable cause, corrective action, and any excess emissions in the units of the applicable emission limitation;

B. The licensee shall submit a report to the Department on a quarterly basis if a malfunction or breakdown in any component part causes a violation of any emission standard, together with any exemption requests.

Pursuant to 38 M.R.S. § 349(9), the Commissioner may exempt from civil penalty an air emission in excess of license limitations if the emission occurs during start-up or shutdown or results exclusively from an unavoidable malfunction entirely beyond the control of the licensee and the licensee has taken all reasonable steps to minimize or prevent any emission and takes corrective action as soon as possible. There may be no exemption if the malfunction is caused, entirely or in part, by poor maintenance, careless operation, poor design, or any other reasonably preventable condition or preventable equipment breakdown. The burden of proof is on the licensee seeking the exemption under this subsection.

C. All other deviations shall be reported to the Department in the facility's semiannual report.

[06-096 C.M.R. ch. 140]

(11) Upon the written request of the Department, the licensee shall establish and maintain such records; make such reports; install, use, and maintain such monitoring equipment; sample such emissions in accordance with such methods, at such locations, at such intervals, and in such manner as the Department shall prescribe; and provide other information as the Department may reasonably require to determine the licensee's compliance status.
[06-096 C.M.R. ch. 140]

(12) The licensee shall submit semiannual reports of any required periodic monitoring by January 31 and July 31 of each year, or on an equivalent schedule specified in the license.

All instances of deviations from Part 70 license requirements must be clearly identified in such reports. All required reports must be certified by a responsible official. [06-096 C.M.R. ch. 140]

(13) The licensee shall submit a compliance certification to the Department and EPA annually by January 31 of each year, or more frequently if specified in the applicable requirement or by the Department. The compliance certification shall include the following:

A. The identification of each term or condition of the Part 70 license that is the basis of the certification;
B. The compliance status;
C. Whether compliance was continuous or intermittent;
D. The method(s) used for determining the compliance status of the source, currently and over the reporting period; and
E. Such other facts as the Department may require to determine the compliance status of the source.

[06-096 C.M.R. ch. 140]

SPECIFIC CONDITIONS

(14) **Solid Waste Landfill**

A. JRL shall continue to use good operating practices to minimize the formation and release of the TRS laden landfill gases. These practices include but are not limited to: minimizing landfill waste moisture and ambient landfill gas releases through the use of synthetic intermediate cover or an approved equivalent; the appropriate use of daily cover; and the proper design, installation, maintenance, and operation of landfill gas management system infrastructure in accordance with the Solid Waste Management Regulations. [06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)]

B. Flares #2 and #3 shall not operate when Flare #4 is operating. Flares #2 and #3 shall be used as backup to Flare #4, with backup defined for the purpose of this license as each of the Flares #2 and #3 operating no more than 100 hours per calendar year. All flares are located on the southeast end of the facility when in operation. Flares may be stored in other locations when not operating. [06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)]

C. The elevation of the top of Flare #4 shall be maintained at or above 265 feet above sea level at the established location on the southeast end of the facility. [06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)]

D. Flare Emission Limits

1. Emissions from Flare #2 shall not exceed the following limits:

Pollutant	lb/hr	Origin and Authority	Enforceability
PM	0.38	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
PM_{10}	0.38	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
$PM_{2.5}$	0.38	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
SO_2	33.09	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
NO_x	1.53	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
CO	8.33	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
VOC	0.07	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable

2. Emissions from Flare #3 shall not exceed the following limits:

Pollutant	lb/hr	Origin and Authority	Enforceability
PM	0.69	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
PM_{10}	0.69	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
$PM_{2.5}$	0.69	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
SO_2	59.56	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
NO_x	2.75	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
CO	14.99	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
VOC	0.12	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable

3. Emissions from Flare #4 shall not exceed the following limits:

Pollutant	lb/hr	Origin and Authority	Enforceability
PM	1.81	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
PM_{10}	1.81	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
$PM_{2.5}$	1.81	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
SO_2	157.0	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
NO_x	7.24	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
CO	39.41	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable
VOC	0.32	06-096 C.M.R. ch.115, BACT (A-921-77-2-A, 11/26/2012)	Federally Enforceable

4. Visible emissions from the flares shall each not exceed 20% opacity on a six (6) minute block average basis.
[06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)]

E. Annual Emissions

1. Total SO_2 emissions from the JRL flares shall not exceed 449.0 tpy, based on a 12-month rolling total. Compliance shall be demonstrated by monthly sampling of the landfill gas as described in Condition (15).
[06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)]

2. Total VOC emissions from the facility shall not exceed 39.9 tpy based on a 12-month rolling total. Compliance shall be demonstrated by calculating actual emissions at least once annually as required by *Emission Statements*, 06-096 C.M.R. ch. 137. [06-096 C.M.R. ch. 140, BPT] **Enforceable by State-only**

3. Total emissions of any single HAP from the facility shall not exceed 9.9 tpy based on a 12-month rolling total. Total emissions for all HAP combined at the facility shall not exceed 24.9 tpy based on a 12-month rolling total. Compliance shall be demonstrated by calculating actual emissions at least once annually as required by *Emission Statements*, 06-096 C.M.R. ch. 137.
[06-096 C.M.R. ch. 140, BPT (A-921-70-B-R, 10/7/2014)]

(15) **Control Technology Requirements**

A. JRL shall install and operate pollution control equipment as necessary on the landfill gas to achieve (on a 12-month rolling average basis) an outlet TRS concentration of 1,000 ppmv or less and to control emissions of SO_2 so as to be in compliance with the facility's SO_2 tpy limit. JRL may utilize alternative control equipment in conjunction with the Thiopaq system as necessary to meet the TRS and SO_2 emission limits. Any change in the type or configuration of the control equipment used must be submitted to the Department prior to use. Compliance testing of any alternative control equipment shall be performed within 60 days of beginning operation. If alternative control equipment is used, JRL shall notify the compliance inspector at least 30 days prior to any TRS compliance testing.
[060-96 C.M.R. ch. 115, BACT (A-921-77-4-M, 5/6/2014)]

B. Compliance with the SO_2 lb/hr and tpy limits and the TRS ppmv limit shall be based on sampling of the landfill gas entering and exiting the control equipment three times during a single day (i.e. three samples at the inlet to the scrubber and three samples at the scrubber outlet) once per month using a test method approved by the Department. JRL shall record the gas flow rate on the days of sampling events. The average of the sampling results for each month, along with the associated gas flow rates, shall be used to estimate the monthly SO_2 emissions based on the assumption that TRS compounds are converted to SO_2 during combustion. Compliance with the SO_2 lb/hr and tpy limits and the TRS ppmv limit shall be based on a 12-month rolling average.
[060-96 C.M.R. ch. 115, BACT (A-921-77-4-M, 5/9/2014)]

C. Periodic Monitoring [060-96 C.M.R. ch. 115, BACT (A-921-77-4-M, 5/9/2014)]

JRL shall record data and maintain records for the following periodic monitoring values in addition to the monitoring required by 40 C.F.R. Part 60, Subpart XXX and 40 C.F.R. Part 63, Subpart AAAA.

Item to be Monitored	Units of Measure	Monitoring Tool/Method	Frequency
TRS concentration entering TRS control equipment	ppmv	Periodic TRS grab sample tests (or equivalent method)	See Note 1
LFG flow entering TRS control equip (daily average)	scfm	Flow meter	See Note 2
LFG flow exiting TRS control equip (daily average)	scfm	Flow meter	See Note 2

Item to be Monitored	Units of Measure	Monitoring Tool/Method	Frequency
H_2S concentration entering TRS control equip	ppmv	Colorimetric tubes	See Note 2
H_2S concentration exiting TRS control equip	ppmv	Colorimetric tubes	See Note 2
Control Equipment Downtime	Hours	Record in logbook with explanation	As occurs
Unscrubbed bypass	Hours	Record in logbook with explanation	As occurs
Calibration of flow meters	Dates	As specified by manufacturer	Once per year
Propane fuel use	gal	Purchase records	Monthly
Hours of Operation for each flare	Dates & Hours	Logbook	As occurs

Note 1: JRL shall sample the landfill gas TRS concentration in accordance with Condition (15)(B) above.

Note 2: JRL shall sample the landfill gas H_2S concentration (both entering and exiting the control equipment) twice in the same day (morning and afternoon, with at least four hours between the two sample times) using colorimetric tubes and average the samples for that day. This sampling method shall occur at least two times per week with at least three days between samples. The colorimetric tube data shall be used as an operational tool and not for determining compliance with numerical emission limits.

D. Parameter Monitoring [40 C.F.R. Part 64)]

During all operating times, JRL shall operate, record data, and maintain records from the following parameter monitors in accordance with JRL's approved CAM plan:

Item to be Monitored	Units of Measure	Monitoring Tool/Method	Frequency
TRS concentration exiting TRS control equipment	ppmv (12-month rolling average basis)	Periodic TRS grab sample tests (or equivalent method)	See Note 1
LFG flow to each flare and to the Archaea facility	scf	Flow meter	Totalized Monthly; See Note 1

Note 1: JRL shall sample the landfill gas TRS concentration in accordance with Condition (15)(B) above.

E. Control Equipment Uptime

1. JRL shall utilize the flares at all times unless switching is occurring between the primary flare and the backup flares. Switching to and from primary Flare #4 and backup Flares #2 and #3 shall be performed as expediently as possible. Records shall be maintained documenting the date and timeframe when no flaring occurs. [06-096 C.M.R. ch. 115, BACT (A-921-77-4-M, 5/9/2014)]

2. JRL shall meet a 95% uptime for all sulfur control equipment on a 12-month rolling total basis, including, but not limited to, scheduled or unscheduled maintenance and repair and equipment malfunction. Periods of downtime (not to exceed 438 hours per 12-month period) may be excluded when determining compliance with the H_2S and TRS ppmv limits. JRL shall keep records documenting compliance with the uptime requirement. [06-096 C.M.R. ch. 115, BACT (A-921-77-4-M, 5/9/2014)]

3. Pursuant to 38 M.R.S. §349.9, the Commissioner may exempt from civil penalty an air emission in excess of license limitations if the emission occurs during start-up or shutdown or results exclusively from an unavoidable malfunction entirely beyond the control of the licensee and the licensee has taken all reasonable steps to minimize or prevent any emission and takes corrective action as soon as possible. There may be no exemption if the malfunction is caused, entirely or in part, by poor maintenance, careless operation, poor design or any other reasonably preventable condition or preventable equipment breakdown. The burden of proof is on the licensee seeking the exemption under this subsection. In the event of an unavoidable malfunction, the licensee must notify the Commissioner in writing

within 48 hours and submit a written report, together with any exemption requests, to the Department on a quarterly basis. **Enforceable by State-Only**

(16) **New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP)**

JRL shall comply with all applicable requirements of NSPS 40 C.F.R. Part 60, Subpart XXX and NESHAP 40 C.F.R. Part 63, Subpart AAAA including, but not limited to, the following:

A. Standards

JRL shall install and operate an active collection and control system that meets the requirements of 40 C.F.R. §§ 60.762(b)(2)(ii)(C) and 60.762(b)(2)(iii).
[40 C.F.R. § 60.762(b)(2)(ii)]

JRL shall control emissions of NMOC through use of either a non-enclosed flare (Flares #2, #3, and #4) pursuant to § 60.762(b)(2)(iii)(A) or by routing the gas to a treatment system that processes the gas for sale or beneficial use (Archaea facility) pursuant to § 60.762(b)(2)(iii)(C).

B. Operation

JRL shall comply with the operational standards, compliance provisions, and monitoring requirements of §§ 60.763, 60.765, and 60.766 by complying with the similar provisions of §§ 63.1958, 63.1960, and 63.1961. However, by electing to comply with the Subpart AAAA requirements, JRL must continue to operate the collection and control devices pursuant to those requirements and cannot return to the provisions of §§ 60.763, 60.765, and 60.766. [40 C.F.R. § 60.762(b)(2)(iv)]

1. JRL shall operate the collection system with negative pressure at each wellhead except under the following conditions:

   a. A fire or increased well temperature (i.e., > 145 °F). JRL must record instances when positive pressure occurs in efforts to avoid a fire. These records must be submitted with the semi-annual reports.
   b. Areas of the landfill where a geomembrane or synthetic cover is being used and acceptable pressure limits are maintained as specified by the design plan.
   c. A decommissioned well.

   [40 C.F.R. § 63.1958(b)]

2. JRL shall operate each interior wellhead in the collection system with a landfill gas temperature less than 145 °F. JRL may establish a higher operating temperature value for a particular well(s) by submitting a request to the Department demonstrating that the elevated temperature neither causes fires nor significantly inhibits anaerobic decomposition by killing methanogens. [40 C.F.R. § 63.1958(c)]

3. JRL shall operate the collection system so that the methane concentration is less than 500 parts per million (ppm) above background at the surface of the landfill. [40 C.F.R. § 63.1958(d)(1)]

   Background concentration shall be determined by moving the probe inlet upwind and downwind outside the boundary of the landfill at a distance of at least 30 meters from the perimeter wells. [40 C.F.R. § 63.1960(c)(2)]

4. If monitoring demonstrates that the operational requirements listed above are not met, corrective action shall be taken as specified in 40 C.F.R. §§ 63.1960(a)(3) and (c)(4). As long as the specified actions are taken, the monitored exceedance is not a deviation of the operational requirements. [40 C.F.R. § 63.1958(g)]

5. JRL shall operate the control system at all times when the collected gas is routed to the system. [40 C.F.R. § 63.1958(f)]

6. The collection and control requirements apply at all times, including periods of startup, shutdown, and malfunction (SSM). During periods of SSM, JRL shall comply with the following work practice standards [40 C.F.R. § 63.1960(e)(2)]:

   In the event the collection or control system is not operating:

   a. The gas mover system must be shut down and all valves in the collection and control system contributing to venting of the gas to the atmosphere must be closed within 1 hour.
   b. Efforts to repair the collection or control system must be initiated and completed in a manner such that downtime is kept to a minimum, and the collection and control system must be returned to operation.

   [40 C.F.R. § 63.1958(e)]

C. Monitoring

1. For the purpose of demonstrating whether the gas collection system flow rate is sufficient, JRL shall measure gauge pressure monthly in the gas collection header applied to each individual well. If a positive pressure exists, JRL shall initiate action to correct the exceedance as specified in 40 C.F.R. § 63.1960(a)(3)(i).
[40 C.F.R. §§ 63.1960(a)(3) and 63.1961(a)(1)]

2. JRL shall monitor each wellhead monthly for nitrogen or oxygen concentration in the landfill gas as specified in 40 C.F.R. § 63.1961(a)(2).

3. For the purpose of identifying whether excess air infiltration into the landfill is occurring, JRL shall monitor each well monthly for temperature.
[40 C.F.R. §§ 63.1960(a)(4) and 63.1961(a)(4)]

4. If a well exceeds the operating parameter (or approved higher operating value) for temperature, JRL shall:

   a. Initiate action to correct the exceedance as specified in 40 C.F.R. § 63.1960(a)(4)(i); and
   b. Initiate enhanced monitoring as described in 40 C.F.R. § 63.1961(a)(5).
   [40 C.F.R. §§ 63.1960(a)(4) and 63.1961(a)(5)]

5. JRL shall monitor surface concentrations of methane on a quarterly basis along the entire perimeter of the collection area and along a pattern that traverses the landfill at 30-meter intervals using a monitor specified in 40 C.F.R. § 63.1960(d) and the procedures in 40 C.F.R. § 63.1960(c).
[40 C.F.R. §§ 63.1960(c)(1) and 63.1961(f)]

   Areas with steep slopes or other dangerous areas may be excluded from the surface testing. [40 C.F.R. § 63.1958(d)(1)]

6. JRL shall implement a program to monitor for cover integrity and implement cover repairs as necessary on a monthly basis. [40 C.F.R. § 63.1960(c)(5)]

7. JRL shall install, calibrate, maintain, and operate according to the manufacturer's specifications:

   a. A heat sensing device at the pilot light or the flame itself of each flare; and
   b. A device which records the flow to each flare, the landfill gas treatment system (i.e., Archaea facility), and any bypass of these systems.
   [40 C.F.R. §§ 63.1961(c) and (g)]

D. Notifications and Reports

1. JRL shall submit a revised design plan to the Department and EPA for approval:

   a. At least 90 days before expanding operations to an area not covered by the previously approved design plan; or
   b. Prior to installing or expanding the gas collection system in a way that is not consistent with the design plan that was previously submitted.

   [40 C.F.R. §§ 60.767(d) and 63.1981(e)]

2. JRL shall submit an Initial Performance Test Report to the Department and EPA by September 30, 2021, which contains the information listed in 40 C.F.R. §§ 60.767(h) and 63.1981(i). [40 C.F.R. §§ 63.7, 60.767(h), and 63.1981(i)]

3. JRL shall submit to the Department and EPA semi-annual reports which contain the information listed in 40 C.F.R. § 63.1981(h). The initial semi-annual report is due July 31, 2021. [40 C.F.R. § 63.1981(h)]

   As described in 40 C.F.R. § 60.767(g), the semi-annual report takes the place of the annual report required by Subpart XXX.

4. Reports shall be submitted electronically pursuant to 40 C.F.R. §§ 60.767(i) and 63.1981(l), (m), and (n).

   Copies of all reports shall be provided to the DEP. [40 C.F.R. § 70.6(c)(1)]

5. Unless a higher operating temperature value has been approved by the Department under Subpart XXX, if a landfill gas temperature measured at the wellhead or at any point in the well is greater than or equal to 170 °F and the carbon monoxide concentration measured is greater than or equal to 1,000 ppm, JRL shall submit a report to the Department via email within 24 hours. The report shall contain the date, time, well identifier, temperature, and carbon monoxide reading.
   [40 C.F.R. § 63.1981(k)]

E. Records

1. JRL shall keep for at least five years up-to-date, readily accessible, on-site records of the design capacity report, the current amount of solid waste in-place, and the year-by-year waste acceptance rate. Off-site records may be maintained if they are retrievable within four hours. Either paper copy or electronic formats are acceptable. [40 C.F.R. §§ 60.768(a) and 63.1983(a)]

2. JRL shall keep up-to-date, readily accessible records of the following:

   a. The date upon which JRL began complying with the provisions of 40 C.F.R. §§ 63.1958, 63.1960, and 63.1961 in lieu of §§ 60.763, 60.765, and 60.766; [40 C.F.R. § 60.768(e)(6)]
   b. The applicable data listed in 40 C.F.R. §§ 60.768(b)(1) and 63.1983(b);
   c. Indication of flow to the control system and the indication of bypass flow; [40 C.F.R. §§ 60.768(c)(2) and 63.1983(c)(2)]
   d. Monitoring of each flare flame or pilot flame including all periods of operation in which the flame or flare pilot flame were absent; [40 C.F.R. §§ 60.768(c)(4) and 63.1983(c)(4)]
   e. Periods when the collection system or control device is not operating; [40 C.F.R. §§ 60.768(c)(5) and 63.1983(c)(5)]
   f. Date and time of any SSM event in which the collection and control system was not operated, including the times the gas mover system was shut down and all venting ceased. [40 C.F.R. § 63.1958(e)]
   g. Date, time, and duration of each startup and/or shutdown period for each control device; [40 C.F.R. § 63.1983(c)(6)]
   h. The information contained in 40 C.F.R. § 63.1983(c)(7) for periods when a control device fails to operate as required;
   i. Maps showing each existing and planned collector in the system providing a unique identification location label for each collector, for the life of the collection system; [40 C.F.R. §§ 60.768(d) and 63.1983(d)]
   j. All collection and control system exceedances of the operational standards, the reading in the subsequent month whether or not the second reading is an exceedance, and the location of each exceedance; [40 C.F.R. § 63.1983(e)(1)]
   k. Each wellhead temperature monitoring value of 145 °F or above; [40 C.F.R. § 63.1983(e)(2)(i)]
   l. All enhanced monitoring activities due to an exceedance of the operating parameter for temperature; [40 C.F.R. § 63.1983(e)(2)(ii)]
   m. Email transmissions of 24-hour high temperature reports; [40 C.F.R. § 63.1983(e)(2)(iii)]
   n. Any root cause analysis as specified in 40 C.F.R. §§ 63.1983(e)(3) and (4); and
   o. All collection and control system monitoring data required by 40 C.F.R. § 63.1961(a)(1) thru (6). [40 C.F.R. § 63.1983(g)]

(17) **Generator #1**

A. Generator #1 shall fire distillate fuel. [06-096 C.M.R. ch. 140, BPT] **Enforceable by State-only**

B. Fuel Sulfur Content

1. The fuel oil sulfur content for Generator #1 shall be limited to 0.0015% sulfur by weight. [06-096 C.M.R. ch. 140, BPT] **Enforceable by State-only**

2. Fuel sulfur content compliance shall be demonstrated by fuel delivery receipts from the supplier, fuel supplier certification, certificate of analysis, or testing of the tank containing the fuel to be fired. [06-096 C.M.R. ch. 140, BPT] **Enforceable by State-only**

C. Emissions shall not exceed the following limits.
[06-096 C.M.R. ch. 140, BPT] **Enforceable by State-only**

Unit	PM (lb/hr)	PM_{10} (lb/hr)	SO_2 (lb/hr)	NO_x (lb/hr)	CO (lb/hr)	VOC (lb/hr)
Generator #1	0.72	0.72	–	10.28	2.21	0.82

D. Visible Emissions

Visible emissions from Generator #1 shall not exceed 20% opacity on a six-minute block average basis except for periods of startup during which time JRL may comply with the following work practice standards in lieu of the numerical visible emissions standard. [06-096 C.M.R. ch. 101, § 3(A)(4)]

1. Maintain a log (written or electronic) of the date, time, and duration of all generator startups.

2. Operate Generator #1 in accordance with the manufacturer's emission-related operating instructions.

3. Minimize the engine's time spent at idle during startup and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the non-startup emission limitations shall apply.

4. Operate Generator #1, including any associated air pollution control equipment, at all times in a manner consistent with safety and good air pollution control practices for minimizing emissions. Determination of whether such operation and maintenance procedures are being used will be based on information available to the Department that may include, but is not limited to, monitoring results, review of operation and maintenance procedures, review of operation and maintenance records, and inspection of the unit.

E. Generator #1 shall meet the applicable requirements of 40 C.F.R. Part 63, Subpart ZZZZ, including the following:

1. JRL shall meet the following operational limitations for Generator #1:

   a. Change the oil and filter every 500 hours of operation or annually, whichever comes first;
   b. Inspect the air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary; and
   c. Inspect the hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.

   Records shall be maintained documenting compliance with the operational limitations.

   [40 C.F.R. § 63.6603(a) and Table 2(d); and 06-096 C.M.R. ch. 140, BPT]

2. Oil Analysis Program Option
   JRL has the option of utilizing an oil analysis program which complies with the requirements of § 63.6625(i) in order to extend the specified oil change requirement. If this option is used, JRL must keep records of the parameters that are analyzed as part of the program, the results of the analysis, and the oil changes for the engine. The analysis program must be part of the maintenance plan for the engine. [40 C.F.R.§ 63.6625(i)]

3. Non-Resettable Hour Meter
   A non-resettable hour meter shall be installed and operated on the engine.
   [40 C.F.R. § 63.6625(f)]

4. Maintenance, Testing, and Non-Emergency Operating Situations

   a. The engine shall be limited to 100 hours/year for maintenance checks and readiness testing. Up to 50 hours/year of the 100 hours/year may be used in non-emergency situations (this does not include peak shaving, demand response, or to generate income for a facility by providing power to an electric grid or otherwise supply power as part of a financial arrangement with another entity). These limits are based on a calendar year. Compliance shall be demonstrated by records (electronic or written logs) of all engine operating hours. [40 C.F.R. § 63.6640(f) and 06-096 C.M.R. ch. 140, BPT]

b. JRL shall keep records that include maintenance conducted on the engine and the hours of operation of the engine recorded through the non-resettable hour meter. Documentation shall include the number of hours the unit operated for emergency purposes, the number of hours the unit operated for non-emergency purposes, and the reason the engine was in operation during each time. [40 C.F.R. §§ 63.6655(e) and (f)]

5. Operation and Maintenance
The engine(s) shall be operated and maintained according to the manufacturer's emission-related written instructions, or JRL shall develop a maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions. [40 C.F.R. § 63.6625(e)]

6. Startup Idle and Startup Time Minimization
During periods of startup the facility must minimize the engine's time spent at idle and minimize the engine's startup time to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes.
[40 C.F.R. § 63.6625(h) & 40 C.F.R. Part 63, Subpart ZZZZ Table 2d]

(18) **Fugitive Emissions**

Visible emissions from a fugitive emission source (including stockpiles and roadways) shall not exceed 20% opacity on a 5-minute block average basis.
[06-096 C.M.R. ch. 101, § 3(C)]

(19) **Parameter Monitor General Requirements**
[06-096 C.M.R. ch. 140 and 117]

A. Parameter monitors required by this license shall be installed, operated, maintained, and calibrated in accordance with manufacturer recommendations or as otherwise required by the Department.

B. Parameter monitors required by this license shall continuously monitor data at all times the associated emissions unit is in operation. "Continuously" with respect to the operation of parameter monitors required by this license means providing equally spaced data points with at least one valid data point in each successive 15-minute period. A minimum of three valid 15-minute periods constitute a valid hour.

C. Each parameter monitor must record accurate and reliable data. If any parameter monitor is recording accurate and reliable data less than 98% of the source-operating time within any quarter of the calendar year, the Department may initiate enforcement

action. The Department may include in that enforcement action any period of time that the parameter monitor was not recording accurate and reliable data during that quarter unless the licensee can demonstrate to the Department's satisfaction that the failure of the system to record such data was due to the performance of established quality assurance and quality control procedures or unavoidable malfunctions.

Enforceable by State-only

(20) **Compliance Assurance Monitoring (CAM) – General Requirements**

A. The licensee shall operate and monitor all emission units and their associated control equipment in accordance with the approved CAM Plan. [40 C.F.R. Part 64]

B. Any excursion shall be reported in semiannual reports. If excursions occur, the licensee must also certify intermittent compliance with the emission limits for the control device monitored in the annual compliance certification. [40 C.F.R. Part 64]

C. Upon detecting an excursion, the licensee shall restore normal operation of the control equipment as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. [40 C.F.R. § 64.7(d)]

D. Prior to making any changes to the approved CAM plan, the licensee shall notify the Department and, if necessary, submit a proposed license modification application to address the necessary monitoring changes. Such a modification may include, but is not limited to, reestablishing indicator ranges or designated conditions, modifying the frequency of conducting monitoring and collecting data, or the monitoring of additional parameters. [40 C.F.R. § 64.7(e)]

E. Any change of the target level shall be submitted in a letter to the Department for written approval. [06-096 C.M.R. ch. 140, BPT]

(21) **Semiannual Reporting** [06-096 C.M.R. ch. 140]

Note: This semiannual report is separate from, and in addition to, any semiannual report required by specific NSPS or NESHAP regulations.

A. The licensee shall submit to the Bureau of Air Quality semiannual reports which are due on **January 31st** and **July 31st** of each year. The facility's designated responsible official must sign this report.

B. The semiannual report shall be considered on-time if the postmark of the submittal is on or before the due date or if the report is received by the Department within seven calendar days of the due date.
C. Each semiannual report shall include a summary of the periodic and CAM monitoring required by this license.
D. All instances of deviations from license requirements and the corrective action taken must be clearly identified and provided to the Department in summary form for each six-month interval.

(22) **Annual Compliance Certification**

JRL shall submit an annual compliance certification to the Department and EPA in accordance with Standard Condition (13) of this license. The annual compliance certification is due **January 31st** of each year. The facility's designated responsible official must sign this report.

The annual compliance certification shall be considered on-time if the postmark of the submittal is on or before the due date or if the report is received by the Department within seven calendar days of the due date. Certification of compliance is to be based on the stack testing or monitoring data required by this license. Where the license does not require such data, or the license requires such data upon request of the Department and the Department has not requested the testing or monitoring, compliance may be certified based upon other reasonably available information such as the design of the equipment or applicable emission factors. [06-096 C.M.R. ch. 140]

(23) **Annual Emission Statements**

A. In accordance with *Emission Statements*, 06-096 C.M.R. ch. 137, JRL shall annually report to the Department, in a format prescribed by the Department, the information necessary to accurately update the State's emission inventory. The emission statement shall be submitted as specified by the date in 06-096 C.M.R. ch. 137.

B. JRL shall keep the following records in order to comply with 06-096 C.M.R. ch. 137:

1. Hours each flare is operating on a monthly and calendar year basis;
2. Hours of operation of Generator #1 on a monthly and calendar year basis;
3. Amount of distillate fuel fired in Generator #1 on a calendar year basis;
4. The sulfur content of the distillate fuel fired in Generator #1;
5. LFG flow to each flare and the Archaea facility on a monthly and calendar year basis;
6. Site-specific sampling data on the NMOC concentration of the LFG;
7. TRS concentration of the LFG measured on a monthly basis; and

8. Calculations of the VOC and HAP emissions from the facility on a calendar year total basis.

[06-096 C.M.R. ch. 137]

C. In reporting year 2020 and every third year thereafter, JRL shall report to the Department emissions of hazardous air pollutants as required by 06-096 C.M.R. ch. 137, § (3)(C). JRL shall pay the annual air quality surcharge, calculated by the Department based on these reported emissions of hazardous air pollutants, by the date required in Title 38 M.R.S. § 353-A(3). [38 M.R.S. § 353-A(1-A)]

(24) **General Applicable State Regulations**

The licensee is subject to the State regulations listed below.

Origin and Authority	Requirement Summary	Enforceability
06-096 C.M.R. ch. 102	Open Burning	-
06-096 C.M.R. ch. 109	Emergency Episode Regulation	-
06-096 C.M.R. ch. 110	Ambient Air Quality Standard	-
06-096 C.M.R. ch. 116	Prohibited Dispersion Techniques	-
38 M.R.S. § 585-B, §§5	Mercury Emission Limit	Enforceable by State-only

(25) **Units Containing Ozone Depleting Substances**

When repairing or disposing of units containing ozone depleting substances, the licensee shall comply with the standards for recycling and emission reduction pursuant to 40 C.F.R. Part 82, Subpart F, except as provided for motor vehicle air conditioning units in Subpart B. Examples of such units include refrigerators and any size air conditioners that contain CFCs. [40 C.F.R. Part 82, Subpart F]

(26) **Asbestos Abatement**

When undertaking Asbestos abatement activities, JRL shall comply with the *Standard for Asbestos Demolition and Renovation,* 40 C.F.R. Part 61, Subpart M.

(27) **Expiration of a Part 70 license**

A. JRL shall submit a complete Part 70 renewal application at least six but no more than 18 months prior to the expiration of this air license.

B. Pursuant to Title 5 M.R.S. §10002, and 06-096 C.M.R. ch. 140, the Part 70 license shall not expire and all terms and conditions shall remain in effect until the Department takes final action on the renewal application of the Part 70 license. An existing source

submitting a complete renewal application under 06-096 C.M.R. ch. 140 prior to the expiration of the Part 70 license will not be in violation of operating without a Part 70 license. **Enforceable by State-only**

(28) **New Source Review**

JRL is subject to all previous New Source Review (NSR) requirements summarized in this Part 70 air emission license, and the NSR requirements remain in effect even if this 06-096 C.M.R. ch. 140 Air Emissions License, A-921-70-F-R, expires.

DONE AND DATED IN AUGUSTA, MAINE THIS 24th DAY OF MAY, 2021.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY:_____ for _____
MELANIE LOYZIM, COMMISSIONER

The term of this license shall be five (5) years from the signature date above.

[Note: If a complete renewal application, as determined by the Department, is submitted at least six but no more than 18 months prior to expiration of the facility's Part 70 license, then pursuant to Title 5 M.R.S. §10002, all terms and conditions of the Part 70 license shall remain in effect until the Department takes final action on the Part 70 license renewal application.]

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 4/4/2019
Date of application acceptance: 4/4/2019

Date filed with the Board of Environmental Protection:

This Order prepared by Lynn Muzzey, Bureau of Air Quality.

FILED

MAY 24, 2021

State of Maine
Board of Environmental Protection

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JANET T. MILLS
GOVERNOR

MELANIE LOYZIM
COMMISSIONER

January 26, 2024

Jeffrey Pelletier
NEWSME Landfill Operations, LLC
358 Emerson Hill Rd
Hampden, ME 04444

RE: Air Emission License A-921-70-I-A

Dear Mr. Pelletier:

Enclosed please find final air emission license A-921-70-I-A for the State of Maine and NEWSME Landfill Operations, LLC d/b/a Juniper Ridge Landfill. This license completes the processing of the application(s) associated with the following DEP tracking number(s): 596618. Also enclosed please find an information sheet on appealing a licensing decision. Thank you for working with the Department to process this application. We trust that the process was informative and resulted in a satisfactory outcome.

If you have any questions, please write or call your project manager, Lynn Muzzey. The main office number is (207) 287-7688.

Sincerely,

Jane E. Gilbert

Jane Gilbert, P.E.
Bureau of Air Quality

cc: License File
City of Old Town
Jeffrey Doris [Sanborn Head]
Heather Little [Sanborn Head]
Lane Gould [Bureau of General Services]

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826
RAY BLDG., HOSPITAL ST.

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04679-2094
(207) 764-0477 FAX: (207) 760-3143

website: www.maine.gov/dep

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

State of Maine and **NEWSME Landfill Operations, LLC** **d/b/a Juniper Ridge Landfill** **Penobscot County** **Old Town, Maine** **A-921-70-I-A**	**Departmental** **Findings of Fact and Order** **Part 70 Air Emission License** **Amendment #1**

FINDINGS OF FACT

After review of the Part 70 License amendment application, staff investigation reports, and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 Maine Revised Statutes (M.R.S.) § 344 and § 590, the Maine Department of Environmental Protection (Department) finds the following facts:

I. REGISTRATION

A. Introduction

FACILITY	State of Maine and NEWSME Landfill Operations , LLC d/b/a Juniper Ridge Landfill
LICENSE TYPE	06-096 C.M.R. ch. 115, Minor Modification
NAICS CODES	562212
NATURE OF BUSINESS	Solid Waste Landfill
FACILITY LOCATION	2828 Bennoch Road, Old Town, Maine

Juniper Ridge Landfill (JRL) is a solid waste disposal facility currently owned by the State of Maine (Bureau of General Services) and operated by NEWSME Landfill Operations, LLC.

New Source Review (NSR) license A-921-77-6-A (NSR #6), issued December 8, 2023, addressed conversion of the pilot light on Flare #4 from intermittent to continuous operation. JRL has requested that the provisions of NSR #6 be incorporated into their Part 70 license.

In addition, the Department is taking this opportunity to address recent changes to applicable requirements contained on *Visible Emissions Regulation*, 06-096 Code of Maine Rules (C.M.R.) ch. 101.

B. Emission Equipment

The following emission units are addressed by this Part 70 License:

Process Equipment

Equipment	Capacity	Maximum Flow Rate (scfm)
Flare #2	22.5 MMBtu/hr	750
Flare #3	40.5 MMBtu/hr	1,350
Flare #4	106.5 MMBtu/hr	3,550

Generators

Equipment	Maximum Heat Input Capacity (MMBtu/hr)	Max. Firing Rate (gal/hr)	Fuel Type, % sulfur	Mfr. Date	Install. Date
Generator #1	2.33	17.0	distillate fuel, 0.0015%	3/16/2006	8/21/2006

C. Application Classification

All rules, regulations, or statutes referenced in this air emission license refer to the amended version in effect as of the issued date of this license.

JRL has requested incorporation into the Part 70 Air License the relevant terms and conditions of NSR #6 pursuant to *Major and Minor Source Air Emission License Regulations*, 06-096 C.M.R. ch. 115. NSR #6 was a minor modification that involved only new equipment (i.e., the new continuous pilot light) and did not modify any existing Best Available Control Technology (BACT) requirements. Therefore, this license application was considered a Part 70 Minor Modification and processed under *Part 70 Air Emission License Regulations*, 06-096 C.M.R. ch. 140.

D. Amendment Description

The State of Maine (Bureau of General Services) owns the Juniper Ridge Landfill, which is currently operated by NEWSME Landfill Operations, LLC. Gases formed from the decomposition of the landfill materials are collected and controlled by the facility's three flares.

The landfill gas (LFG) generated at JRL is collected and then flared or sent to a nearby independent facility operated by AHJRLLFG LLC (Archaea). Archaea may process JRL's LFG for sale or beneficial use. The processing of the LFG at the Archaea facility is considered a treatment system equivalent to JRL's flares.

The primary flare at JRL is Flare #4. It is rated at 106.5 MMBtu/hr (3,550 scfm) and is typically in continuous use. Flares #2 and #3 are to be used as back-up and are rated at 22.5 MMBtu/hr (750 scfm) and 40.5 MMBtu/hr (1,350 scfm), respectively.

Flare #4 operated a propane-fueled pilot light intermittently as needed to ensure a continuous flame. The flare is monitored by a heat sensing device to ensure there is flame present whenever the flare is in operation.

With startup of the Archaea facility, JRL may no longer need to use their flares continuously. However, they will still be used to control any LFG not processed by the Archaea facility. Upsets in Archaea's system, especially during commissioning, may cause LFG to be rerouted to Flare #4 unpredictably. Therefore, JRL proposed a continuous pilot light for Flare #4 to ensure flame is always present to spark ignition of the LFG. The pilot light has a maximum heat input of 0.55 MMBtu/hr firing natural gas or propane.

Due to its size, the continuous pilot light for Flare #4 is considered an insignificant activity pursuant to *Part 70 Air Emission License Regulation,*, 06-096 C.M.R. ch. 140, Appendix B, §§ B.1 and 2.

II. BEST PRACTICAL TREATMENT (BPT) AND EMISSION STANDARDS

A. Introduction

In order to receive a license, the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in *Definitions Regulation*, 06-096 C.M.R. ch. 100. Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas.

BPT for new sources and modifications is based on the demonstration contained in the underlying NSR license that emissions are receiving Best Available Control Technology (BACT), as defined in *Definitions Regulation*, 06-096 C.M.R. ch. 100. BACT is a top-down approach to selecting air emission controls considering economic, environmental, and energy impacts. As an insignificant activity, BACT was not required for the Flare #4 pilot light.

B. Changes to Applicable Visible Emissions Requirements

Changes to *Visible Emissions Regulation*, 06-096 C.M.R. ch. 101 were recently adopted by the Department and take effect on January 1, 2024. Following are the updated visible emission standards that apply to JRL and a description of any streamlining, if applicable.

1. Flares

   a. 06-096 C.M.R. ch. 101

      Flares #2, #3, and #4 are subject to the following visible emissions standard:

      Visible emissions from each flare (Flares #2, #3, and #4) shall not exceed 30% opacity on a six-minute block average basis, except for periods of startup, shutdown, or malfunction during which time JRL shall meet the normal operating visible emissions standard or the following alternate visible emissions standard.

      During periods of startup, shutdown, or malfunction, visible emissions shall not exceed 40% opacity on a six-minute block average basis. This alternative visible emissions standard shall not be utilized for more than two hours (20 consecutive six-minute block averages) per event.
      [06-096 C.M.R. ch. 101, § 4(A)(8)]

   b. 06-096 C.M.R. ch. 115, BACT

      Flares #2, #3, and #4 are subject to the following visible emission limit established under BACT:

      Visible emissions from Flares #2, #3, and #4 shall each not exceed 20% opacity on a 6-minute block average basis. [06-096 C.M.R. ch. 115, BACT (A-921-77-2-A, 11/26/2012)]

   c. Streamlining

      The Department has determined that the BACT visible emissions standard is more stringent than the applicable limit in 06-096 C.M.R. ch. 101. Therefore, the visible emission limit has been streamlined to the more stringent BACT limit, and only this more stringent limit shall be included in the air emission license.

      Therefore, there is no change required to licensed visible emissions limits for Flares #2, #3, and #4.

2. Generator #1

Generator #1 is an emergency generator manufactured on March 16, 2006. It is subject to no other visible emissions standard other than that contained in 06-096 C.M.R. ch. 101, which has been updated to the following:

Visible emissions from Generator #1 shall not exceed 20% opacity on a six-minute block average basis except for periods of startup during which time JRL shall either meet the normal operating visible emissions standard or the following work practice standards and alternative visible emissions standard.

(1) The duration of the startup shall not exceed 30 minutes per event;
(2) Visible emissions shall not exceed 50% opacity on a six-minute block average basis; and
(3) JRL shall keep records of the date, time, and duration of each startup.

Use of the work practice standards and alternative visible emissions standard in lieu of the normal operating standard is limited to no more than once per day.
[06-096 C.M.R. ch. 101, § 4(A)(8)]

3. Fugitive Emissions

The visible emissions requirements for fugitive emissions are updated as follows:

JRL shall not cause emissions of any fugitive dust during any period of construction, reconstruction, or operation without taking reasonable precautions. Such reasonable precautions shall be included in the facility's continuing program of best management practices for suppression of fugitive particulate matter. See 06-096 C.M.R. ch. 101, § 4(C) for a list of potential reasonable precautions.

JRL shall not cause or allow visible emissions within 20 feet of ground level, measured as any level of opacity and not including water vapor, beyond the legal boundary of the property on which such emissions occur. Compliance with this standard shall be determined pursuant to 40 C.F.R. Part 60, Appendix A, Method 22.

[06-096 C.M.R. ch. 101, § 4(C)]

C. Facility Annual Emissions

This license amendment will not change the facility's licensed annual emissions.

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that emissions from this source:

- will receive Best Practical Treatment;
- will not violate applicable emissions standards; and
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants the Part 70 License Amendment A-921-70-I-A pursuant to 06-096 C.M.R. 140 and the preconstruction permitting requirements of *Major and Minor Source Air Emission License Regulations*, 06-096 C.M.R. ch. 115 and subject to the conditions found in Air Emission License A-921-70-F-R and the following conditions.

Federally enforceable conditions in this Part 70 license must be changed pursuant to the applicable requirements in 06-096 C.M.R. ch. 115 for making such changes and pursuant to the applicable requirements in 06-096 C.M.R. ch. 140.

For each specific condition which is state enforceable only, state-only enforceability is designated with the following statement: **Enforceable by State-only**.

Severability. The invalidity or unenforceability of any provision of this License Amendment or part thereof shall not affect the remainder of the provision or any other provisions. This License Amendment shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

SPECIFIC CONDITIONS

The following shall replace Condition (17)(D) of Air Emission License A-921-70-F-R:

(17) **Generator #1**

D. Visible Emissions

Visible emissions from Generator #1 shall not exceed 20% opacity on a six-minute block average basis except for periods of startup during which time JRL shall either meet the normal operating visible emissions standard or the following work practice standards and alternative visible emissions standard.

1. The duration of the startup shall not exceed 30 minutes per event;
2. Visible emissions shall not exceed 50% opacity on a six-minute block average basis; and

3. JRL shall keep records of the date, time, and duration of each startup.

Use of the work practice standards and alternative visible emissions standard in lieu of the normal operating standard is limited to no more than once per day.
[06-096 C.M.R. ch. 101, § 4(A)(8)]

The following shall replace Condition (18) of Air Emission License A-921-70-F-R:

(18) **Fugitive Emissions**

1. JRL shall not cause emissions of any fugitive dust during any period of construction, reconstruction, or operation without taking reasonable precautions. Such reasonable precautions shall be included in the facility's continuing program of best management practices for suppression of fugitive particulate matter. See 06-096 C.M.R. ch. 101, § 4(C) for a list of potential reasonable precautions.

2. JRL shall not cause or allow visible emissions within 20 feet of ground level, measured as any level of opacity and not including water vapor, beyond the legal boundary of the property on which such emissions occur. Compliance with this standard shall be determined pursuant to 40 C.F.R. Part 60, Appendix A, Method 22.

[06-096 C.M.R. ch. 101, § 4(C)]

DONE AND DATED IN AUGUSTA, MAINE THIS 26th DAY OF JANUARY, 2024.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: _____ for
MELANIE LOYZIM, COMMISSIONER

The term of this amendment shall be concurrent with the term of Air Emission License A-921-70-F-R.

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 10/13/2023
Date of application acceptance: 10/13/2023

Date filed with the Board of Environmental Protection:

This Order prepared by Lynn Muzzey, Bureau of Air Quality.

FILED

JAN 26, 2024

State of Maine
Board of Environmental Protection

APPENDIX K

STORMWATER MANAGEMENT PLAN

SME
SEVEE & MAHER
ENGINEERS

PHASE II EXPANSION APPLICATION
JUNIPER RIDGE LANDFILL
STORMWATER MANAGEMENT PLAN

Prepared for

STATE OF MAINE BUREAU OF GENERAL SERVICES
as Owner
and
NEWSME LANDFILL OPERATIONS, LLC
as Operator

November 2025

4 Blanchard Road
P.O. Box 85A
Cumberland, Maine 04021

Tel: 207.829.5016 sme-engineers.com

SME
SEVEE & MAHER
ENGINEERS

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PHASE II EXPANSION
JUNIPER RIDGE LANDFILL
STORMWATER MANAGEMENT PLAN

1.0 INTRODUCTION

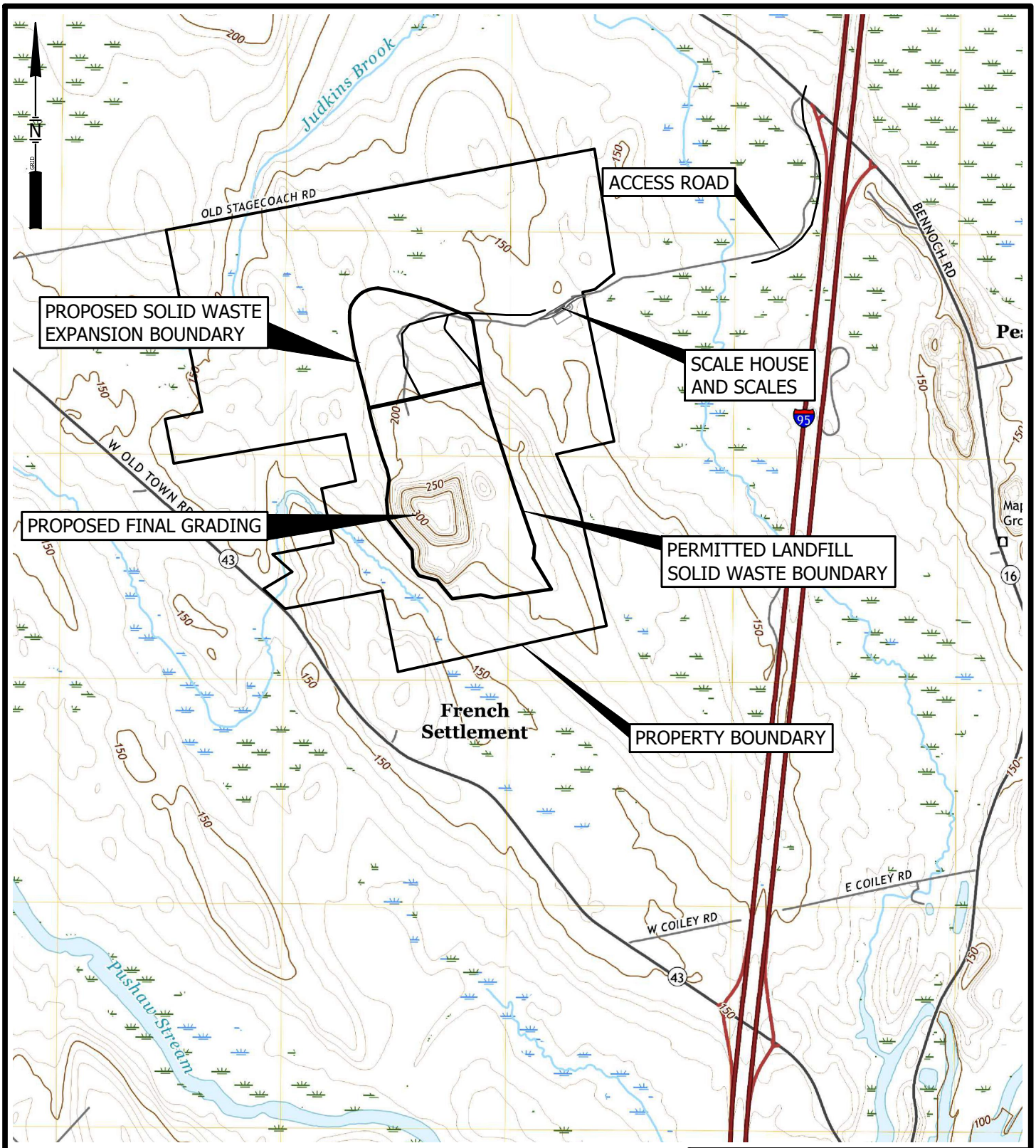
This Stormwater Management Plan (SWMP) has been prepared to outline the concepts and design criteria for stormwater management associated with the proposed Phase II Landfill Expansion at the Juniper Ridge Landfill in Old Town Maine (Phase II Expansion) (see Figure 1-1). For the purposes of this SWMP, the term "site" refers to the existing permitted landfill and the entire JRL property owned by Maine Bureau of General Services (BGS).

The SWMP has been prepared to address the standards and submission requirements of Chapter 400, Section 4.M, including the following objectives:

- The solid waste facility may not unreasonably cause or increase flooding to on-site or adjacent properties;
- The solid waste facility may not create an unreasonable flood hazard;
- The solid waste facility may have no unreasonable effect on run-on, runoff, and/or infiltration relationships; and
- The solid waste facility may not be located in the Federal Flood Insurance Administration 100-year frequency floodplain.

The proposed Phase II Expansion is not located within the watershed of a "lake most at risk from new development" or an "urban impaired stream," as defined by Chapter 502 of MEDEP's Rules for stormwater; therefore, the Phase II Expansion is not required to comply with Chapter 500 stormwater requirements for water quality.

Erosion control measures associated with Phase II are addressed in the application's Erosion and Sedimentation Control Plan, provided in Volume I, Appendix L.



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE
OLD TOWN, MAINE - 2021
GREENBUSH, MAINE - 2021

1000 0 2000 FEET

DWG: SITELOC LMN: USGS MAP CTB: SME-STD REV: 4/29/2025

FIGURE 1-1
SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
SEVEE & MAHER
ENGINEERS

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2.0 SITE DESCRIPTION

The existing landfill and the Phase II Expansion are located on an approximately 780-acre parcel of land located approximately one mile west of Interstate 95 in Old Town, Maine.

The existing landfill consists of the previously permitted 122-acre solid waste footprint (of which approximately 115 acres are currently developed). The existing landfill related infrastructure includes a 2-mile primary access road, a maintenance/administration building, several storage buildings, a dual-scale house, a former leachate storage pond now used for stormwater detention, a leachate storage tank, five primary leachate pump stations, one leachate haul truck loading rack, one water haul truck loading rack, multiple detention/sedimentation ponds, soil borrow areas, construction material laydown/soil stockpile areas, parking areas and other grassed areas (i.e., berm slopes etc.), Thiopaq and Sulfa Treat gas scrubbing systems, a storage/processing pad for clean wood debris and railroad ties, a perimeter access road, a Renewable Natural Gas (RNG) Processing Facility, and two landfill gas flares (one belonging to JRL, and the other to the owners of the RNG Processing Facility).

The Phase II Expansion will be adjacent to and north of the existing permitted landfill and will expand the solid waste footprint by about 57 acres. The total additional area of development associated with the Phase II Expansion, including supporting site infrastructure (e.g., access roads, stormwater management ponds, etc.) will be approximately 72 acres.

3.0 SITE SETTING

The majority of the northern portion of the parcel is wooded, with hardwoods predominating in the upper elevations, and softwoods predominating in the lower elevations. The parcel is irregularly shaped and the existing landfill is positioned in the southern portion of the parcel.

A drumlin oriented in a northwest to southeast direction effectively divides the parcel into four watersheds, east, northeast, northwest, and southwest. The predevelopment area analyzed for each of the watersheds is approximately 240, 270, 306, and 20 acres, respectively. The northeast and the northwest watersheds both contribute to Judkins Brook and eventually Birch Stream. These watersheds will not be affected by the Phase II Expansion. The southwest watershed contributes to an unnamed tributary to Pushaw Stream, and the east watershed drains to an unnamed and unmapped tributary of Judkins Brook. Birch Stream and Pushaw Stream are tributaries to the Stillwater River, which flows to the Penobscot River.

For the purpose of estimating pre-development flows, two of the four watersheds (i.e., the east and southwest) are further broken down into subcatchments with five analysis points, which represent the locations where stormwater flows across the site's property boundary. The points of analysis are labeled as Analysis Points 1 through 5 as shown on Pre Development Analysis Drawing D-100 in Appendix A, and Post Development Analysis Drawing D-101 in Appendix B. Flows from Subcatchments 1A, 1B, 1C, 1D, and 2 contribute to southwestern watershed, Subcatchment 3 contributes to the northwest watershed, and Subcatchments 4 and 5 contribute to the east watershed.

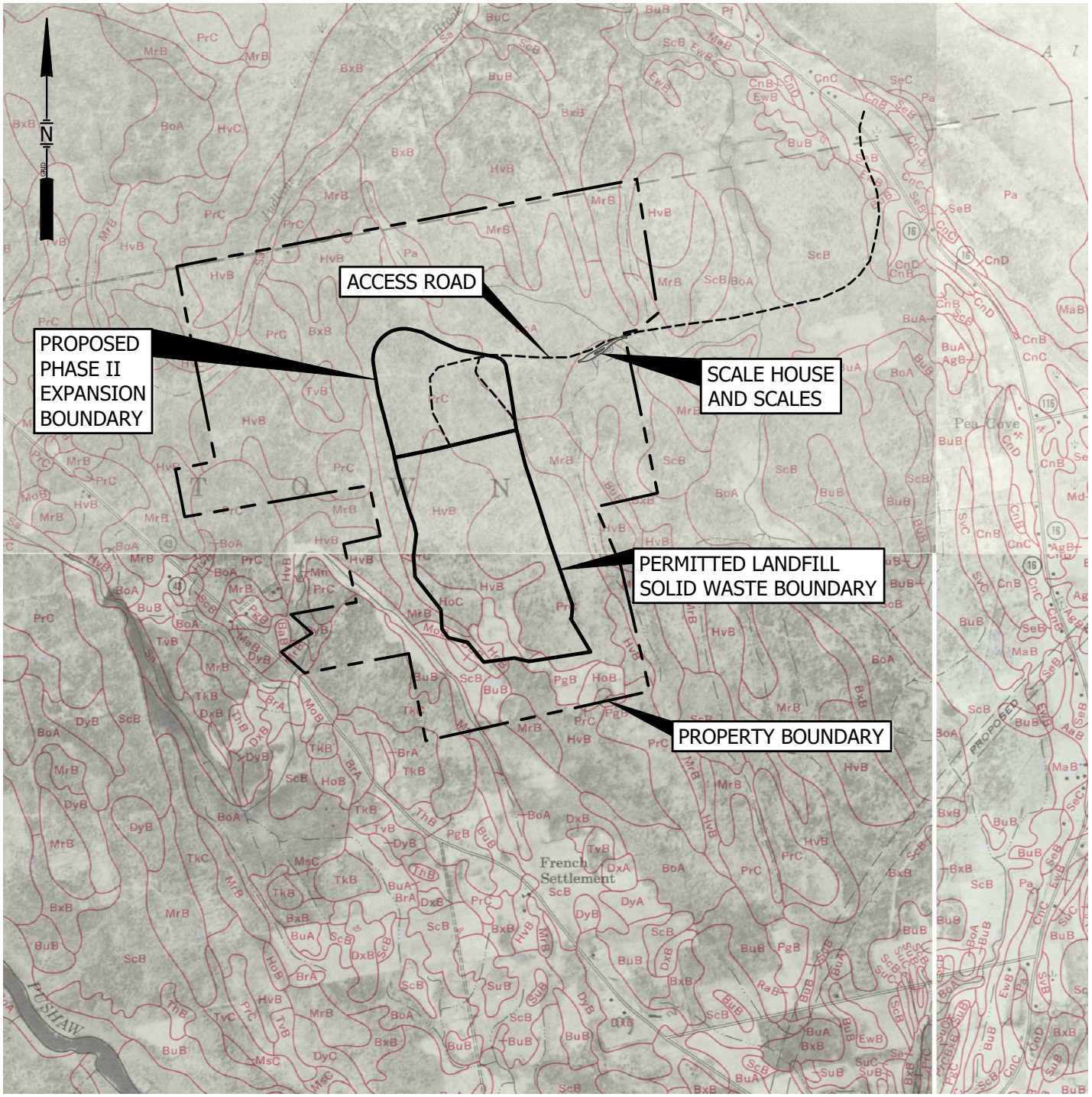
The ground elevation within the Phase II Expansion area currently ranges from approximately 152 to 200 feet-MSL. The Expansion area is mostly wooded with a mixed stand of hardwood and softwood overlying underbrush along the forest floor. The existing ground within the Expansion area slopes radially from the top of the drumlin toward the property boundary at grades varying from 1 to 20 percent. Surface drainage within the Phase II Expansion area consists of sheet and shallow concentrated flow with some channelization occurring in existing roadside ditches.

Surficial soils at the site are primarily Plaisted and Howland series along with some Monarda, Buxton, and Scantic, as shown on Figure 3-1. Surficial soils at the site were delineated based on mapping shown on the Soil Conservation Service Medium Intensity Soils Survey for Penobscot County. This soil survey was the basis for stormwater design during preparation of the original landfill permit, the Phase I Permit Application, and each of the project related stormwater plans created to date for the facility. Table 3-1 shows the hydrologic soil group (HSG) for the various soil series at the site.

TABLE 3-1

SITE SURFICIAL SOIL SUMMARY

Soil Series	Hydrologic Soil Group
Plaisted	C
Howland	C
Monarda	D
Buxton	C
Scantic	D
Landfill Cover	C
Gravel Surfaces	C/D
Buildings/Roofs/Pond/ Paved Surfaces	Impervious Surface



MAPPING SOURCE

NATURAL RESOURCES CONSERVATION SERVICE, WEB SOIL SURVEY OF PENOBSCOT COUNTY, MAINE, 2014. SOIL CONSERVATION SERVICE MEDIUM INTENSITY SOIL MAPS FOR PENOBSCOT COUNTY, SHEETS 203 & 213 COMPILED IN 1962.

LEGEND

BoA	BIDDEFORD MUCKY PEAT
BuB	BUXTON SILT LOAM
HoC	HOWLAND GRAVELLY LOAM
HvB	HOWLAND VERY STONY LOAM
MoB	MONARDA SILT LOAM
MrB	MONARDA-BURNHAM COMPLEX
PgB	PLAISTED GRAVELLY LOAM
PrC	PLAISTED VERY STONY LOAM
ScB	SCANTIC SILT LOAM

1000 0 2000 FEET

FIGURE 3-1
MEDIUM INTENSITY SOIL TYPES
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
SEVEE & MAHER ENGINEERS

DWG: SITELOC LMN: SOILS CTB: SME-STD JOB#: 240101.00 REV: 10/9/2025

\\Nserver\CFS\Casella\OldTownLandfill\Expansion\Phase II Expansion\Acad\Figures\SITELOC.dwg, A_FIG 3-1, 10/9/2025 11:38:46 AM, sjm

4.0 WATERSHED STORMWATER FLOWS

The pre-development and post-development surface water peak runoff rates were evaluated for the watersheds in which the Phase II Expansion is proposed. Stormwater flows were calculated for 2-year, 10-year, and 25-year/24-hour storm events using a computer stormwater modeling system entitled *HydroCAD* by HydroCAD Software Solutions, Inc. of Chocorua, New Hampshire. A 24-hour/Type II Soil Conservation Service (SCS) rainfall distribution with antecedent moisture condition (AMC) 2 was used to model the runoff characteristics of the site.

There are five points of analysis for stormwater quantity in pre-development and post-development conditions. The points of analysis are at points where defined channels within each subcatchment cross the property boundary. The points of analysis are labeled as Analysis Points 1 through 5 on Pre-Development Analysis Drawing D-100 in Appendix A and Post-Development Analysis Drawing D-101 in Appendix B. Flow from Subcatchments 1 and 2 contribute to southwestern watershed flows, Subcatchment 3 contributes to the northwest watershed flows, and Subcatchments 4 and 5 contribute to east side watershed flows.

A weighted (average) curve number (CN) was calculated for each subcatchment based on the land use and the hydrologic soil group within each subcatchment. Times of concentration (T_c) and travel time (T_t) for each subcatchment were calculated based upon SCS methodology and on-site observations of existing drainage paths. Peak runoff rates were calculated for the 2-, 10-, and 25-year storm events. HydroCAD output for pre-development and post-development conditions are contained in Appendices A and B, respectively.

4.1 Pre-Development Conditions

The Pre-Development conditions represent site conditions prior to construction of the existing landfill facility and associated infrastructure. The pre-development analysis is based on a previous version from the West Old Town Landfill (now known as the Juniper Ridge Landfill) License Amendment Application stormwater management report completed by SME in October 2003; however, the area of analysis was increased to include the developed areas of the Phase II Expansion. Pre-development drainage boundaries are shown on pre-development stormwater Drawing D-100 located in Appendix A. Ground cover types are primarily woods (hardwood and softwood), with underbrush overlaying surficial soils classified as HSG C and D. Other cover types for the pre-development conditions analysis include historic roadways with HSGs of C or D and existing water bodies. Subcatchment boundaries were delineated based on review of topographic mappings and by means of aerial photography, both of which predate construction of the landfill facility.

A summary of the peak pre-development stormwater flows for the five analysis points are included in Table 4-1. HydroCAD output for pre-development stormwater flow conditions are contained in Appendix A.

4.2 Post-Development Conditions

The post-development conditions assume final cover is constructed on the entirety of the existing landfill and the Phase II Expansion. The post-development conditions consist of the final cover conditions after construction of the Phase II Expansion, including associated infrastructure. The post-development drainage condition is shown on the post-development stormwater analysis Drawing D-101 located in Appendix B.

To analyze post-development conditions at the site, the watersheds containing the limits of development of the existing landfill and proposed Phase II Expansion were divided into 39 subcatchments. Subcatchments were named using the number of the analysis point that they contribute to, followed by a unique letter. The subcatchments in the post-development stormwater analysis include: 1A through 1O, 2A through 2D, 3, 4A through 4Q, and 5 (see Appendix B, Drawing D-101). The limits of these subcatchments were established by future surface water drainage control elements of the site (i.e., landfill terrace ditches, sideslope ditches, perimeter ditches, downspouts, and culvert/catch basin locations) and by the existing surface water drainage channels topographically downgradient of the proposed facility that will continue to be utilized to convey stormwater. Subcatchments 1B1, 1B2, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 2B, 2C, 2D, 2E, 4B, 4C, 4D, 4G, 4H, 4I, 4J, 4K, 4L, and 4M represent the watersheds associated with the final cover landfill boundary (i.e., inside the perimeter access road). Subcatchments 1A, 1B, 1C, 1N, 1O, 2A, 2F, 3A, 4A, 4E, 4F, 4O, 4N, 4P, 4Q, 4R, and 5 represent watersheds outside the solid waste boundary. A weighted runoff curve number for each subcatchment was determined as described earlier in Section 4.0. A curve number of 71 was applied to areas of the landfill with soil cover, which can be described as a meadow (in good condition) and HSG-C. The cover system runoff curve number was designated HSG C soil as this type of soil is anticipated to be used as the vegetative soil for the final cover system. This is consistent as soils for final cover vegetative soil is underdrained with geocomposite and typically sourced from areas currently designated as HSG C. Curve numbers ranging from 89 to 98 were applied to areas of the development containing gravel or paved access roads dependent upon the underlying soil characteristics and roadway surface. A curve number of 71 was applied to unpaved developed areas that will not be regularly mowed (i.e., grassed perimeter road sideslopes) and were modeled as meadow and HSG C. Assuming all roadways at the site are paved is a conservative assumption that will allow the operator the flexibility of paving or not paving areas as they choose without impacting stormwater systems. Time of concentrations (T_c) and time of travel (T_t) for the post-development subcatchments were based on the topography and stormwater structures (e.g., terrace swales, perimeter swales, downspouts, etc.) in final cover conditions. Peak rates of runoff were calculated for the 2-, 10-, and 25-year storm events. A comparison of the peak stormwater flows from pre and post development

are included below in Table 4-1. HydroCAD output for post-development conditions is contained in Appendix B.

TABLE 4-1

SUMMARY OF AREA AND PEAK FLOWS

Analysis Point	Peak Flow (cfs)							
	Pre-Development				Post-Development			
	Area	2-Year	10-Year	25-Year	Area	2-Year	10-Year	25-Year
1	178.7	31.2	90.1	152.0	145.1	26.4	72.6	123.4
2	61.4	10.7	25.4	39.6	79.5	9.0	20.0	30.8
3	270.3	29.8	69.3	107.8	265.6	29.3	68.1	105.9
4	306.4	36.9	86.9	135.7	326.6	23.9	54.3	82.5
5	39.1	6.3	13.7	20.7	39.1	6.3	13.7	20.7

Note:
Peak flow at analysis point after routing through detention pond and/or reaches.

As designed, peak runoff rates for the post-development conditions at the site during storms of intensities up to and including the 25-year/24-hour storm event will be less than the peak runoff rates for the site's pre-development conditions.

5.0 STORMWATER DETENTION

Detention structures were designed to store and release stormwater at rates such that post-development rates do not exceed the pre-development peak rates.

Since operations began at the JRL in 1996, there have been numerous stormwater detention ponds constructed to control the quantity of stormwater leaving the landfill. These detention ponds were designed to store and release stormwater such that post-development peak flows for the 2-,10-, and 25-year storm events do not exceed those at the pre-development conditions. Currently, there are seven (7) permanent detention ponds used to control stormwater at the landfill (see Appendix A, Site Development Overview Plan).

The Site's detention ponds have been designed in general accordance with the Maine Erosion and Sediment Control Best Management Practices (BMPs) (MEDEP, 10/2016) design criteria for embankment ponds, which include the following:

- Earth embankment top width shall be a minimum of six (6) feet;
- Earth embankment sideslopes shall have a combined slope of greater than or equal to 5 horizontal to 1 vertical (5H:1V);
- Minimum elevation of the top of the embankment shall be one (1) foot above the water surface with the 25-year storm event routed independently through the emergency spillway;
- Principal spillway elevation shall be at least 0.5 feet below the crest of the emergency spillway;
- Anti-seep collars shall be installed to increase the flow path along the outlet pipe; and
- Primary inlets shall have trash guards to prevent conduit clogging.

The following sections discuss the site's existing detention ponds and the proposed ponds for Phase II Expansion development. These detention ponds are shown on the Site Development Overview Plan (see Appendix A).

5.1 Existing Detention Ponds to Remain in Final Conditions

A summary of each of the existing detention ponds to be utilized during post-development conditions is included below. The detention ponds and storage curves are provided in Appendix C-1 and their locations are shown on drawing D-101 located in Appendix A.

Post-development pond routing was evaluated using HydroCAD software and are contained in Appendix B.

Detention Pond 1A

Post-development runoff from subcatchments 1E (9.6 acres) will flow into the Detention Pond 1A at the western end of the landfill adjacent to Detention Pond 1. Detention Pond 1A will outlet via a pipe into Detention Pond 1.

Detention Pond 1

Post-development runoff from subcatchments 1B, 1B1, 1B2, and 1D (33.5 acres) as well as outflow from the Detention Pond 1A will flow into the existing Detention Pond 1. Detention Pond 1 is approximately 22,500 square feet in size to top of berm, 5 feet deep with 3:1 sideslopes, and has a total storage volume of approximately 2.1 acre-ft. The pond includes an 8-foot-wide top width earthen berm and an emergency spillway and contains a combination outlet structure consisting of a 6-foot-diameter outlet structure with a 30-inch outlet barrel and a 3-inch-diameter orifice opening. This detention pond also served as a sedimentation pond during the site's initial years of development.

Detention Pond 2

Detention Pond 2 receives flow from subcatchments 1F and 1G (9.8 acres) and has a pond storage volume of approximately 0.8 acre-feet. The primary outlet structure for Detention Pond 2 is a 4-foot-diameter precast concrete outlet structure with two cored holes through the side of the structure. The 8-inch- and 4-inch-diameter holes are set at different elevations to control peak flows from the 2-year, 10-year, and 25-year storms without any flow through the grate on top of the structure. Flows entering the outlet structure through the 8-inch and 4-inch holes are then conveyed to a level spreader, through a 24-inch-diameter pipe. The emergency spillway for this pond is a riprap-lined channel that was designed to pass the 25-year/24-hour storm event with at least one foot of freeboard.

Detention Pond 6

During post-development conditions, Pond 6 will receive flow from subcatchments 1J, 1K, 1L, 1M, and 1N (27.2 acres). Detention Pond 6 has a pond storage volume of approximately 8.8 acre-feet below the emergency spillway primary outlet (elev. 179.0). The primary outlet structures for this pond include a pond underdrain system with a 6-inch-diameter outlet pipe and a 24-inch-diameter outlet culvert. The pond underdrain system consists of approximately 200 feet of 6-inch-diameter perforated pipe backfilled with stone and wrapped in a filter geotextile. This underdrain system will allow filtering of stormwater in the bottom of the pond prior to discharge during low flow conditions. The 6-inch-diameter outlet pipe (located 2 feet above the pond bottom) allows metering of flow from the pond. The 24-inch-diameter outlet culvert conveys stormwater to a level spreader during large intensity storm events. The emergency spillway for the pond is a riprap-lined channel that was designed to pass the 25-year/24-hour storm event with at least one foot of freeboard.

Detention Pond 9

Detention Pond 9 is located east of the previously permitted landfill and maintenance building. This pond collects stormwater from subcatchments 4L, 4M, 4N, 4O, and 4P (approximately 34.5 acres), which consist of the wood waste handling area, the maintenance/administrative building and parking area, the landfill gas treatment facility, the RNG processing facility, and the construction material laydown/soil stockpile areas. This detention pond has a pond storage volume of approximately 5.1 acre-feet below the emergency spillway primary outlet (Elev. 190.5). The primary outlet structures for this pond includes a pond underdrain system, a 6-inch-diameter outlet pipe, and a 12-inch-diameter outlet culvert. The pond underdrain system consists of 6-inch-diameter perforated pipe backfilled with stone and wrapped in a geotextile filter fabric. The underdrain system filters stormwater seepage in the bottom of the pond prior to discharge during low flow conditions.

The 12-inch-diameter outlet culvert allows controlled discharge to a level spreader during storm events. The emergency spillway for the pond is a riprap-lined channel that was designed to convey the 25-year/24-hour storm event with at least one foot of freeboard.

RNG Facility Stormwater Pond

The RNG Facility stormwater pond is located within subcatchment 4N. This pond is excluded from our analysis as it is small. Exclusion of the pond from the post-development analysis is conservative as modeling the pond would increase runoff storage volumes and further decrease peak flows to AP 4.

Detention Pond 10

Detention Pond 10 is located in a former permitted till borrow area east of Cell 12. During post-development conditions, Pond 10 will receive flow from subcatchments 4J, 4K, and 4Q (approximately 35 acres). The pond's footprint is roughly 84,000 square feet and its design capacity is 7.3 acre-feet below the pond's emergency spillway elevation. The primary outlet structures for this Pond include an underdrain system, a 6-inch-diameter outlet pipe and an 18-inch-diameter outlet culvert. The Pond underdrain system consists of approximately 570 feet of 6-inch-diameter perforated pipe backfilled with stone and wrapped in a filter geotextile. This underdrain system allows filtering of stormwater in the bottom of the Pond prior to discharge during low-flow conditions. The 6-inch-diameter outlet pipe (located 1.2 feet above the pond bottom) has a valve to meter flow out of the pond, as necessary. The 6-inch-diameter orifice on the 6-foot concrete outlet structure and the grate atop the outlet structure will control peak flows from the 10-year and 25-year/24-hour storms while maintaining a minimum of 0.5 feet of freeboard between peak water elevations and the emergency spillway elevation. The 18-inch-diameter outlet culvert will allow controlled discharge to a level spreader during large intensity storm events. The emergency spillway for the pond is a riprap-lined channel that was designed to pass the 100-year/24-hour storm event with at least one foot of freeboard.

Detention Pond 11

Detention Pond 11 is in the eastern watershed and within the footprint of future Cell 18. This detention pond will be replaced with Detention Pond 11R as part of Cell 18 construction.

5.2 Proposed Detention Ponds

Proposed detention ponds were designed to provide detention during cell construction, operations, and post-closure conditions. Design calculations for each and stage-storage curves, are included in Appendix C. Each outlet culvert will have anti-seep collars to minimize "piping" of water along the outside of the outlet pipe. An anti-seep collar design for each detention pond outlet culvert is located in Appendix C-2. Each outlet culvert discharges to a riprap-lined plunge pool and a level spreader. Plunge pools and level spreaders at pipe outlets were designed to meet the requirements of *Maine Erosion and Sediment Control BMPs* (SCS 10/2016). Design calculations for riprap plunge pools and level spreaders are included in Appendix C. Details for the detention pond structures are shown on Drawing C-306 included in Appendix D.

5.2.1 Detention Pond 11R

Proposed detention Pond 11R is east of proposed Cell 18 adjacent to the proposed landfill access road. This pond will be constructed concurrently with the construction of Cell 18. During post-development conditions of the proposed Expansion, Pond 11R will receive flow from subcatchments 4I, 4H, 4G, and 4R (approximately 29.4 acres). The proposed pond's area is approximately 54,090 square feet at elevation 166.0 (2 feet below the top of the berm) and its storage capacity is approximately 9 acre-feet. The primary outlet structures for this pond will include a pond underdrain system, a 6-inch-diameter underdrain outlet pipe, and 4-foot-diameter concrete outlet structure with a 6-inch-diameter orifice, and an open top. Flows from the outlet structure will be conveyed in a 24-inch-diameter outlet pipe to a plunge pool and level spreader. The pond underdrain system consists of approximately 250 feet of 6-inch-diameter perforated pipe backfilled with stone and wrapped in a filter geotextile. This underdrain system will allow filtering of stormwater in the bottom of the pond prior to discharge during low flow conditions. The 6-inch outlet pipe will control the peak flow from the 2-year/24-hour storm. The 6-inch orifice will control flow from the 10-year and 25-year/24-hour storms while maintaining a minimum of 0.5 feet of freeboard between peak water elevations and the top of the 4-foot-diameter concrete outlet structure. The emergency spillway for the pond was designed to pass the 100-year/24-hour storm event with at least one foot of freeboard between the peak water elevation and the top of the pond berm.

5.2.2 Detention Pond 12

Proposed detention Pond 12 is west of and adjacent to Cell 19. This pond will be constructed concurrently with Cell 19. During post-development conditions, Pond 12 will receive flow from subcatchments 2B, 2C, 2D, 2E, and 2F (approximately 31.5 acres). The proposed pond's area is approximately 58,580 square feet at elevation 178.0 (2 feet below top of basin berm) and the storage capacity is approximately 9.5 acre-

feet. The primary outlet structures for this pond include a pond underdrain system, a 6-inch-diameter underdrain outlet pipe, and a 4-foot-diameter concrete outlet structure with an 8-inch-diameter orifice, and an open top. Flows from the outlet structure will be conveyed in a 24-inch-diameter outlet pipe to a plunge pool and level spreader. The pond underdrain system consists of approximately 190 feet of 6-inch-diameter perforated pipe backfilled with stone and wrapped in a filter geotextile. This underdrain system will allow filtering of stormwater in the bottom of the pond prior to discharge during low flow conditions. The 6-inch outlet pipe will control the peak flow from the 2-year/24-hour storm. The 6-inch orifice will control flow from the 25-year/24-hour storm while maintaining a minimum of 0.5 feet of freeboard between the peak water elevation and the top of the 4-foot-diameter precast concrete outlet structure. The emergency spillway for the pond was designed to pass the 100-year/24-hour storm event with at least one foot of freeboard between the peak water elevation and the top of the berm.

5.2.3 Detention Pond 13

Proposed detention Pond 13 is north of and adjacent to Cell 20. This pond will be constructed concurrently with Cell 20. During post-development conditions, Pond 13 will receive flow from subcatchments 4B, 4C, and 4E (approximately 11.5 acres). The proposed pond's area is approximately 17,000 square feet and its storage capacity is approximately 1.6 acre-feet. The primary outlet structures for this pond includes a pond underdrain system, a 6-inch-diameter underdrain outlet pipe, and a 4-foot-diameter concrete outlet structure with an 6-inch-diameter orifice, and an open top. Flows from the outlet structure will be conveyed in a 24-inch-diameter outlet pipe to a plunge pool and level spreader. The pond underdrain system consists of approximately 100 feet of 6-inch-diameter perforated pipe backfilled with stone and wrapped in a filter geotextile. This underdrain system will allow filtering of stormwater in the bottom of the pond prior to discharge during low flow conditions. The 6-inch outlet pipe will control the peak flow from the 2-year/24-hour storm. The 6-inch orifice will control flow from the 10-year and 25-year/24-hour storms while maintaining a minimum of 0.5 feet of freeboard between peak water elevations and the top of the 4-foot-diameter concrete outlet structure. The emergency spillway for the pond was designed to pass the 100-year/24-hour storm event with at least one foot of freeboard between the peak water elevation and the top of the pond berm.

5.2.4 Detention Pond 14

Proposed detention Pond 14 is north of and adjacent to Cell 22. This pond will be constructed concurrently with Cell 22. During post-development conditions, Pond 14 will receive flow from subcatchments 4D and 4F (approximately 13.5 acres). The proposed pond's area is approximately 38,900 square feet at elevation 160.0 (2 feet below top of basin embankment) and storage capacity is approximately 2.1 acre-feet. The primary outlet structures for this pond include a pond underdrain system, a 6-inch-diameter underdrain outlet pipe, and a 4-foot-diameter concrete outlet structure with an 6-inch-diameter orifice, and an open top. Flows from the outlet structure will be conveyed through a 24-inch-diameter outlet pipe to a plunge pool and level spreader. The pond underdrain system consists of approximately 75 feet of 6-inch-diameter perforated pipe backfilled with stone and wrapped in a filter geotextile. This underdrain system will allow filtering of stormwater in the bottom of the pond prior to discharge during low flow conditions. The 6-

inch outlet pipe will control the peak flow from the 2-year/24-hour storm. The 6-inch orifice will control flow from the 10-year and 25-year/24-hour storms while maintaining a minimum of 0.5 feet of freeboard between peak water elevations and the top of the 4-foot-diameter concrete outlet structure. The emergency spillway for the pond was designed to pass the 100-year/24-hour storm event with at least one foot of freeboard between the peak water elevation and the top of the pond berm.

6.0 EXISTING DRAINAGE FACILITIES

In addition to the ponds described above, there are several existing drainage structures within the proposed landfill project site. Several roadway culverts (18 to 30 inches) presently exist, crossing at various locations along the perimeter access road. Existing culverts that will remain in-place in post-development were included in the stormwater routing analysis.

7.0 PROPOSED DRAINAGE FACILITIES

Stormwater runoff from covered portions of the Phase II Expansion and areas adjacent to the Phase II Expansion perimeter access road will be conveyed in a series of drainage structures consisting of channels, catch basins, storm drains, and culverts. Locations of the channels, catch basins, and culverts are shown on the Drawing C-107 included in Appendix D and summarized on Table 7-1. These structures were sized to convey peak flow rates during the 25-year/24-hour rainfall event.

Peak flows to each of the stormwater drainage structures is based on SCS TR20 methodology. Culverts and catch basins were sized using *HydroCAD* computer stormwater modeling system by HydroCAD Software Solutions, Inc of Chocorua, New Hampshire. Channels were sized using the *Hydraulic Design Series No. 4, Design of Roadside Drainage Channels*. Channel linings, level spreaders, culvert inlet and outlet protection, and emergency spillways have been designed using SCS guidance in the *Maine Erosion and Sediment Control BMPs* (SCS, 10/2016*)*. These calculations are in the Phase II Expansion Erosion and Sedimentation Control Plan.

Proposed culverts will be corrugated polyethylene pipe (CPE) with smooth interior and have a minimum diameter of 24 inches. The culverts were designed with riprap inlet apron and riprap-lined aprons or plunge pools at their outlets. Riprap for culvert inlet and outlet protection has a D_{50} rating (i.e., 50 percent of riprap) that ranges from 4 to 10 inches. Culvert outflows will be routed through level spreaders to limit the potential for erosion.

The Phase II Expansion perimeter drainage channels will be riprap-lined channels with a minimum base width of 3 feet, a minimum depth of 3 feet, maximum sideslopes of 2 horizontal to 1 vertical (2H:1V), and a riprap D_{50} of at least 10 inches.

Surface terrace channels on the sideslopes of the landfill cover will be grass-lined ‘v’-channels with a depth of 1.5 feet, longitudinal pitch of 7 percent (typical), and maximum sideslopes of 2H:1V.

Riprap downspouts on the landfill cover will be lined with riprap (D_{50} of 12 inches), have a base width of 4 feet, depth of 2 feet, and maximum sideslopes of 2H:1V. Perimeter riprap-lined channels will have a minimum base width of 3 feet, depth of 3 feet, and maximum sideslopes of 2H:1V.

TABLE 7-1

SUMMARY OF STORMWATER STORM DRAINS, CATCH BASINS, AND CHANNELS

Culverts	Diameter (in.)	Material	Length (ft.)	Slope (%)	Inv. In.	Inv. Out
P-1G	24	HDPE	36	0.13	335.5	331
P-1H	24(2)	CMP	56	0.017	183	182
P-1I	24	HDPE	38	0.12	290.5	286
P-1J-1	24(2)	HDPE	37	0.01	190	189.6
P-1J-2	18	HDPE	40	0.02	186.8	186
P-1K	24	HDPE	33	0.075	254.5	252
1P	24(2)	HDPE	76	0.013	206	205
12P	24(2)	HDPE	98	0.025	197.9	195.5
15P	12	HDPE	121	0.06	197.4	189.9
C-2B	24	HDPE	90	0.01	173	172
C-2E	24	HDPE	80	0.01	173	172
C-2D	24	HDPE	30	0.02	192	191.5
C-4C	24	HDPE	52	0.009	167	166.5
C-4D	24	HDPE	54.5	0.009	158	157.56
C-4G	24	HDPE	115	0.008	161	160
C-4H	24	HDPE	65	0.03	174	172
C-4IA	24	HDPE	40	0.023	213	212.2
C-4JA	18	HDPE	56	0.01	213	212.2
C-4JA3	24	HDPE	60	0.02	204.9	204
C-4JC	24	HDPE	73	0.021	211.5	210
C-4K	24	HDPE	51	0.043	216.5	214.3
C-4L	18	HDPE	121	0.017	213	211
C-4N	18	HDPE	33	0.03	184	183

Catch Basin	Basin Dia. (ft)	Grate Opening (in.)	Depth (ft)	Catch Basin Outlet Dia. (in.)
CB-2B	4	30	8	24
CB-2E	4	30	8	24
CB-2D	4	30	11	24
CB-4C	4	30	6	24
CB-4D	4	30	4.5	24
CB-4G	4	30	8	24
CB-4H	4	30	9	24
CB-4I	4	30	9.6	24
CB-4JA	4	30	7	18
CB-4JA3	4	30	10	24
CB-4K	4	30	4.5	24
CB-4L	4	24	4	18

Channels	Base Width (ft.)	Depth (ft.)	Sideslope Z-Value ('/')	Lining
Detention Pond 11R Emergency Spillway	10	2	2	Riprap (D50=6", t=12")
Perimeter (toe) PH II	3'	3'	2 '/'	Riprap (D50=10", t=22")
Terrace Drain	0' - V-ditch	1.5’	2 '/'	NAG C125BN erosion mat
Downspouts	4'	2'	2 '/'	Riprap (D50=12”, ,t=24”)

Notes:
1 Existing to remain for Post Development condition.
2 Location of culvert structures shown on Drawing C-109 contained in Appendix D.

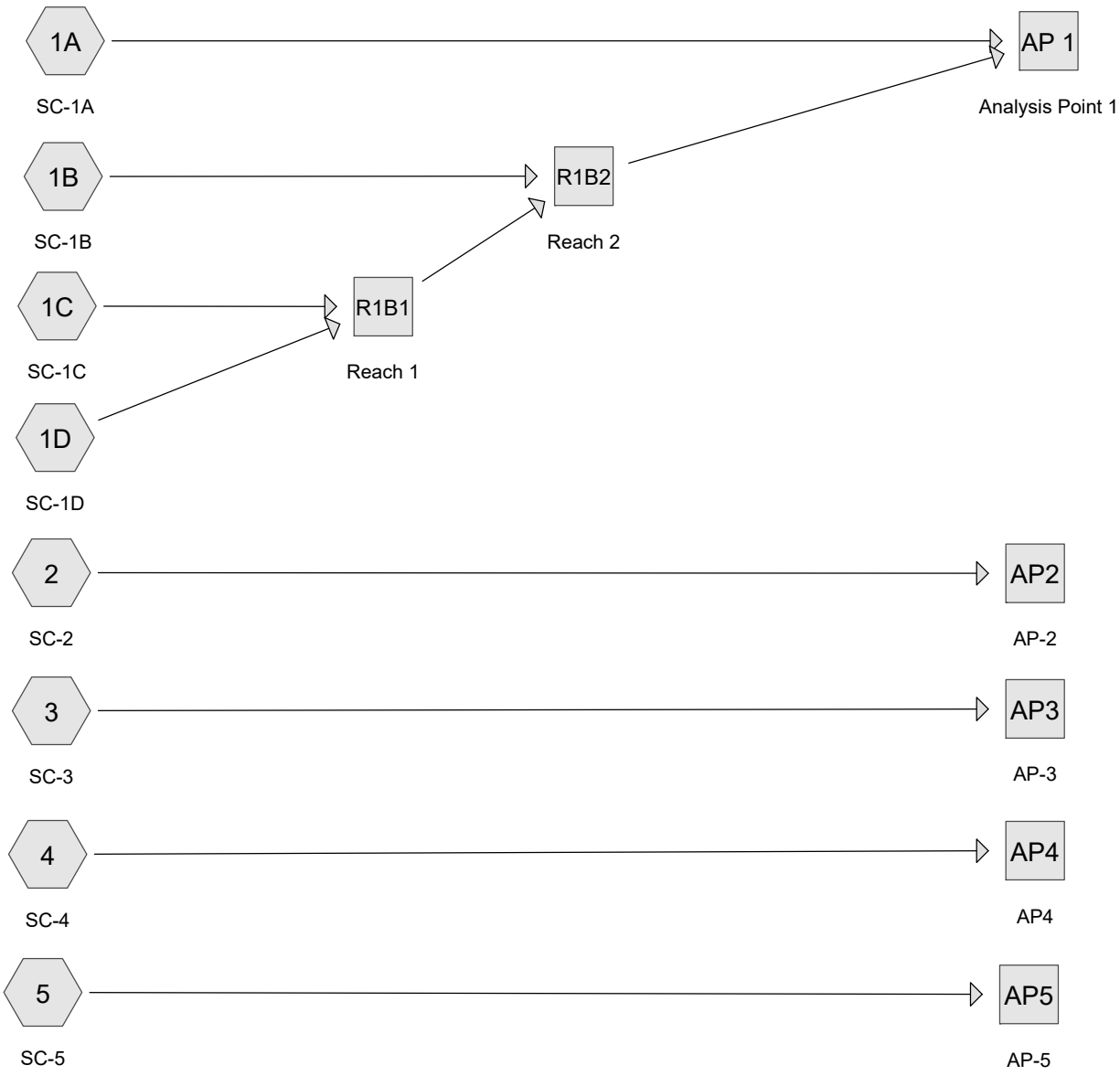
Surface terrace channels were uniformly sized based on the largest contributing drainage area and minimum expected slope. Perimeter riprap channel sizing is based on the largest contributing area and minimum longitudinal slope. Riprap downspouts are uniformly sized for capacity based on the largest contributing drainage area and riprap size based on the largest contributing area and maximum slope. HYDRAIN 6.01, Integrated Drainage Design Computer System (1996), from the Federal Highway Administration (FHWA), was used to size the riprap for downspouts and ditches. Computer software entitled Erosion Control Materials Design Software (ECMDS) Version 4.3 (2003) from the North American Green Co. (N.A.G.) was utilized to determine temporary erosion matting for grass-lined and vegetated ditches.

The HYCHL Module of the FHWA HYDRAIN 6.01 software and the ECMDS software are designed to provide recommendations for effective temporary and permanent erosion protection of stormwater ditches and channels conveying intermittent, concentrated, uniform water flows. The channel lining analysis and performance evaluations are conducted using the maximum shear stress (tractive force) method as outlined in the Federal Highway Administration's HEC-15. The stability check for channel lining materials is based on its capability to physically survive and effectively control soil loss on the channel surface under the calculated shear stresses for a specified flow period.

APPENDIX A

PRE-DEVELOPMENT STORMWATER ANALYSIS

SME
SEVEE & MAHER
ENGINEERS



Subcat Reach Pond Link

Routing Diagram for Pre-development-ExpansionII
Prepared by Sevee & Maher Engineers, Printed 4/21/2025
HydroCAD® 10.20-6a s/n 01260 © 2024 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Yr	Type II 24-hr		Default	24.00	1	2.70	2
2	10-Yr	Type II 24-hr		Default	24.00	1	3.90	2
3	25-Yr	Type II 24-hr		Default	24.00	1	4.90	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.330	98	Existing Water Body (3)
1.600	98	Existing Waterbody (2)
0.950	71	Meadow, non-grazed, HSG C (3)
0.320	98	Paved Areas (New) (3)
2.140	93	Paved roads w/open ditches, 50% imp, HSG D (3, 5)
503.481	70	Woods, Good, HSG C (1A, 1B, 1C, 1D, 2, 3, 4, 5)
345.129	77	Woods, Good, HSG D (1A, 1B, 1C, 1D, 2, 3, 4, 5)
855.950	**73**	**TOTAL AREA**

Summary for Subcatchment 1A: SC-1A

Runoff = 15.99 cfs @ 12.79 hrs, Volume= 3.195 af, Depth> 0.58"
Routed to Reach AP 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Rainfall=2.70"

Area (ac)	CN	Description
58.220	70	Woods, Good, HSG C
8.050	77	Woods, Good, HSG D
66.270	71	Weighted Average
66.270		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
12.3					**Direct Entry, Segment ID: B-C**
7.9	1,530	0.0400	3.22		**Shallow Concentrated Flow, Segment ID: C-D** Unpaved Kv= 16.1 fps
13.5					**Direct Entry, Segment ID: D-E**
64.5	1,580	Total			

Summary for Subcatchment 1B: SC-1B

Runoff = 9.78 cfs @ 12.73 hrs, Volume= 1.790 af, Depth> 0.66"
Routed to Reach R1B2 : Reach 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Rainfall=2.70"

	Area (ac)	CN	Description
*	17.167	70	Woods, Good, HSG C
*	15.223	77	Woods, Good, HSG D
	32.390	73	Weighted Average
	32.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.0	1,300	0.0500	3.60		**Shallow Concentrated Flow, Segment ID: B-C** Unpaved Kv= 16.1 fps
24.6					**Direct Entry, Segment ID: C-D**
61.4	1,350	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 8.43 cfs @ 12.62 hrs, Volume= 1.513 af, Depth> 0.54"
Routed to Reach R1B1 : Reach 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Rainfall=2.70"

	Area (ac)	CN	Description
*	32.888	70	Woods, Good, HSG C
*	0.622	77	Woods, Good, HSG D
	33.510	70	Weighted Average
	33.510		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.8	490	0.0055	1.19		**Shallow Concentrated Flow, Segment ID: B-C** Unpaved Kv= 16.1 fps
11.0					**Direct Entry, Segment ID: C-D**
4.5					**Direct Entry, Segment ID: D-E**
53.1	540	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 12.08 cfs @ 12.79 hrs, Volume= 2.402 af, Depth> 0.62"
Routed to Reach R1B1 : Reach 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Rainfall=2.70"

	Area (ac)	CN	Description
*	30.196	70	Woods, Good, HSG C
*	16.354	77	Woods, Good, HSG D
	46.550	72	Weighted Average
	46.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
10.9	1,840	0.0304	2.81		**Shallow Concentrated Flow, Segment ID: B-C** Unpaved Kv= 16.1 fps
24.5					**Direct Entry, Segment ID: C-D**
66.2	1,890	Total			

Summary for Subcatchment 2: SC-2

Runoff = 10.74 cfs @ 13.70 hrs, Volume= 3.299 af, Depth> 0.64"
Routed to Reach AP2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Rainfall=2.70"

Area (ac)	CN	Description
39.630	70	Woods, Good, HSG C
20.200	77	Woods, Good, HSG D
1.600	98	Existing Waterbody
61.430	73	Weighted Average
59.830		97.40% Pervious Area
1.600		2.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
60.4	1,375	0.0230	0.38		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
10.6	1,213		1.90		**Direct Entry, Segment C-D (STWC, 0.008)**
127.3	2,738	Total			

Summary for Subcatchment 3: SC-3

Runoff = 29.80 cfs @ 15.25 hrs, Volume= 13.702 af, Depth> 0.61"
Routed to Reach AP3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Rainfall=2.70"

	Area (ac)	CN	Description
	162.090	70	Woods, Good, HSG C
	102.790	77	Woods, Good, HSG D
*	2.330	98	Existing Water Body
*	0.320	98	Paved Areas (New)
	1.570	93	Paved roads w/open ditches, 50% imp, HSG D
	0.280	93	Paved roads w/open ditches, 50% imp, HSG D
	0.950	71	Meadow, non-grazed, HSG C
	270.330	73	Weighted Average
	266.755		98.68% Pervious Area
	3.575		1.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
105.2	1,116	0.0050	0.18		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
78.7	3,069		0.65		**Direct Entry, Segment C-D (STWC, 0.001)**
240.2	4,335	Total			

Summary for Subcatchment 4: SC-4

Runoff = 36.87 cfs @ 14.85 hrs, Volume= 15.811 af, Depth> 0.62"
Routed to Reach AP4 : AP4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Rainfall=2.70"

Area (ac)	CN	Description
150.370	77	Woods, Good, HSG D
156.030	70	Woods, Good, HSG C
306.400	73	Weighted Average
306.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.7	150	0.0270	0.09		**Sheet Flow, Segment A-B** Woods: Light underbrush n= 0.400 P2= 2.70"
148.4	2,789	0.0157	0.31		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
17.7	1,592		1.50		**Direct Entry, Segment C-D (STWC,0.0031)**
7.9	760		1.60		**Direct Entry, Segment D-E (STWC,0.005)**
6.7	963		2.40		**Direct Entry, Segment E-F (STWC, 0.0125)**
209.4	6,254	Total			

Summary for Subcatchment 5: SC-5

Runoff = 6.25 cfs @ 14.50 hrs, Volume= 2.469 af, Depth> 0.76"
Routed to Reach AP5 : AP-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Yr Rainfall=2.70"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
31.520	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
39.070	76	Weighted Average
38.925		99.63% Pervious Area
0.145		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
122.7	1,930	0.0110	0.26		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
2.5	275		1.80		**Direct Entry, Segment C-D (STWC, 0.007)**
192.1	2,355	Total			

Summary for Reach AP 1: Analysis Point 1

Inflow Area = 178.720 ac, 0.00% Impervious, Inflow Depth > 0.59" for 2-Yr event
Inflow = 31.17 cfs @ 13.34 hrs, Volume= 8.716 af
Outflow = 31.17 cfs @ 13.34 hrs, Volume= 8.716 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP2: AP-2

Inflow Area = 61.430 ac, 2.60% Impervious, Inflow Depth > 0.64" for 2-Yr event
Inflow = 10.74 cfs @ 13.70 hrs, Volume= 3.299 af
Outflow = 10.74 cfs @ 13.70 hrs, Volume= 3.299 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: AP-3

Inflow Area = 270.330 ac, 1.32% Impervious, Inflow Depth > 0.61" for 2-Yr event
Inflow = 29.80 cfs @ 15.25 hrs, Volume= 13.702 af
Outflow = 29.80 cfs @ 15.25 hrs, Volume= 13.702 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 306.400 ac, 0.00% Impervious, Inflow Depth > 0.62" for 2-Yr event
Inflow = 36.87 cfs @ 14.85 hrs, Volume= 15.811 af
Outflow = 36.87 cfs @ 14.85 hrs, Volume= 15.811 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: AP-5

Inflow Area = 39.070 ac, 0.37% Impervious, Inflow Depth > 0.76" for 2-Yr event
Inflow = 6.25 cfs @ 14.50 hrs, Volume= 2.469 af
Outflow = 6.25 cfs @ 14.50 hrs, Volume= 2.469 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach R1B1: Reach 1

Inflow Area = 80.060 ac, 0.00% Impervious, Inflow Depth > 0.59" for 2-Yr event
Inflow = 20.15 cfs @ 12.72 hrs, Volume= 3.915 af
Outflow = 16.74 cfs @ 13.39 hrs, Volume= 3.784 af, Atten= 17%, Lag= 40.3 min
Routed to Reach R1B2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.39 fps, Min. Travel Time= 22.2 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 38.2 min

Peak Storage= 22,280 cf @ 13.02 hrs
Average Depth at Peak Storage= 0.71' , Surface Width= 24.12'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 149.69 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 1,850.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 146.30'

‡

Summary for Reach R1B2: Reach 2

Inflow Area = 112.450 ac, 0.00% Impervious, Inflow Depth > 0.59" for 2-Yr event
Inflow = 22.12 cfs @ 13.30 hrs, Volume= 5.573 af
Outflow = 21.91 cfs @ 13.49 hrs, Volume= 5.521 af, Atten= 1%, Lag= 11.1 min
Routed to Reach AP 1 : Analysis Point 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 6.3 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 10.5 min

Peak Storage= 8,330 cf @ 13.38 hrs
Average Depth at Peak Storage= 0.81' , Surface Width= 26.16'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 149.69 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 570.0' Slope= 0.0020 '/'
Inlet Invert= 146.30', Outlet Invert= 145.16'

‡

Summary for Subcatchment 1A: SC-1A

Runoff = 41.18 cfs @ 12.72 hrs, Volume= 7.165 af, Depth> 1.30"
Routed to Reach AP 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Yr Rainfall=3.90"

Area (ac)	CN	Description
58.220	70	Woods, Good, HSG C
8.050	77	Woods, Good, HSG D
66.270	71	Weighted Average
66.270		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
12.3					**Direct Entry, Segment ID: B-C**
7.9	1,530	0.0400	3.22		**Shallow Concentrated Flow, Segment ID: C-D** Unpaved Kv= 16.1 fps
13.5					**Direct Entry, Segment ID: D-E**
64.5	1,580	Total			

Summary for Subcatchment 1B: SC-1B

Runoff = 23.41 cfs @ 12.67 hrs, Volume= 3.853 af, Depth> 1.43"
Routed to Reach R1B2 : Reach 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Yr Rainfall=3.90"

	Area (ac)	CN	Description
*	17.167	70	Woods, Good, HSG C
*	15.223	77	Woods, Good, HSG D
	32.390	73	Weighted Average
	32.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.0	1,300	0.0500	3.60		**Shallow Concentrated Flow, Segment ID: B-C** Unpaved Kv= 16.1 fps
24.6					**Direct Entry, Segment ID: C-D**
61.4	1,350	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 22.65 cfs @ 12.57 hrs, Volume= 3.464 af, Depth> 1.24"
Routed to Reach R1B1 : Reach 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Yr Rainfall=3.90"

	Area (ac)	CN	Description
*	32.888	70	Woods, Good, HSG C
*	0.622	77	Woods, Good, HSG D
	33.510	70	Weighted Average
	33.510		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.8	490	0.0055	1.19		**Shallow Concentrated Flow, Segment ID: B-C** Unpaved Kv= 16.1 fps
11.0					**Direct Entry, Segment ID: C-D**
4.5					**Direct Entry, Segment ID: D-E**
53.1	540	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 30.05 cfs @ 12.74 hrs, Volume= 5.276 af, Depth> 1.36"
Routed to Reach R1B1 : Reach 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Yr Rainfall=3.90"

	Area (ac)	CN	Description
*	30.196	70	Woods, Good, HSG C
*	16.354	77	Woods, Good, HSG D
	46.550	72	Weighted Average
	46.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
10.9	1,840	0.0304	2.81		**Shallow Concentrated Flow, Segment ID: B-C** Unpaved Kv= 16.1 fps
24.5					**Direct Entry, Segment ID: C-D**
66.2	1,890	Total			

Summary for Subcatchment 2: SC-2

Runoff = 25.38 cfs @ 13.60 hrs, Volume= 7.137 af, Depth> 1.39"
Routed to Reach AP2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Yr Rainfall=3.90"

Area (ac)	CN	Description
39.630	70	Woods, Good, HSG C
20.200	77	Woods, Good, HSG D
1.600	98	Existing Waterbody
61.430	73	Weighted Average
59.830		97.40% Pervious Area
1.600		2.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
60.4	1,375	0.0230	0.38		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
10.6	1,213		1.90		**Direct Entry, Segment C-D (STWC, 0.008)**
127.3	2,738	Total			

Summary for Subcatchment 3: SC-3

Runoff = 69.34 cfs @ 15.21 hrs, Volume= 29.920 af, Depth> 1.33"
Routed to Reach AP3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Yr Rainfall=3.90"

	Area (ac)	CN	Description
	162.090	70	Woods, Good, HSG C
	102.790	77	Woods, Good, HSG D
*	2.330	98	Existing Water Body
*	0.320	98	Paved Areas (New)
	1.570	93	Paved roads w/open ditches, 50% imp, HSG D
	0.280	93	Paved roads w/open ditches, 50% imp, HSG D
	0.950	71	Meadow, non-grazed, HSG C
	270.330	73	Weighted Average
	266.755		98.68% Pervious Area
	3.575		1.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
105.2	1,116	0.0050	0.18		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
78.7	3,069		0.65		**Direct Entry, Segment C-D (STWC, 0.001)**
240.2	4,335	Total			

Summary for Subcatchment 4: SC-4

Runoff = 86.87 cfs @ 14.67 hrs, Volume= 34.429 af, Depth> 1.35"
Routed to Reach AP4 : AP4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Yr Rainfall=3.90"

Area (ac)	CN	Description
150.370	77	Woods, Good, HSG D
156.030	70	Woods, Good, HSG C
306.400	73	Weighted Average
306.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.7	150	0.0270	0.09		**Sheet Flow, Segment A-B** Woods: Light underbrush n= 0.400 P2= 2.70"
148.4	2,789	0.0157	0.31		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
17.7	1,592		1.50		**Direct Entry, Segment C-D (STWC,0.0031)**
7.9	760		1.60		**Direct Entry, Segment D-E (STWC,0.005)**
6.7	963		2.40		**Direct Entry, Segment E-F (STWC, 0.0125)**
209.4	6,254	Total			

Summary for Subcatchment 5: SC-5

Runoff = 13.69 cfs @ 14.32 hrs, Volume= 5.072 af, Depth> 1.56"
Routed to Reach AP5 : AP-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Yr Rainfall=3.90"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
31.520	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
39.070	76	Weighted Average
38.925		99.63% Pervious Area
0.145		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
122.7	1,930	0.0110	0.26		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
2.5	275		1.80		**Direct Entry, Segment C-D (STWC, 0.007)**
192.1	2,355	Total			

Summary for Reach AP 1: Analysis Point 1

Inflow Area = 178.720 ac, 0.00% Impervious, Inflow Depth > 1.31" for 10-Yr event
Inflow = 90.05 cfs @ 13.07 hrs, Volume= 19.489 af
Outflow = 90.05 cfs @ 13.07 hrs, Volume= 19.489 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP2: AP-2

Inflow Area = 61.430 ac, 2.60% Impervious, Inflow Depth > 1.39" for 10-Yr event
Inflow = 25.38 cfs @ 13.60 hrs, Volume= 7.137 af
Outflow = 25.38 cfs @ 13.60 hrs, Volume= 7.137 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: AP-3

Inflow Area = 270.330 ac, 1.32% Impervious, Inflow Depth > 1.33" for 10-Yr event
Inflow = 69.34 cfs @ 15.21 hrs, Volume= 29.920 af
Outflow = 69.34 cfs @ 15.21 hrs, Volume= 29.920 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 306.400 ac, 0.00% Impervious, Inflow Depth > 1.35" for 10-Yr event
Inflow = 86.87 cfs @ 14.67 hrs, Volume= 34.429 af
Outflow = 86.87 cfs @ 14.67 hrs, Volume= 34.429 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: AP-5

Inflow Area = 39.070 ac, 0.37% Impervious, Inflow Depth > 1.56" for 10-Yr event
Inflow = 13.69 cfs @ 14.32 hrs, Volume= 5.072 af
Outflow = 13.69 cfs @ 14.32 hrs, Volume= 5.072 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach R1B1: Reach 1

Inflow Area = 80.060 ac, 0.00% Impervious, Inflow Depth > 1.31" for 10-Yr event
Inflow = 51.51 cfs @ 12.67 hrs, Volume= 8.740 af
Outflow = 45.50 cfs @ 13.18 hrs, Volume= 8.548 af, Atten= 12%, Lag= 30.3 min
Routed to Reach R1B2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.83 fps, Min. Travel Time= 16.9 min
Avg. Velocity = 0.95 fps, Avg. Travel Time= 32.3 min

Peak Storage= 46,104 cf @ 12.89 hrs
Average Depth at Peak Storage= 1.16' , Surface Width= 33.12'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 149.69 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 1,850.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 146.30'

‡

Summary for Reach R1B2: Reach 2

Inflow Area = 112.450 ac, 0.00% Impervious, Inflow Depth > 1.32" for 10-Yr event
Inflow = 61.01 cfs @ 13.07 hrs, Volume= 12.401 af
Outflow = 60.48 cfs @ 13.22 hrs, Volume= 12.324 af, Atten= 1%, Lag= 8.8 min
Routed to Reach AP 1 : Analysis Point 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.97 fps, Min. Travel Time= 4.8 min
Avg. Velocity = 1.05 fps, Avg. Travel Time= 9.0 min

Peak Storage= 17,504 cf @ 13.14 hrs
Average Depth at Peak Storage= 1.32' , Surface Width= 36.45'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 149.69 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 570.0' Slope= 0.0020 '/'
Inlet Invert= 146.30', Outlet Invert= 145.16'

‡

Summary for Subcatchment 1A: SC-1A

Runoff = 66.08 cfs @ 12.71 hrs, Volume= 11.050 af, Depth> 2.00"
Routed to Reach AP 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Rainfall=4.90"

Area (ac)	CN	Description
58.220	70	Woods, Good, HSG C
8.050	77	Woods, Good, HSG D
66.270	71	Weighted Average
66.270		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
12.3					**Direct Entry, Segment ID: B-C**
7.9	1,530	0.0400	3.22		**Shallow Concentrated Flow, Segment ID: C-D** Unpaved Kv= 16.1 fps
13.5					**Direct Entry, Segment ID: D-E**
64.5	1,580	Total			

Summary for Subcatchment 1B: SC-1B

Runoff = 36.56 cfs @ 12.66 hrs, Volume= 5.837 af, Depth> 2.16"
Routed to Reach R1B2 : Reach 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Rainfall=4.90"

	Area (ac)	CN	Description
*	17.167	70	Woods, Good, HSG C
*	15.223	77	Woods, Good, HSG D
	32.390	73	Weighted Average
	32.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.0	1,300	0.0500	3.60		**Shallow Concentrated Flow, Segment ID: B-C** Unpaved Kv= 16.1 fps
24.6					**Direct Entry, Segment ID: C-D**
61.4	1,350	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 36.85 cfs @ 12.56 hrs, Volume= 5.390 af, Depth> 1.93"
Routed to Reach R1B1 : Reach 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Rainfall=4.90"

	Area (ac)	CN	Description
*	32.888	70	Woods, Good, HSG C
*	0.622	77	Woods, Good, HSG D
	33.510	70	Weighted Average
	33.510		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.8	490	0.0055	1.19		**Shallow Concentrated Flow, Segment ID: B-C** Unpaved Kv= 16.1 fps
11.0					**Direct Entry, Segment ID: C-D**
4.5					**Direct Entry, Segment ID: D-E**
53.1	540	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 47.56 cfs @ 12.73 hrs, Volume= 8.065 af, Depth> 2.08"
Routed to Reach R1B1 : Reach 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Rainfall=4.90"

	Area (ac)	CN	Description
*	30.196	70	Woods, Good, HSG C
*	16.354	77	Woods, Good, HSG D
	46.550	72	Weighted Average
	46.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
10.9	1,840	0.0304	2.81		**Shallow Concentrated Flow, Segment ID: B-C** Unpaved Kv= 16.1 fps
24.5					**Direct Entry, Segment ID: C-D**
66.2	1,890	Total			

Summary for Subcatchment 2: SC-2

Runoff = 39.64 cfs @ 13.55 hrs, Volume= 10.836 af, Depth> 2.12"
Routed to Reach AP2 : AP-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Rainfall=4.90"

Area (ac)	CN	Description
39.630	70	Woods, Good, HSG C
20.200	77	Woods, Good, HSG D
1.600	98	Existing Waterbody
61.430	73	Weighted Average
59.830		97.40% Pervious Area
1.600		2.60% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
60.4	1,375	0.0230	0.38		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
10.6	1,213		1.90		**Direct Entry, Segment C-D (STWC, 0.008)**
127.3	2,738	Total			

Summary for Subcatchment 3: SC-3

Runoff = 107.78 cfs @ 15.20 hrs, Volume= 45.618 af, Depth> 2.03"
Routed to Reach AP3 : AP-3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Rainfall=4.90"

	Area (ac)	CN	Description
	162.090	70	Woods, Good, HSG C
	102.790	77	Woods, Good, HSG D
*	2.330	98	Existing Water Body
*	0.320	98	Paved Areas (New)
	1.570	93	Paved roads w/open ditches, 50% imp, HSG D
	0.280	93	Paved roads w/open ditches, 50% imp, HSG D
	0.950	71	Meadow, non-grazed, HSG C
	270.330	73	Weighted Average
	266.755		98.68% Pervious Area
	3.575		1.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
105.2	1,116	0.0050	0.18		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
78.7	3,069		0.65		**Direct Entry, Segment C-D (STWC, 0.001)**
240.2	4,335	Total			

Summary for Subcatchment 4: SC-4

Runoff = 135.68 cfs @ 14.66 hrs, Volume= 52.428 af, Depth> 2.05"
Routed to Reach AP4 : AP4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Rainfall=4.90"

Area (ac)	CN	Description
150.370	77	Woods, Good, HSG D
156.030	70	Woods, Good, HSG C
306.400	73	Weighted Average
306.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.7	150	0.0270	0.09		**Sheet Flow, Segment A-B** Woods: Light underbrush n= 0.400 P2= 2.70"
148.4	2,789	0.0157	0.31		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
17.7	1,592		1.50		**Direct Entry, Segment C-D (STWC,0.0031)**
7.9	760		1.60		**Direct Entry, Segment D-E (STWC,0.005)**
6.7	963		2.40		**Direct Entry, Segment E-F (STWC, 0.0125)**
209.4	6,254	Total			

Summary for Subcatchment 5: SC-5

Runoff = 20.73 cfs @ 14.31 hrs, Volume= 7.525 af, Depth> 2.31"
Routed to Reach AP5 : AP-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Yr Rainfall=4.90"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
31.520	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
39.070	76	Weighted Average
38.925		99.63% Pervious Area
0.145		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
122.7	1,930	0.0110	0.26		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
2.5	275		1.80		**Direct Entry, Segment C-D (STWC, 0.007)**
192.1	2,355	Total			

Summary for Reach AP 1: Analysis Point 1

Inflow Area = 178.720 ac, 0.00% Impervious, Inflow Depth > 2.01" for 25-Yr event
Inflow = 151.99 cfs @ 12.99 hrs, Volume= 30.009 af
Outflow = 151.99 cfs @ 12.99 hrs, Volume= 30.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP2: AP-2

Inflow Area = 61.430 ac, 2.60% Impervious, Inflow Depth > 2.12" for 25-Yr event
Inflow = 39.64 cfs @ 13.55 hrs, Volume= 10.836 af
Outflow = 39.64 cfs @ 13.55 hrs, Volume= 10.836 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: AP-3

Inflow Area = 270.330 ac, 1.32% Impervious, Inflow Depth > 2.03" for 25-Yr event
Inflow = 107.78 cfs @ 15.20 hrs, Volume= 45.618 af
Outflow = 107.78 cfs @ 15.20 hrs, Volume= 45.618 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 306.400 ac, 0.00% Impervious, Inflow Depth > 2.05" for 25-Yr event
Inflow = 135.68 cfs @ 14.66 hrs, Volume= 52.428 af
Outflow = 135.68 cfs @ 14.66 hrs, Volume= 52.428 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: AP-5

Inflow Area = 39.070 ac, 0.37% Impervious, Inflow Depth > 2.31" for 25-Yr event
Inflow = 20.73 cfs @ 14.31 hrs, Volume= 7.525 af
Outflow = 20.73 cfs @ 14.31 hrs, Volume= 7.525 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Reach R1B1: Reach 1

Inflow Area = 80.060 ac, 0.00% Impervious, Inflow Depth > 2.02" for 25-Yr event
Inflow = 82.45 cfs @ 12.65 hrs, Volume= 13.455 af
Outflow = 74.78 cfs @ 13.09 hrs, Volume= 13.216 af, Atten= 9%, Lag= 26.8 min
Routed to Reach R1B2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.08 fps, Min. Travel Time= 14.8 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 29.9 min

Peak Storage= 66,404 cf @ 12.85 hrs
Average Depth at Peak Storage= 1.46' , Surface Width= 39.19'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 149.69 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 1,850.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 146.30'

‡

Summary for Reach R1B2: Reach 2

Inflow Area = 112.450 ac, 0.00% Impervious, Inflow Depth > 2.03" for 25-Yr event
Inflow = 101.26 cfs @ 13.00 hrs, Volume= 19.054 af
Outflow = 100.48 cfs @ 13.12 hrs, Volume= 18.959 af, Atten= 1%, Lag= 7.5 min
Routed to Reach AP 1 : Analysis Point 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.25 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 1.13 fps, Avg. Travel Time= 8.4 min

Peak Storage= 25,472 cf @ 13.05 hrs
Average Depth at Peak Storage= 1.67' , Surface Width= 43.45'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 149.69 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 570.0' Slope= 0.0020 '/'
Inlet Invert= 146.30', Outlet Invert= 145.16'

‡

TIME OF CONCENTRATION

SUBCATCHMENT 1A
A - B: Sht L=50', S=0.010
B - C: DIRECT ENTRY
C - D: ShC L=1530', S=0.040
D - E: DIRECT ENTRY

SUBCATCHMENT 1B
A - B: Sht L=50', S=0.010
B - C: ShC L=1300', S=0.050
C - D: DIRECT ENTRY

SUBCATCHMENT 1C
A - B: Sht L=50', S=0.010
B - C: ShC L=490', S=0.0055
C - D: DIRECT ENTRY
D - E: DIRECT ENTRY

SUBCATCHMENT 1D
A - B: Sht L=50', S=0.010
B - C: ShC L=1840', S=0.0304
C - D: DIRECT ENTRY

SUBCATCHMENT SC-2
A - B: Sht L=150', S=0.020
B - C: ShC L=1375', S=0.023
C - D: DIRECT ENTRY L=1215'

SUBCATCHMENT SC-3
A - B: Sht L=150', S=0.020
B - C: ShC L=1120', S=0.005
C - D: DIRECT ENTRY L=3070'

SUBCATCHMENT SC-4
A - B: Sht L=150', S=0.027
B - C: ShC L=2780', S=0.0157
C - D: DIRECT ENTRY L=1590'
D - E: DIRECT ENTRY L=760'
E - F: DIRECT ENTRY L=965'

SUBCATCHMENT SC-5
A - B: Sht L=150', S=0.013
B - C: ShC L=1930', S=0.011
C - D: DIRECT ENTRY L=275'

ANALYSIS POINT 1
ANALYSIS POINT 2
ANALYSIS POINT 3
ANALYSIS POINT 4
ANALYSIS POINT 5

EAST
WEST

EXISTING PROPERTY LINE (TYP)

Stillwater River

Penobscot River

French Settlement

Old Town

Sunkhaze

BNRR 147.3

X169

LEGEND

- 1B — SUBCATCHMENT DESIGNATION
- SUBCATCHMENT BOUNDARY
- A B C — TIME OF CONCENTRATION SEGMENT DESIGNATION
- TIME OF CONCENTRATION PATH
- WATERSHED BOUNDARY
- HYDROLOGIC SOIL GROUP BOUNDARY
- HSG D — HYDROLOGIC SOIL GROUP DESIGNATION
- Sht L=50' S=0.005 — TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE
- Sht — SHEET FLOW
- Shc — SHALLOW CONCENTRATED FLOW
- Ch — CHANNEL FLOW
- DRAINAGE REACH
- R-1H — REACH DESIGNATION (HYDROCAD)
- POND/STRUCTURE DESIGNATION (HYDROCAD)
- tc① — TIME OF CONCENTRATION WITH SUBCATCHMENT DESIGNATION

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO, NORRIDGEWOCK, MAINE. PHOTO DATE DECEMBER 31, 2014. VERTICAL DATUM MAINE STATE COORDINATE SYSTEM EAST ZONE NAD 83. GROUND CONTROL BY PLISGA & DAY, BANGOR, MAINE.
2. HYDROLOGIC SOIL GROUP DATA INTERPRETED FROM SOIL SURVEY OF PENOBSCOT COUNTY, MAINE, BY U.S. DEPT. OF AGRICULTURE SOIL CONSERVATION SERVICE DECEMBER 1970. MAPS 203 AND 213.
3. SUBCATCHMENTS BASED ON TOPOGRAPHY OF SITE PRIOR TO DEVELOPMENT WHICH PREDATES THE TOPOGRAPHY SHOWN.

150 0 300 600 FEET

REV.	BY	DATE	STATUS
	BDP	11/2025	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

STATE OF MAINE — BRIAN D. PERRY — 13601 — REGISTERED PROFESSIONAL ENGINEER — 11/11/2025

JUNIPER RIDGE LANDFILL EXPANSION PROJECT OLD TOWN, MAINE

STORMWATER MANAGEMENT PLAN PRE-DEVELOPMENT ANALYSIS

SME SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	NMT
DRAWN BY:	SJM
DATE:	11/2025
CHECKED BY:	BDP
LMN:	
CTB:	SME-STD.CTB
JOB NO.	240101
DWG FILE	SMP-PREDEVELOPMENT CONDITIONS

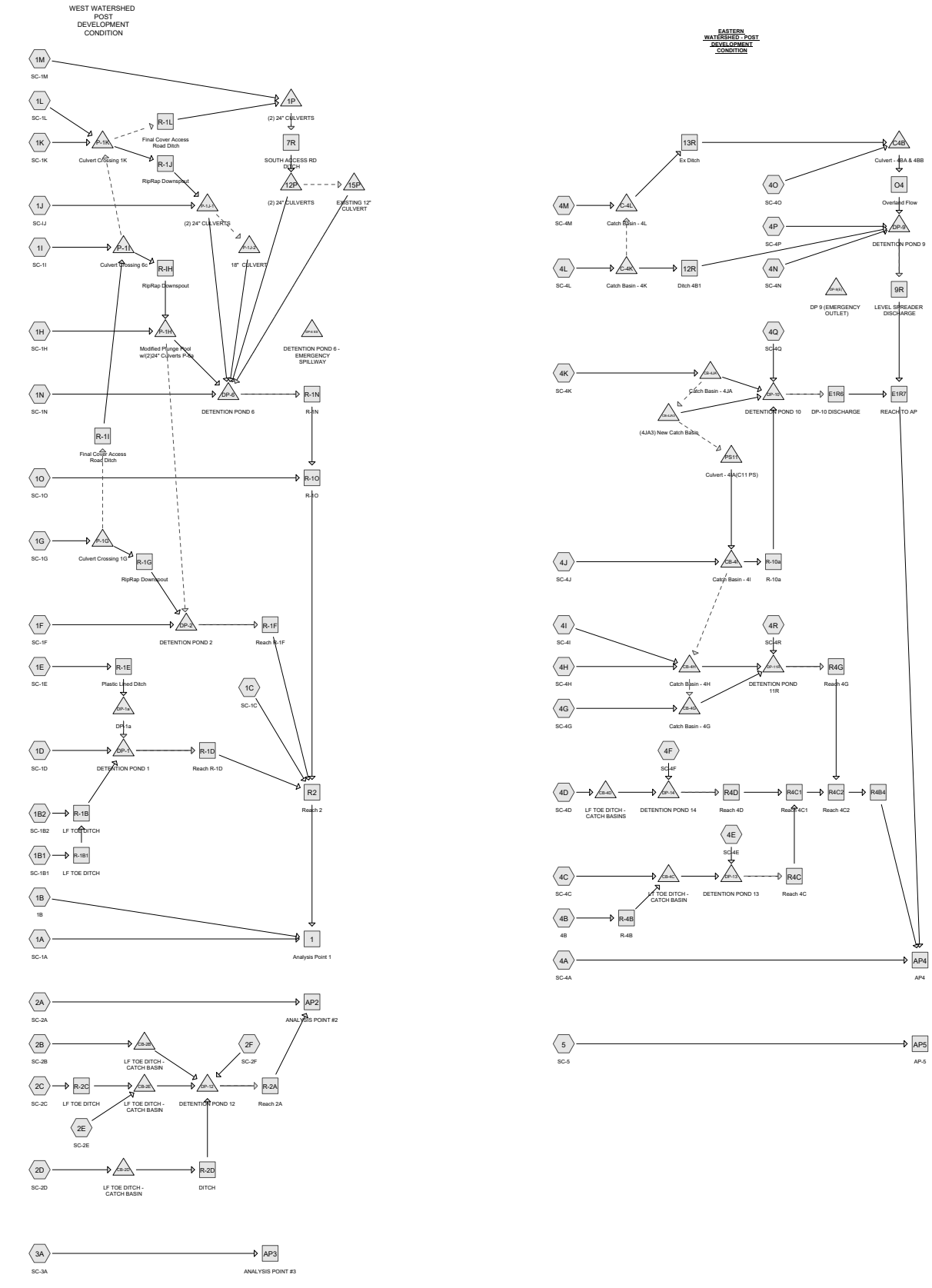
D-100

Viewed:N:\Coatelic\OldTown\Landfill\Expansion\Phase 5 Expansion\Arcdata\Plans\SWPP\PreDevelopment Conditions.dwg, SMP-E Sheet1, 11/10/2025 1:42:16 PM, sjm

APPENDIX B

POST-DEVELOPMENT STORMWATER ANALYSIS

SME
SEVEE & MAHER
ENGINEERS



Routing Diagram for Post-Development_20250312

Prepared by Sevee & Maher Engineers, Printed 5/29/2025

HydroCAD® 10.20-7a s/n 01260 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr Storm	Type II 24-hr		Default	24.00	1	2.70	2
2	10-yr Storm	Type II 24-hr		Default	24.00	1	3.90	2
3	25-yr Storm	Type II 24-hr		Default	24.00	1	4.90	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.393	79	50-75% Grass cover, Fair, HSG C (4Q)
14.519	74	>75% Grass cover, Good, HSG C (2F, 4N, 4O, 4P, 4Q, 4R)
1.074	70	Brush, Fair, HSG C (4O)
0.338	98	Building/Concrete Slabs (4N)
3.930	98	Existing Waterbody (2A, 3A)
0.032	91	Fallow, bare soil, HSG C, rip rap (1H)
6.452	91	Gravel (1F, 1J, 4A, 4N, 4P)
2.122	96	Gravel Surface (1A, 1C, 1D, 1E, 1G, 1N, 1O)
2.329	89	Gravel roads, HSG C (1K, 1L, 4A, 4O, 4P)
2.879	98	Impervious Surface (1A, 1O, 4A, 4O)
168.865	71	Landfill Final Cover (1B, 1B2, 1D, 1E, 1F, 1G, 1I, 1J, 1K, 1L, 1M, 2B, 2C, 2D, 2E, 4B, 4C, 4D, 4G, 4H, 4I, 4J, 4K, 4L, 4M)
17.694	78	Meadow HSG D (1A, 1C, 1N, 1O)
50.348	71	Meadow, non-grazed, HSG C (1A, 1B1, 1C, 1H, 1O, 2A, 3A, 4A, 4E, 4F, 4N)
5.359	98	Paved Area (1O, 2A, 3A, 4A, 4N, 4O, 4P)
0.283	92	Paved roads w/open ditches, 50% imp, HSG C (1M)
2.758	93	Paved roads w/open ditches, 50% imp, HSG D (2F, 4Q, 4R, 5)
3.819	98	Pond (1N, 4P, 4Q)
0.800	78	Pond, Meadow HSG D (1D)
5.663	98	Riprap (1B1, 1B2, 1D, 1E, 1I, 1K, 2B, 2C, 2D, 2E, 4B, 4C, 4D, 4G, 4H, 4I, 4J, 4K, 4L, 4M)
0.007	98	Roofs, HSG C (1F)
255.568	70	Woods, Good, HSG C (1A, 1C, 1N, 1O, 2A, 3A, 4A, 5)
307.674	77	Woods, Good, HSG D (1A, 1C, 1O, 2A, 3A, 4A, 5)
855.906	**74**	**TOTAL AREA**

Summary for Subcatchment 1A: SC-1A

Runoff = 5.44 cfs @ 13.15 hrs, Volume= 1.359 af, Depth= 0.72"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.084	70	Woods, Good, HSG C
*	7.750	77	Woods, Good, HSG D
*	1.540	71	Meadow, non-grazed, HSG C
*	1.760	78	Meadow HSG D
*	0.070	96	Gravel Surface
*	0.330	98	Impervious Surface
	22.534	74	Weighted Average
	22.204		98.54% Pervious Area
	0.330		1.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.4	1,840		1.50		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
93.1	2,250	Total			

Summary for Subcatchment 1B: 1B

Runoff = 0.39 cfs @ 11.94 hrs, Volume= 0.017 af, Depth= 0.59"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.344	71	Landfill Final Cover
	0.344		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segement A-B**

Summary for Subcatchment 1B1: SC-1B1

Runoff = 6.76 cfs @ 12.06 hrs, Volume= 0.451 af, Depth= 0.64"
Routed to Reach R-1B1 : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	8.111	71	Meadow, non-grazed, HSG C
*	0.400	98	Riprap
	8.511	72	Weighted Average
	8.111		95.30% Pervious Area
	0.400		4.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	140	0.1000	4.74		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	240	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	482	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.8	1,012	Total			

Summary for Subcatchment 1B2: SC-1B2

Runoff = 8.63 cfs @ 12.07 hrs, Volume= 0.583 af, Depth= 0.64"
Routed to Reach R-1B : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	10.600	71	Landfill Final Cover
*	0.403	98	Riprap
	11.003	72	Weighted Average
	10.600		96.34% Pervious Area
	0.403		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.6	75	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	403	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	554	0.3300	19.66	314.62	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.050 Mountain streams w/large boulders
13.1	1,182	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 4.26 cfs @ 12.90 hrs, Volume= 0.872 af, Depth= 0.82"
Routed to Reach R2 : Reach 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	6.100	77	Woods, Good, HSG D
*	0.690	70	Woods, Good, HSG C
*	3.100	78	Meadow HSG D
*	2.580	71	Meadow, non-grazed, HSG C
*	0.310	96	Gravel Surface
	12.780	76	Weighted Average
	12.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.6	170	0.0133	1.73		**Shallow Concentrated Flow, Segment ID: B-C** Grassed Waterway Kv= 15.0 fps
16.7					**Direct Entry, Segment ID: C-D**
75.0	370	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 9.74 cfs @ 12.06 hrs, Volume= 0.647 af, Depth= 0.64"
Routed to Pond DP-1 : DETENTION POND 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.000	71	Landfill Final Cover
*	0.110	96	Gravel Surface
*	0.800	78	Pond, Meadow HSG D
*	0.300	98	Riprap
	12.210	72	Weighted Average
	11.910		97.54% Pervious Area
	0.300		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.3	241	0.0700	12.78	172.52	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.025
0.3	556	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
12.7	1,057	Total			

Summary for Subcatchment 1E: SC-1E

Runoff = 7.89 cfs @ 12.05 hrs, Volume= 0.508 af, Depth= 0.64"
Routed to Reach R-1E : Plastic Lined Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	9.100	71	Landfill Final Cover
*	0.200	96	Gravel Surface
*	0.280	98	Riprap
	9.580	72	Weighted Average
	9.300		97.08% Pervious Area
	0.280		2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	146	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	296	0.0700	16.72	200.67	**Trap/Vee/Rect Channel Flow, Segment ID: B-C** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.025
0.3	537	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
0.3	186	0.0700	10.28	57.82	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 '/' Top.W=7.50' n= 0.030 Earth, grassed & winding
11.9	1,165	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 8.89 cfs @ 11.97 hrs, Volume= 0.429 af, Depth= 0.64"
Routed to Pond DP-2 : DETENTION POND 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	7.747	71	Landfill Final Cover
*	0.349	91	Gravel
	0.007	98	Roofs, HSG C
	8.103	72	Weighted Average
	8.096		99.91% Pervious Area
	0.007		0.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	100	0.3800	0.51		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	293	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.2	300	0.3800	29.77	669.83	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.50' Z= 2.0 '/' Top.W=14.00' n= 0.040 Earth, cobble bottom, clean sides
4.7	693	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 1.55 cfs @ 12.06 hrs, Volume= 0.100 af, Depth= 0.68"
Routed to Pond P-1G : Culvert Crossing 1G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	1.625	71	Landfill Final Cover
*	0.147	96	Gravel Surface
	1.772	73	Weighted Average
	1.772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	142	0.1500	2.71		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	154	0.0700	8.95	60.43	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.035 Earth, dense weeds

12.5 446 Total

Summary for Subcatchment 1H: SC-1H

Runoff = 3.09 cfs @ 11.95 hrs, Volume= 0.138 af, Depth= 0.59"
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.032	91	Fallow, bare soil, HSG C, rip rap
	2.759	71	Meadow, non-grazed, HSG C
	2.791	71	Weighted Average
	2.791		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	66	0.3900	0.47		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
0.3	140	0.0800	9.12	27.13	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.030 Earth, grassed & winding
0.2	190	0.1430	16.62	49.46	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.022 Earth, clean & straight
2.8	396	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 3.66 cfs @ 12.02 hrs, Volume= 0.207 af, Depth= 0.64"
Routed to Pond P-1I : Culvert Crossing 6c

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	3.829	71	Landfill Final Cover
*	0.077	98	Riprap
	3.906	72	Weighted Average
	3.829		98.03% Pervious Area
	0.077		1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	150	0.1000	0.32		**Sheet Flow, Segment AB** Grass: Short n= 0.150 P2= 2.70"
0.4	106	0.1000	4.74		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
0.4	260	0.0700	10.44	70.50	**Trap/Vee/Rect Channel Flow, Segment C - D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.030 Earth, grassed & winding
0.1	140	0.3300	39.33	629.24	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.025 Rubble masonry, cemented
8.7	656	Total			

Summary for Subcatchment 1J: SC-IJ

Runoff = 2.13 cfs @ 11.95 hrs, Volume= 0.096 af, Depth= 0.64"
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	1.763	71	Landfill Final Cover
*	0.046	91	Gravel
	1.809	72	Weighted Average
	1.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	67	0.5000	0.52		**Sheet Flow, SEGMENT AB** Grass: Short n= 0.150 P2= 2.70"
0.8	325	0.1900	6.54		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	325	0.0300	12.44	149.28	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.022 Earth, clean & straight
3.3	717	Total			

Summary for Subcatchment 1K: SC-1K

Runoff = 3.34 cfs @ 11.95 hrs, Volume= 0.148 af, Depth= 0.68"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	2.350	71	Landfill Final Cover
	0.163	89	Gravel roads, HSG C
*	0.111	98	Riprap
	2.624	73	Weighted Average
	2.513		95.77% Pervious Area
	0.111		4.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	68	0.3300	0.44		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 2.70"
0.4	93	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.3	249	0.3300	12.60	201.68	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.078 Riprap, 12-inch
3.3	410	Total			

Summary for Subcatchment 1L: SC-1L

Runoff = 1.95 cfs @ 11.95 hrs, Volume= 0.089 af, Depth= 0.64"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	1.607	71	Landfill Final Cover
	0.064	89	Gravel roads, HSG C
	1.671	72	Weighted Average
	1.671		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	67	0.4000	0.48		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	442	0.1000	6.15	49.59	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=2.00' D=1.50' Z= 2.0 & 2.5 '/' Top.W=8.75' n= 0.069 Riprap, 6-inch
3.5	509	Total			

Summary for Subcatchment 1M: SC-1M

Runoff = 4.52 cfs @ 12.06 hrs, Volume= 0.299 af, Depth= 0.64"
Routed to Pond 1P : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	5.368	71	Landfill Final Cover
	0.283	92	Paved roads w/open ditches, 50% imp, HSG C
	5.651	72	Weighted Average
	5.509		97.50% Pervious Area
	0.141		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	73	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	174	0.0700	11.06	265.40	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=2.00' Z= 2.0 & 10.0 '/' Top.W=24.00' n= 0.035 Earth, dense weeds
0.5	413	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.6	810	Total			

Summary for Subcatchment 1N: SC-1N

Runoff = 7.05 cfs @ 12.30 hrs, Volume= 0.754 af, Depth= 1.03"
Routed to Pond DP-6 : DETENTION POND 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	2.942	70	Woods, Good, HSG C
*	3.662	78	Meadow HSG D
*	0.572	96	Gravel Surface
*	1.607	98	Pond
	8.783	80	Weighted Average
	7.176		81.70% Pervious Area
	1.607		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.7	123	0.0569	1.19		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
0.5	370	0.0189	12.43	801.88	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=2.00' D=3.00' Z= 10.0 & 3.0 '/' Top.W=41.00' n= 0.022 Earth, clean & straight
33.0	593	Total			

Summary for Subcatchment 1O: SC-1O

Runoff = 17.81 cfs @ 12.39 hrs, Volume= 2.246 af, Depth= 0.87"
Routed to Reach R-1O : R-1O

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	13.230	77	Woods, Good, HSG D
*	5.712	70	Woods, Good, HSG C
*	9.172	78	Meadow HSG D
*	1.195	71	Meadow, non-grazed, HSG C
*	0.713	96	Gravel Surface
*	0.515	98	Impervious Surface
*	0.494	98	Paved Area
	31.031	77	Weighted Average
	30.022		96.75% Pervious Area
	1.009		3.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0100	0.07		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
15.1	1,875	0.0190	2.07		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
12.8	856	0.0500	1.12		**Shallow Concentrated Flow, Segment CD** Woodland Kv= 5.0 fps
39.7	2,781	Total			

Summary for Subcatchment 2A: SC-2A

Runoff = 8.33 cfs @ 13.94 hrs, Volume= 2.898 af, Depth= 0.72"
Routed to Reach AP2 : ANALYSIS POINT #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	24.340	70	Woods, Good, HSG C
	15.830	77	Woods, Good, HSG D
*	5.898	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area
	1.600	98	Existing Waterbody
	48.048	74	Weighted Average
	46.068		95.88% Pervious Area
	1.980		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
42.6	534	0.0070	0.21		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
10.6	1,213		1.90		**Direct Entry, Segment C-D (STWC, 0.008)**
144.3	1,897	Total			

Summary for Subcatchment 2B: SC-2B

Runoff = 6.91 cfs @ 12.09 hrs, Volume= 0.493 af, Depth= 0.64"
Routed to Pond CB-2B : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	9.090	71	Landfill Final Cover
*	0.218	98	Riprap
	9.308	72	Weighted Average
	9.090		97.66% Pervious Area
	0.218		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.3	178	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	252	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	455	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
0.8	136	0.0100	3.00	81.02	**Trap/Vee/Rect Channel Flow, Segment E-F** Bot.W=3.00' D=3.00' Z= 2.0 '/' Top.W=15.00' n= 0.069 Riprap, 6-inch
14.4	1,171	Total			

Summary for Subcatchment 2C: SC-2C

Runoff = 7.41 cfs @ 12.08 hrs, Volume= 0.516 af, Depth= 0.64"
Routed to Reach R-2C : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	9.383	71	Landfill Final Cover
*	0.357	98	Riprap
	9.740	72	Weighted Average
	9.383		96.33% Pervious Area
	0.357		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	158	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.6	308	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	474	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,090	Total			

Summary for Subcatchment 2D: SC-2D

Runoff = 7.14 cfs @ 12.07 hrs, Volume= 0.493 af, Depth= 0.64"
Routed to Pond CB-2D : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	8.931	71	Landfill Final Cover
*	0.366	98	Riprap
	9.297	72	Weighted Average
	8.931		96.06% Pervious Area
	0.366		3.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	157	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	248	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	475	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.6	1,030	Total			

Summary for Subcatchment 2E: SC-2E

Runoff = 0.80 cfs @ 11.94 hrs, Volume= 0.035 af, Depth= 0.77"
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.466	71	Landfill Final Cover
*	0.073	98	Riprap
	0.539	75	Weighted Average
	0.466		86.46% Pervious Area
	0.073		13.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 2F: SC-2F

Runoff = 4.93 cfs @ 11.94 hrs, Volume= 0.211 af, Depth= 0.97"
Routed to Pond DP-12 : DETENTION POND 12

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
1.947	74	>75% Grass cover, Good, HSG C
0.655	93	Paved roads w/open ditches, 50% imp, HSG D
2.602	79	Weighted Average
2.274		87.41% Pervious Area
0.327		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 3A: SC-3A

Runoff = 29.28 cfs @ 15.25 hrs, Volume= 15.029 af, Depth= 0.68"
Routed to Reach AP3 : ANALYSIS POINT #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	158.900	70	Woods, Good, HSG C
	102.800	77	Woods, Good, HSG D
	1.000	71	Meadow, non-grazed, HSG C
*	0.564	98	Paved Area
*	2.330	98	Existing Waterbody
	265.594	73	Weighted Average
	262.700		98.91% Pervious Area
	2.894		1.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
105.2	1,116	0.0050	0.18		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
78.7	3,093		0.66		**Direct Entry, Segment C-D (STWC, 0.001)**
240.2	4,359	Total			

Summary for Subcatchment 4A: SC-4A

Runoff = 22.65 cfs @ 16.26 hrs, Volume= 14.143 af, Depth= 0.82"
Routed to Reach AP4 : AP4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	130.444	77	Woods, Good, HSG D
	44.640	70	Woods, Good, HSG C
*	23.410	71	Meadow, non-grazed, HSG C
*	3.300	98	Paved Area
*	2.520	91	Gravel
	1.000	89	Gravel roads, HSG C
*	2.000	98	Impervious Surface
	207.314	76	Weighted Average
	202.014		97.44% Pervious Area
	5.300		2.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
200.8	1,905	0.0040	0.16		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
17.7	1,592		1.50		**Direct Entry, Segment C-D (STWC, 0.0031)**
7.9	760		1.60		**Direct Entry, Segment D-E (STWC, 0.005)**
6.7	963		2.40		**Direct Entry, Segment E-F (STWC, 0.0125)**
324.2	5,370	Total			

Summary for Subcatchment 4B: 4B

Runoff = 4.35 cfs @ 12.06 hrs, Volume= 0.278 af, Depth= 0.72"
Routed to Reach R-4B : R-4B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	4.150	71	Landfill Final Cover
*	0.452	98	Riprap
	4.602	74	Weighted Average
	4.150		90.18% Pervious Area
	0.452		9.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	32	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	240	0.0700	8.81	49.56	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 3.0 '/' Top.W=7.50' n= 0.035 Earth, dense weeds
0.4	342	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.5	764	Total			

Summary for Subcatchment 4C: SC-4C

Runoff = 6.23 cfs @ 12.02 hrs, Volume= 0.353 af, Depth= 0.72"
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.566	98	Riprap
*	5.290	71	Landfill Final Cover
	5.856	74	Weighted Average
	5.290		90.33% Pervious Area
	0.566		9.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	101	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	442	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 Earth, dense weeds
0.4	365	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.4	908	Total			

Summary for Subcatchment 4D: SC-4D

Runoff = 11.18 cfs @ 12.02 hrs, Volume= 0.641 af, Depth= 0.64"
Routed to Pond CB-4D : LF TOE DITCH - CATCH BASINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.800	71	Landfill Final Cover
*	0.295	98	Riprap
	12.095	72	Weighted Average
	11.800		97.56% Pervious Area
	0.295		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.2	117	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	504	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.0	721	Total			

Summary for Subcatchment 4E: SC-4E

Runoff = 1.09 cfs @ 11.95 hrs, Volume= 0.049 af, Depth= 0.59"
Routed to Pond DP-13 : DETENTION POND 13

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.992	71	Meadow, non-grazed, HSG C
0.992		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	300		1.67		**Direct Entry, Segment A-B**

Summary for Subcatchment 4F: SC-4F

Runoff = 1.53 cfs @ 11.94 hrs, Volume= 0.068 af, Depth= 0.59"
Routed to Pond DP-14 : DETENTION POND 14

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
1.366	71	Meadow, non-grazed, HSG C
1.366		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	500		4.17		**Direct Entry, Segment A-B**

Summary for Subcatchment 4G: SC-4G

Runoff = 8.57 cfs @ 12.08 hrs, Volume= 0.597 af, Depth= 0.64"
Routed to Pond CB-4G : Catch Basin - 4G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.040	71	Landfill Final Cover
*	0.220	98	Riprap
	11.260	72	Weighted Average
	11.040		98.05% Pervious Area
	0.220		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	143	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	390	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	497	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,180	Total			

Summary for Subcatchment 4H: SC-4H

Runoff = 8.50 cfs @ 12.09 hrs, Volume= 0.617 af, Depth= 0.59"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	12.330	71	Landfill Final Cover
*	0.135	98	Riprap
	12.465	71	Weighted Average
	12.330		98.92% Pervious Area
	0.135		1.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	232	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	464	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	440	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.3	1,286	Total			

Summary for Subcatchment 4I: SC-4I

Runoff = 2.90 cfs @ 11.95 hrs, Volume= 0.130 af, Depth= 0.59"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	2.595	71	Landfill Final Cover
*	0.036	98	Riprap
	2.631	71	Weighted Average
	2.595		98.63% Pervious Area
	0.036		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, A-B**

Summary for Subcatchment 4J: SC-4J

Runoff = 9.80 cfs @ 12.08 hrs, Volume= 0.692 af, Depth= 0.64"
Routed to Pond CB-4I : Catch Basin - 4I

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	12.590	71	Landfill Final Cover
*	0.462	98	Riprap
	13.052	72	Weighted Average
	12.590		96.46% Pervious Area
	0.462		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	223	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	386	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.4	376	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.1	1,135	Total			

Summary for Subcatchment 4K: SC-4K

Runoff = 6.51 cfs @ 12.19 hrs, Volume= 0.618 af, Depth= 0.64"
Routed to Pond CB-4JA : Catch Basin - 4JA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.234	71	Landfill Final Cover
*	0.429	98	Riprap
	11.663	72	Weighted Average
	11.234		96.32% Pervious Area
	0.429		3.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
10.3	432	0.0100	0.70		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	432	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	392	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
22.9	1,406	Total			

Summary for Subcatchment 4L: SC-4L

Runoff = 10.40 cfs @ 12.10 hrs, Volume= 0.765 af, Depth= 0.64"
Routed to Pond C-4K : Catch Basin - 4K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	14.000	71	Landfill Final Cover
*	0.437	98	Riprap
	14.437	72	Weighted Average
	14.000		96.97% Pervious Area
	0.437		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
2.6	242	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.9	476	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	406	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
15.3	1,274	Total			

Summary for Subcatchment 4M: SC-4M

Runoff = 0.88 cfs @ 11.93 hrs, Volume= 0.038 af, Depth= 0.68"
Routed to Pond C-4L : Catch Basin - 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.633	71	Landfill Final Cover
*	0.046	98	Riprap
	0.679	73	Weighted Average
	0.633		93.23% Pervious Area
	0.046		6.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 4N: SC-4N

Runoff = 6.78 cfs @ 12.13 hrs, Volume= 0.515 af, Depth= 1.03"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	2.512	74	>75% Grass cover, Good, HSG C
*	0.245	98	Paved Area
*	0.338	98	Building/Concrete Slabs
*	1.404	91	Gravel
	1.497	71	Meadow, non-grazed, HSG C
	5.996	80	Weighted Average
	5.413		90.28% Pervious Area
	0.583		9.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	61	0.0200	1.14		**Sheet Flow, Segment A-B** Smooth surfaces n= 0.011 P2= 2.70"
10.5	61	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
7.9	955	0.0180	2.01		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
19.3	1,077	Total			

Summary for Subcatchment 4O: SC-4O

Runoff = 3.16 cfs @ 12.06 hrs, Volume= 0.197 af, Depth= 0.97"
Routed to Pond C4B : Culvert - 4BA & 4BB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	1.074	70	Brush, Fair, HSG C
*	0.034	98	Impervious Surface
	0.687	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
*	0.240	98	Paved Area
	2.422	79	Weighted Average
	2.148		88.69% Pervious Area
	0.274		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	24	0.0200	0.95		**Sheet Flow, Segment AB** Smooth surfaces n= 0.011 P2= 2.70"
0.8	19	0.5000	0.41		**Sheet Flow, Segment BC** Grass: Short n= 0.150 P2= 2.70"
11.9	584	0.0137	0.82		**Shallow Concentrated Flow, Segment CD** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0250	7.14	85.66	**Trap/Vee/Rect Channel Flow, Segment DE** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.035
13.2	667	Total			

Summary for Subcatchment 4P: SC-4P

Runoff = 7.66 cfs @ 12.29 hrs, Volume= 0.800 af, Depth= 1.48"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	0.415	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.500	98	Pond
*	0.136	98	Paved Area
	6.488	87	Weighted Average
	4.852		74.78% Pervious Area
	1.636		25.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	125	0.0216	0.12		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	25	0.0520	0.78		**Sheet Flow, Segment B-C** n= 0.023 P2= 2.70"
2.0	270	0.0190	2.22		**Shallow Concentrated Flow, Segment C-D** Unpaved Kv= 16.1 fps
0.2	44	0.3300	4.02		**Shallow Concentrated Flow, Segment D-E** Short Grass Pasture Kv= 7.0 fps
2.0	102	0.0150	0.86		**Shallow Concentrated Flow, Segment E-F** Short Grass Pasture Kv= 7.0 fps
11.2	258	0.0030	0.38		**Shallow Concentrated Flow, Segment F-G** Short Grass Pasture Kv= 7.0 fps
33.9	824	Total			

Summary for Subcatchment 4Q: SC-4Q

Runoff = 16.86 cfs @ 11.99 hrs, Volume= 0.831 af, Depth= 0.97"
Routed to Pond DP-10 : DETENTION POND 10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	3.393	79	50-75% Grass cover, Fair, HSG C
	1.056	93	Paved roads w/open ditches, 50% imp, HSG D
*	0.712	98	Pond
	5.073	74	>75% Grass cover, Good, HSG C
	10.234	79	Weighted Average
	8.994		87.88% Pervious Area
	1.240		12.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	150	0.0500	0.59		**Sheet Flow, AB** Fallow n= 0.050 P2= 2.70"
0.2	85	0.1600	6.44		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
2.5	625	0.0800	4.24		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
6.9	860	Total			

Summary for Subcatchment 4R: SC-4R

Runoff = 4.24 cfs @ 12.04 hrs, Volume= 0.248 af, Depth= 0.97"
Routed to Pond DP-11R : DETENTION POND 11R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.757	93	Paved roads w/open ditches, 50% imp, HSG D
2.296	74	>75% Grass cover, Good, HSG C
3.053	79	Weighted Average
2.674		87.60% Pervious Area
0.378		12.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	37	0.0200	1.04		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 2.70"
0.4	215	0.3300	9.25		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
10.4	338	0.0060	0.54		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.4	590	Total			

Summary for Subcatchment 5: SC-5

Runoff = 6.25 cfs @ 14.50 hrs, Volume= 2.665 af, Depth= 0.82"
Routed to Reach AP5 : AP-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
31.520	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
39.070	76	Weighted Average
38.925		99.63% Pervious Area
0.145		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
122.7	1,930	0.0110	0.26		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
2.5	275		1.80		**Direct Entry, Segment C-D (STWC, 0.007)**
192.1	2,355	Total			

Summary for Reach 1: Analysis Point 1

Inflow Area = 145.103 ac, 3.22% Impervious, Inflow Depth > 0.66" for 2-yr Storm event
Inflow = 26.41 cfs @ 12.90 hrs, Volume= 7.921 af
Outflow = 26.41 cfs @ 12.90 hrs, Volume= 7.921 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach 7R: SOUTH ACCESS RD DITCH

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 4.35 cfs @ 12.09 hrs, Volume= 0.299 af
Outflow = 4.21 cfs @ 12.12 hrs, Volume= 0.299 af, Atten= 3%, Lag= 1.7 min
Routed to Pond 12P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.27 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 3.4 min

Peak Storage= 266 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 4.14'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 173.05 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 262.0' Slope= 0.0271 '/'
Inlet Invert= 205.00', Outlet Invert= 197.90'

Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth > 0.10" for 2-yr Storm event
Inflow = 0.05 cfs @ 24.71 hrs, Volume= 0.259 af
Outflow = 0.04 cfs @ 28.29 hrs, Volume= 0.254 af, Atten= 1%, Lag= 214.7 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.05 fps, Min. Travel Time= 84.1 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 98.9 min

Peak Storage= 226 cf @ 26.89 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 20.81'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 11.46 cfs

20.00' x 1.00' deep channel, n= 0.800 Sheet flow: Woods+dense brush
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 273.0' Slope= 0.0623 '/'
Inlet Invert= 180.00', Outlet Invert= 163.00'

‡

Summary for Reach 12R: Ditch 4B1

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 10.52 cfs @ 12.10 hrs, Volume= 0.764 af
Outflow = 10.00 cfs @ 12.15 hrs, Volume= 0.764 af, Atten= 5%, Lag= 3.1 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.53 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.30 fps, Avg. Travel Time= 4.5 min

Peak Storage= 1,019 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.80' , Surface Width= 5.21'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.02 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 352.0' Slope= 0.0085 '/'
Inlet Invert= 213.50', Outlet Invert= 210.50'

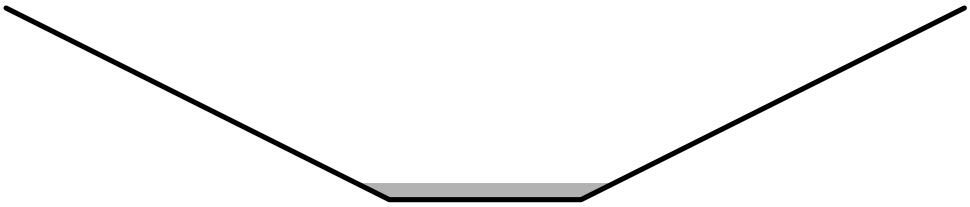
Summary for Reach 13R: Ex Ditch

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 0.18" for 2-yr Storm event
Inflow = 0.78 cfs @ 11.93 hrs, Volume= 0.010 af
Outflow = 0.67 cfs @ 11.99 hrs, Volume= 0.010 af, Atten= 14%, Lag= 3.5 min
Routed to Pond C4B : Culvert - 4BA & 4BB

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.77 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 5.5 min

Peak Storage= 91 cf @ 11.95 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 2.69'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 81.05 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 225.0' Slope= 0.0164 '/'
Inlet Invert= 209.70', Outlet Invert= 206.00'



Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 79.534 ac, 4.18% Impervious, Inflow Depth = 0.70" for 2-yr Storm event
Inflow = 9.00 cfs @ 13.96 hrs, Volume= 4.639 af
Outflow = 9.00 cfs @ 13.96 hrs, Volume= 4.639 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 265.594 ac, 1.09% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 29.28 cfs @ 15.25 hrs, Volume= 15.029 af
Outflow = 29.28 cfs @ 15.25 hrs, Volume= 15.029 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 326.605 ac, 3.82% Impervious, Inflow Depth > 0.70" for 2-yr Storm event
Inflow = 23.89 cfs @ 16.55 hrs, Volume= 19.005 af
Outflow = 23.89 cfs @ 16.55 hrs, Volume= 19.005 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: AP-5

Inflow Area = 39.070 ac, 0.37% Impervious, Inflow Depth = 0.82" for 2-yr Storm event
Inflow = 6.25 cfs @ 14.50 hrs, Volume= 2.665 af
Outflow = 6.25 cfs @ 14.50 hrs, Volume= 2.665 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach E1R6: DP-10 DISCHARGE

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth > 0.56" for 2-yr Storm event
Inflow = 0.78 cfs @ 19.76 hrs, Volume= 1.643 af
Outflow = 0.78 cfs @ 19.94 hrs, Volume= 1.641 af, Atten= 0%, Lag= 10.5 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.98 fps, Min. Travel Time= 6.1 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 9.0 min

Peak Storage= 283 cf @ 19.84 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 20.78'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 827.94 cfs

20.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 357.0' Slope= 0.0672 '/'
Inlet Invert= 178.00', Outlet Invert= 154.00'

‡

Summary for Reach E1R7: REACH TO AP

Inflow Area = 64.971 ac, 7.86% Impervious, Inflow Depth > 0.35" for 2-yr Storm event
Inflow = 0.78 cfs @ 20.01 hrs, Volume= 1.895 af
Outflow = 0.78 cfs @ 21.09 hrs, Volume= 1.882 af, Atten= 0%, Lag= 65.2 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.00 fps, Min. Travel Time= 36.3 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 57.4 min

Peak Storage= 1,690 cf @ 20.49 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 3.65'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 48.12 cfs

2.00' x 2.00' deep channel, n= 0.045 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 2,170.0' Slope= 0.0074 '/'
Inlet Invert= 158.00', Outlet Invert= 142.00'

Summary for Reach O4: Overland Flow

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 0.80" for 2-yr Storm event
Inflow = 3.60 cfs @ 12.06 hrs, Volume= 0.207 af
Outflow = 3.56 cfs @ 12.06 hrs, Volume= 0.207 af, Atten= 1%, Lag= 0.5 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.99 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 9.99 fps, Avg. Travel Time= 0.3 min

Peak Storage= 60 cf @ 12.06 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.87 cfs

Custom stage-perimeter table, n= 0.035 Earth, dense weeds
100 Intermediate values determined by Multi-point interpolation
Length= 168.0' Slope= 0.0554 '/'
Inlet Invert= 201.30', Outlet Invert= 192.00'

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
2.00	12.0	12.0	2,016	119.87

Summary for Reach R-10a: R-10a

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 0.63" for 2-yr Storm event
Inflow = 9.33 cfs @ 12.07 hrs, Volume= 0.683 af
Outflow = 8.84 cfs @ 12.16 hrs, Volume= 0.683 af, Atten= 5%, Lag= 5.7 min
Routed to Pond DP-10 : DETENTION POND 10

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.85 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.32 fps, Avg. Travel Time= 8.1 min

Peak Storage= 1,477 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.43' , Surface Width= 6.61'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 437.98 cfs

4.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 641.0' Slope= 0.0137 '/'
Inlet Invert= 194.00', Outlet Invert= 185.25'

‡

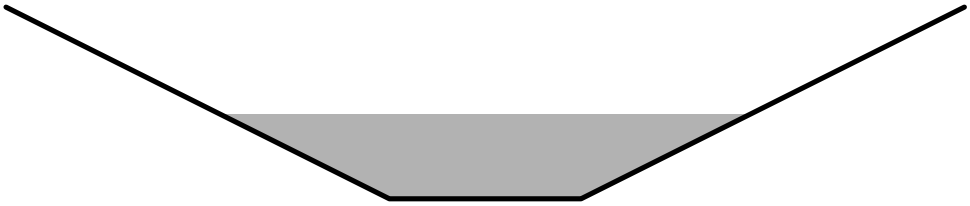
Summary for Reach R-1B: LF TOE DITCH

Inflow Area = 19.514 ac, 4.11% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 14.45 cfs @ 12.09 hrs, Volume= 1.034 af
Outflow = 13.81 cfs @ 12.16 hrs, Volume= 1.034 af, Atten= 4%, Lag= 3.9 min
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.19 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.48 fps, Avg. Travel Time= 6.1 min

Peak Storage= 1,805 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.89' , Surface Width= 5.55'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 540.0' Slope= 0.0278 '/'
Inlet Invert= 181.00', Outlet Invert= 166.00'



Summary for Reach R-1B1: LF TOE DITCH

Inflow Area = 8.511 ac, 4.70% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 6.76 cfs @ 12.06 hrs, Volume= 0.451 af
Outflow = 6.36 cfs @ 12.13 hrs, Volume= 0.451 af, Atten= 6%, Lag= 3.7 min
Routed to Reach R-1B : LF TOE DITCH

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.95 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.35 fps, Avg. Travel Time= 5.9 min

Peak Storage= 791 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.54' , Surface Width= 4.15'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 478.0' Slope= 0.0418 '/'
Inlet Invert= 204.00', Outlet Invert= 184.00'

Summary for Reach R-1D: Reach R-1D

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 0.55" for 2-yr Storm event
Inflow = 1.11 cfs @ 17.26 hrs, Volume= 1.882 af
Outflow = 1.11 cfs @ 17.45 hrs, Volume= 1.881 af, Atten= 0%, Lag= 11.6 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.94 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 14.1 min

Peak Storage= 436 cf @ 17.34 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 12.13'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 67.93 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 370.0' Slope= 0.0324 '/'
Inlet Invert= 159.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1E: Plastic Lined Ditch

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.89 cfs @ 12.05 hrs, Volume= 0.508 af
Outflow = 7.77 cfs @ 12.06 hrs, Volume= 0.508 af, Atten= 2%, Lag= 0.5 min
Routed to Pond DP-1a : DP-1a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.39 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.24 fps, Avg. Travel Time= 1.0 min

Peak Storage= 168 cf @ 12.06 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 4.77'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 1,302.19 cfs

4.00' x 3.00' deep channel, n= 0.011
Side Slope Z-value= 2.0 '/' Top Width= 16.00'
Length= 200.0' Slope= 0.0500 '/'
Inlet Invert= 176.00', Outlet Invert= 166.00'

Summary for Reach R-1F: Reach R-1F

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 0.60" for 2-yr Storm event
Inflow = 1.94 cfs @ 12.35 hrs, Volume= 0.496 af
Outflow = 1.93 cfs @ 12.44 hrs, Volume= 0.496 af, Atten= 0%, Lag= 5.5 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.08 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 9.6 min

Peak Storage= 377 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 21.72'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 140.14 cfs

20.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 210.0' Slope= 0.0524 '/'
Inlet Invert= 158.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1G: RipRap Downspout

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 1.47 cfs @ 12.09 hrs, Volume= 0.100 af
Outflow = 1.41 cfs @ 12.17 hrs, Volume= 0.100 af, Atten= 4%, Lag= 4.8 min
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.87 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 1.13 fps, Avg. Travel Time= 7.3 min

Peak Storage= 242 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 4.46'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 368.81 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 493.0' Slope= 0.3428 '/'
Inlet Invert= 333.00', Outlet Invert= 164.00'

Summary for Reach R-1I: Final Cover Access Road Ditch

Inflow = 0.02 cfs @ 12.09 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 12.49 hrs, Volume= 0.000 af, Atten= 84%, Lag= 23.5 min
Routed to Pond P-1I : Culvert Crossing 6c

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.46 fps, Min. Travel Time= 19.2 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 19.2 min

Peak Storage= 4 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.00' , Surface Width= 2.02'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 80.08 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 524.0' Slope= 0.0849 '/'
Inlet Invert= 335.00', Outlet Invert= 290.50'

Summary for Reach R-1J: RipRap Downspout

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 4.97 cfs @ 11.97 hrs, Volume= 0.237 af
Outflow = 4.80 cfs @ 11.98 hrs, Volume= 0.237 af, Atten= 3%, Lag= 1.1 min
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.59 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.34 fps, Avg. Travel Time= 2.0 min

Peak Storage= 174 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.24' , Surface Width= 4.95'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 387.31 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 164.0' Slope= 0.3780 '/'
Inlet Invert= 252.00', Outlet Invert= 190.00'

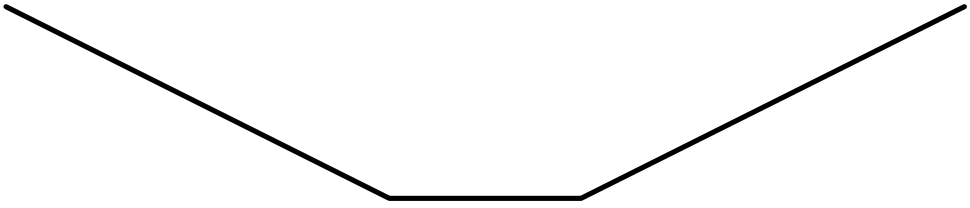
Summary for Reach R-1L: Final Cover Access Road Ditch

Inflow = 0.01 cfs @ 11.95 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 12.37 hrs, Volume= 0.000 af, Atten= 88%, Lag= 25.0 min
Routed to Pond 1P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.44 fps, Min. Travel Time= 21.2 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 21.2 min

Peak Storage= 1 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.00' , Surface Width= 2.00'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 77.46 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 560.0' Slope= 0.0795 '/'
Inlet Invert= 254.50', Outlet Invert= 210.00'



Summary for Reach R-1N: R-1N

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 0.46" for 2-yr Storm event
Inflow = 0.63 cfs @ 19.70 hrs, Volume= 1.051 af
Outflow = 0.63 cfs @ 20.37 hrs, Volume= 1.051 af, Atten= 0%, Lag= 40.3 min
Routed to Reach R-1O : R-1O

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.63 fps, Min. Travel Time= 24.8 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 58.0 min

Peak Storage= 939 cf @ 19.95 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 11.83'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.97 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 940.0' Slope= 0.0176 '/'
Inlet Invert= 168.00', Outlet Invert= 151.50'

‡

Summary for Reach R-1O: R-1O

Inflow Area = 58.266 ac, 5.06% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 17.81 cfs @ 12.39 hrs, Volume= 3.297 af
Outflow = 16.43 cfs @ 12.66 hrs, Volume= 3.297 af, Atten= 8%, Lag= 15.9 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.39 fps, Min. Travel Time= 8.8 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 44.1 min

Peak Storage= 8,670 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.70' , Surface Width= 23.91'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 151.21 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 735.0' Slope= 0.0020 '/'
Inlet Invert= 151.50', Outlet Invert= 150.00'

‡

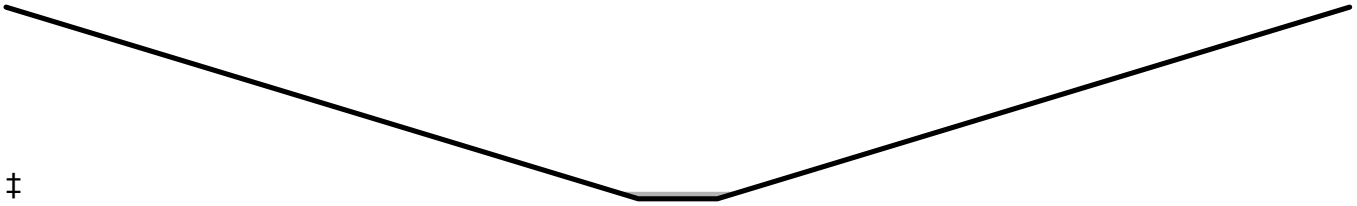
Summary for Reach R-2A: Reach 2A

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 1.08 cfs @ 15.98 hrs, Volume= 1.741 af
Outflow = 1.08 cfs @ 18.39 hrs, Volume= 1.741 af, Atten= 0%, Lag= 144.4 min
Routed to Reach AP2 : ANALYSIS POINT #2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.44 fps, Min. Travel Time= 61.2 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 87.0 min

Peak Storage= 3,970 cf @ 17.37 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 39.95'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,332.75 cfs

25.00' x 2.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,630.0' Slope= 0.0092 '/'
Inlet Invert= 166.00', Outlet Invert= 151.00'



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Summary for Reach R-2C: LF TOE DITCH

Inflow Area = 9.740 ac, 3.67% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.41 cfs @ 12.08 hrs, Volume= 0.516 af
Outflow = 6.99 cfs @ 12.17 hrs, Volume= 0.516 af, Atten= 6%, Lag= 5.5 min
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.42 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 9.3 min

Peak Storage= 1,307 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.99' , Surface Width= 6.96'
Defined Flood Depth= 2.00' Flow Area= 14.0 sf, Capacity= 29.12 cfs
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 70.39 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 265.0' Slope= 0.0075 '/'
Inlet Invert= 181.00', Outlet Invert= 179.00'

Summary for Reach R-2D: DITCH

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 0.63" for 2-yr Storm event
Inflow = 7.13 cfs @ 12.07 hrs, Volume= 0.489 af
Outflow = 6.88 cfs @ 12.11 hrs, Volume= 0.489 af, Atten= 4%, Lag= 2.4 min
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.82 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 3.9 min

Peak Storage= 563 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.60' , Surface Width= 5.39'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 183.17 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 225.0' Slope= 0.0511 '/'
Inlet Invert= 191.50', Outlet Invert= 180.00'

Summary for Reach R-4B: R-4B

Inflow Area = 4.602 ac, 9.82% Impervious, Inflow Depth = 0.72" for 2-yr Storm event
Inflow = 4.35 cfs @ 12.06 hrs, Volume= 0.278 af
Outflow = 2.44 cfs @ 12.46 hrs, Volume= 0.278 af, Atten= 44%, Lag= 24.0 min
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.05 fps, Min. Travel Time= 16.0 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 53.1 min

Peak Storage= 2,361 cf @ 12.19 hrs
Average Depth at Peak Storage= 0.57' , Surface Width= 5.27'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 69.96 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 1,006.0' Slope= 0.0075 '/'
Inlet Invert= 178.50', Outlet Invert= 171.00'

Summary for Reach R-IH: RipRap Downspout

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 3.72 cfs @ 12.01 hrs, Volume= 0.207 af
Outflow = 3.50 cfs @ 12.05 hrs, Volume= 0.207 af, Atten= 6%, Lag= 2.1 min
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.14 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 3.4 min

Peak Storage= 226 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 4.80'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 385.75 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 256.0' Slope= 0.3750 '/'
Inlet Invert= 286.00', Outlet Invert= 190.00'

Summary for Reach R2: Reach 2

Inflow Area = 122.225 ac, 3.55% Impervious, Inflow Depth > 0.64" for 2-yr Storm event
Inflow = 22.27 cfs @ 12.67 hrs, Volume= 6.546 af
Outflow = 21.46 cfs @ 12.88 hrs, Volume= 6.545 af, Atten= 4%, Lag= 12.4 min
Routed to Reach 1 : Analysis Point 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.73 fps, Min. Travel Time= 6.8 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 28.1 min

Peak Storage= 8,721 cf @ 12.77 hrs
Average Depth at Peak Storage= 0.72' , Surface Width= 24.46'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 183.33 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 700.0' Slope= 0.0030 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'

‡

Summary for Reach R4B4:

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 2.40 cfs @ 24.25 hrs, Volume= 2.980 af
Outflow = 2.39 cfs @ 24.97 hrs, Volume= 2.980 af, Atten= 0%, Lag= 43.1 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.65 fps, Min. Travel Time= 24.8 min
Avg. Velocity = 0.23 fps, Avg. Travel Time= 69.8 min

Peak Storage= 3,558 cf @ 24.56 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 17.08'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 131.94 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 963.0' Slope= 0.0094 '/'
Inlet Invert= 142.00', Outlet Invert= 132.96'

‡

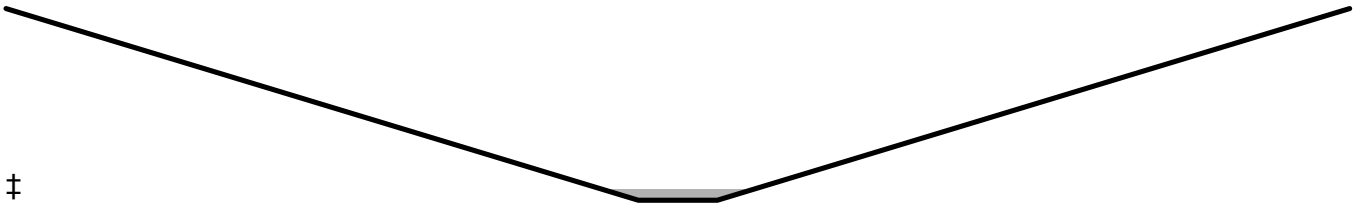
Summary for Reach R4C: Reach 4C

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 0.71" for 2-yr Storm event
Inflow = 1.38 cfs @ 13.06 hrs, Volume= 0.678 af
Outflow = 1.25 cfs @ 15.27 hrs, Volume= 0.678 af, Atten= 9%, Lag= 132.5 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.29 fps, Min. Travel Time= 56.4 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 114.4 min

Peak Storage= 4,223 cf @ 14.33 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 48.63'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 669.12 cfs

25.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 970.0' Slope= 0.0093 '/'
Inlet Invert= 159.00', Outlet Invert= 150.00'



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Summary for Reach R4C1: Reach 4C1

Inflow Area = 24.911 ac, 5.27% Impervious, Inflow Depth = 0.67" for 2-yr Storm event
Inflow = 2.12 cfs @ 15.40 hrs, Volume= 1.386 af
Outflow = 1.48 cfs @ 23.02 hrs, Volume= 1.386 af, Atten= 30%, Lag= 457.7 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.16 fps, Min. Travel Time= 239.0 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 526.5 min

Peak Storage= 21,267 cf @ 19.04 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 117.45'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 562.82 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 2,240.0' Slope= 0.0031 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Reach R4C2: Reach 4C2

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 2.42 cfs @ 22.97 hrs, Volume= 2.980 af
Outflow = 2.40 cfs @ 24.25 hrs, Volume= 2.980 af, Atten= 1%, Lag= 76.7 min
Routed to Reach R4B4 :

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.17 fps, Min. Travel Time= 44.5 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 106.2 min

Peak Storage= 6,407 cf @ 23.51 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 125.52'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 477.27 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 445.0' Slope= 0.0022 '/'
Inlet Invert= 143.00', Outlet Invert= 142.00'

‡

Summary for Reach R4D: Reach 4D

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 0.63" for 2-yr Storm event
Inflow = 0.89 cfs @ 13.36 hrs, Volume= 0.707 af
Outflow = 0.88 cfs @ 16.16 hrs, Volume= 0.707 af, Atten= 1%, Lag= 168.2 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 54.2 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 76.2 min

Peak Storage= 2,856 cf @ 15.26 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 109.02'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 1,002.64 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 605.0' Slope= 0.0099 '/'
Inlet Invert= 156.00', Outlet Invert= 150.00'

‡

Summary for Reach R4G: Reach 4G

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 0.65" for 2-yr Storm event
Inflow = 1.13 cfs @ 15.41 hrs, Volume= 1.595 af
Outflow = 1.12 cfs @ 15.76 hrs, Volume= 1.595 af, Atten= 0%, Lag= 21.2 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.47 fps, Min. Travel Time= 12.9 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 16.8 min

Peak Storage= 871 cf @ 15.54 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 22.27'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 199.54 cfs

20.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 363.0' Slope= 0.0193 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Pond 1P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 4.52 cfs @ 12.06 hrs, Volume= 0.299 af
Outflow = 4.35 cfs @ 12.09 hrs, Volume= 0.299 af, Atten= 4%, Lag= 1.9 min
Primary = 4.35 cfs @ 12.09 hrs, Volume= 0.299 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 206.65' @ 12.09 hrs Surf.Area= 1,195 sf Storage= 686 cf
Flood Elev= 210.00' Surf.Area= 3,240 sf Storage= 7,740 cf

Plug-Flow detention time= 7.6 min calculated for 0.299 af (100% of inflow)
Center-of-Mass det. time= 7.7 min (892.3 - 884.6)

Volume	Invert	Avail.Storage	Storage Description
#1	206.00'	7,740 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
206.00	900	0	0
208.00	1,800	2,700	2,700
210.00	3,240	5,040	7,740

Device	Routing	Invert	Outlet Devices
#1	Primary	206.00'	**24.0" Round 24"Culvert (X2) X 2.00** L= 76.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 206.00' / 205.00' S= 0.0132 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	209.60'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=4.29 cfs @ 12.09 hrs HW=206.65' (Free Discharge)
↑—**1=24"Culvert (X2)** (Inlet Controls 4.29 cfs @ 2.42 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=206.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 12P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 4.21 cfs @ 12.12 hrs, Volume= 0.299 af
Outflow = 4.13 cfs @ 12.15 hrs, Volume= 0.299 af, Atten= 2%, Lag= 1.5 min
Primary = 4.13 cfs @ 12.15 hrs, Volume= 0.299 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 15P : EXISTING 12" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 198.54' @ 12.15 hrs Surf.Area= 933 sf Storage= 375 cf
Flood Elev= 200.50' Surf.Area= 2,548 sf Storage= 3,866 cf

Plug-Flow detention time= 1.5 min calculated for 0.299 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (897.2 - 895.6)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	3,866 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676
200.50	2,548	1,190	3,866

Device	Routing	Invert	Outlet Devices
#1	Primary	197.90'	**24.0" Round 24"Culvert (X2) X 2.00** L= 98.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 197.90' / 195.47' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Secondary	200.00'	**14.0' long x 11.0' breadth Broad-Crested Rectangular Weir-Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Primary OutFlow Max=4.11 cfs @ 12.15 hrs HW=198.54' (Free Discharge)
1=24"Culvert (X2) (Inlet Controls 4.11 cfs @ 2.39 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
2=Broad-Crested Rectangular Weir-Overflow(Controls 0.00 cfs)

Summary for Pond 15P: EXISTING 12" CULVERT

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 198.00' @ 0.00 hrs Surf.Area= 464 sf Storage= 0 cf
Flood Elev= 200.50' Surf.Area= 2,212 sf Storage= 2,676 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	2,676 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676

Device	Routing	Invert	Outlet Devices
#1	Primary	197.40'	**12.0" Round 24"Culvert (X2)** L= 121.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 197.40' / 189.90' S= 0.0620 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	198.00'	**10.0' long x 50.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**1=24"Culvert (X2)** (Passes 0.00 cfs of 1.02 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 10.40 cfs @ 12.10 hrs, Volume= 0.765 af
Outflow = 10.52 cfs @ 12.10 hrs, Volume= 0.764 af, Atten= 0%, Lag= 0.1 min
Primary = 10.52 cfs @ 12.10 hrs, Volume= 0.764 af
Routed to Reach 12R : Ditch 4B1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond C-4L : Catch Basin - 4L

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 218.55' @ 12.10 hrs Surf.Area= 13 sf Storage= 51 cf

Plug-Flow detention time= 1.0 min calculated for 0.764 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (887.4 - 887.1)

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	216.50'	**24.0" Round Culvert - 4K** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.50' / 214.50' S= 0.0392 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	218.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=10.45 cfs @ 12.10 hrs HW=218.55' (Free Discharge)
└**1=Culvert - 4K** (Passes 10.45 cfs of 15.49 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 10.45 cfs @ 2.42 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=214.50' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C-4L: Catch Basin - 4L

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 0.88 cfs @ 11.93 hrs, Volume= 0.038 af
Outflow = 0.78 cfs @ 11.93 hrs, Volume= 0.010 af, Atten= 12%, Lag= 0.0 min
Primary = 0.78 cfs @ 11.93 hrs, Volume= 0.010 af
Routed to Reach 13R : Ex Ditch
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 214.61' @ 11.93 hrs Surf.Area= 13 sf Storage= 43 cf

Plug-Flow detention time= 3.7 min calculated for 0.010 af (27% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	210.50'	43 cf	**4.00'D x 3.40'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.50'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.50' / 210.50' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	214.50'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads
#3	Secondary	215.00'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.72 cfs @ 11.93 hrs HW=214.61' (Free Discharge)
↑**1=Culvert 4L** (Passes 0.72 cfs of 9.91 cfs potential flow)
↑**2=Orifice-Top of catch basin** (Weir Controls 0.72 cfs @ 1.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=210.50' (Free Discharge)
↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 0.80" for 2-yr Storm event
Inflow = 3.62 cfs @ 12.04 hrs, Volume= 0.207 af
Outflow = 3.60 cfs @ 12.06 hrs, Volume= 0.207 af, Atten= 1%, Lag= 0.8 min
Primary = 3.60 cfs @ 12.06 hrs, Volume= 0.207 af
Routed to Reach O4 : Overland Flow

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 205.03' @ 12.06 hrs Surf.Area= 510 sf Storage= 160 cf

Plug-Flow detention time= 0.7 min calculated for 0.207 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (852.6 - 851.9)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,690 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
204.40	0	0	0
206.00	1,300	1,040	1,040
208.00	4,200	5,500	6,540
209.00	6,100	5,150	11,690

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0152 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=3.56 cfs @ 12.06 hrs HW=205.02' (Free Discharge)
└**1=Culvert - 4B** (Inlet Controls 3.56 cfs @ 2.12 fps)

Summary for Pond CB-2B: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.308 ac, 2.34% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 6.91 cfs @ 12.09 hrs, Volume= 0.493 af
Outflow = 7.01 cfs @ 12.07 hrs, Volume= 0.491 af, Atten= 0%, Lag= 0.0 min
Primary = 7.01 cfs @ 12.07 hrs, Volume= 0.491 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 179.42' @ 12.07 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 3.4 min calculated for 0.491 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (887.6 - 886.3)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	173.00'	**24.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.71 cfs @ 12.07 hrs HW=179.41' (Free Discharge)
└**2=Culvert** (Passes 6.71 cfs of 35.18 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 6.71 cfs @ 2.09 fps)

Summary for Pond CB-2D: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.14 cfs @ 12.07 hrs, Volume= 0.493 af
Outflow = 7.13 cfs @ 12.07 hrs, Volume= 0.489 af, Atten= 0%, Lag= 0.1 min
Primary = 7.13 cfs @ 12.07 hrs, Volume= 0.489 af
Routed to Reach R-2D : DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 201.42' @ 12.07 hrs Surf.Area= 13 sf Storage= 138 cf
Flood Elev= 200.65' Surf.Area= 13 sf Storage= 134 cf

Plug-Flow detention time= 4.8 min calculated for 0.489 af (99% of inflow)
Center-of-Mass det. time= 1.2 min (886.7 - 885.5)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	138 cf	**4.00'D x 11.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	201.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	192.00'	**24.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 192.00' / 191.50' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.92 cfs @ 12.07 hrs HW=201.42' (Free Discharge)
↑**2=Culvert** (Passes 6.92 cfs of 34.65 cfs potential flow)
↑**1=Orifice/Grate** (Weir Controls 6.92 cfs @ 2.11 fps)

Summary for Pond CB-2E: LF TOE DITCH - CATCH BASIN

Inflow Area = 10.279 ac, 4.18% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.11 cfs @ 12.17 hrs, Volume= 0.551 af
Outflow = 7.18 cfs @ 12.16 hrs, Volume= 0.549 af, Atten= 0%, Lag= 0.0 min
Primary = 7.18 cfs @ 12.16 hrs, Volume= 0.549 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 179.43' @ 12.16 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 3.2 min calculated for 0.548 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (894.0 - 893.0)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#2	Primary	173.00'	**24.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.97 cfs @ 12.16 hrs HW=179.42' (Free Discharge)
↑—**2=Culvert** (Passes 6.97 cfs of 35.21 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 6.97 cfs @ 2.12 fps)

Summary for Pond CB-4C: LT TOE DITCH - CATCH BASIN

Inflow Area = 10.458 ac, 9.73% Impervious, Inflow Depth = 0.72" for 2-yr Storm event
Inflow = 6.24 cfs @ 12.02 hrs, Volume= 0.631 af
Outflow = 6.35 cfs @ 12.03 hrs, Volume= 0.629 af, Atten= 0%, Lag= 0.6 min
Primary = 6.35 cfs @ 12.03 hrs, Volume= 0.629 af
Routed to Pond DP-13 : DETENTION POND 13

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.39' @ 12.03 hrs Surf.Area= 13 sf Storage= 80 cf
Flood Elev= 174.00' Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 2.5 min calculated for 0.629 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (895.9 - 895.4)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	171.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	167.00'	**24.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.00' / 166.50' S= 0.0096 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.07 cfs @ 12.03 hrs HW=171.38' (Free Discharge)
↑—**2=Culvert** (Passes 6.07 cfs of 27.82 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 6.07 cfs @ 2.02 fps)

Summary for Pond CB-4D: LF TOE DITCH - CATCH BASINS

Inflow Area = 12.095 ac, 2.44% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 11.18 cfs @ 12.02 hrs, Volume= 0.641 af
Outflow = 11.20 cfs @ 12.02 hrs, Volume= 0.640 af, Atten= 0%, Lag= 0.0 min
Primary = 11.20 cfs @ 12.02 hrs, Volume= 0.640 af
Routed to Pond DP-14 : DETENTION POND 14

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 160.86' @ 12.02 hrs Surf.Area= 13 sf Storage= 57 cf
Flood Elev= 162.00' Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 1.5 min calculated for 0.640 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (881.7 - 881.2)

Volume	Invert	Avail.Storage	Storage Description
#1	156.00'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	160.50'	**30.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	158.00'	**24.0" Round Culvert X 2.00** L= 54.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.50' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=10.79 cfs @ 12.02 hrs HW=160.85' (Free Discharge)
└**2=Culvert** (Passes 10.79 cfs of 39.73 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 10.79 cfs @ 1.94 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area = 11.260 ac, 1.95% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 8.57 cfs @ 12.08 hrs, Volume= 0.597 af
Outflow = 8.62 cfs @ 12.08 hrs, Volume= 0.596 af, Atten= 0%, Lag= 0.3 min
Primary = 8.62 cfs @ 12.08 hrs, Volume= 0.596 af
Routed to Pond DP-11R : DETENTION POND 11R

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 162.32' @ 12.08 hrs Surf.Area= 13 sf Storage= 42 cf
Flood Elev= 170.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 0.8 min calculated for 0.596 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (885.9 - 885.6)

Volume	Invert	Avail.Storage	Storage Description
#1	159.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**24.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.00' S= 0.0087 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Primary	167.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=8.40 cfs @ 12.08 hrs HW=162.30' (Free Discharge)
└**1=Culvert** (Inlet Controls 8.40 cfs @ 3.88 fps)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CB-4H: Catch Basin - 4H

Inflow Area = 15.096 ac, 1.13% Impervious, Inflow Depth = 0.60" for 2-yr Storm event
Inflow = 9.67 cfs @ 12.07 hrs, Volume= 0.753 af
Outflow = 9.69 cfs @ 12.07 hrs, Volume= 0.751 af, Atten= 0%, Lag= 0.0 min
Primary = 9.69 cfs @ 12.07 hrs, Volume= 0.751 af
Routed to Pond DP-11R : DETENTION POND 11R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4G : Catch Basin - 4G

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 181.52' @ 12.07 hrs Surf.Area= 13 sf Storage= 113 cf
Flood Elev= 183.00' Surf.Area= 13 sf Storage= 113 cf

Plug-Flow detention time= 2.6 min calculated for 0.751 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (888.0 - 887.3)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	174.00'	**24.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.00' / 172.00' S= 0.0308 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	181.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	183.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=9.46 cfs @ 12.07 hrs HW=181.51' (Free Discharge)
└**1=Culvert** (Passes 9.46 cfs of 38.61 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 9.46 cfs @ 2.34 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 9.80 cfs @ 12.08 hrs, Volume= 0.692 af
Outflow = 10.00 cfs @ 12.07 hrs, Volume= 0.689 af, Atten= 0%, Lag= 0.0 min
Primary = 9.33 cfs @ 12.07 hrs, Volume= 0.683 af
Routed to Reach R-10a : R-10a
Secondary = 0.67 cfs @ 12.07 hrs, Volume= 0.006 af
Routed to Pond CB-4H : Catch Basin - 4H

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 208.09' @ 12.07 hrs Surf.Area= 13 sf Storage= 102 cf
Flood Elev= 209.90' Surf.Area= 13 sf Storage= 121 cf

Plug-Flow detention time= 2.4 min calculated for 0.689 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (886.6 - 886.0)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	121 cf	**4.00'D x 9.60'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	200.00'	**24.0" Round NEW 24-INCH** L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.00' / 194.00' S= 0.0896 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	207.58'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	208.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=9.01 cfs @ 12.07 hrs HW=208.08' (Free Discharge)
└**1=NEW 24-INCH** (Passes 9.01 cfs of 40.24 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 9.01 cfs @ 2.31 fps)

Secondary OutFlow Max=0.50 cfs @ 12.07 hrs HW=208.08' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.50 cfs @ 0.65 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area = 11.663 ac, 3.68% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 6.51 cfs @ 12.19 hrs, Volume= 0.618 af
Outflow = 6.74 cfs @ 12.20 hrs, Volume= 0.616 af, Atten= 0%, Lag= 0.3 min
Primary = 6.74 cfs @ 12.20 hrs, Volume= 0.616 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4JA3 : (4JA3) New Catch Basin

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 219.11' @ 12.20 hrs Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 2.5 min calculated for 0.616 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (895.2 - 894.1)

Volume	Invert	Avail.Storage	Storage Description
#1	211.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert - 4JA** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 212.20' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=6.68 cfs @ 12.20 hrs HW=219.11' (Free Discharge)
└─**1=Culvert - 4JA** (Passes 6.68 cfs of 19.69 cfs potential flow)
└─**2=Orifice/Grate** (Weir Controls 6.68 cfs @ 2.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=211.00' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond CB-4JA3: (4JA3) New Catch Basin

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond PS11 : Culvert - 4IA(C11 PS)

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 202.90' @ 0.00 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 215.00' Surf.Area= 0.000 ac Storage= 0.003 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	202.90'	0.003 af	**4.00'D x 10.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	204.90'	**18.0" Round NEW 24-INCH** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 204.90' / 204.00' S= 0.0150 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	212.90'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	212.90'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=202.90' (Free Discharge)
└**1=NEW 24-INCH** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=202.90' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1: DETENTION POND 1

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 0.60" for 2-yr Storm event
Inflow = 21.44 cfs @ 12.12 hrs, Volume= 2.064 af
Outflow = 1.11 cfs @ 17.26 hrs, Volume= 1.882 af, Atten= 95%, Lag= 308.2 min
Primary = 1.11 cfs @ 17.26 hrs, Volume= 1.882 af
Routed to Reach R-1D : Reach R-1D
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1D : Reach R-1D

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 163.74' @ 17.26 hrs Surf.Area= 16,618 sf Storage= 50,977 cf
Flood Elev= 166.00' Surf.Area= 21,310 sf Storage= 93,390 cf

Plug-Flow detention time= 1,290.1 min calculated for 1.881 af (91% of inflow)
Center-of-Mass det. time= 1,118.4 min (2,212.0 - 1,093.6)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	115,245 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	10,750	0	0
162.00	13,540	24,290	24,290
164.00	17,070	30,610	54,900
165.00	19,300	18,185	73,085
166.00	21,310	20,305	93,390
167.00	22,400	21,855	115,245

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**30.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 159.80' / 159.35' S= 0.0060 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	160.60'	**3.0" Vert. Orifice on side** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.70'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	166.30'	**40.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.97 cfs @ 17.26 hrs HW=163.74' (Free Discharge)
└**1=Culvert** (Passes 0.97 cfs of 30.62 cfs potential flow)
  ├**2=Orifice on side** (Orifice Controls 0.41 cfs @ 8.37 fps)
  └**3=Orifice-Top of drop inlet** (Weir Controls 0.56 cfs @ 0.68 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth = 0.73" for 2-yr Storm event
Inflow = 22.81 cfs @ 12.02 hrs, Volume= 2.131 af
Outflow = 0.78 cfs @ 19.76 hrs, Volume= 1.643 af, Atten= 97%, Lag= 464.8 min
Primary = 0.17 cfs @ 19.76 hrs, Volume= 0.117 af
Routed to Reach E1R6 : DP-10 DISCHARGE
Secondary = 0.61 cfs @ 19.76 hrs, Volume= 1.525 af
Routed to Reach E1R6 : DP-10 DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach E1R6 : DP-10 DISCHARGE

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 186.25' @ 19.76 hrs Surf.Area= 38,562 sf Storage= 69,558 cf
Flood Elev= 189.00' Surf.Area= 77,500 sf Storage= 239,860 cf

Plug-Flow detention time= 2,088.8 min calculated for 1.642 af (77% of inflow)
Center-of-Mass det. time= 1,992.4 min (2,871.6 - 879.2)

Volume	Invert	Avail.Storage	Storage Description
#1	180.00'	320,610 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
180.00	10	0	0
182.00	2,300	2,310	2,310
184.00	11,000	13,300	15,610
186.00	34,000	45,000	60,610
188.00	71,000	105,000	165,610
190.00	84,000	155,000	320,610

Device	Routing	Invert	Outlet Devices
#1	Device 3	187.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.00'	**6.0" Vert. 6-in Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	181.00'	**24.0" Round 18-in Primary Culvert** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.00' / 180.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#4	Secondary	177.50'	**5.8" Round 6-in Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 177.50' / 174.00' S= 0.0159 '/' Cc= 0.900

n= 0.011, Flow Area= 0.18 sf

#5	Device 4	186.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	184.00'	**1.5" Vert. Orifice Side** X 2 rows with 0.5" cc spacing C= 0.600 Limited to weir flow at low heads
#7	Tertiary	188.00'	**10.0' long x 26.0' breadth E-Spillway Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.16 cfs @ 19.76 hrs HW=186.25' (Free Discharge)
└**3=18-in Primary Culvert** (Passes 0.16 cfs of 31.17 cfs potential flow)
  ├**1=Orifice/Grate** (Controls 0.00 cfs)
  └**2=6-in Orifice** (Orifice Controls 0.16 cfs @ 1.69 fps)

Secondary OutFlow Max=0.61 cfs @ 19.76 hrs HW=186.25' (Free Discharge)
└**4=6-in Culvert** (Passes 0.61 cfs of 1.31 cfs potential flow)
  ├**5=Orifice Top** (Orifice Controls 0.44 cfs @ 2.39 fps)
  └**6=Orifice Side** (Orifice Controls 0.17 cfs @ 7.08 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=180.00' (Free Discharge)
└**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 0.65" for 2-yr Storm event
Inflow = 22.31 cfs @ 12.07 hrs, Volume= 1.595 af
Outflow = 1.13 cfs @ 15.41 hrs, Volume= 1.595 af, Atten= 95%, Lag= 200.4 min
Primary = 0.15 cfs @ 15.41 hrs, Volume= 0.044 af
  Routed to Reach R4G : Reach 4G
Secondary = 0.98 cfs @ 15.41 hrs, Volume= 1.551 af
  Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 156.64' @ 15.41 hrs Surf.Area= 21,446 sf Storage= 34,924 cf

Plug-Flow detention time= 411.3 min calculated for 1.594 af (100% of inflow)
Center-of-Mass det. time= 411.4 min (1,293.8 - 882.4)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.16 cfs @ 15.41 hrs HW=156.64' (Free Discharge)
└**1=Culvert** (Passes 0.16 cfs of 8.82 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.16 cfs @ 1.80 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.98 cfs @ 15.41 hrs HW=156.64' (Free Discharge)
└**5=Culvert** (Barrel Controls 0.98 cfs @ 4.99 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 20.74 cfs @ 12.13 hrs, Volume= 1.741 af
Outflow = 1.08 cfs @ 15.98 hrs, Volume= 1.741 af, Atten= 95%, Lag= 231.2 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-2A : Reach 2A
Secondary = 1.08 cfs @ 15.98 hrs, Volume= 1.741 af
  Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 169.89' @ 15.98 hrs Surf.Area= 33,302 sf Storage= 38,655 cf

Plug-Flow detention time= 422.3 min calculated for 1.740 af (100% of inflow)
Center-of-Mass det. time= 422.3 min (1,308.2 - 885.9)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
  ├**2=Orifice** (Controls 0.00 cfs)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.08 cfs @ 15.98 hrs HW=169.89' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.08 cfs @ 5.52 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 0.71" for 2-yr Storm event
Inflow = 6.68 cfs @ 12.02 hrs, Volume= 0.678 af
Outflow = 1.38 cfs @ 13.06 hrs, Volume= 0.678 af, Atten= 79%, Lag= 62.7 min
Primary = 0.29 cfs @ 13.06 hrs, Volume= 0.057 af
  Routed to Reach R4C : Reach 4C
Secondary = 1.08 cfs @ 13.06 hrs, Volume= 0.621 af
  Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 161.15' @ 13.06 hrs Surf.Area= 8,690 sf Storage= 8,606 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 59.2 min calculated for 0.678 af (100% of inflow)
Center-of-Mass det. time= 59.2 min (954.0 - 894.8)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	164.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.29 cfs @ 13.06 hrs HW=161.15' (Free Discharge)
└**1=Culvert** (Passes 0.29 cfs of 4.03 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.29 cfs @ 3.36 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.08 cfs @ 13.06 hrs HW=161.15' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.08 cfs @ 5.52 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 0.63" for 2-yr Storm event
Inflow = 11.86 cfs @ 12.01 hrs, Volume= 0.707 af
Outflow = 0.89 cfs @ 13.36 hrs, Volume= 0.707 af, Atten= 93%, Lag= 81.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4D : Reach 4D
Secondary = 0.89 cfs @ 13.36 hrs, Volume= 0.707 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 157.72' @ 13.36 hrs Surf.Area= 26,310 sf Storage= 11,692 cf

Plug-Flow detention time= 129.3 min calculated for 0.707 af (100% of inflow)
Center-of-Mass det. time= 129.3 min (1,010.7 - 881.4)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Controls 0.00 cfs)
└**3=Grate** (Controls 0.00 cfs)
└**5=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.89 cfs @ 13.36 hrs HW=157.72' (Free Discharge)
└**4=Culvert** (Barrel Controls 0.89 cfs @ 4.53 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1a: DP-1a

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.77 cfs @ 12.06 hrs, Volume= 0.508 af
Outflow = 0.22 cfs @ 18.99 hrs, Volume= 0.383 af, Atten= 97%, Lag= 415.8 min
Primary = 0.22 cfs @ 18.99 hrs, Volume= 0.383 af
Routed to Pond DP-1 : DETENTION POND 1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 163.00' Surf.Area= 34,985 sf Storage= 146,410 cf
Peak Elev= 163.42' @ 18.99 hrs Surf.Area= 36,006 sf Storage= 161,235 cf (14,825 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (116,636 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 1,101.3 min (1,986.4 - 885.1)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	263,046 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	24,139	0	0
160.00	27,981	52,120	52,120
162.00	32,544	60,525	112,645
163.00	34,985	33,765	146,410
164.00	37,429	36,207	182,617
166.00	43,000	80,429	263,046

Device	Routing	Invert	Outlet Devices
#1	Primary	163.10'	**113.0 deg Sharp-Crested Vee/Trap Weir** Cv= 2.49 (C= 3.11)
#2	Secondary	165.60'	**18.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.21 cfs @ 18.99 hrs HW=163.42' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 0.21 cfs @ 1.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 9.03 cfs @ 11.97 hrs, Volume= 0.530 af
Outflow = 1.94 cfs @ 12.35 hrs, Volume= 0.496 af, Atten= 79%, Lag= 22.7 min
Primary = 1.94 cfs @ 12.35 hrs, Volume= 0.496 af
Routed to Reach R-1F : Reach R-1F

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 162.30' Surf.Area= 1,330 sf Storage= 630 cf
Peak Elev= 164.75' @ 12.35 hrs Surf.Area= 4,507 sf Storage= 7,257 cf (6,627 cf above start)
Flood Elev= 167.80' Surf.Area= 17,700 sf Storage= 36,993 cf (36,363 cf above start)

Plug-Flow detention time= 114.7 min calculated for 0.481 af (91% of inflow)
Center-of-Mass det. time= 60.0 min (941.1 - 881.1)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	36,993 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,000	0	0
164.00	3,200	4,200	4,200
165.00	4,940	4,070	8,270
166.00	7,860	6,400	14,670
167.00	12,570	10,215	24,885
167.80	17,700	12,108	36,993

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.20' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	164.20'	**8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	165.40'	**2.4' long x 0.30' rise Sharp-Crested Rectangular Weir** 1 End Contraction(s)
#5	Device 1	166.60'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.94 cfs @ 12.35 hrs HW=164.75' (Free Discharge)
└**1=Culvert** (Passes 1.94 cfs of 14.84 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 1.16 cfs @ 5.90 fps)
  ├**3=Orifice** (Orifice Controls 0.78 cfs @ 2.53 fps)
  ├**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**5=Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 0.76" for 2-yr Storm event
Inflow = 15.20 cfs @ 12.01 hrs, Volume= 1.729 af
Outflow = 0.63 cfs @ 19.70 hrs, Volume= 1.051 af, Atten= 96%, Lag= 461.0 min
Primary = 0.63 cfs @ 19.70 hrs, Volume= 1.051 af
Routed to Reach R-1N : R-1N
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1N : R-1N

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 174.51' @ 19.70 hrs Surf.Area= 35,172 sf Storage= 52,033 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf

Plug-Flow detention time= 748.0 min calculated for 1.051 af (61% of inflow)
Center-of-Mass det. time= 615.1 min (1,496.3 - 881.3)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.63 cfs @ 19.70 hrs HW=174.51' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Orifice Controls 0.63 cfs @ 3.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-6 ES: DETENTION POND 6 - EMERGENCY SPILLWAY

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Secondary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 178.00' Surf.Area= 93,326 sf Storage= 273,159 cf
Peak Elev= 178.00' @ 0.00 hrs Surf.Area= 93,326 sf Storage= 273,159 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (223,485 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert X 0.00** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice X 0.00** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**20.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth = 0.91" for 2-yr Storm event
Inflow = 25.56 cfs @ 12.15 hrs, Volume= 2.286 af
Outflow = 0.05 cfs @ 24.71 hrs, Volume= 0.259 af, Atten= 100%, Lag= 753.8 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Secondary = 0.05 cfs @ 24.71 hrs, Volume= 0.259 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 188.51' @ 24.71 hrs Surf.Area= 80,385 sf Storage= 98,824 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 3,035.2 min calculated for 0.259 af (11% of inflow)
Center-of-Mass det. time= 2,873.1 min (3,739.6 - 866.5)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Primary	189.50'	**12.0" Round 12-In Outlet Culvert** L= 48.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.50' / 180.50' S= 0.1875 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	184.21'	**5.8" Round 6-In Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.21' / 180.50' S= 0.0618 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#3	Device 2	188.70'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 2	188.30'	**1.5" Vert. Orifice X 2.00** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**1=12-In Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.05 cfs @ 24.71 hrs HW=188.51' (Free Discharge)
└**2=6-In Culvert** (Passes 0.05 cfs of 1.41 cfs potential flow)
  └**3=Orifice** (Controls 0.00 cfs)
  └**4=Orifice** (Orifice Controls 0.05 cfs @ 1.85 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9(E): DP 9 (EMERGENCY OUTLET)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P-1G: Culvert Crossing 1G

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 1.55 cfs @ 12.06 hrs, Volume= 0.100 af
Outflow = 1.49 cfs @ 12.09 hrs, Volume= 0.100 af, Atten= 4%, Lag= 1.8 min
Primary = 1.47 cfs @ 12.09 hrs, Volume= 0.100 af
Routed to Reach R-1G : RipRap Downspout
Secondary = 0.02 cfs @ 12.09 hrs, Volume= 0.000 af
Routed to Reach R-1I : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 336.03' @ 12.09 hrs Surf.Area= 507 sf Storage= 242 cf

Plug-Flow detention time= 8.3 min calculated for 0.100 af (100% of inflow)
Center-of-Mass det. time= 8.3 min (888.7 - 880.4)

Volume	Invert	Avail.Storage	Storage Description
#1	335.50'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
335.50	400	0	0
337.50	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	**24.0" Round 24" Culvert** L= 36.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 335.50' / 331.00' S= 0.1250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	336.00'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=1.45 cfs @ 12.09 hrs HW=336.03' (Free Discharge)
↑**1=24" Culvert** (Inlet Controls 1.45 cfs @ 2.18 fps)

Secondary OutFlow Max=0.02 cfs @ 12.09 hrs HW=336.03' (Free Discharge)
↑**2=Stone Check Dam Weir** (Weir Controls 0.02 cfs @ 0.52 fps)

Summary for Pond P-1H: Modified Plunge Pool w/(2)24" Culverts P-6a

Inflow Area = 6.697 ac, 1.15% Impervious, Inflow Depth = 0.62" for 2-yr Storm event
Inflow = 5.07 cfs @ 11.99 hrs, Volume= 0.345 af
Outflow = 5.00 cfs @ 12.00 hrs, Volume= 0.343 af, Atten= 1%, Lag= 0.4 min
Primary = 5.00 cfs @ 12.00 hrs, Volume= 0.343 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 183.75' @ 12.00 hrs Surf.Area= 302 sf Storage= 275 cf
Flood Elev= 186.00' Surf.Area= 869 sf Storage= 1,551 cf

Plug-Flow detention time= 6.3 min calculated for 0.343 af (99% of inflow)
Center-of-Mass det. time= 2.6 min (889.1 - 886.5)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	5,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	37	0	0
183.00	163	100	100
184.00	348	256	356
185.00	587	468	823
186.00	869	728	1,551
188.00	1,067	1,936	3,487
190.00	1,160	2,227	5,714

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**24.0" Round (2)24"-Culvert X 2.00** L= 56.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 183.00' / 182.00' S= 0.0179 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Secondary	185.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=5.00 cfs @ 12.00 hrs HW=183.75' (Free Discharge)
1=(2)24"-Culvert (Barrel Controls 5.00 cfs @ 3.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-1I: Culvert Crossing 6c

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 3.66 cfs @ 12.02 hrs, Volume= 0.207 af
Outflow = 3.72 cfs @ 12.01 hrs, Volume= 0.207 af, Atten= 0%, Lag= 0.0 min
Primary = 3.72 cfs @ 12.01 hrs, Volume= 0.207 af
Routed to Reach R-IH : RipRap Downspout
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-1K : Culvert Crossing 1K

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 291.38' @ 12.01 hrs Surf.Area= 800 sf Storage= 300 cf

Plug-Flow detention time= 6.8 min calculated for 0.207 af (100% of inflow)
Center-of-Mass det. time= 6.5 min (887.4 - 880.9)

Volume	Invert	Avail.Storage	Storage Description
#1	290.50'	300 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
290.50	400	0	0
291.00	800	300	300

Device	Routing	Invert	Outlet Devices
#1	Primary	290.50'	**24.0" Round 24" Culvert** L= 38.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 290.50' / 286.00' S= 0.1184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	291.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=3.59 cfs @ 12.01 hrs HW=291.36' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 3.59 cfs @ 2.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=290.50' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Controls 0.00 cfs)

Summary for Pond P-1J-1: (2) 24" CULVERTS

Inflow Area = 6.104 ac, 1.82% Impervious, Inflow Depth = 0.65" for 2-yr Storm event
Inflow = 6.69 cfs @ 11.97 hrs, Volume= 0.333 af
Outflow = 6.68 cfs @ 11.98 hrs, Volume= 0.333 af, Atten= 0%, Lag= 0.4 min
Primary = 6.68 cfs @ 11.98 hrs, Volume= 0.333 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-1J-2 : 18" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 190.88' @ 11.98 hrs Surf.Area= 182 sf Storage= 84 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.3 min (876.2 - 875.9)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	410 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
190.00	10	0	0
192.00	400	410	410

Device	Routing	Invert	Outlet Devices
#1	Primary	190.00'	**24.0" Round Culvert X 2.00** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 190.00' / 189.60' S= 0.0108 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	191.20'	**170.0 deg x 1.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Primary OutFlow Max=6.38 cfs @ 11.98 hrs HW=190.86' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 6.38 cfs @ 2.49 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=190.00' (Free Discharge)
↑—**2=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond P-1J-2: 18" CULVERT

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.00' @ 0.00 hrs Surf.Area= 10 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	32,056 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	10	0	0
188.00	1,367	689	689
190.00	3,000	4,367	5,056
192.00	6,000	9,000	14,056
194.00	12,000	18,000	32,056

Device	Routing	Invert	Outlet Devices
#1	Primary	186.80'	**18.0" Round 18" Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 186.80' / 185.97' S= 0.0208 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
↑—**1=18" Culvert** (Passes 0.00 cfs of 0.17 cfs potential flow)

Summary for Pond P-1K: Culvert Crossing 1K

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 5.29 cfs @ 11.95 hrs, Volume= 0.237 af
Outflow = 4.98 cfs @ 11.97 hrs, Volume= 0.237 af, Atten= 6%, Lag= 1.0 min
Primary = 4.97 cfs @ 11.97 hrs, Volume= 0.237 af
Routed to Reach R-1J : RipRap Downspout
Secondary = 0.01 cfs @ 11.95 hrs, Volume= 0.000 af
Routed to Reach R-1L : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 255.53' @ 11.97 hrs Surf.Area= 506 sf Storage= 241 cf

Plug-Flow detention time= 0.3 min calculated for 0.237 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (873.7 - 873.5)

Volume	Invert	Avail.Storage	Storage Description
#1	255.00'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.00	400	0	0
257.00	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**24.0" Round 24" Culvert** L= 33.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 254.50' / 252.00' S= 0.0758 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	255.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=4.76 cfs @ 11.97 hrs HW=255.51' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 4.76 cfs @ 3.01 fps)

Secondary OutFlow Max=0.01 cfs @ 11.95 hrs HW=255.52' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Weir Controls 0.01 cfs @ 0.41 fps)

Summary for Pond PS11: Culvert - 4IA(C11 PS)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4I : Catch Basin - 4I

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 212.90' @ 0.00 hrs Surf.Area= 5 sf Storage= 0 cf
Flood Elev= 215.10' Surf.Area= 1,133 sf Storage= 1,237 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,353 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
212.90	5	0	0
213.04	63	5	5
215.20	1,185	1,348	1,353

Device	Routing	Invert	Outlet Devices
#1	Primary	213.05'	**24.0" Round Culvert - 4IA(C11 PS)** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.05' / 212.15' S= 0.0225 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=212.90' (Free Discharge)
↑—**1=Culvert - 4IA(C11 PS)** (Controls 0.00 cfs)

Summary for Subcatchment 1A: SC-1A

Runoff = 12.59 cfs @ 13.12 hrs, Volume= 2.861 af, Depth= 1.52"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.084	70	Woods, Good, HSG C
*	7.750	77	Woods, Good, HSG D
*	1.540	71	Meadow, non-grazed, HSG C
*	1.760	78	Meadow HSG D
*	0.070	96	Gravel Surface
*	0.330	98	Impervious Surface
	22.534	74	Weighted Average
	22.204		98.54% Pervious Area
	0.330		1.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.4	1,840		1.50		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
93.1	2,250	Total			

Summary for Subcatchment 1B: 1B

Runoff = 0.89 cfs @ 11.93 hrs, Volume= 0.038 af, Depth= 1.33"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.344	71	Landfill Final Cover
	0.344		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segement A-B**

Summary for Subcatchment 1B1: SC-1B1

Runoff = 16.03 cfs @ 12.06 hrs, Volume= 0.986 af, Depth= 1.39"
Routed to Reach R-1B1 : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	8.111	71	Meadow, non-grazed, HSG C
*	0.400	98	Riprap
	8.511	72	Weighted Average
	8.111		95.30% Pervious Area
	0.400		4.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	140	0.1000	4.74		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	240	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	482	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.8	1,012	Total			

Summary for Subcatchment 1B2: SC-1B2

Runoff = 20.51 cfs @ 12.06 hrs, Volume= 1.275 af, Depth= 1.39"
Routed to Reach R-1B : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	10.600	71	Landfill Final Cover
*	0.403	98	Riprap
	11.003	72	Weighted Average
	10.600		96.34% Pervious Area
	0.403		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.6	75	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	403	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	554	0.3300	19.66	314.62	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.050 Mountain streams w/large boulders
13.1	1,182	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 9.30 cfs @ 12.86 hrs, Volume= 1.770 af, Depth= 1.66"
Routed to Reach R2 : Reach 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	6.100	77	Woods, Good, HSG D
*	0.690	70	Woods, Good, HSG C
*	3.100	78	Meadow HSG D
*	2.580	71	Meadow, non-grazed, HSG C
*	0.310	96	Gravel Surface
	12.780	76	Weighted Average
	12.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.6	170	0.0133	1.73		**Shallow Concentrated Flow, Segment ID: B-C** Grassed Waterway Kv= 15.0 fps
16.7					**Direct Entry, Segment ID: C-D**
75.0	370	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 23.10 cfs @ 12.05 hrs, Volume= 1.415 af, Depth= 1.39"
Routed to Pond DP-1 : DETENTION POND 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.000	71	Landfill Final Cover
*	0.110	96	Gravel Surface
*	0.800	78	Pond, Meadow HSG D
*	0.300	98	Riprap
	12.210	72	Weighted Average
	11.910		97.54% Pervious Area
	0.300		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.3	241	0.0700	12.78	172.52	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.025
0.3	556	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
12.7	1,057	Total			

Summary for Subcatchment 1E: SC-1E

Runoff = 18.64 cfs @ 12.05 hrs, Volume= 1.110 af, Depth= 1.39"
Routed to Reach R-1E : Plastic Lined Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	9.100	71	Landfill Final Cover
*	0.200	96	Gravel Surface
*	0.280	98	Riprap
	9.580	72	Weighted Average
	9.300		97.08% Pervious Area
	0.280		2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	146	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	296	0.0700	16.72	200.67	**Trap/Vee/Rect Channel Flow, Segment ID: B-C** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.025
0.3	537	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
0.3	186	0.0700	10.28	57.82	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 '/' Top.W=7.50' n= 0.030 Earth, grassed & winding
11.9	1,165	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 20.48 cfs @ 11.96 hrs, Volume= 0.939 af, Depth= 1.39"
Routed to Pond DP-2 : DETENTION POND 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	7.747	71	Landfill Final Cover
*	0.349	91	Gravel
	0.007	98	Roofs, HSG C
	8.103	72	Weighted Average
	8.096		99.91% Pervious Area
	0.007		0.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	100	0.3800	0.51		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	293	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.2	300	0.3800	29.77	669.83	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.50' Z= 2.0 '/' Top.W=14.00' n= 0.040 Earth, cobble bottom, clean sides
4.7	693	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 3.55 cfs @ 12.05 hrs, Volume= 0.215 af, Depth= 1.46"
Routed to Pond P-1G : Culvert Crossing 1G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	1.625	71	Landfill Final Cover
*	0.147	96	Gravel Surface
	1.772	73	Weighted Average
	1.772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	142	0.1500	2.71		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	154	0.0700	8.95	60.43	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.035 Earth, dense weeds

12.5 446 Total

Summary for Subcatchment 1H: SC-1H

Runoff = 7.21 cfs @ 11.94 hrs, Volume= 0.308 af, Depth= 1.33"
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.032	91	Fallow, bare soil, HSG C, rip rap
	2.759	71	Meadow, non-grazed, HSG C
	2.791	71	Weighted Average
	2.791		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	66	0.3900	0.47		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
0.3	140	0.0800	9.12	27.13	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.030 Earth, grassed & winding
0.2	190	0.1430	16.62	49.46	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.022 Earth, clean & straight
2.8	396	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 8.56 cfs @ 12.01 hrs, Volume= 0.453 af, Depth= 1.39"
Routed to Pond P-1I : Culvert Crossing 6c

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	3.829	71	Landfill Final Cover
*	0.077	98	Riprap
	3.906	72	Weighted Average
	3.829		98.03% Pervious Area
	0.077		1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	150	0.1000	0.32		**Sheet Flow, Segment AB** Grass: Short n= 0.150 P2= 2.70"
0.4	106	0.1000	4.74		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
0.4	260	0.0700	10.44	70.50	**Trap/Vee/Rect Channel Flow, Segment C - D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.030 Earth, grassed & winding
0.1	140	0.3300	39.33	629.24	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.025 Rubble masonry, cemented
8.7	656	Total			

Summary for Subcatchment 1J: SC-IJ

Runoff = 4.85 cfs @ 11.94 hrs, Volume= 0.210 af, Depth= 1.39"
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	1.763	71	Landfill Final Cover
*	0.046	91	Gravel
	1.809	72	Weighted Average
	1.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	67	0.5000	0.52		**Sheet Flow, SEGMENT AB** Grass: Short n= 0.150 P2= 2.70"
0.8	325	0.1900	6.54		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	325	0.0300	12.44	149.28	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.022 Earth, clean & straight
3.3	717	Total			

Summary for Subcatchment 1K: SC-1K

Runoff = 7.38 cfs @ 11.94 hrs, Volume= 0.318 af, Depth= 1.46"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	2.350	71	Landfill Final Cover
	0.163	89	Gravel roads, HSG C
*	0.111	98	Riprap
	2.624	73	Weighted Average
	2.513		95.77% Pervious Area
	0.111		4.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	68	0.3300	0.44		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 2.70"
0.4	93	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.3	249	0.3300	12.60	201.68	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.078 Riprap, 12-inch
3.3	410	Total			

Summary for Subcatchment 1L: SC-1L

Runoff = 4.45 cfs @ 11.95 hrs, Volume= 0.194 af, Depth= 1.39"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	1.607	71	Landfill Final Cover
	0.064	89	Gravel roads, HSG C
	1.671	72	Weighted Average
	1.671		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	67	0.4000	0.48		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	442	0.1000	6.15	49.59	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=2.00' D=1.50' Z= 2.0 & 2.5 '/' Top.W=8.75' n= 0.069 Riprap, 6-inch
3.5	509	Total			

Summary for Subcatchment 1M: SC-1M

Runoff = 10.72 cfs @ 12.05 hrs, Volume= 0.655 af, Depth= 1.39"
Routed to Pond 1P : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	5.368	71	Landfill Final Cover
	0.283	92	Paved roads w/open ditches, 50% imp, HSG C
	5.651	72	Weighted Average
	5.509		97.50% Pervious Area
	0.141		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	73	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	174	0.0700	11.06	265.40	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=2.00' Z= 2.0 & 10.0 '/' Top.W=24.00' n= 0.035 Earth, dense weeds
0.5	413	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.6	810	Total			

Summary for Subcatchment 1N: SC-1N

Runoff = 13.88 cfs @ 12.29 hrs, Volume= 1.434 af, Depth= 1.96"
Routed to Pond DP-6 : DETENTION POND 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	2.942	70	Woods, Good, HSG C
*	3.662	78	Meadow HSG D
*	0.572	96	Gravel Surface
*	1.607	98	Pond
	8.783	80	Weighted Average
	7.176		81.70% Pervious Area
	1.607		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.7	123	0.0569	1.19		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
0.5	370	0.0189	12.43	801.88	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=2.00' D=3.00' Z= 10.0 & 3.0 '/' Top.W=41.00' n= 0.022 Earth, clean & straight
33.0	593	Total			

Summary for Subcatchment 1O: SC-1O

Runoff = 37.78 cfs @ 12.38 hrs, Volume= 4.484 af, Depth= 1.73"
Routed to Reach R-1O : R-1O

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	13.230	77	Woods, Good, HSG D
*	5.712	70	Woods, Good, HSG C
*	9.172	78	Meadow HSG D
*	1.195	71	Meadow, non-grazed, HSG C
*	0.713	96	Gravel Surface
*	0.515	98	Impervious Surface
*	0.494	98	Paved Area
	31.031	77	Weighted Average
	30.022		96.75% Pervious Area
	1.009		3.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0100	0.07		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
15.1	1,875	0.0190	2.07		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
12.8	856	0.0500	1.12		**Shallow Concentrated Flow, Segment CD** Woodland Kv= 5.0 fps
39.7	2,781	Total			

Summary for Subcatchment 2A: SC-2A

Runoff = 19.04 cfs @ 13.82 hrs, Volume= 6.099 af, Depth= 1.52"
Routed to Reach AP2 : ANALYSIS POINT #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	24.340	70	Woods, Good, HSG C
	15.830	77	Woods, Good, HSG D
*	5.898	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area
	1.600	98	Existing Waterbody
	48.048	74	Weighted Average
	46.068		95.88% Pervious Area
	1.980		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
42.6	534	0.0070	0.21		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
10.6	1,213		1.90		**Direct Entry, Segment C-D (STWC, 0.008)**
144.3	1,897	Total			

Summary for Subcatchment 2B: SC-2B

Runoff = 16.53 cfs @ 12.07 hrs, Volume= 1.078 af, Depth= 1.39"
Routed to Pond CB-2B : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	9.090	71	Landfill Final Cover
*	0.218	98	Riprap
	9.308	72	Weighted Average
	9.090		97.66% Pervious Area
	0.218		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.3	178	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	252	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	455	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
0.8	136	0.0100	3.00	81.02	**Trap/Vee/Rect Channel Flow, Segment E-F** Bot.W=3.00' D=3.00' Z= 2.0 '/' Top.W=15.00' n= 0.069 Riprap, 6-inch
14.4	1,171	Total			

Summary for Subcatchment 2C: SC-2C

Runoff = 17.76 cfs @ 12.06 hrs, Volume= 1.129 af, Depth= 1.39"
Routed to Reach R-2C : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	9.383	71	Landfill Final Cover
*	0.357	98	Riprap
	9.740	72	Weighted Average
	9.383		96.33% Pervious Area
	0.357		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	158	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.6	308	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	474	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,090	Total			

Summary for Subcatchment 2D: SC-2D

Runoff = 17.01 cfs @ 12.06 hrs, Volume= 1.077 af, Depth= 1.39"
Routed to Pond CB-2D : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	8.931	71	Landfill Final Cover
*	0.366	98	Riprap
	9.297	72	Weighted Average
	8.931		96.06% Pervious Area
	0.366		3.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	157	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	248	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	475	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.6	1,030	Total			

Summary for Subcatchment 2E: SC-2E

Runoff = 1.67 cfs @ 11.94 hrs, Volume= 0.072 af, Depth= 1.59"
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.466	71	Landfill Final Cover
*	0.073	98	Riprap
	0.539	75	Weighted Average
	0.466		86.46% Pervious Area
	0.073		13.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 2F: SC-2F

Runoff = 9.48 cfs @ 11.94 hrs, Volume= 0.408 af, Depth= 1.88"
Routed to Pond DP-12 : DETENTION POND 12

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
1.947	74	>75% Grass cover, Good, HSG C
0.655	93	Paved roads w/open ditches, 50% imp, HSG D
2.602	79	Weighted Average
2.274		87.41% Pervious Area
0.327		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 3A: SC-3A

Runoff = 68.13 cfs @ 15.21 hrs, Volume= 32.228 af, Depth= 1.46"
Routed to Reach AP3 : ANALYSIS POINT #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	158.900	70	Woods, Good, HSG C
	102.800	77	Woods, Good, HSG D
	1.000	71	Meadow, non-grazed, HSG C
*	0.564	98	Paved Area
*	2.330	98	Existing Waterbody
	265.594	73	Weighted Average
	262.700		98.91% Pervious Area
	2.894		1.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
105.2	1,116	0.0050	0.18		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
78.7	3,093		0.66		**Direct Entry, Segment C-D (STWC, 0.001)**
240.2	4,359	Total			

Summary for Subcatchment 4A: SC-4A

Runoff = 48.86 cfs @ 16.22 hrs, Volume= 28.718 af, Depth= 1.66"
Routed to Reach AP4 : AP4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	130.444	77	Woods, Good, HSG D
	44.640	70	Woods, Good, HSG C
*	23.410	71	Meadow, non-grazed, HSG C
*	3.300	98	Paved Area
*	2.520	91	Gravel
	1.000	89	Gravel roads, HSG C
*	2.000	98	Impervious Surface
	207.314	76	Weighted Average
	202.014		97.44% Pervious Area
	5.300		2.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
200.8	1,905	0.0040	0.16		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
17.7	1,592		1.50		**Direct Entry, Segment C-D (STWC, 0.0031)**
7.9	760		1.60		**Direct Entry, Segment D-E (STWC, 0.005)**
6.7	963		2.40		**Direct Entry, Segment E-F (STWC, 0.0125)**
324.2	5,370	Total			

Summary for Subcatchment 4B: 4B

Runoff = 9.69 cfs @ 12.05 hrs, Volume= 0.584 af, Depth= 1.52"
Routed to Reach R-4B : R-4B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	4.150	71	Landfill Final Cover
*	0.452	98	Riprap
	4.602	74	Weighted Average
	4.150		90.18% Pervious Area
	0.452		9.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	32	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	240	0.0700	8.81	49.56	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 3.0 '/' Top.W=7.50' n= 0.035 Earth, dense weeds
0.4	342	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.5	764	Total			

Summary for Subcatchment 4C: SC-4C

Runoff = 13.75 cfs @ 12.01 hrs, Volume= 0.743 af, Depth= 1.52"
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.566	98	Riprap
*	5.290	71	Landfill Final Cover
	5.856	74	Weighted Average
	5.290		90.33% Pervious Area
	0.566		9.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	101	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	442	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 Earth, dense weeds
0.4	365	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.4	908	Total			

Summary for Subcatchment 4D: SC-4D

Runoff = 26.16 cfs @ 12.01 hrs, Volume= 1.401 af, Depth= 1.39"
Routed to Pond CB-4D : LF TOE DITCH - CATCH BASINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.800	71	Landfill Final Cover
*	0.295	98	Riprap
	12.095	72	Weighted Average
	11.800		97.56% Pervious Area
	0.295		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.2	117	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	504	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.0	721	Total			

Summary for Subcatchment 4E: SC-4E

Runoff = 2.55 cfs @ 11.94 hrs, Volume= 0.110 af, Depth= 1.33"
Routed to Pond DP-13 : DETENTION POND 13

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
0.992	71	Meadow, non-grazed, HSG C
0.992		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	300		1.67		**Direct Entry, Segment A-B**

Summary for Subcatchment 4F: SC-4F

Runoff = 3.55 cfs @ 11.93 hrs, Volume= 0.151 af, Depth= 1.33"
Routed to Pond DP-14 : DETENTION POND 14

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
1.366	71	Meadow, non-grazed, HSG C
1.366		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	500		4.17		**Direct Entry, Segment A-B**

Summary for Subcatchment 4G: SC-4G

Runoff = 20.53 cfs @ 12.06 hrs, Volume= 1.305 af, Depth= 1.39"
Routed to Pond CB-4G : Catch Basin - 4G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.040	71	Landfill Final Cover
*	0.220	98	Riprap
	11.260	72	Weighted Average
	11.040		98.05% Pervious Area
	0.220		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	143	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	390	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	497	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,180	Total			

Summary for Subcatchment 4H: SC-4H

Runoff = 21.06 cfs @ 12.07 hrs, Volume= 1.378 af, Depth= 1.33"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	12.330	71	Landfill Final Cover
*	0.135	98	Riprap
	12.465	71	Weighted Average
	12.330		98.92% Pervious Area
	0.135		1.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	232	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	464	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	440	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.3	1,286	Total			

Summary for Subcatchment 4I: SC-4I

Runoff = 6.77 cfs @ 11.94 hrs, Volume= 0.291 af, Depth= 1.33"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	2.595	71	Landfill Final Cover
*	0.036	98	Riprap
	2.631	71	Weighted Average
	2.595		98.63% Pervious Area
	0.036		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, A-B**

Summary for Subcatchment 4J: SC-4J

Runoff = 23.44 cfs @ 12.07 hrs, Volume= 1.512 af, Depth= 1.39"
Routed to Pond CB-4I : Catch Basin - 4I

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	12.590	71	Landfill Final Cover
*	0.462	98	Riprap
	13.052	72	Weighted Average
	12.590		96.46% Pervious Area
	0.462		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	223	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	386	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.4	376	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.1	1,135	Total			

Summary for Subcatchment 4K: SC-4K

Runoff = 15.93 cfs @ 12.17 hrs, Volume= 1.351 af, Depth= 1.39"
Routed to Pond CB-4JA : Catch Basin - 4JA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.234	71	Landfill Final Cover
*	0.429	98	Riprap
	11.663	72	Weighted Average
	11.234		96.32% Pervious Area
	0.429		3.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
10.3	432	0.0100	0.70		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	432	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	392	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
22.9	1,406	Total			

Summary for Subcatchment 4L: SC-4L

Runoff = 24.84 cfs @ 12.08 hrs, Volume= 1.673 af, Depth= 1.39"
Routed to Pond C-4K : Catch Basin - 4K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	14.000	71	Landfill Final Cover
*	0.437	98	Riprap
	14.437	72	Weighted Average
	14.000		96.97% Pervious Area
	0.437		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
2.6	242	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.9	476	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	406	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
15.3	1,274	Total			

Summary for Subcatchment 4M: SC-4M

Runoff = 1.94 cfs @ 11.93 hrs, Volume= 0.082 af, Depth= 1.46"
Routed to Pond C-4L : Catch Basin - 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.633	71	Landfill Final Cover
*	0.046	98	Riprap
	0.679	73	Weighted Average
	0.633		93.23% Pervious Area
	0.046		6.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 4N: SC-4N

Runoff = 13.24 cfs @ 12.12 hrs, Volume= 0.979 af, Depth= 1.96"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	2.512	74	>75% Grass cover, Good, HSG C
*	0.245	98	Paved Area
*	0.338	98	Building/Concrete Slabs
*	1.404	91	Gravel
	1.497	71	Meadow, non-grazed, HSG C
	5.996	80	Weighted Average
	5.413		90.28% Pervious Area
	0.583		9.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	61	0.0200	1.14		**Sheet Flow, Segment A-B** Smooth surfaces n= 0.011 P2= 2.70"
10.5	61	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
7.9	955	0.0180	2.01		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
19.3	1,077	Total			

Summary for Subcatchment 4O: SC-4O

Runoff = 6.22 cfs @ 12.05 hrs, Volume= 0.380 af, Depth= 1.88"
Routed to Pond C4B : Culvert - 4BA & 4BB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	1.074	70	Brush, Fair, HSG C
*	0.034	98	Impervious Surface
	0.687	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
*	0.240	98	Paved Area
	2.422	79	Weighted Average
	2.148		88.69% Pervious Area
	0.274		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	24	0.0200	0.95		**Sheet Flow, Segment AB** Smooth surfaces n= 0.011 P2= 2.70"
0.8	19	0.5000	0.41		**Sheet Flow, Segment BC** Grass: Short n= 0.150 P2= 2.70"
11.9	584	0.0137	0.82		**Shallow Concentrated Flow, Segment CD** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0250	7.14	85.66	**Trap/Vee/Rect Channel Flow, Segment DE** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.035
13.2	667	Total			

Summary for Subcatchment 4P: SC-4P

Runoff = 13.18 cfs @ 12.29 hrs, Volume= 1.376 af, Depth= 2.55"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	0.415	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.500	98	Pond
*	0.136	98	Paved Area
	6.488	87	Weighted Average
	4.852		74.78% Pervious Area
	1.636		25.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	125	0.0216	0.12		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	25	0.0520	0.78		**Sheet Flow, Segment B-C** n= 0.023 P2= 2.70"
2.0	270	0.0190	2.22		**Shallow Concentrated Flow, Segment C-D** Unpaved Kv= 16.1 fps
0.2	44	0.3300	4.02		**Shallow Concentrated Flow, Segment D-E** Short Grass Pasture Kv= 7.0 fps
2.0	102	0.0150	0.86		**Shallow Concentrated Flow, Segment E-F** Short Grass Pasture Kv= 7.0 fps
11.2	258	0.0030	0.38		**Shallow Concentrated Flow, Segment F-G** Short Grass Pasture Kv= 7.0 fps
33.9	824	Total			

Summary for Subcatchment 4Q: SC-4Q

Runoff = 32.71 cfs @ 11.98 hrs, Volume= 1.606 af, Depth= 1.88"
Routed to Pond DP-10 : DETENTION POND 10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	3.393	79	50-75% Grass cover, Fair, HSG C
	1.056	93	Paved roads w/open ditches, 50% imp, HSG D
*	0.712	98	Pond
	5.073	74	>75% Grass cover, Good, HSG C
	10.234	79	Weighted Average
	8.994		87.88% Pervious Area
	1.240		12.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	150	0.0500	0.59		**Sheet Flow, AB** Fallow n= 0.050 P2= 2.70"
0.2	85	0.1600	6.44		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
2.5	625	0.0800	4.24		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
6.9	860	Total			

Summary for Subcatchment 4R: SC-4R

Runoff = 8.32 cfs @ 12.03 hrs, Volume= 0.479 af, Depth= 1.88"
Routed to Pond DP-11R : DETENTION POND 11R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
0.757	93	Paved roads w/open ditches, 50% imp, HSG D
2.296	74	>75% Grass cover, Good, HSG C
3.053	79	Weighted Average
2.674		87.60% Pervious Area
0.378		12.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	37	0.0200	1.04		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 2.70"
0.4	215	0.3300	9.25		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
10.4	338	0.0060	0.54		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.4	590	Total			

Summary for Subcatchment 5: SC-5

Runoff = 13.69 cfs @ 14.32 hrs, Volume= 5.412 af, Depth= 1.66"
Routed to Reach AP5 : AP-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
31.520	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
39.070	76	Weighted Average
38.925		99.63% Pervious Area
0.145		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
122.7	1,930	0.0110	0.26		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
2.5	275		1.80		**Direct Entry, Segment C-D (STWC, 0.007)**
192.1	2,355	Total			

Summary for Reach 1: Analysis Point 1

Inflow Area = 145.103 ac, 3.22% Impervious, Inflow Depth > 1.46" for 10-yr Storm event
Inflow = 72.63 cfs @ 12.71 hrs, Volume= 17.639 af
Outflow = 72.63 cfs @ 12.71 hrs, Volume= 17.639 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach 7R: SOUTH ACCESS RD DITCH

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 12.24 cfs @ 12.08 hrs, Volume= 0.682 af
Outflow = 11.96 cfs @ 12.10 hrs, Volume= 0.682 af, Atten= 2%, Lag= 1.3 min
Routed to Pond 12P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.92 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.57 fps, Avg. Travel Time= 2.8 min

Peak Storage= 540 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.51' , Surface Width= 5.05'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 173.05 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 262.0' Slope= 0.0271 '/'
Inlet Invert= 205.00', Outlet Invert= 197.90'

Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth > 0.85" for 10-yr Storm event
Inflow = 0.82 cfs @ 24.20 hrs, Volume= 2.133 af
Outflow = 0.82 cfs @ 24.83 hrs, Volume= 2.125 af, Atten= 0%, Lag= 38.2 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.16 fps, Min. Travel Time= 28.2 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 51.1 min

Peak Storage= 1,379 cf @ 24.36 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 24.54'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 11.46 cfs

20.00' x 1.00' deep channel, n= 0.800 Sheet flow: Woods+dense brush
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 273.0' Slope= 0.0623 '/'
Inlet Invert= 180.00', Outlet Invert= 163.00'

‡

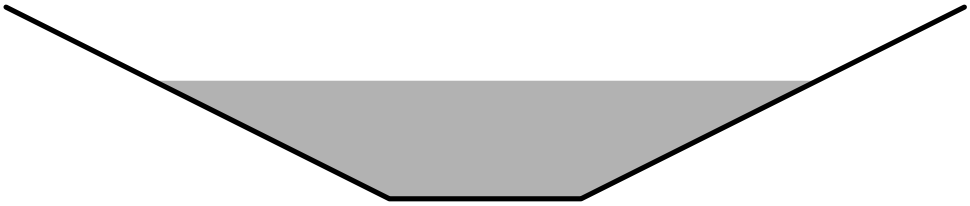
Summary for Reach 12R: Ditch 4B1

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 24.63 cfs @ 12.08 hrs, Volume= 1.671 af
Outflow = 24.01 cfs @ 12.12 hrs, Volume= 1.671 af, Atten= 3%, Lag= 2.5 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.46 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.58 fps, Avg. Travel Time= 3.7 min

Peak Storage= 1,938 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.23' , Surface Width= 6.93'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.02 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 352.0' Slope= 0.0085 '/'
Inlet Invert= 213.50', Outlet Invert= 210.50'



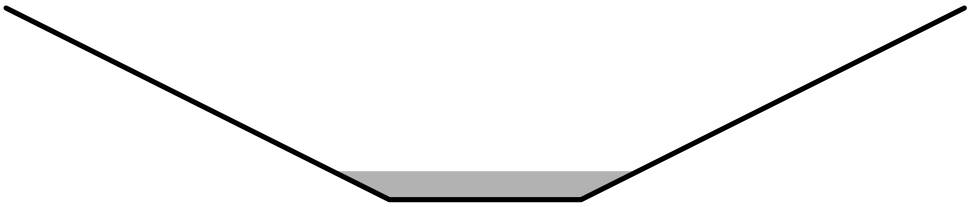
Summary for Reach 13R: Ex Ditch

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 1.93 cfs @ 11.93 hrs, Volume= 0.078 af
Outflow = 1.73 cfs @ 11.97 hrs, Volume= 0.078 af, Atten= 11%, Lag= 2.3 min
Routed to Pond C4B : Culvert - 4BA & 4BB

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.40 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 5.9 min

Peak Storage= 175 cf @ 11.94 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 3.19'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 81.05 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 225.0' Slope= 0.0164 '/'
Inlet Invert= 209.70', Outlet Invert= 206.00'



Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 79.534 ac, 4.18% Impervious, Inflow Depth = 1.49" for 10-yr Storm event
Inflow = 19.98 cfs @ 13.90 hrs, Volume= 9.856 af
Outflow = 19.98 cfs @ 13.90 hrs, Volume= 9.856 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 265.594 ac, 1.09% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 68.13 cfs @ 15.21 hrs, Volume= 32.228 af
Outflow = 68.13 cfs @ 15.21 hrs, Volume= 32.228 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 326.605 ac, 3.82% Impervious, Inflow Depth > 1.51" for 10-yr Storm event
Inflow = 54.33 cfs @ 16.22 hrs, Volume= 41.205 af
Outflow = 54.33 cfs @ 16.22 hrs, Volume= 41.205 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: AP-5

Inflow Area = 39.070 ac, 0.37% Impervious, Inflow Depth = 1.66" for 10-yr Storm event
Inflow = 13.69 cfs @ 14.32 hrs, Volume= 5.412 af
Outflow = 13.69 cfs @ 14.32 hrs, Volume= 5.412 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach E1R6: DP-10 DISCHARGE

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth > 1.32" for 10-yr Storm event
Inflow = 3.63 cfs @ 14.10 hrs, Volume= 3.849 af
Outflow = 3.62 cfs @ 14.20 hrs, Volume= 3.847 af, Atten= 0%, Lag= 5.7 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.77 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 7.9 min

Peak Storage= 733 cf @ 14.14 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 21.96'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 827.94 cfs

20.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 357.0' Slope= 0.0672 '/'
Inlet Invert= 178.00', Outlet Invert= 154.00'

‡

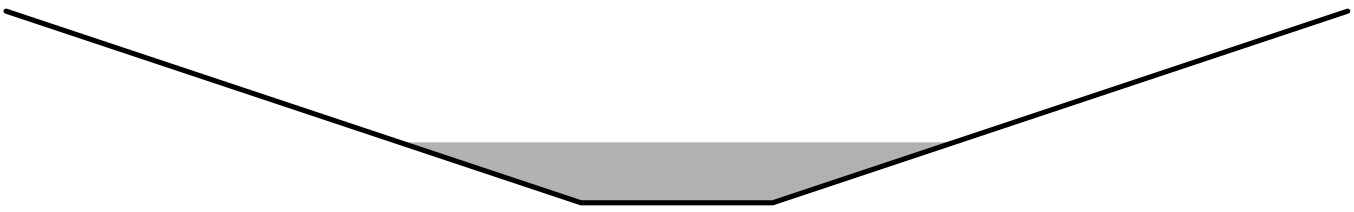
Summary for Reach E1R7: REACH TO AP

Inflow Area = 64.971 ac, 7.86% Impervious, Inflow Depth > 1.10" for 10-yr Storm event
Inflow = 3.89 cfs @ 14.49 hrs, Volume= 5.972 af
Outflow = 3.83 cfs @ 15.27 hrs, Volume= 5.957 af, Atten= 2%, Lag= 46.8 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.56 fps, Min. Travel Time= 23.1 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 44.4 min

Peak Storage= 5,312 cf @ 14.89 hrs
Average Depth at Peak Storage= 0.63' , Surface Width= 5.78'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 48.12 cfs

2.00' x 2.00' deep channel, n= 0.045 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 2,170.0' Slope= 0.0074 '/'
Inlet Invert= 158.00', Outlet Invert= 142.00'



Summary for Reach O4: Overland Flow

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 1.77" for 10-yr Storm event
Inflow = 7.26 cfs @ 12.05 hrs, Volume= 0.458 af
Outflow = 7.21 cfs @ 12.05 hrs, Volume= 0.458 af, Atten= 1%, Lag= 0.5 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.99 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 9.99 fps, Avg. Travel Time= 0.3 min

Peak Storage= 122 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.87 cfs

Custom stage-perimeter table, n= 0.035 Earth, dense weeds
100 Intermediate values determined by Multi-point interpolation
Length= 168.0' Slope= 0.0554 '/'
Inlet Invert= 201.30', Outlet Invert= 192.00'

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
2.00	12.0	12.0	2,016	119.87

Summary for Reach R-10a: R-10a

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 1.30" for 10-yr Storm event
Inflow = 17.93 cfs @ 12.07 hrs, Volume= 1.416 af
Outflow = 17.28 cfs @ 12.14 hrs, Volume= 1.416 af, Atten= 4%, Lag= 4.1 min
Routed to Pond DP-10 : DETENTION POND 10

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.73 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.63 fps, Avg. Travel Time= 6.6 min

Peak Storage= 2,375 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.63' , Surface Width= 7.78'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 437.98 cfs

4.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 641.0' Slope= 0.0137 '/'
Inlet Invert= 194.00', Outlet Invert= 185.25'

‡

Summary for Reach R-1B: LF TOE DITCH

Inflow Area = 19.514 ac, 4.11% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 34.92 cfs @ 12.08 hrs, Volume= 2.261 af
Outflow = 33.52 cfs @ 12.13 hrs, Volume= 2.261 af, Atten= 4%, Lag= 3.1 min
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.32 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 5.1 min

Peak Storage= 3,493 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.37' , Surface Width= 7.47'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 540.0' Slope= 0.0278 '/'
Inlet Invert= 181.00', Outlet Invert= 166.00'

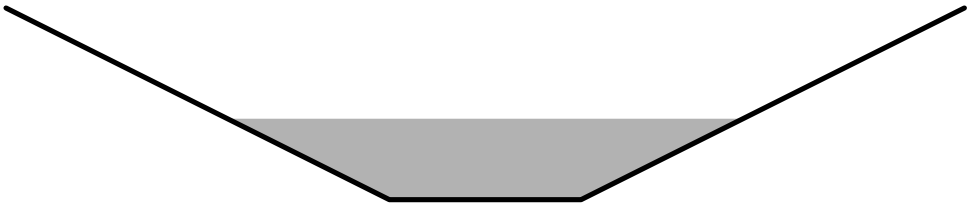
Summary for Reach R-1B1: LF TOE DITCH

Inflow Area = 8.511 ac, 4.70% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 16.03 cfs @ 12.06 hrs, Volume= 0.986 af
Outflow = 15.31 cfs @ 12.10 hrs, Volume= 0.986 af, Atten= 5%, Lag= 2.9 min
Routed to Reach R-1B : LF TOE DITCH

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.00 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.64 fps, Avg. Travel Time= 4.8 min

Peak Storage= 1,487 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.84' , Surface Width= 5.38'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 478.0' Slope= 0.0418 '/'
Inlet Invert= 204.00', Outlet Invert= 184.00'



Summary for Reach R-1D: Reach R-1D

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 1.30" for 10-yr Storm event
Inflow = 22.23 cfs @ 12.32 hrs, Volume= 4.476 af
Outflow = 21.25 cfs @ 12.41 hrs, Volume= 4.475 af, Atten= 4%, Lag= 5.5 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.45 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 12.2 min

Peak Storage= 3,226 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.56' , Surface Width= 21.19'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 67.93 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 370.0' Slope= 0.0324 '/'
Inlet Invert= 159.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1E: Plastic Lined Ditch

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 18.64 cfs @ 12.05 hrs, Volume= 1.110 af
Outflow = 18.46 cfs @ 12.05 hrs, Volume= 1.110 af, Atten= 1%, Lag= 0.4 min
Routed to Pond DP-1a : DP-1a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.67 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.73 fps, Avg. Travel Time= 0.9 min

Peak Storage= 294 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.32' , Surface Width= 5.27'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 1,302.19 cfs

4.00' x 3.00' deep channel, n= 0.011
Side Slope Z-value= 2.0 '/' Top Width= 16.00'
Length= 200.0' Slope= 0.0500 '/'
Inlet Invert= 176.00', Outlet Invert= 166.00'

Summary for Reach R-1F: Reach R-1F

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 1.35" for 10-yr Storm event
Inflow = 6.22 cfs @ 12.15 hrs, Volume= 1.110 af
Outflow = 6.21 cfs @ 12.21 hrs, Volume= 1.110 af, Atten= 0%, Lag= 3.8 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.66 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 8.3 min

Peak Storage= 784 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 23.44'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 140.14 cfs

20.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 210.0' Slope= 0.0524 '/'
Inlet Invert= 158.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1G: RipRap Downspout

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 2.75 cfs @ 12.06 hrs, Volume= 0.205 af
Outflow = 2.66 cfs @ 12.13 hrs, Volume= 0.205 af, Atten= 3%, Lag= 3.9 min
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.64 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 6.8 min

Peak Storage= 364 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 4.68'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 368.81 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 493.0' Slope= 0.3428 '/'
Inlet Invert= 333.00', Outlet Invert= 164.00'

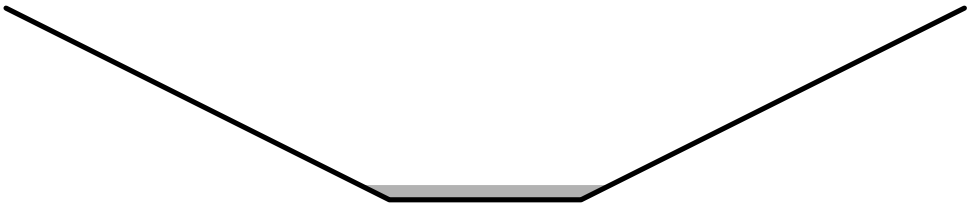
Summary for Reach R-1I: Final Cover Access Road Ditch

Inflow = 0.78 cfs @ 12.06 hrs, Volume= 0.011 af
Outflow = 0.56 cfs @ 12.21 hrs, Volume= 0.011 af, Atten= 28%, Lag= 9.1 min
Routed to Pond P-1I : Culvert Crossing 6c

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.60 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 15.0 min

Peak Storage= 185 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 2.61'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 80.08 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 524.0' Slope= 0.0849 '/'
Inlet Invert= 335.00', Outlet Invert= 290.50'



Summary for Reach R-1J: RipRap Downspout

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 9.02 cfs @ 11.96 hrs, Volume= 0.495 af
Outflow = 8.80 cfs @ 11.97 hrs, Volume= 0.495 af, Atten= 2%, Lag= 0.8 min
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.72 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.63 fps, Avg. Travel Time= 1.7 min

Peak Storage= 257 cf @ 11.96 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 5.34'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 387.31 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 164.0' Slope= 0.3780 '/'
Inlet Invert= 252.00', Outlet Invert= 190.00'

Summary for Reach R-1L: Final Cover Access Road Ditch

Inflow = 3.11 cfs @ 11.96 hrs, Volume= 0.027 af
Outflow = 2.01 cfs @ 12.06 hrs, Volume= 0.027 af, Atten= 35%, Lag= 6.3 min
Routed to Pond 1P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.45 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 15.2 min

Peak Storage= 502 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 3.34'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 77.46 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 560.0' Slope= 0.0795 '/'
Inlet Invert= 254.50', Outlet Invert= 210.00'

Summary for Reach R-1N: R-1N

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 1.28" for 10-yr Storm event
Inflow = 1.19 cfs @ 19.28 hrs, Volume= 2.901 af
Outflow = 1.19 cfs @ 19.82 hrs, Volume= 2.901 af, Atten= 0%, Lag= 32.5 min
Routed to Reach R-1O : R-1O

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.79 fps, Min. Travel Time= 19.8 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 42.4 min

Peak Storage= 1,412 cf @ 19.49 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 12.65'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.97 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 940.0' Slope= 0.0176 '/'
Inlet Invert= 168.00', Outlet Invert= 151.50'

‡

Summary for Reach R-1O: R-1O

Inflow Area = 58.266 ac, 5.06% Impervious, Inflow Depth = 1.52" for 10-yr Storm event
Inflow = 37.78 cfs @ 12.38 hrs, Volume= 7.385 af
Outflow = 35.67 cfs @ 12.59 hrs, Volume= 7.385 af, Atten= 6%, Lag= 12.8 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.73 fps, Min. Travel Time= 7.1 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 34.8 min

Peak Storage= 15,244 cf @ 12.47 hrs
Average Depth at Peak Storage= 1.02' , Surface Width= 30.49'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 151.21 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 735.0' Slope= 0.0020 '/'
Inlet Invert= 151.50', Outlet Invert= 150.00'

‡

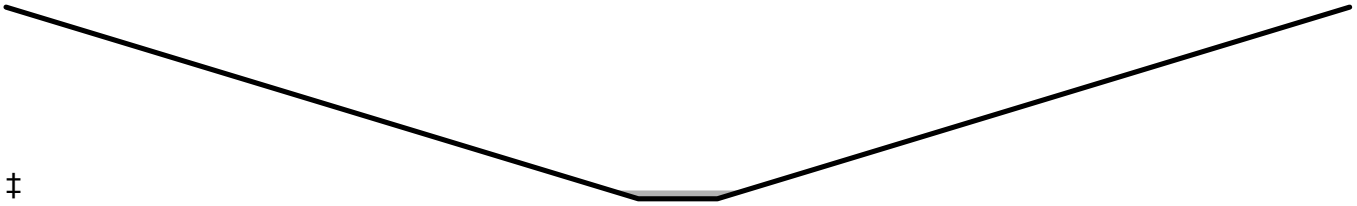
Summary for Reach R-2A: Reach 2A

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 1.43" for 10-yr Storm event
Inflow = 1.43 cfs @ 18.64 hrs, Volume= 3.756 af
Outflow = 1.42 cfs @ 20.22 hrs, Volume= 3.756 af, Atten= 0%, Lag= 95.2 min
Routed to Reach AP2 : ANALYSIS POINT #2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.48 fps, Min. Travel Time= 56.2 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 76.1 min

Peak Storage= 4,798 cf @ 19.29 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 42.41'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,332.75 cfs

25.00' x 2.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,630.0' Slope= 0.0092 '/'
Inlet Invert= 166.00', Outlet Invert= 151.00'



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Summary for Reach R-2C: LF TOE DITCH

Inflow Area = 9.740 ac, 3.67% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 17.76 cfs @ 12.06 hrs, Volume= 1.129 af
Outflow = 16.84 cfs @ 12.14 hrs, Volume= 1.129 af, Atten= 5%, Lag= 4.5 min
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.81 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 7.7 min

Peak Storage= 2,503 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.55' , Surface Width= 9.20'
Defined Flood Depth= 2.00' Flow Area= 14.0 sf, Capacity= 29.12 cfs
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 70.39 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 265.0' Slope= 0.0075 '/'
Inlet Invert= 181.00', Outlet Invert= 179.00'

Summary for Reach R-2D: DITCH

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 16.93 cfs @ 12.07 hrs, Volume= 1.074 af
Outflow = 16.49 cfs @ 12.10 hrs, Volume= 1.074 af, Atten= 3%, Lag= 1.8 min
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.60 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 3.1 min

Peak Storage= 1,045 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.95' , Surface Width= 6.80'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 183.17 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 225.0' Slope= 0.0511 '/'
Inlet Invert= 191.50', Outlet Invert= 180.00'

Summary for Reach R-4B: R-4B

Inflow Area = 4.602 ac, 9.82% Impervious, Inflow Depth = 1.52" for 10-yr Storm event
Inflow = 9.69 cfs @ 12.05 hrs, Volume= 0.584 af
Outflow = 6.58 cfs @ 12.35 hrs, Volume= 0.584 af, Atten= 32%, Lag= 18.2 min
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.39 fps, Min. Travel Time= 12.0 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 45.7 min

Peak Storage= 4,758 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.96' , Surface Width= 6.84'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 69.96 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 1,006.0' Slope= 0.0075 '/'
Inlet Invert= 178.50', Outlet Invert= 171.00'

Summary for Reach R-IH: RipRap Downspout

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 7.21 cfs @ 12.02 hrs, Volume= 0.453 af
Outflow = 7.22 cfs @ 12.03 hrs, Volume= 0.453 af, Atten= 0%, Lag= 0.7 min
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.34 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.48 fps, Avg. Travel Time= 2.9 min

Peak Storage= 354 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 5.20'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 385.75 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 256.0' Slope= 0.3750 '/'
Inlet Invert= 286.00', Outlet Invert= 190.00'

Summary for Reach R2: Reach 2

Inflow Area = 122.225 ac, 3.55% Impervious, Inflow Depth > 1.45" for 10-yr Storm event
Inflow = 64.41 cfs @ 12.52 hrs, Volume= 14.741 af
Outflow = 62.80 cfs @ 12.69 hrs, Volume= 14.741 af, Atten= 2%, Lag= 10.0 min
Routed to Reach 1 : Analysis Point 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.31 fps, Min. Travel Time= 5.0 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 23.4 min

Peak Storage= 19,061 cf @ 12.60 hrs
Average Depth at Peak Storage= 1.22' , Surface Width= 34.48'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 183.33 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 700.0' Slope= 0.0030 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'

‡

Summary for Reach R4B4:

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 1.44" for 10-yr Storm event
Inflow = 4.31 cfs @ 23.80 hrs, Volume= 6.530 af
Outflow = 4.31 cfs @ 24.39 hrs, Volume= 6.530 af, Atten= 0%, Lag= 34.9 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.78 fps, Min. Travel Time= 20.5 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 56.1 min

Peak Storage= 5,292 cf @ 24.05 hrs
Average Depth at Peak Storage= 0.35' , Surface Width= 19.07'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 131.94 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 963.0' Slope= 0.0094 '/'
Inlet Invert= 142.00', Outlet Invert= 132.96'

‡

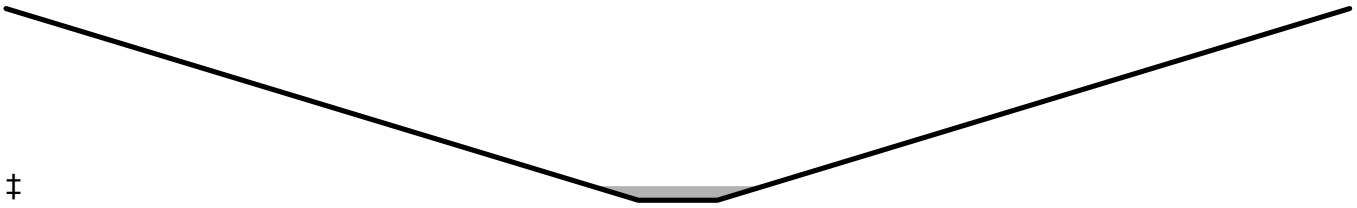
Summary for Reach R4C: Reach 4C

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 1.50" for 10-yr Storm event
Inflow = 1.97 cfs @ 13.29 hrs, Volume= 1.435 af
Outflow = 1.91 cfs @ 15.45 hrs, Volume= 1.435 af, Atten= 3%, Lag= 129.9 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.32 fps, Min. Travel Time= 49.8 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 99.5 min

Peak Storage= 5,697 cf @ 14.62 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 54.50'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 669.12 cfs

25.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 970.0' Slope= 0.0093 '/'
Inlet Invert= 159.00', Outlet Invert= 150.00'



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Summary for Reach R4C1: Reach 4C1

Inflow Area = 24.911 ac, 5.27% Impervious, Inflow Depth = 1.44" for 10-yr Storm event
Inflow = 3.10 cfs @ 15.58 hrs, Volume= 2.987 af
Outflow = 2.58 cfs @ 23.02 hrs, Volume= 2.987 af, Atten= 17%, Lag= 446.9 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 196.5 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 467.5 min

Peak Storage= 30,413 cf @ 19.75 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 124.22'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 562.82 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 2,240.0' Slope= 0.0031 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Reach R4C2: Reach 4C2

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 1.44" for 10-yr Storm event
Inflow = 4.32 cfs @ 22.76 hrs, Volume= 6.530 af
Outflow = 4.31 cfs @ 23.80 hrs, Volume= 6.530 af, Atten= 0%, Lag= 62.4 min
Routed to Reach R4B4 :

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.20 fps, Min. Travel Time= 36.4 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 88.8 min

Peak Storage= 9,414 cf @ 23.20 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 135.87'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 477.27 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 445.0' Slope= 0.0022 '/'
Inlet Invert= 143.00', Outlet Invert= 142.00'

‡

Summary for Reach R4D: Reach 4D

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 1.21 cfs @ 14.17 hrs, Volume= 1.551 af
Outflow = 1.20 cfs @ 16.05 hrs, Volume= 1.551 af, Atten= 1%, Lag= 112.4 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.21 fps, Min. Travel Time= 48.3 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 66.3 min

Peak Storage= 3,482 cf @ 15.24 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 110.90'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 1,002.64 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 605.0' Slope= 0.0099 '/'
Inlet Invert= 156.00', Outlet Invert= 150.00'

‡

Summary for Reach R4G: Reach 4G

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 1.86 cfs @ 15.94 hrs, Volume= 3.543 af
Outflow = 1.86 cfs @ 16.23 hrs, Volume= 3.543 af, Atten= 0%, Lag= 17.6 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.56 fps, Min. Travel Time= 10.7 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 14.4 min

Peak Storage= 1,194 cf @ 16.06 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 23.06'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 199.54 cfs

20.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 363.0' Slope= 0.0193 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Pond 1P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 12.73 cfs @ 12.06 hrs, Volume= 0.682 af
Outflow = 12.24 cfs @ 12.08 hrs, Volume= 0.682 af, Atten= 4%, Lag= 1.4 min
Primary = 12.24 cfs @ 12.08 hrs, Volume= 0.682 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 207.16' @ 12.08 hrs Surf.Area= 1,422 sf Storage= 1,348 cf
Flood Elev= 210.00' Surf.Area= 3,240 sf Storage= 7,740 cf

Plug-Flow detention time= 5.1 min calculated for 0.682 af (100% of inflow)
Center-of-Mass det. time= 5.2 min (858.8 - 853.6)

Volume	Invert	Avail.Storage	Storage Description
#1	206.00'	7,740 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
206.00	900	0	0
208.00	1,800	2,700	2,700
210.00	3,240	5,040	7,740

Device	Routing	Invert	Outlet Devices
#1	Primary	206.00'	**24.0" Round 24"Culvert (X2) X 2.00** L= 76.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 206.00' / 205.00' S= 0.0132 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	209.60'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=11.91 cfs @ 12.08 hrs HW=207.14' (Free Discharge)
↑—**1=24"Culvert (X2)** (Inlet Controls 11.91 cfs @ 3.21 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=206.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 12P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 11.96 cfs @ 12.10 hrs, Volume= 0.682 af
Outflow = 11.64 cfs @ 12.12 hrs, Volume= 0.682 af, Atten= 3%, Lag= 1.3 min
Primary = 11.64 cfs @ 12.12 hrs, Volume= 0.682 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 15P : EXISTING 12" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 199.03' @ 12.12 hrs Surf.Area= 1,362 sf Storage= 939 cf
Flood Elev= 200.50' Surf.Area= 2,548 sf Storage= 3,866 cf

Plug-Flow detention time= 1.6 min calculated for 0.682 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (862.9 - 861.3)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	3,866 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676
200.50	2,548	1,190	3,866

Device	Routing	Invert	Outlet Devices
#1	Primary	197.90'	**24.0" Round 24"Culvert (X2) X 2.00** L= 98.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 197.90' / 195.47' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Secondary	200.00'	**14.0' long x 11.0' breadth Broad-Crested Rectangular Weir-Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Primary OutFlow Max=11.35 cfs @ 12.12 hrs HW=199.01' (Free Discharge)
1=24"Culvert (X2) (Inlet Controls 11.35 cfs @ 3.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
2=Broad-Crested Rectangular Weir-Overflow(Controls 0.00 cfs)

Summary for Pond 15P: EXISTING 12" CULVERT

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 198.00' @ 0.00 hrs Surf.Area= 464 sf Storage= 0 cf
Flood Elev= 200.50' Surf.Area= 2,212 sf Storage= 2,676 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	2,676 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676

Device	Routing	Invert	Outlet Devices
#1	Primary	197.40'	**12.0" Round 24"Culvert (X2)** L= 121.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 197.40' / 189.90' S= 0.0620 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	198.00'	**10.0' long x 50.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**1=24"Culvert (X2)** (Passes 0.00 cfs of 1.02 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 24.84 cfs @ 12.08 hrs, Volume= 1.673 af
Outflow = 24.78 cfs @ 12.08 hrs, Volume= 1.672 af, Atten= 0%, Lag= 0.0 min
Primary = 24.63 cfs @ 12.08 hrs, Volume= 1.671 af
Routed to Reach 12R : Ditch 4B1
Secondary = 0.17 cfs @ 12.10 hrs, Volume= 0.001 af
Routed to Pond C-4L : Catch Basin - 4L

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 220.15' @ 12.08 hrs Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 0.5 min calculated for 1.672 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (861.6 - 861.5)

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	216.50'	**24.0" Round Culvert - 4K** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.50' / 214.50' S= 0.0392 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	218.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=24.24 cfs @ 12.08 hrs HW=220.07' (Free Discharge)
└**1=Culvert - 4K** (Inlet Controls 24.24 cfs @ 7.72 fps)
└**2=Orifice/Grate** (Passes 24.24 cfs of 34.00 cfs potential flow)

Secondary OutFlow Max=0.17 cfs @ 12.10 hrs HW=220.10' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.80 fps)

Summary for Pond C-4L: Catch Basin - 4L

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 1.47" for 10-yr Storm event
Inflow = 1.94 cfs @ 11.93 hrs, Volume= 0.083 af
Outflow = 1.93 cfs @ 11.93 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min
Primary = 1.93 cfs @ 11.93 hrs, Volume= 0.078 af
Routed to Reach 13R : Ex Ditch
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 214.71' @ 11.93 hrs Surf.Area= 13 sf Storage= 43 cf

Plug-Flow detention time= 24.4 min calculated for 0.078 af (94% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	210.50'	43 cf	**4.00'D x 3.40'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.50'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.50' / 210.50' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	214.50'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads
#3	Secondary	215.00'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.81 cfs @ 11.93 hrs HW=214.70' (Free Discharge)
↑└**1=Culvert 4L** (Passes 1.81 cfs of 10.24 cfs potential flow)
↑└**2=Orifice-Top of catch basin** (Weir Controls 1.81 cfs @ 1.46 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=210.50' (Free Discharge)
↑└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 1.77" for 10-yr Storm event
Inflow = 7.30 cfs @ 12.03 hrs, Volume= 0.458 af
Outflow = 7.26 cfs @ 12.05 hrs, Volume= 0.458 af, Atten= 0%, Lag= 1.0 min
Primary = 7.26 cfs @ 12.05 hrs, Volume= 0.458 af
Routed to Reach O4 : Overland Flow

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 205.32' @ 12.05 hrs Surf.Area= 747 sf Storage= 343 cf

Plug-Flow detention time= 0.7 min calculated for 0.458 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (840.4 - 839.7)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,690 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
204.40	0	0	0
206.00	1,300	1,040	1,040
208.00	4,200	5,500	6,540
209.00	6,100	5,150	11,690

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0152 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=7.21 cfs @ 12.05 hrs HW=205.32' (Free Discharge)
└**1=Culvert - 4B** (Inlet Controls 7.21 cfs @ 2.57 fps)

Summary for Pond CB-2B: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.308 ac, 2.34% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 16.53 cfs @ 12.07 hrs, Volume= 1.078 af
Outflow = 16.60 cfs @ 12.07 hrs, Volume= 1.076 af, Atten= 0%, Lag= 0.0 min
Primary = 16.60 cfs @ 12.07 hrs, Volume= 1.076 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 179.75' @ 12.07 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 1.7 min calculated for 1.076 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (861.2 - 860.6)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	173.00'	**24.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=16.16 cfs @ 12.07 hrs HW=179.73' (Free Discharge)
└**2=Culvert** (Passes 16.16 cfs of 36.22 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 16.16 cfs @ 2.80 fps)

Summary for Pond CB-2D: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 17.01 cfs @ 12.06 hrs, Volume= 1.077 af
Outflow = 16.93 cfs @ 12.07 hrs, Volume= 1.074 af, Atten= 0%, Lag= 0.1 min
Primary = 16.93 cfs @ 12.07 hrs, Volume= 1.074 af
Routed to Reach R-2D : DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 201.76' @ 12.07 hrs Surf.Area= 13 sf Storage= 138 cf
Flood Elev= 200.65' Surf.Area= 13 sf Storage= 134 cf

Plug-Flow detention time= 2.3 min calculated for 1.074 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (860.5 - 859.9)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	138 cf	**4.00'D x 11.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	201.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	192.00'	**24.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 192.00' / 191.50' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=16.58 cfs @ 12.07 hrs HW=201.75' (Free Discharge)
↑**2=Culvert** (Passes 16.58 cfs of 35.32 cfs potential flow)
↑**1=Orifice/Grate** (Weir Controls 16.58 cfs @ 2.83 fps)

Summary for Pond CB-2E: LF TOE DITCH - CATCH BASIN

Inflow Area = 10.279 ac, 4.18% Impervious, Inflow Depth = 1.40" for 10-yr Storm event
Inflow = 17.07 cfs @ 12.14 hrs, Volume= 1.200 af
Outflow = 17.07 cfs @ 12.14 hrs, Volume= 1.198 af, Atten= 0%, Lag= 0.0 min
Primary = 17.07 cfs @ 12.14 hrs, Volume= 1.198 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 179.76' @ 12.14 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 1.7 min calculated for 1.198 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (866.1 - 865.7)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#2	Primary	173.00'	**24.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=16.80 cfs @ 12.14 hrs HW=179.75' (Free Discharge)
↑—**2=Culvert** (Passes 16.80 cfs of 36.28 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 16.80 cfs @ 2.84 fps)

Summary for Pond CB-4C: LT TOE DITCH - CATCH BASIN

Inflow Area = 10.458 ac, 9.73% Impervious, Inflow Depth = 1.52" for 10-yr Storm event
Inflow = 14.38 cfs @ 12.02 hrs, Volume= 1.328 af
Outflow = 14.39 cfs @ 12.02 hrs, Volume= 1.326 af, Atten= 0%, Lag= 0.0 min
Primary = 14.39 cfs @ 12.02 hrs, Volume= 1.326 af
Routed to Pond DP-13 : DETENTION POND 13

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.68' @ 12.02 hrs Surf.Area= 13 sf Storage= 84 cf
Flood Elev= 174.00' Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 1.7 min calculated for 1.326 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (867.3 - 867.0)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	171.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	167.00'	**24.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.00' / 166.50' S= 0.0096 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=13.97 cfs @ 12.02 hrs HW=171.67' (Free Discharge)
↑—**2=Culvert** (Passes 13.97 cfs of 28.96 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 13.97 cfs @ 2.67 fps)

Summary for Pond CB-4D: LF TOE DITCH - CATCH BASINS

Inflow Area = 12.095 ac, 2.44% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 26.16 cfs @ 12.01 hrs, Volume= 1.401 af
Outflow = 26.17 cfs @ 12.01 hrs, Volume= 1.400 af, Atten= 0%, Lag= 0.0 min
Primary = 26.17 cfs @ 12.01 hrs, Volume= 1.400 af
Routed to Pond DP-14 : DETENTION POND 14

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 161.14' @ 12.01 hrs Surf.Area= 13 sf Storage= 57 cf
Flood Elev= 162.00' Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 0.7 min calculated for 1.400 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (855.8 - 855.6)

Volume	Invert	Avail.Storage	Storage Description
#1	156.00'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	160.50'	**30.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	158.00'	**24.0" Round Culvert X 2.00** L= 54.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.50' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=25.52 cfs @ 12.01 hrs HW=161.13' (Free Discharge)
↑**2=Culvert** (Passes 25.52 cfs of 43.57 cfs potential flow)
↑**1=Orifice/Grate** (Weir Controls 25.52 cfs @ 2.59 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area = 11.260 ac, 1.95% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 20.53 cfs @ 12.06 hrs, Volume= 1.305 af
Outflow = 20.52 cfs @ 12.07 hrs, Volume= 1.304 af, Atten= 0%, Lag= 0.0 min
Primary = 20.52 cfs @ 12.07 hrs, Volume= 1.304 af
Routed to Pond DP-11R : DETENTION POND 11R

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 163.84' @ 12.07 hrs Surf.Area= 13 sf Storage= 61 cf
Flood Elev= 170.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 0.4 min calculated for 1.304 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (860.1 - 860.0)

Volume	Invert	Avail.Storage	Storage Description
#1	159.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**24.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.00' S= 0.0087 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Primary	167.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=20.09 cfs @ 12.07 hrs HW=163.76' (Free Discharge)
↑**1=Culvert** (Inlet Controls 20.09 cfs @ 6.40 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond CB-4H: Catch Basin - 4H

Inflow Area = 15.096 ac, 1.13% Impervious, Inflow Depth = 1.40" for 10-yr Storm event
Inflow = 27.85 cfs @ 12.06 hrs, Volume= 1.762 af
Outflow = 27.74 cfs @ 12.06 hrs, Volume= 1.760 af, Atten= 0%, Lag= 0.1 min
Primary = 27.74 cfs @ 12.06 hrs, Volume= 1.760 af
Routed to Pond DP-11R : DETENTION POND 11R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4G : Catch Basin - 4G

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 182.38' @ 12.06 hrs Surf.Area= 13 sf Storage= 113 cf
Flood Elev= 183.00' Surf.Area= 13 sf Storage= 113 cf

Plug-Flow detention time= 1.2 min calculated for 1.759 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (854.7 - 854.3)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	174.00'	**24.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.00' / 172.00' S= 0.0308 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	181.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	183.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=27.45 cfs @ 12.06 hrs HW=182.35' (Free Discharge)
└**1=Culvert** (Passes 27.45 cfs of 41.01 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 27.45 cfs @ 5.59 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 23.44 cfs @ 12.07 hrs, Volume= 1.512 af
Outflow = 23.46 cfs @ 12.07 hrs, Volume= 1.510 af, Atten= 0%, Lag= 0.0 min
Primary = 17.93 cfs @ 12.07 hrs, Volume= 1.416 af
Routed to Reach R-10a : R-10a
Secondary = 5.53 cfs @ 12.07 hrs, Volume= 0.094 af
Routed to Pond CB-4H : Catch Basin - 4H

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 208.37' @ 12.07 hrs Surf.Area= 13 sf Storage= 105 cf
Flood Elev= 209.90' Surf.Area= 13 sf Storage= 121 cf

Plug-Flow detention time= 1.2 min calculated for 1.509 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (860.7 - 860.3)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	121 cf	**4.00'D x 9.60'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	200.00'	**24.0" Round NEW 24-INCH** L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.00' / 194.00' S= 0.0896 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	207.58'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	208.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=17.58 cfs @ 12.07 hrs HW=208.36' (Free Discharge)
└**1=NEW 24-INCH** (Passes 17.58 cfs of 41.03 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 17.58 cfs @ 2.88 fps)

Secondary OutFlow Max=5.26 cfs @ 12.07 hrs HW=208.36' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 5.26 cfs @ 1.47 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area = 11.663 ac, 3.68% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 15.93 cfs @ 12.17 hrs, Volume= 1.351 af
Outflow = 15.90 cfs @ 12.18 hrs, Volume= 1.349 af, Atten= 0%, Lag= 0.1 min
Primary = 15.90 cfs @ 12.18 hrs, Volume= 1.349 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4JA3 : (4JA3) New Catch Basin

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 219.43' @ 12.18 hrs Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 1.2 min calculated for 1.349 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (868.8 - 868.5)

Volume	Invert	Avail.Storage	Storage Description
#1	211.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert - 4JA** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 212.20' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=15.71 cfs @ 12.18 hrs HW=219.42' (Free Discharge)
└**1=Culvert - 4JA** (Passes 15.71 cfs of 20.26 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 15.71 cfs @ 2.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=211.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond CB-4JA3: (4JA3) New Catch Basin

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond PS11 : Culvert - 4IA(C11 PS)

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 202.90' @ 0.00 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 215.00' Surf.Area= 0.000 ac Storage= 0.003 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	202.90'	0.003 af	**4.00'D x 10.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	204.90'	**18.0" Round NEW 24-INCH** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 204.90' / 204.00' S= 0.0150 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	212.90'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	212.90'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=202.90' (Free Discharge)
└**1=NEW 24-INCH** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=202.90' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1: DETENTION POND 1

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 1.35" for 10-yr Storm event
Inflow = 53.86 cfs @ 12.10 hrs, Volume= 4.659 af
Outflow = 22.23 cfs @ 12.32 hrs, Volume= 4.476 af, Atten= 59%, Lag= 13.5 min
Primary = 22.23 cfs @ 12.32 hrs, Volume= 4.476 af
Routed to Reach R-1D : Reach R-1D
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1D : Reach R-1D

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 164.20' @ 12.32 hrs Surf.Area= 17,516 sf Storage= 58,540 cf
Flood Elev= 166.00' Surf.Area= 21,310 sf Storage= 93,390 cf

Plug-Flow detention time= 596.4 min calculated for 4.474 af (96% of inflow)
Center-of-Mass det. time= 514.0 min (1,503.7 - 989.6)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	115,245 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	10,750	0	0
162.00	13,540	24,290	24,290
164.00	17,070	30,610	54,900
165.00	19,300	18,185	73,085
166.00	21,310	20,305	93,390
167.00	22,400	21,855	115,245

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**30.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 159.80' / 159.35' S= 0.0060 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	160.60'	**3.0" Vert. Orifice on side** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.70'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	166.30'	**40.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=21.61 cfs @ 12.32 hrs HW=164.19' (Free Discharge)
└**1=Culvert** (Passes 21.61 cfs of 33.07 cfs potential flow)
  ├**2=Orifice on side** (Orifice Controls 0.44 cfs @ 8.96 fps)
  └**3=Orifice-Top of drop inlet** (Weir Controls 21.17 cfs @ 2.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth = 1.50" for 10-yr Storm event
Inflow = 51.38 cfs @ 12.01 hrs, Volume= 4.371 af
Outflow = 3.63 cfs @ 14.10 hrs, Volume= 3.849 af, Atten= 93%, Lag= 125.2 min
Primary = 2.49 cfs @ 14.10 hrs, Volume= 1.384 af
  Routed to Reach E1R6 : DP-10 DISCHARGE
Secondary = 1.14 cfs @ 14.10 hrs, Volume= 2.465 af
  Routed to Reach E1R6 : DP-10 DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach E1R6 : DP-10 DISCHARGE

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.11' @ 14.10 hrs Surf.Area= 54,592 sf Storage= 109,916 cf
Flood Elev= 189.00' Surf.Area= 77,500 sf Storage= 239,860 cf

Plug-Flow detention time= 1,133.6 min calculated for 3.847 af (88% of inflow)
Center-of-Mass det. time= 1,076.2 min (1,934.6 - 858.4)

Volume	Invert	Avail.Storage	Storage Description
#1	180.00'	320,610 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
180.00	10	0	0
182.00	2,300	2,310	2,310
184.00	11,000	13,300	15,610
186.00	34,000	45,000	60,610
188.00	71,000	105,000	165,610
190.00	84,000	155,000	320,610

Device	Routing	Invert	Outlet Devices
#1	Device 3	187.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.00'	**6.0" Vert. 6-in Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	181.00'	**24.0" Round 18-in Primary Culvert** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.00' / 180.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#4	Secondary	177.50'	**5.8" Round 6-in Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 177.50' / 174.00' S= 0.0159 '/' Cc= 0.900

n= 0.011, Flow Area= 0.18 sf

#5	Device 4	186.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	184.00'	**1.5" Vert. Orifice Side** X 2 rows with 0.5" cc spacing C= 0.600 Limited to weir flow at low heads
#7	Tertiary	188.00'	**10.0' long x 26.0' breadth E-Spillway Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=2.44 cfs @ 14.10 hrs HW=187.11' (Free Discharge)
└**3=18-in Primary Culvert** (Passes 2.44 cfs of 34.20 cfs potential flow)
  ├**1=Orifice/Grate** (Weir Controls 1.56 cfs @ 1.10 fps)
  └**2=6-in Orifice** (Orifice Controls 0.88 cfs @ 4.47 fps)

Secondary OutFlow Max=1.14 cfs @ 14.10 hrs HW=187.11' (Free Discharge)
└**4=6-in Culvert** (Passes 1.14 cfs of 1.35 cfs potential flow)
  ├**5=Orifice Top** (Orifice Controls 0.93 cfs @ 5.08 fps)
  └**6=Orifice Side** (Orifice Controls 0.21 cfs @ 8.38 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=180.00' (Free Discharge)
└**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 56.32 cfs @ 12.06 hrs, Volume= 3.543 af
Outflow = 1.86 cfs @ 15.94 hrs, Volume= 3.543 af, Atten= 97%, Lag= 233.0 min
Primary = 0.65 cfs @ 15.94 hrs, Volume= 0.853 af
  Routed to Reach R4G : Reach 4G
Secondary = 1.21 cfs @ 15.94 hrs, Volume= 2.690 af
  Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 158.89' @ 15.94 hrs Surf.Area= 28,727 sf Storage= 91,332 cf

Plug-Flow detention time= 621.8 min calculated for 3.542 af (100% of inflow)
Center-of-Mass det. time= 622.0 min (1,476.4 - 854.4)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.65 cfs @ 15.94 hrs HW=158.89' (Free Discharge)
└**1=Culvert** (Passes 0.65 cfs of 24.35 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.65 cfs @ 7.45 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.21 cfs @ 15.94 hrs HW=158.89' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.21 cfs @ 6.15 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 1.43" for 10-yr Storm event
Inflow = 50.07 cfs @ 12.10 hrs, Volume= 3.756 af
Outflow = 1.43 cfs @ 18.64 hrs, Volume= 3.756 af, Atten= 97%, Lag= 392.2 min
Primary = 0.11 cfs @ 18.64 hrs, Volume= 0.061 af
  Routed to Reach R-2A : Reach 2A
Secondary = 1.32 cfs @ 18.64 hrs, Volume= 3.696 af
  Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.74' @ 18.64 hrs Surf.Area= 39,716 sf Storage= 107,124 cf

Plug-Flow detention time= 897.1 min calculated for 3.755 af (100% of inflow)
Center-of-Mass det. time= 897.4 min (1,757.4 - 860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.11 cfs @ 18.64 hrs HW=171.74' (Free Discharge)
└**1=Culvert** (Passes 0.11 cfs of 18.93 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.11 cfs @ 1.67 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.32 cfs @ 18.64 hrs HW=171.74' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.32 cfs @ 6.70 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 1.50" for 10-yr Storm event
Inflow = 15.85 cfs @ 12.00 hrs, Volume= 1.435 af
Outflow = 1.97 cfs @ 13.29 hrs, Volume= 1.435 af, Atten= 88%, Lag= 76.9 min
Primary = 0.62 cfs @ 13.29 hrs, Volume= 0.314 af
  Routed to Reach R4C : Reach 4C
Secondary = 1.36 cfs @ 13.29 hrs, Volume= 1.121 af
  Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 162.83' @ 13.29 hrs Surf.Area= 11,800 sf Storage= 25,985 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 139.9 min calculated for 1.435 af (100% of inflow)
Center-of-Mass det. time= 139.9 min (1,006.1 - 866.2)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	164.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.62 cfs @ 13.29 hrs HW=162.83' (Free Discharge)
└**1=Culvert** (Passes 0.62 cfs of 18.72 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.62 cfs @ 7.08 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.36 cfs @ 13.29 hrs HW=162.83' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.36 cfs @ 6.91 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 27.78 cfs @ 12.00 hrs, Volume= 1.551 af
Outflow = 1.21 cfs @ 14.17 hrs, Volume= 1.551 af, Atten= 96%, Lag= 130.2 min
Primary = 0.21 cfs @ 14.17 hrs, Volume= 0.110 af
Routed to Reach R4D : Reach 4D
Secondary = 1.00 cfs @ 14.17 hrs, Volume= 1.441 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 158.41' @ 14.17 hrs Surf.Area= 35,143 sf Storage= 34,295 cf

Plug-Flow detention time= 350.6 min calculated for 1.550 af (100% of inflow)
Center-of-Mass det. time= 350.6 min (1,206.1 - 855.4)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.21 cfs @ 14.17 hrs HW=158.41' (Free Discharge)
└**1=Culvert** (Passes 0.21 cfs of 9.53 cfs potential flow)
├**2=Orifice** (Controls 0.00 cfs)
├**3=Grate** (Controls 0.00 cfs)
└**5=Orifice/Grate** (Orifice Controls 0.21 cfs @ 2.36 fps)

Secondary OutFlow Max=1.00 cfs @ 14.17 hrs HW=158.41' (Free Discharge)
└**4=Culvert** (Barrel Controls 1.00 cfs @ 5.11 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1a: DP-1a

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 18.46 cfs @ 12.05 hrs, Volume= 1.110 af
Outflow = 1.09 cfs @ 13.70 hrs, Volume= 0.983 af, Atten= 94%, Lag= 98.7 min
Primary = 1.09 cfs @ 13.70 hrs, Volume= 0.983 af
Routed to Pond DP-1 : DETENTION POND 1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 163.00' Surf.Area= 34,985 sf Storage= 146,410 cf
Peak Elev= 163.71' @ 13.70 hrs Surf.Area= 36,712 sf Storage= 171,743 cf (25,333 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (116,636 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 601.8 min (1,461.0 - 859.2)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	263,046 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	24,139	0	0
160.00	27,981	52,120	52,120
162.00	32,544	60,525	112,645
163.00	34,985	33,765	146,410
164.00	37,429	36,207	182,617
166.00	43,000	80,429	263,046

Device	Routing	Invert	Outlet Devices
#1	Primary	163.10'	**113.0 deg Sharp-Crested Vee/Trap Weir** Cv= 2.49 (C= 3.11)
#2	Secondary	165.60'	**18.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=1.08 cfs @ 13.70 hrs HW=163.71' (Free Discharge)
↑**1=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.08 cfs @ 1.94 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 21.60 cfs @ 11.96 hrs, Volume= 1.143 af
Outflow = 6.22 cfs @ 12.15 hrs, Volume= 1.110 af, Atten= 71%, Lag= 11.2 min
Primary = 6.22 cfs @ 12.15 hrs, Volume= 1.110 af
Routed to Reach R-1F : Reach R-1F

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 162.30' Surf.Area= 1,330 sf Storage= 630 cf
Peak Elev= 166.08' @ 12.15 hrs Surf.Area= 8,250 sf Storage= 15,517 cf (14,887 cf above start)
Flood Elev= 167.80' Surf.Area= 17,700 sf Storage= 36,993 cf (36,363 cf above start)

Plug-Flow detention time= 75.7 min calculated for 1.096 af (96% of inflow)
Center-of-Mass det. time= 48.6 min (904.5 - 856.0)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	36,993 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,000	0	0
164.00	3,200	4,200	4,200
165.00	4,940	4,070	8,270
166.00	7,860	6,400	14,670
167.00	12,570	10,215	24,885
167.80	17,700	12,108	36,993

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.20' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	164.20'	**8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	165.40'	**2.4' long x 0.30' rise Sharp-Crested Rectangular Weir** 1 End Contraction(s)
#5	Device 1	166.60'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.22 cfs @ 12.15 hrs HW=166.08' (Free Discharge)
└**1=Culvert** (Passes 6.22 cfs of 22.86 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 1.59 cfs @ 8.10 fps)
  ├**3=Orifice** (Orifice Controls 2.09 cfs @ 5.99 fps)
  ├**4=Sharp-Crested Rectangular Weir** (Orifice Controls 2.54 cfs @ 3.57 fps)
  └**5=Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 1.58" for 10-yr Storm event
Inflow = 35.27 cfs @ 12.00 hrs, Volume= 3.580 af
Outflow = 1.19 cfs @ 19.28 hrs, Volume= 2.901 af, Atten= 97%, Lag= 436.7 min
Primary = 1.19 cfs @ 19.28 hrs, Volume= 2.901 af
  Routed to Reach R-1N : R-1N
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-1N : R-1N

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 175.82' @ 19.28 hrs Surf.Area= 58,872 sf Storage= 109,652 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf

Plug-Flow detention time= 999.1 min calculated for 2.901 af (81% of inflow)
Center-of-Mass det. time= 915.4 min (1,772.8 - 857.4)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.19 cfs @ 19.28 hrs HW=175.82' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Orifice Controls 1.19 cfs @ 6.49 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-6 ES: DETENTION POND 6 - EMERGENCY SPILLWAY

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Secondary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 178.00' Surf.Area= 93,326 sf Storage= 273,159 cf
Peak Elev= 178.00' @ 0.00 hrs Surf.Area= 93,326 sf Storage= 273,159 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (223,485 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert X 0.00** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice X 0.00** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**20.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth = 1.79" for 10-yr Storm event
Inflow = 53.20 cfs @ 12.13 hrs, Volume= 4.484 af
Outflow = 0.82 cfs @ 24.20 hrs, Volume= 2.133 af, Atten= 98%, Lag= 724.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Secondary = 0.82 cfs @ 24.20 hrs, Volume= 2.133 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 189.33' @ 24.20 hrs Surf.Area= 83,859 sf Storage= 166,368 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,571.3 min calculated for 2.132 af (48% of inflow)
Center-of-Mass det. time= 1,446.0 min (2,294.1 - 848.1)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Primary	189.50'	**12.0" Round 12-In Outlet Culvert** L= 48.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.50' / 180.50' S= 0.1875 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	184.21'	**5.8" Round 6-In Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.21' / 180.50' S= 0.0618 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#3	Device 2	188.70'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 2	188.30'	**1.5" Vert. Orifice X 2.00** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**1=12-In Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.82 cfs @ 24.20 hrs HW=189.33' (Free Discharge)
└**2=6-In Culvert** (Passes 0.82 cfs of 1.54 cfs potential flow)
  └**3=Orifice** (Orifice Controls 0.70 cfs @ 3.82 fps)
  └**4=Orifice** (Orifice Controls 0.12 cfs @ 4.74 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9(E): DP 9 (EMERGENCY OUTLET)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-1G: Culvert Crossing 1G

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 3.55 cfs @ 12.05 hrs, Volume= 0.215 af
Outflow = 3.53 cfs @ 12.06 hrs, Volume= 0.215 af, Atten= 1%, Lag= 0.7 min
Primary = 2.75 cfs @ 12.06 hrs, Volume= 0.205 af
Routed to Reach R-1G : RipRap Downspout
Secondary = 0.78 cfs @ 12.06 hrs, Volume= 0.011 af
Routed to Reach R-1I : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 336.24' @ 12.06 hrs Surf.Area= 549 sf Storage= 352 cf

Plug-Flow detention time= 5.7 min calculated for 0.215 af (100% of inflow)
Center-of-Mass det. time= 5.7 min (861.7 - 855.9)

Volume	Invert	Avail.Storage	Storage Description
#1	335.50'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
335.50	400	0	0
337.50	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	**24.0" Round 24" Culvert** L= 36.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 335.50' / 331.00' S= 0.1250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	336.00'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=2.71 cfs @ 12.06 hrs HW=336.24' (Free Discharge)
1=24" Culvert (Inlet Controls 2.71 cfs @ 2.58 fps)

Secondary OutFlow Max=0.74 cfs @ 12.06 hrs HW=336.24' (Free Discharge)
2=Stone Check Dam Weir (Weir Controls 0.74 cfs @ 1.33 fps)

Summary for Pond P-1H: Modified Plunge Pool w/(2)24" Culverts P-6a

Inflow Area = 6.697 ac, 1.15% Impervious, Inflow Depth = 1.36" for 10-yr Storm event
Inflow = 12.69 cfs @ 11.96 hrs, Volume= 0.761 af
Outflow = 12.41 cfs @ 11.97 hrs, Volume= 0.759 af, Atten= 2%, Lag= 0.3 min
Primary = 12.41 cfs @ 11.97 hrs, Volume= 0.759 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 184.25' @ 11.97 hrs Surf.Area= 409 sf Storage= 452 cf
Flood Elev= 186.00' Surf.Area= 869 sf Storage= 1,551 cf

Plug-Flow detention time= 3.4 min calculated for 0.758 af (100% of inflow)
Center-of-Mass det. time= 1.7 min (860.5 - 858.8)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	5,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	37	0	0
183.00	163	100	100
184.00	348	256	356
185.00	587	468	823
186.00	869	728	1,551
188.00	1,067	1,936	3,487
190.00	1,160	2,227	5,714

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**24.0" Round (2)24"-Culvert X 2.00** L= 56.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 183.00' / 182.00' S= 0.0179 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Secondary	185.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=12.03 cfs @ 11.97 hrs HW=184.23' (Free Discharge)
1=(2)24"-Culvert (Barrel Controls 12.03 cfs @ 4.25 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-1I: Culvert Crossing 6c

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 1.42" for 10-yr Storm event
Inflow = 8.56 cfs @ 12.01 hrs, Volume= 0.463 af
Outflow = 8.24 cfs @ 12.02 hrs, Volume= 0.463 af, Atten= 4%, Lag= 0.7 min
Primary = 7.21 cfs @ 12.02 hrs, Volume= 0.453 af
Routed to Reach R-IH : RipRap Downspout
Secondary = 1.03 cfs @ 12.02 hrs, Volume= 0.011 af
Routed to Pond P-1K : Culvert Crossing 1K

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 291.78' @ 12.02 hrs Surf.Area= 800 sf Storage= 300 cf

Plug-Flow detention time= 4.3 min calculated for 0.463 af (100% of inflow)
Center-of-Mass det. time= 4.3 min (857.0 - 852.6)

Volume	Invert	Avail.Storage	Storage Description
#1	290.50'	300 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
290.50	400	0	0
291.00	800	300	300

Device	Routing	Invert	Outlet Devices
#1	Primary	290.50'	**24.0" Round 24" Culvert** L= 38.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 290.50' / 286.00' S= 0.1184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	291.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=7.14 cfs @ 12.02 hrs HW=291.77' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 7.14 cfs @ 3.39 fps)

Secondary OutFlow Max=0.97 cfs @ 12.02 hrs HW=291.77' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Weir Controls 0.97 cfs @ 1.41 fps)

Summary for Pond P-1J-1: (2) 24" CULVERTS

Inflow Area = 6.104 ac, 1.82% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 13.51 cfs @ 11.96 hrs, Volume= 0.705 af
Outflow = 13.43 cfs @ 11.96 hrs, Volume= 0.705 af, Atten= 1%, Lag= 0.3 min
Primary = 13.26 cfs @ 11.96 hrs, Volume= 0.704 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.17 cfs @ 11.95 hrs, Volume= 0.001 af
Routed to Pond P-1J-2 : 18" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 191.30' @ 11.96 hrs Surf.Area= 264 sf Storage= 178 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (853.9 - 853.7)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	410 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
190.00	10	0	0
192.00	400	410	410

Device	Routing	Invert	Outlet Devices
#1	Primary	190.00'	**24.0" Round Culvert X 2.00** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 190.00' / 189.60' S= 0.0108 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	191.20'	**170.0 deg x 1.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Primary OutFlow Max=12.96 cfs @ 11.96 hrs HW=191.28' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 12.96 cfs @ 3.04 fps)

Secondary OutFlow Max=0.16 cfs @ 11.95 hrs HW=191.29' (Free Discharge)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.16 cfs @ 0.84 fps)

Summary for Pond P-1J-2: 18" CULVERT

Inflow	=	0.17 cfs @	11.95 hrs, Volume=	0.001 af
Outflow	=	0.15 cfs @	11.96 hrs, Volume=	0.001 af, Atten= 12%, Lag= 0.3 min
Primary	=	0.15 cfs @	11.96 hrs, Volume=	0.001 af

Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.04' @ 11.96 hrs Surf.Area= 58 sf Storage= 1 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.5 min (717.9 - 717.4)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	32,056 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	10	0	0
188.00	1,367	689	689
190.00	3,000	4,367	5,056
192.00	6,000	9,000	14,056
194.00	12,000	18,000	32,056

Device	Routing	Invert	Outlet Devices
#1	Primary	186.80'	**18.0" Round 18" Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 186.80' / 185.97' S= 0.0208 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.23 cfs @ 11.96 hrs HW=187.03' (Free Discharge)
↑—**1=18" Culvert** (Inlet Controls 0.23 cfs @ 1.30 fps)

Summary for Pond P-1K: Culvert Crossing 1K

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 12.41 cfs @ 11.95 hrs, Volume= 0.523 af
Outflow = 12.13 cfs @ 11.96 hrs, Volume= 0.523 af, Atten= 2%, Lag= 0.4 min
Primary = 9.02 cfs @ 11.96 hrs, Volume= 0.495 af
Routed to Reach R-1J : RipRap Downspout
Secondary = 3.11 cfs @ 11.96 hrs, Volume= 0.027 af
Routed to Reach R-1L : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 255.97' @ 11.96 hrs Surf.Area= 594 sf Storage= 482 cf

Plug-Flow detention time= 0.3 min calculated for 0.522 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (846.3 - 846.0)

Volume	Invert	Avail.Storage	Storage Description
#1	255.00'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.00	400	0	0
257.00	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**24.0" Round 24" Culvert** L= 33.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 254.50' / 252.00' S= 0.0758 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	255.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=8.89 cfs @ 11.96 hrs HW=255.96' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 8.89 cfs @ 3.63 fps)

Secondary OutFlow Max=2.95 cfs @ 11.96 hrs HW=255.96' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Weir Controls 2.95 cfs @ 1.79 fps)

Summary for Pond PS11: Culvert - 4IA(C11 PS)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4I : Catch Basin - 4I

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 212.90' @ 0.00 hrs Surf.Area= 5 sf Storage= 0 cf
Flood Elev= 215.10' Surf.Area= 1,133 sf Storage= 1,237 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,353 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
212.90	5	0	0
213.04	63	5	5
215.20	1,185	1,348	1,353

Device	Routing	Invert	Outlet Devices
#1	Primary	213.05'	**24.0" Round Culvert - 4IA(C11 PS)** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.05' / 212.15' S= 0.0225 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=212.90' (Free Discharge)
↑—**1=Culvert - 4IA(C11 PS)** (Controls 0.00 cfs)

Summary for Subcatchment 1A: SC-1A

Runoff = 19.42 cfs @ 13.10 hrs, Volume= 4.290 af, Depth= 2.28"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.084	70	Woods, Good, HSG C
*	7.750	77	Woods, Good, HSG D
*	1.540	71	Meadow, non-grazed, HSG C
*	1.760	78	Meadow HSG D
*	0.070	96	Gravel Surface
*	0.330	98	Impervious Surface
	22.534	74	Weighted Average
	22.204		98.54% Pervious Area
	0.330		1.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.4	1,840		1.50		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
93.1	2,250	Total			

Summary for Subcatchment 1B: 1B

Runoff = 1.37 cfs @ 11.93 hrs, Volume= 0.059 af, Depth= 2.04"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.344	71	Landfill Final Cover
	0.344		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segement A-B**

Summary for Subcatchment 1B1: SC-1B1

Runoff = 24.87 cfs @ 12.05 hrs, Volume= 1.504 af, Depth= 2.12"
Routed to Reach R-1B1 : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	8.111	71	Meadow, non-grazed, HSG C
*	0.400	98	Riprap
	8.511	72	Weighted Average
	8.111		95.30% Pervious Area
	0.400		4.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	140	0.1000	4.74		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	240	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	482	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.8	1,012	Total			

Summary for Subcatchment 1B2: SC-1B2

Runoff = 31.82 cfs @ 12.05 hrs, Volume= 1.945 af, Depth= 2.12"
Routed to Reach R-1B : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	10.600	71	Landfill Final Cover
*	0.403	98	Riprap
	11.003	72	Weighted Average
	10.600		96.34% Pervious Area
	0.403		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.6	75	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	403	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	554	0.3300	19.66	314.62	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.050 Mountain streams w/large boulders
13.1	1,182	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 14.02 cfs @ 12.84 hrs, Volume= 2.613 af, Depth= 2.45"
Routed to Reach R2 : Reach 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	6.100	77	Woods, Good, HSG D
*	0.690	70	Woods, Good, HSG C
*	3.100	78	Meadow HSG D
*	2.580	71	Meadow, non-grazed, HSG C
*	0.310	96	Gravel Surface
	12.780	76	Weighted Average
	12.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.6	170	0.0133	1.73		**Shallow Concentrated Flow, Segment ID: B-C** Grassed Waterway Kv= 15.0 fps
16.7					**Direct Entry, Segment ID: C-D**
75.0	370	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 35.81 cfs @ 12.05 hrs, Volume= 2.158 af, Depth= 2.12"
Routed to Pond DP-1 : DETENTION POND 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.000	71	Landfill Final Cover
*	0.110	96	Gravel Surface
*	0.800	78	Pond, Meadow HSG D
*	0.300	98	Riprap
	12.210	72	Weighted Average
	11.910		97.54% Pervious Area
	0.300		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.3	241	0.0700	12.78	172.52	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.025
0.3	556	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
12.7	1,057	Total			

Summary for Subcatchment 1E: SC-1E

Runoff = 28.86 cfs @ 12.04 hrs, Volume= 1.693 af, Depth= 2.12"
Routed to Reach R-1E : Plastic Lined Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	9.100	71	Landfill Final Cover
*	0.200	96	Gravel Surface
*	0.280	98	Riprap
	9.580	72	Weighted Average
	9.300		97.08% Pervious Area
	0.280		2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	146	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	296	0.0700	16.72	200.67	**Trap/Vee/Rect Channel Flow, Segment ID: B-C** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.025
0.3	537	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
0.3	186	0.0700	10.28	57.82	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 '/' Top.W=7.50' n= 0.030 Earth, grassed & winding
11.9	1,165	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 31.43 cfs @ 11.96 hrs, Volume= 1.432 af, Depth= 2.12"
Routed to Pond DP-2 : DETENTION POND 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	7.747	71	Landfill Final Cover
*	0.349	91	Gravel
	0.007	98	Roofs, HSG C
	8.103	72	Weighted Average
	8.096		99.91% Pervious Area
	0.007		0.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	100	0.3800	0.51		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	293	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.2	300	0.3800	29.77	669.83	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.50' Z= 2.0 '/' Top.W=14.00' n= 0.040 Earth, cobble bottom, clean sides
4.7	693	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 5.44 cfs @ 12.05 hrs, Volume= 0.325 af, Depth= 2.20"
Routed to Pond P-1G : Culvert Crossing 1G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	1.625	71	Landfill Final Cover
*	0.147	96	Gravel Surface
	1.772	73	Weighted Average
	1.772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	142	0.1500	2.71		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	154	0.0700	8.95	60.43	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.035 Earth, dense weeds

12.5 446 Total

Summary for Subcatchment 1H: SC-1H

Runoff = 11.12 cfs @ 11.94 hrs, Volume= 0.475 af, Depth= 2.04"
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.032	91	Fallow, bare soil, HSG C, rip rap
	2.759	71	Meadow, non-grazed, HSG C
	2.791	71	Weighted Average
	2.791		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	66	0.3900	0.47		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
0.3	140	0.0800	9.12	27.13	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.030 Earth, grassed & winding
0.2	190	0.1430	16.62	49.46	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.022 Earth, clean & straight
2.8	396	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 13.20 cfs @ 12.00 hrs, Volume= 0.690 af, Depth= 2.12"
Routed to Pond P-1I : Culvert Crossing 6c

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	3.829	71	Landfill Final Cover
*	0.077	98	Riprap
	3.906	72	Weighted Average
	3.829		98.03% Pervious Area
	0.077		1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	150	0.1000	0.32		**Sheet Flow, Segment AB** Grass: Short n= 0.150 P2= 2.70"
0.4	106	0.1000	4.74		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
0.4	260	0.0700	10.44	70.50	**Trap/Vee/Rect Channel Flow, Segment C - D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.030 Earth, grassed & winding
0.1	140	0.3300	39.33	629.24	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.025 Rubble masonry, cemented
8.7	656	Total			

Summary for Subcatchment 1J: SC-IJ

Runoff = 7.41 cfs @ 11.94 hrs, Volume= 0.320 af, Depth= 2.12"
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	1.763	71	Landfill Final Cover
*	0.046	91	Gravel
	1.809	72	Weighted Average
	1.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	67	0.5000	0.52		**Sheet Flow, SEGMENT AB** Grass: Short n= 0.150 P2= 2.70"
0.8	325	0.1900	6.54		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	325	0.0300	12.44	149.28	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.022 Earth, clean & straight
3.3	717	Total			

Summary for Subcatchment 1K: SC-1K

Runoff = 11.15 cfs @ 11.94 hrs, Volume= 0.482 af, Depth= 2.20"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	2.350	71	Landfill Final Cover
	0.163	89	Gravel roads, HSG C
*	0.111	98	Riprap
	2.624	73	Weighted Average
	2.513		95.77% Pervious Area
	0.111		4.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	68	0.3300	0.44		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 2.70"
0.4	93	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.3	249	0.3300	12.60	201.68	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.078 Riprap, 12-inch
3.3	410	Total			

Summary for Subcatchment 1L: SC-1L

Runoff = 6.81 cfs @ 11.94 hrs, Volume= 0.295 af, Depth= 2.12"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	1.607	71	Landfill Final Cover
	0.064	89	Gravel roads, HSG C
	1.671	72	Weighted Average
	1.671		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	67	0.4000	0.48		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	442	0.1000	6.15	49.59	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=2.00' D=1.50' Z= 2.0 & 2.5 '/' Top.W=8.75' n= 0.069 Riprap, 6-inch
3.5	509	Total			

Summary for Subcatchment 1M: SC-1M

Runoff = 16.63 cfs @ 12.05 hrs, Volume= 0.999 af, Depth= 2.12"
Routed to Pond 1P : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	5.368	71	Landfill Final Cover
	0.283	92	Paved roads w/open ditches, 50% imp, HSG C
	5.651	72	Weighted Average
	5.509		97.50% Pervious Area
	0.141		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	73	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	174	0.0700	11.06	265.40	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=2.00' Z= 2.0 & 10.0 '/' Top.W=24.00' n= 0.035 Earth, dense weeds
0.5	413	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.6	810	Total			

Summary for Subcatchment 1N: SC-1N

Runoff = 20.01 cfs @ 12.28 hrs, Volume= 2.054 af, Depth= 2.81"
Routed to Pond DP-6 : DETENTION POND 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	2.942	70	Woods, Good, HSG C
*	3.662	78	Meadow HSG D
*	0.572	96	Gravel Surface
*	1.607	98	Pond
	8.783	80	Weighted Average
	7.176		81.70% Pervious Area
	1.607		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.7	123	0.0569	1.19		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
0.5	370	0.0189	12.43	801.88	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=2.00' D=3.00' Z= 10.0 & 3.0 '/' Top.W=41.00' n= 0.022 Earth, clean & straight
33.0	593	Total			

Summary for Subcatchment 1O: SC-1O

Runoff = 56.18 cfs @ 12.37 hrs, Volume= 6.567 af, Depth= 2.54"
Routed to Reach R-1O : R-1O

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	13.230	77	Woods, Good, HSG D
*	5.712	70	Woods, Good, HSG C
*	9.172	78	Meadow HSG D
*	1.195	71	Meadow, non-grazed, HSG C
*	0.713	96	Gravel Surface
*	0.515	98	Impervious Surface
*	0.494	98	Paved Area
	31.031	77	Weighted Average
	30.022		96.75% Pervious Area
	1.009		3.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0100	0.07		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
15.1	1,875	0.0190	2.07		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
12.8	856	0.0500	1.12		**Shallow Concentrated Flow, Segment CD** Woodland Kv= 5.0 fps
39.7	2,781	Total			

Summary for Subcatchment 2A: SC-2A

Runoff = 29.38 cfs @ 13.79 hrs, Volume= 9.148 af, Depth= 2.28"
Routed to Reach AP2 : ANALYSIS POINT #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	24.340	70	Woods, Good, HSG C
	15.830	77	Woods, Good, HSG D
*	5.898	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area
	1.600	98	Existing Waterbody
	48.048	74	Weighted Average
	46.068		95.88% Pervious Area
	1.980		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
42.6	534	0.0070	0.21		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
10.6	1,213		1.90		**Direct Entry, Segment C-D (STWC, 0.008)**
144.3	1,897	Total			

Summary for Subcatchment 2B: SC-2B

Runoff = 25.70 cfs @ 12.07 hrs, Volume= 1.645 af, Depth= 2.12"
Routed to Pond CB-2B : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	9.090	71	Landfill Final Cover
*	0.218	98	Riprap
	9.308	72	Weighted Average
	9.090		97.66% Pervious Area
	0.218		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.3	178	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	252	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	455	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
0.8	136	0.0100	3.00	81.02	**Trap/Vee/Rect Channel Flow, Segment E-F** Bot.W=3.00' D=3.00' Z= 2.0 '/' Top.W=15.00' n= 0.069 Riprap, 6-inch
14.4	1,171	Total			

Summary for Subcatchment 2C: SC-2C

Runoff = 27.58 cfs @ 12.06 hrs, Volume= 1.722 af, Depth= 2.12"
Routed to Reach R-2C : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	9.383	71	Landfill Final Cover
*	0.357	98	Riprap
	9.740	72	Weighted Average
	9.383		96.33% Pervious Area
	0.357		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	158	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.6	308	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	474	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,090	Total			

Summary for Subcatchment 2D: SC-2D

Runoff = 26.42 cfs @ 12.06 hrs, Volume= 1.643 af, Depth= 2.12"
Routed to Pond CB-2D : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	8.931	71	Landfill Final Cover
*	0.366	98	Riprap
	9.297	72	Weighted Average
	8.931		96.06% Pervious Area
	0.366		3.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	157	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	248	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	475	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.6	1,030	Total			

Summary for Subcatchment 2E: SC-2E

Runoff = 2.47 cfs @ 11.94 hrs, Volume= 0.106 af, Depth= 2.37"
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.466	71	Landfill Final Cover
*	0.073	98	Riprap
	0.539	75	Weighted Average
	0.466		86.46% Pervious Area
	0.073		13.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 2F: SC-2F

Runoff = 13.50 cfs @ 11.94 hrs, Volume= 0.589 af, Depth= 2.72"
Routed to Pond DP-12 : DETENTION POND 12

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
1.947	74	>75% Grass cover, Good, HSG C
0.655	93	Paved roads w/open ditches, 50% imp, HSG D
2.602	79	Weighted Average
2.274		87.41% Pervious Area
0.327		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 3A: SC-3A

Runoff = 105.89 cfs @ 15.20 hrs, Volume= 48.744 af, Depth= 2.20"
Routed to Reach AP3 : ANALYSIS POINT #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	158.900	70	Woods, Good, HSG C
	102.800	77	Woods, Good, HSG D
	1.000	71	Meadow, non-grazed, HSG C
*	0.564	98	Paved Area
*	2.330	98	Existing Waterbody
	265.594	73	Weighted Average
	262.700		98.91% Pervious Area
	2.894		1.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
105.2	1,116	0.0050	0.18		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
78.7	3,093		0.66		**Direct Entry, Segment C-D (STWC, 0.001)**
240.2	4,359	Total			

Summary for Subcatchment 4A: SC-4A

Runoff = 73.65 cfs @ 16.21 hrs, Volume= 42.385 af, Depth= 2.45"
Routed to Reach AP4 : AP4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	130.444	77	Woods, Good, HSG D
	44.640	70	Woods, Good, HSG C
*	23.410	71	Meadow, non-grazed, HSG C
*	3.300	98	Paved Area
*	2.520	91	Gravel
	1.000	89	Gravel roads, HSG C
*	2.000	98	Impervious Surface
	207.314	76	Weighted Average
	202.014		97.44% Pervious Area
	5.300		2.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
200.8	1,905	0.0040	0.16		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
17.7	1,592		1.50		**Direct Entry, Segment C-D (STWC, 0.0031)**
7.9	760		1.60		**Direct Entry, Segment D-E (STWC, 0.005)**
6.7	963		2.40		**Direct Entry, Segment E-F (STWC, 0.0125)**
324.2	5,370	Total			

Summary for Subcatchment 4B: 4B

Runoff = 14.68 cfs @ 12.05 hrs, Volume= 0.876 af, Depth= 2.28"
Routed to Reach R-4B : R-4B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	4.150	71	Landfill Final Cover
*	0.452	98	Riprap
	4.602	74	Weighted Average
	4.150		90.18% Pervious Area
	0.452		9.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	32	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	240	0.0700	8.81	49.56	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 3.0 '/' Top.W=7.50' n= 0.035 Earth, dense weeds
0.4	342	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.5	764	Total			

Summary for Subcatchment 4C: SC-4C

Runoff = 20.76 cfs @ 12.01 hrs, Volume= 1.115 af, Depth= 2.28"
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.566	98	Riprap
*	5.290	71	Landfill Final Cover
	5.856	74	Weighted Average
	5.290		90.33% Pervious Area
	0.566		9.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	101	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	442	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 Earth, dense weeds
0.4	365	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.4	908	Total			

Summary for Subcatchment 4D: SC-4D

Runoff = 40.38 cfs @ 12.01 hrs, Volume= 2.138 af, Depth= 2.12"
Routed to Pond CB-4D : LF TOE DITCH - CATCH BASINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.800	71	Landfill Final Cover
*	0.295	98	Riprap
	12.095	72	Weighted Average
	11.800		97.56% Pervious Area
	0.295		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.2	117	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	504	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.0	721	Total			

Summary for Subcatchment 4E: SC-4E

Runoff = 3.94 cfs @ 11.94 hrs, Volume= 0.169 af, Depth= 2.04"
Routed to Pond DP-13 : DETENTION POND 13

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
0.992	71	Meadow, non-grazed, HSG C
0.992		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	300		1.67		**Direct Entry, Segment A-B**

Summary for Subcatchment 4F: SC-4F

Runoff = 5.46 cfs @ 11.93 hrs, Volume= 0.232 af, Depth= 2.04"
Routed to Pond DP-14 : DETENTION POND 14

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
1.366	71	Meadow, non-grazed, HSG C
1.366		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	500		4.17		**Direct Entry, Segment A-B**

Summary for Subcatchment 4G: SC-4G

Runoff = 31.88 cfs @ 12.06 hrs, Volume= 1.990 af, Depth= 2.12"
Routed to Pond CB-4G : Catch Basin - 4G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.040	71	Landfill Final Cover
*	0.220	98	Riprap
	11.260	72	Weighted Average
	11.040		98.05% Pervious Area
	0.220		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	143	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	390	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	497	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,180	Total			

Summary for Subcatchment 4H: SC-4H

Runoff = 33.16 cfs @ 12.07 hrs, Volume= 2.120 af, Depth= 2.04"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	12.330	71	Landfill Final Cover
*	0.135	98	Riprap
	12.465	71	Weighted Average
	12.330		98.92% Pervious Area
	0.135		1.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	232	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	464	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	440	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.3	1,286	Total			

Summary for Subcatchment 4I: SC-4I

Runoff = 10.45 cfs @ 11.94 hrs, Volume= 0.448 af, Depth= 2.04"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	2.595	71	Landfill Final Cover
*	0.036	98	Riprap
	2.631	71	Weighted Average
	2.595		98.63% Pervious Area
	0.036		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, A-B**

Summary for Subcatchment 4J: SC-4J

Runoff = 36.42 cfs @ 12.07 hrs, Volume= 2.307 af, Depth= 2.12"
Routed to Pond CB-4I : Catch Basin - 4I

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	12.590	71	Landfill Final Cover
*	0.462	98	Riprap
	13.052	72	Weighted Average
	12.590		96.46% Pervious Area
	0.462		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	223	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	386	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.4	376	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.1	1,135	Total			

Summary for Subcatchment 4K: SC-4K

Runoff = 24.96 cfs @ 12.17 hrs, Volume= 2.062 af, Depth= 2.12"
Routed to Pond CB-4JA : Catch Basin - 4JA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.234	71	Landfill Final Cover
*	0.429	98	Riprap
	11.663	72	Weighted Average
	11.234		96.32% Pervious Area
	0.429		3.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
10.3	432	0.0100	0.70		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	432	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	392	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
22.9	1,406	Total			

Summary for Subcatchment 4L: SC-4L

Runoff = 38.63 cfs @ 12.08 hrs, Volume= 2.552 af, Depth= 2.12"
Routed to Pond C-4K : Catch Basin - 4K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	14.000	71	Landfill Final Cover
*	0.437	98	Riprap
	14.437	72	Weighted Average
	14.000		96.97% Pervious Area
	0.437		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
2.6	242	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.9	476	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	406	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
15.3	1,274	Total			

Summary for Subcatchment 4M: SC-4M

Runoff = 2.92 cfs @ 11.93 hrs, Volume= 0.125 af, Depth= 2.20"
Routed to Pond C-4L : Catch Basin - 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.633	71	Landfill Final Cover
*	0.046	98	Riprap
	0.679	73	Weighted Average
	0.633		93.23% Pervious Area
	0.046		6.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 4N: SC-4N

Runoff = 19.00 cfs @ 12.12 hrs, Volume= 1.402 af, Depth= 2.81"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	2.512	74	>75% Grass cover, Good, HSG C
*	0.245	98	Paved Area
*	0.338	98	Building/Concrete Slabs
*	1.404	91	Gravel
	1.497	71	Meadow, non-grazed, HSG C
	5.996	80	Weighted Average
	5.413		90.28% Pervious Area
	0.583		9.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	61	0.0200	1.14		**Sheet Flow, Segment A-B** Smooth surfaces n= 0.011 P2= 2.70"
10.5	61	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
7.9	955	0.0180	2.01		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
19.3	1,077	Total			

Summary for Subcatchment 4O: SC-4O

Runoff = 8.97 cfs @ 12.05 hrs, Volume= 0.548 af, Depth= 2.72"
Routed to Pond C4B : Culvert - 4BA & 4BB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	1.074	70	Brush, Fair, HSG C
*	0.034	98	Impervious Surface
	0.687	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
*	0.240	98	Paved Area
	2.422	79	Weighted Average
	2.148		88.69% Pervious Area
	0.274		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	24	0.0200	0.95		**Sheet Flow, Segment AB** Smooth surfaces n= 0.011 P2= 2.70"
0.8	19	0.5000	0.41		**Sheet Flow, Segment BC** Grass: Short n= 0.150 P2= 2.70"
11.9	584	0.0137	0.82		**Shallow Concentrated Flow, Segment CD** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0250	7.14	85.66	**Trap/Vee/Rect Channel Flow, Segment DE** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.035
13.2	667	Total			

Summary for Subcatchment 4P: SC-4P

Runoff = 17.88 cfs @ 12.28 hrs, Volume= 1.878 af, Depth= 3.47"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	0.415	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.500	98	Pond
*	0.136	98	Paved Area
	6.488	87	Weighted Average
	4.852		74.78% Pervious Area
	1.636		25.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	125	0.0216	0.12		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	25	0.0520	0.78		**Sheet Flow, Segment B-C** n= 0.023 P2= 2.70"
2.0	270	0.0190	2.22		**Shallow Concentrated Flow, Segment C-D** Unpaved Kv= 16.1 fps
0.2	44	0.3300	4.02		**Shallow Concentrated Flow, Segment D-E** Short Grass Pasture Kv= 7.0 fps
2.0	102	0.0150	0.86		**Shallow Concentrated Flow, Segment E-F** Short Grass Pasture Kv= 7.0 fps
11.2	258	0.0030	0.38		**Shallow Concentrated Flow, Segment F-G** Short Grass Pasture Kv= 7.0 fps
33.9	824	Total			

Summary for Subcatchment 4Q: SC-4Q

Runoff = 46.82 cfs @ 11.98 hrs, Volume= 2.316 af, Depth= 2.72"
Routed to Pond DP-10 : DETENTION POND 10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	3.393	79	50-75% Grass cover, Fair, HSG C
	1.056	93	Paved roads w/open ditches, 50% imp, HSG D
*	0.712	98	Pond
	5.073	74	>75% Grass cover, Good, HSG C
	10.234	79	Weighted Average
	8.994		87.88% Pervious Area
	1.240		12.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	150	0.0500	0.59		**Sheet Flow, AB** Fallow n= 0.050 P2= 2.70"
0.2	85	0.1600	6.44		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
2.5	625	0.0800	4.24		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
6.9	860	Total			

Summary for Subcatchment 4R: SC-4R

Runoff = 11.97 cfs @ 12.03 hrs, Volume= 0.691 af, Depth= 2.72"
Routed to Pond DP-11R : DETENTION POND 11R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
0.757	93	Paved roads w/open ditches, 50% imp, HSG D
2.296	74	>75% Grass cover, Good, HSG C
3.053	79	Weighted Average
2.674		87.60% Pervious Area
0.378		12.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	37	0.0200	1.04		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 2.70"
0.4	215	0.3300	9.25		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
10.4	338	0.0060	0.54		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.4	590	Total			

Summary for Subcatchment 5: SC-5

Runoff = 20.73 cfs @ 14.31 hrs, Volume= 7.988 af, Depth= 2.45"
Routed to Reach AP5 : AP-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
31.520	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
39.070	76	Weighted Average
38.925		99.63% Pervious Area
0.145		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
122.7	1,930	0.0110	0.26		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
2.5	275		1.80		**Direct Entry, Segment C-D (STWC, 0.007)**
192.1	2,355	Total			

Summary for Reach 1: Analysis Point 1

Inflow Area = 145.103 ac, 3.22% Impervious, Inflow Depth = 2.22" for 25-yr Storm event
Inflow = 123.36 cfs @ 12.71 hrs, Volume= 26.874 af
Outflow = 123.36 cfs @ 12.71 hrs, Volume= 26.874 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach 7R: SOUTH ACCESS RD DITCH

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 2.30" for 25-yr Storm event
Inflow = 21.68 cfs @ 12.07 hrs, Volume= 1.084 af
Outflow = 21.20 cfs @ 12.09 hrs, Volume= 1.084 af, Atten= 2%, Lag= 1.1 min
Routed to Pond 12P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.98 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 2.5 min

Peak Storage= 806 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.70' , Surface Width= 5.80'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 173.05 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 262.0' Slope= 0.0271 '/'
Inlet Invert= 205.00', Outlet Invert= 197.90'

Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth > 1.63" for 25-yr Storm event
Inflow = 1.83 cfs @ 19.49 hrs, Volume= 4.089 af
Outflow = 1.83 cfs @ 20.08 hrs, Volume= 4.082 af, Atten= 0%, Lag= 35.5 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.21 fps, Min. Travel Time= 21.3 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 41.6 min

Peak Storage= 2,336 cf @ 19.73 hrs
Average Depth at Peak Storage= 0.36' , Surface Width= 27.24'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 11.46 cfs

20.00' x 1.00' deep channel, n= 0.800 Sheet flow: Woods+dense brush
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 273.0' Slope= 0.0623 '/'
Inlet Invert= 180.00', Outlet Invert= 163.00'

‡

Summary for Reach 12R: Ditch 4B1

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 2.03" for 25-yr Storm event
Inflow = 29.87 cfs @ 12.08 hrs, Volume= 2.446 af
Outflow = 29.57 cfs @ 12.12 hrs, Volume= 2.446 af, Atten= 1%, Lag= 2.2 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.69 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 3.4 min

Peak Storage= 2,235 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.35' , Surface Width= 7.40'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.02 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 352.0' Slope= 0.0085 '/'
Inlet Invert= 213.50', Outlet Invert= 210.50'

Summary for Reach 13R: Ex Ditch

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 3.94" for 25-yr Storm event
Inflow = 8.74 cfs @ 12.08 hrs, Volume= 0.223 af
Outflow = 8.21 cfs @ 12.11 hrs, Volume= 0.223 af, Atten= 6%, Lag= 1.6 min
Routed to Pond C4B : Culvert - 4BA & 4BB

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.76 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 4.9 min

Peak Storage= 519 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.68' , Surface Width= 4.74'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 81.05 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 225.0' Slope= 0.0164 '/'
Inlet Invert= 209.70', Outlet Invert= 206.00'

Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 79.534 ac, 4.18% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 30.74 cfs @ 13.81 hrs, Volume= 14.846 af
Outflow = 30.74 cfs @ 13.81 hrs, Volume= 14.846 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 265.594 ac, 1.09% Impervious, Inflow Depth = 2.20" for 25-yr Storm event
Inflow = 105.89 cfs @ 15.20 hrs, Volume= 48.744 af
Outflow = 105.89 cfs @ 15.20 hrs, Volume= 48.744 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 326.605 ac, 3.82% Impervious, Inflow Depth > 2.29" for 25-yr Storm event
Inflow = 82.47 cfs @ 16.20 hrs, Volume= 62.372 af
Outflow = 82.47 cfs @ 16.20 hrs, Volume= 62.372 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: AP-5

Inflow Area = 39.070 ac, 0.37% Impervious, Inflow Depth = 2.45" for 25-yr Storm event
Inflow = 20.73 cfs @ 14.31 hrs, Volume= 7.988 af
Outflow = 20.73 cfs @ 14.31 hrs, Volume= 7.988 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach E1R6: DP-10 DISCHARGE

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth > 2.03" for 25-yr Storm event
Inflow = 15.90 cfs @ 12.62 hrs, Volume= 5.911 af
Outflow = 15.85 cfs @ 12.68 hrs, Volume= 5.910 af, Atten= 0%, Lag= 3.5 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.04 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.79 fps, Avg. Travel Time= 7.5 min

Peak Storage= 1,864 cf @ 12.65 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 24.67'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 827.94 cfs

20.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 357.0' Slope= 0.0672 '/'
Inlet Invert= 178.00', Outlet Invert= 154.00'

‡

Summary for Reach E1R7: REACH TO AP

Inflow Area = 64.971 ac, 7.86% Impervious, Inflow Depth > 1.85" for 25-yr Storm event
Inflow = 15.86 cfs @ 12.68 hrs, Volume= 9.992 af
Outflow = 13.83 cfs @ 13.28 hrs, Volume= 9.977 af, Atten= 13%, Lag= 36.1 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.19 fps, Min. Travel Time= 16.5 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 40.0 min

Peak Storage= 13,716 cf @ 13.01 hrs
Average Depth at Peak Storage= 1.16' , Surface Width= 8.94'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 48.12 cfs

2.00' x 2.00' deep channel, n= 0.045 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 2,170.0' Slope= 0.0074 '/'
Inlet Invert= 158.00', Outlet Invert= 142.00'

Summary for Reach O4: Overland Flow

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 2.98" for 25-yr Storm event
Inflow = 16.05 cfs @ 12.10 hrs, Volume= 0.771 af
Outflow = 15.83 cfs @ 12.11 hrs, Volume= 0.771 af, Atten= 1%, Lag= 0.5 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.99 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 9.99 fps, Avg. Travel Time= 0.3 min

Peak Storage= 269 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.87 cfs

Custom stage-perimeter table, n= 0.035 Earth, dense weeds
100 Intermediate values determined by Multi-point interpolation
Length= 168.0' Slope= 0.0554 '/'
Inlet Invert= 201.30', Outlet Invert= 192.00'

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
2.00	12.0	12.0	2,016	119.87

Summary for Reach R-10a: R-10a

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 1.90" for 25-yr Storm event
Inflow = 23.94 cfs @ 12.07 hrs, Volume= 2.071 af
Outflow = 23.39 cfs @ 12.13 hrs, Volume= 2.071 af, Atten= 2%, Lag= 3.6 min
Routed to Pond DP-10 : DETENTION POND 10

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.16 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.80 fps, Avg. Travel Time= 5.9 min

Peak Storage= 2,938 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.74' , Surface Width= 8.43'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 437.98 cfs

4.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 641.0' Slope= 0.0137 '/'
Inlet Invert= 194.00', Outlet Invert= 185.25'

‡

Summary for Reach R-1B: LF TOE DITCH

Inflow Area = 19.514 ac, 4.11% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 54.70 cfs @ 12.07 hrs, Volume= 3.449 af
Outflow = 52.68 cfs @ 12.12 hrs, Volume= 3.449 af, Atten= 4%, Lag= 2.7 min
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.97 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.94 fps, Avg. Travel Time= 4.6 min

Peak Storage= 4,876 cf @ 12.09 hrs
Average Depth at Peak Storage= 1.68' , Surface Width= 8.73'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 540.0' Slope= 0.0278 '/'
Inlet Invert= 181.00', Outlet Invert= 166.00'

Summary for Reach R-1B1: LF TOE DITCH

Inflow Area = 8.511 ac, 4.70% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 24.87 cfs @ 12.05 hrs, Volume= 1.504 af
Outflow = 23.83 cfs @ 12.09 hrs, Volume= 1.504 af, Atten= 4%, Lag= 2.6 min
Routed to Reach R-1B : LF TOE DITCH

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.64 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.81 fps, Avg. Travel Time= 4.4 min

Peak Storage= 2,063 cf @ 12.07 hrs
Average Depth at Peak Storage= 1.05' , Surface Width= 6.21'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 478.0' Slope= 0.0418 '/'
Inlet Invert= 204.00', Outlet Invert= 184.00'

Summary for Reach R-1D: Reach R-1D

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 2.03" for 25-yr Storm event
Inflow = 38.56 cfs @ 12.29 hrs, Volume= 6.990 af
Outflow = 38.48 cfs @ 12.36 hrs, Volume= 6.990 af, Atten= 0%, Lag= 4.0 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.91 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 11.6 min

Peak Storage= 4,902 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.75' , Surface Width= 25.10'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 67.93 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 370.0' Slope= 0.0324 '/'
Inlet Invert= 159.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1E: Plastic Lined Ditch

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 28.86 cfs @ 12.04 hrs, Volume= 1.693 af
Outflow = 28.64 cfs @ 12.05 hrs, Volume= 1.693 af, Atten= 1%, Lag= 0.3 min
Routed to Pond DP-1a : DP-1a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.66 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.16 fps, Avg. Travel Time= 0.8 min

Peak Storage= 394 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.41' , Surface Width= 5.63'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 1,302.19 cfs

4.00' x 3.00' deep channel, n= 0.011
Side Slope Z-value= 2.0 '/' Top Width= 16.00'
Length= 200.0' Slope= 0.0500 '/'
Inlet Invert= 176.00', Outlet Invert= 166.00'

Summary for Reach R-1F: Reach R-1F

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 2.06" for 25-yr Storm event
Inflow = 13.32 cfs @ 12.08 hrs, Volume= 1.693 af
Outflow = 12.89 cfs @ 12.14 hrs, Volume= 1.693 af, Atten= 3%, Lag= 3.7 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.20 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 7.6 min

Peak Storage= 1,292 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 25.42'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 140.14 cfs

20.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 210.0' Slope= 0.0524 '/'
Inlet Invert= 158.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1G: RipRap Downspout

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 2.00" for 25-yr Storm event
Inflow = 3.63 cfs @ 12.06 hrs, Volume= 0.296 af
Outflow = 3.52 cfs @ 12.12 hrs, Volume= 0.296 af, Atten= 3%, Lag= 3.5 min
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.02 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.28 fps, Avg. Travel Time= 6.4 min

Peak Storage= 436 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 4.80'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 368.81 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 493.0' Slope= 0.3428 '/'
Inlet Invert= 333.00', Outlet Invert= 164.00'

Summary for Reach R-1I: Final Cover Access Road Ditch

Inflow = 1.79 cfs @ 12.06 hrs, Volume= 0.030 af
Outflow = 1.49 cfs @ 12.17 hrs, Volume= 0.030 af, Atten= 17%, Lag= 6.7 min
Routed to Pond P-1I : Culvert Crossing 6c

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.25 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 12.9 min

Peak Storage= 361 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 3.08'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 80.08 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 524.0' Slope= 0.0849 '/'
Inlet Invert= 335.00', Outlet Invert= 290.50'

Summary for Reach R-1J: RipRap Downspout

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 2.07" for 25-yr Storm event
Inflow = 12.70 cfs @ 11.96 hrs, Volume= 0.740 af
Outflow = 12.52 cfs @ 11.98 hrs, Volume= 0.740 af, Atten= 1%, Lag= 0.8 min
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.37 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.82 fps, Avg. Travel Time= 1.5 min

Peak Storage= 322 cf @ 11.97 hrs
Average Depth at Peak Storage= 0.41' , Surface Width= 5.63'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 387.31 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 164.0' Slope= 0.3780 '/'
Inlet Invert= 252.00', Outlet Invert= 190.00'

Summary for Reach R-1L: Final Cover Access Road Ditch

Inflow = 6.72 cfs @ 11.96 hrs, Volume= 0.085 af
Outflow = 6.00 cfs @ 12.04 hrs, Volume= 0.085 af, Atten= 11%, Lag= 4.8 min
Routed to Pond 1P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.30 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 12.9 min

Peak Storage= 1,034 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.58' , Surface Width= 4.33'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 77.46 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 560.0' Slope= 0.0795 '/'
Inlet Invert= 254.50', Outlet Invert= 210.00'

Summary for Reach R-1N: R-1N

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth > 2.05" for 25-yr Storm event
Inflow = 1.45 cfs @ 20.00 hrs, Volume= 4.663 af
Outflow = 1.45 cfs @ 20.52 hrs, Volume= 4.663 af, Atten= 0%, Lag= 31.4 min
Routed to Reach R-1O : R-1O

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 18.4 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 34.0 min

Peak Storage= 1,608 cf @ 20.21 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 12.98'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.97 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 940.0' Slope= 0.0176 '/'
Inlet Invert= 168.00', Outlet Invert= 151.50'

‡

Summary for Reach R-1O: R-1O

Inflow Area = 58.266 ac, 5.06% Impervious, Inflow Depth = 2.31" for 25-yr Storm event
Inflow = 56.24 cfs @ 12.37 hrs, Volume= 11.230 af
Outflow = 53.78 cfs @ 12.56 hrs, Volume= 11.230 af, Atten= 4%, Lag= 11.4 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.93 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 29.0 min

Peak Storage= 20,558 cf @ 12.45 hrs
Average Depth at Peak Storage= 1.25' , Surface Width= 34.91'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 151.21 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 735.0' Slope= 0.0020 '/'
Inlet Invert= 151.50', Outlet Invert= 150.00'

‡

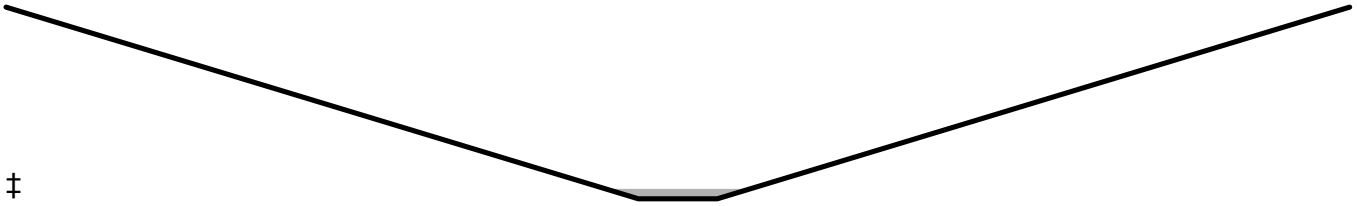
Summary for Reach R-2A: Reach 2A

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 2.17" for 25-yr Storm event
Inflow = 1.99 cfs @ 18.63 hrs, Volume= 5.698 af
Outflow = 1.99 cfs @ 20.06 hrs, Volume= 5.698 af, Atten= 0%, Lag= 86.2 min
Routed to Reach AP2 : ANALYSIS POINT #2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.53 fps, Min. Travel Time= 50.8 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 70.6 min

Peak Storage= 6,062 cf @ 19.22 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 45.93'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,332.75 cfs

25.00' x 2.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,630.0' Slope= 0.0092 '/'
Inlet Invert= 166.00', Outlet Invert= 151.00'



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Summary for Reach R-2C: LF TOE DITCH

Inflow Area = 9.740 ac, 3.67% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 27.58 cfs @ 12.06 hrs, Volume= 1.722 af
Outflow = 26.18 cfs @ 12.13 hrs, Volume= 1.722 af, Atten= 5%, Lag= 4.0 min
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.03 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 7.0 min

Peak Storage= 3,482 cf @ 12.09 hrs
Average Depth at Peak Storage= 1.92' , Surface Width= 10.68'
Defined Flood Depth= 2.00' Flow Area= 14.0 sf, Capacity= 29.12 cfs
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 70.39 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 265.0' Slope= 0.0075 '/'
Inlet Invert= 181.00', Outlet Invert= 179.00'

Summary for Reach R-2D: DITCH

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 26.51 cfs @ 12.06 hrs, Volume= 1.640 af
Outflow = 25.66 cfs @ 12.09 hrs, Volume= 1.640 af, Atten= 3%, Lag= 1.8 min
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.07 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.35 fps, Avg. Travel Time= 2.8 min

Peak Storage= 1,442 cf @ 12.07 hrs
Average Depth at Peak Storage= 1.19' , Surface Width= 7.77'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 183.17 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 225.0' Slope= 0.0511 '/'
Inlet Invert= 191.50', Outlet Invert= 180.00'

Summary for Reach R-4B: R-4B

Inflow Area = 4.602 ac, 9.82% Impervious, Inflow Depth = 2.28" for 25-yr Storm event
Inflow = 14.68 cfs @ 12.05 hrs, Volume= 0.876 af
Outflow = 10.48 cfs @ 12.32 hrs, Volume= 0.876 af, Atten= 29%, Lag= 16.2 min
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 10.6 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 41.8 min

Peak Storage= 6,724 cf @ 12.14 hrs
Average Depth at Peak Storage= 1.23' , Surface Width= 7.90'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 69.96 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 1,006.0' Slope= 0.0075 '/'
Inlet Invert= 178.50', Outlet Invert= 171.00'

Summary for Reach R-IH: RipRap Downspout

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 2.06" for 25-yr Storm event
Inflow = 9.43 cfs @ 12.01 hrs, Volume= 0.672 af
Outflow = 9.32 cfs @ 12.03 hrs, Volume= 0.672 af, Atten= 1%, Lag= 1.1 min
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.81 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.64 fps, Avg. Travel Time= 2.6 min

Peak Storage= 417 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.35' , Surface Width= 5.39'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 385.75 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 256.0' Slope= 0.3750 '/'
Inlet Invert= 286.00', Outlet Invert= 190.00'

Summary for Reach R2: Reach 2

Inflow Area = 122.225 ac, 3.55% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 109.28 cfs @ 12.56 hrs, Volume= 22.526 af
Outflow = 107.85 cfs @ 12.69 hrs, Volume= 22.525 af, Atten= 1%, Lag= 7.6 min
Routed to Reach 1 : Analysis Point 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.66 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 20.6 min

Peak Storage= 28,389 cf @ 12.61 hrs
Average Depth at Peak Storage= 1.57' , Surface Width= 41.50'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 183.33 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 700.0' Slope= 0.0030 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'

‡

Summary for Reach R4B4:

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 6.22 cfs @ 21.54 hrs, Volume= 10.010 af
Outflow = 6.22 cfs @ 22.08 hrs, Volume= 10.010 af, Atten= 0%, Lag= 32.0 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.88 fps, Min. Travel Time= 18.2 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 49.3 min

Peak Storage= 6,810 cf @ 21.77 hrs
Average Depth at Peak Storage= 0.43' , Surface Width= 20.66'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 131.94 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 963.0' Slope= 0.0094 '/'
Inlet Invert= 142.00', Outlet Invert= 132.96'

‡

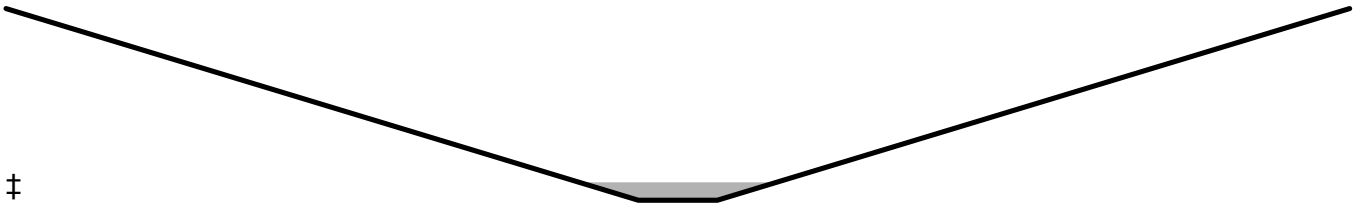
Summary for Reach R4C: Reach 4C

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 2.26" for 25-yr Storm event
Inflow = 3.15 cfs @ 13.11 hrs, Volume= 2.158 af
Outflow = 2.97 cfs @ 14.85 hrs, Volume= 2.158 af, Atten= 6%, Lag= 104.1 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.37 fps, Min. Travel Time= 43.9 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 91.8 min

Peak Storage= 7,838 cf @ 14.11 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 62.08'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 669.12 cfs

25.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 970.0' Slope= 0.0093 '/'
Inlet Invert= 159.00', Outlet Invert= 150.00'



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Summary for Reach R4C1: Reach 4C1

Inflow Area = 24.911 ac, 5.27% Impervious, Inflow Depth = 2.18" for 25-yr Storm event
Inflow = 4.44 cfs @ 14.95 hrs, Volume= 4.527 af
Outflow = 3.42 cfs @ 21.64 hrs, Volume= 4.527 af, Atten= 23%, Lag= 401.2 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.21 fps, Min. Travel Time= 177.8 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 429.7 min

Peak Storage= 36,520 cf @ 18.67 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 128.53'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 562.82 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 2,240.0' Slope= 0.0031 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Reach R4C2: Reach 4C2

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 6.24 cfs @ 20.57 hrs, Volume= 10.011 af
Outflow = 6.22 cfs @ 21.54 hrs, Volume= 10.010 af, Atten= 0%, Lag= 58.4 min
Routed to Reach R4B4 :

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.23 fps, Min. Travel Time= 32.2 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 79.5 min

Peak Storage= 12,014 cf @ 21.01 hrs
Average Depth at Peak Storage= 0.22' , Surface Width= 144.22'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 477.27 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 445.0' Slope= 0.0022 '/'
Inlet Invert= 143.00', Outlet Invert= 142.00'

‡

Summary for Reach R4D: Reach 4D

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 2.11" for 25-yr Storm event
Inflow = 1.50 cfs @ 14.89 hrs, Volume= 2.369 af
Outflow = 1.50 cfs @ 16.21 hrs, Volume= 2.369 af, Atten= 0%, Lag= 79.1 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.23 fps, Min. Travel Time= 44.7 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 61.6 min

Peak Storage= 4,015 cf @ 15.46 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 112.48'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 1,002.64 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 605.0' Slope= 0.0099 '/'
Inlet Invert= 156.00', Outlet Invert= 150.00'

‡

Summary for Reach R4G: Reach 4G

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 3.26 cfs @ 15.01 hrs, Volume= 5.483 af
Outflow = 3.25 cfs @ 15.25 hrs, Volume= 5.483 af, Atten= 0%, Lag= 14.4 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.69 fps, Min. Travel Time= 8.7 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 13.1 min

Peak Storage= 1,708 cf @ 15.11 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 24.25'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 199.54 cfs

20.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 363.0' Slope= 0.0193 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Pond 1P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 2.30" for 25-yr Storm event
Inflow = 22.61 cfs @ 12.05 hrs, Volume= 1.084 af
Outflow = 21.68 cfs @ 12.07 hrs, Volume= 1.084 af, Atten= 4%, Lag= 1.4 min
Primary = 21.68 cfs @ 12.07 hrs, Volume= 1.084 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 207.66' @ 12.07 hrs Surf.Area= 1,649 sf Storage= 2,122 cf
Flood Elev= 210.00' Surf.Area= 3,240 sf Storage= 7,740 cf

Plug-Flow detention time= 4.2 min calculated for 1.084 af (100% of inflow)
Center-of-Mass det. time= 4.2 min (841.0 - 836.7)

Volume	Invert	Avail.Storage	Storage Description
#1	206.00'	7,740 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
206.00	900	0	0
208.00	1,800	2,700	2,700
210.00	3,240	5,040	7,740

Device	Routing	Invert	Outlet Devices
#1	Primary	206.00'	**24.0" Round 24"Culvert (X2) X 2.00** L= 76.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 206.00' / 205.00' S= 0.0132 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	209.60'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=21.09 cfs @ 12.07 hrs HW=207.63' (Free Discharge)
↑—**1=24"Culvert (X2)** (Inlet Controls 21.09 cfs @ 3.84 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=206.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 12P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 2.30" for 25-yr Storm event
Inflow = 21.20 cfs @ 12.09 hrs, Volume= 1.084 af
Outflow = 20.53 cfs @ 12.11 hrs, Volume= 1.084 af, Atten= 3%, Lag= 1.4 min
Primary = 20.53 cfs @ 12.11 hrs, Volume= 1.084 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 15P : EXISTING 12" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 199.50' @ 12.11 hrs Surf.Area= 1,777 sf Storage= 1,684 cf
Flood Elev= 200.50' Surf.Area= 2,548 sf Storage= 3,866 cf

Plug-Flow detention time= 1.6 min calculated for 1.084 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (844.7 - 843.1)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	3,866 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676
200.50	2,548	1,190	3,866

Device	Routing	Invert	Outlet Devices
#1	Primary	197.90'	**24.0" Round 24"Culvert (X2) X 2.00** L= 98.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 197.90' / 195.47' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Secondary	200.00'	**14.0' long x 11.0' breadth Broad-Crested Rectangular Weir-Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Primary OutFlow Max=20.17 cfs @ 12.11 hrs HW=199.48' (Free Discharge)
1=24"Culvert (X2) (Inlet Controls 20.17 cfs @ 3.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
2=Broad-Crested Rectangular Weir-Overflow(Controls 0.00 cfs)

Summary for Pond 15P: EXISTING 12" CULVERT

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 198.00' @ 0.00 hrs Surf.Area= 464 sf Storage= 0 cf
Flood Elev= 200.50' Surf.Area= 2,212 sf Storage= 2,676 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	2,676 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676

Device	Routing	Invert	Outlet Devices
#1	Primary	197.40'	**12.0" Round 24"Culvert (X2)** L= 121.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 197.40' / 189.90' S= 0.0620 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	198.00'	**10.0' long x 50.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**1=24"Culvert (X2)** (Passes 0.00 cfs of 1.02 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 38.63 cfs @ 12.08 hrs, Volume= 2.552 af
Outflow = 38.65 cfs @ 12.08 hrs, Volume= 2.551 af, Atten= 0%, Lag= 0.0 min
Primary = 29.87 cfs @ 12.08 hrs, Volume= 2.446 af
Routed to Reach 12R : Ditch 4B1
Secondary = 8.79 cfs @ 12.08 hrs, Volume= 0.105 af
Routed to Pond C-4L : Catch Basin - 4L

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 221.40' @ 12.08 hrs Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 0.4 min calculated for 2.551 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (849.0 - 848.9)

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	216.50'	**24.0" Round Culvert - 4K** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.50' / 214.50' S= 0.0392 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	218.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=29.64 cfs @ 12.08 hrs HW=221.34' (Free Discharge)
└**1=Culvert - 4K** (Inlet Controls 29.64 cfs @ 9.43 fps)
└**2=Orifice/Grate** (Passes 29.64 cfs of 43.19 cfs potential flow)

Secondary OutFlow Max=8.30 cfs @ 12.08 hrs HW=221.34' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 8.30 cfs @ 3.10 fps)

Summary for Pond C-4L: Catch Basin - 4L

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 4.06" for 25-yr Storm event
Inflow = 9.22 cfs @ 12.08 hrs, Volume= 0.229 af
Outflow = 9.22 cfs @ 12.08 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min
Primary = 8.74 cfs @ 12.08 hrs, Volume= 0.223 af
Routed to Reach 13R : Ex Ditch
Secondary = 0.49 cfs @ 12.09 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 215.07' @ 12.08 hrs Surf.Area= 13 sf Storage= 43 cf

Plug-Flow detention time= 7.4 min calculated for 0.226 af (98% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	210.50'	43 cf	**4.00'D x 3.40'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.50'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.50' / 210.50' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	214.50'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads
#3	Secondary	215.00'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=8.31 cfs @ 12.08 hrs HW=215.05' (Free Discharge)
└**1=Culvert 4L** (Passes 8.31 cfs of 11.41 cfs potential flow)
└**2=Orifice-Top of catch basin** (Weir Controls 8.31 cfs @ 2.42 fps)

Secondary OutFlow Max=0.41 cfs @ 12.09 hrs HW=215.05' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.41 cfs @ 0.56 fps)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 2.98" for 25-yr Storm event
Inflow = 16.44 cfs @ 12.09 hrs, Volume= 0.771 af
Outflow = 16.05 cfs @ 12.10 hrs, Volume= 0.771 af, Atten= 2%, Lag= 1.0 min
Primary = 16.05 cfs @ 12.10 hrs, Volume= 0.771 af
Routed to Reach O4 : Overland Flow

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 205.87' @ 12.10 hrs Surf.Area= 1,191 sf Storage= 872 cf

Plug-Flow detention time= 0.8 min calculated for 0.771 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (817.3 - 816.6)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,690 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
204.40	0	0	0
206.00	1,300	1,040	1,040
208.00	4,200	5,500	6,540
209.00	6,100	5,150	11,690

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0152 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=15.91 cfs @ 12.10 hrs HW=205.86' (Free Discharge)
└**1=Culvert - 4B** (Inlet Controls 15.91 cfs @ 3.24 fps)

Summary for Pond CB-2B: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.308 ac, 2.34% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 25.70 cfs @ 12.07 hrs, Volume= 1.645 af
Outflow = 25.75 cfs @ 12.07 hrs, Volume= 1.643 af, Atten= 0%, Lag= 0.0 min
Primary = 25.75 cfs @ 12.07 hrs, Volume= 1.643 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 180.18' @ 12.07 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 1.2 min calculated for 1.642 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (848.5 - 848.1)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	173.00'	**24.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=25.20 cfs @ 12.07 hrs HW=180.14' (Free Discharge)
└**2=Culvert** (Passes 25.20 cfs of 37.47 cfs potential flow)
└**1=Orifice/Grate** (Orifice Controls 25.20 cfs @ 5.13 fps)

Summary for Pond CB-2D: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 26.42 cfs @ 12.06 hrs, Volume= 1.643 af
Outflow = 26.51 cfs @ 12.06 hrs, Volume= 1.640 af, Atten= 0%, Lag= 0.0 min
Primary = 26.51 cfs @ 12.06 hrs, Volume= 1.640 af
Routed to Reach R-2D : DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 202.25' @ 12.06 hrs Surf.Area= 13 sf Storage= 138 cf
Flood Elev= 200.65' Surf.Area= 13 sf Storage= 134 cf

Plug-Flow detention time= 1.6 min calculated for 1.640 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (847.8 - 847.3)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	138 cf	**4.00'D x 11.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	201.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	192.00'	**24.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 192.00' / 191.50' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=26.10 cfs @ 12.06 hrs HW=202.22' (Free Discharge)
↑**2=Culvert** (Passes 26.10 cfs of 36.26 cfs potential flow)
↑**1=Orifice/Grate** (Orifice Controls 26.10 cfs @ 5.32 fps)

Summary for Pond CB-2E: LF TOE DITCH - CATCH BASIN

Inflow Area = 10.279 ac, 4.18% Impervious, Inflow Depth = 2.13" for 25-yr Storm event
Inflow = 26.52 cfs @ 12.13 hrs, Volume= 1.828 af
Outflow = 26.55 cfs @ 12.13 hrs, Volume= 1.826 af, Atten= 0%, Lag= 0.1 min
Primary = 26.55 cfs @ 12.13 hrs, Volume= 1.826 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 180.26' @ 12.13 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 1.1 min calculated for 1.825 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (852.8 - 852.4)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#2	Primary	173.00'	**24.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=26.04 cfs @ 12.13 hrs HW=180.21' (Free Discharge)
↑—**2=Culvert** (Passes 26.04 cfs of 37.71 cfs potential flow)
↑—**1=Orifice/Grate** (Orifice Controls 26.04 cfs @ 5.31 fps)

Summary for Pond CB-4C: LT TOE DITCH - CATCH BASIN

Inflow Area = 10.458 ac, 9.73% Impervious, Inflow Depth = 2.28" for 25-yr Storm event
Inflow = 22.47 cfs @ 12.02 hrs, Volume= 1.991 af
Outflow = 22.48 cfs @ 12.02 hrs, Volume= 1.989 af, Atten= 0%, Lag= 0.0 min
Primary = 22.48 cfs @ 12.02 hrs, Volume= 1.989 af
Routed to Pond DP-13 : DETENTION POND 13

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.92' @ 12.02 hrs Surf.Area= 13 sf Storage= 87 cf
Flood Elev= 174.00' Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 0.9 min calculated for 1.989 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (853.5 - 853.3)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	171.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	167.00'	**24.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.00' / 166.50' S= 0.0096 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=22.04 cfs @ 12.02 hrs HW=171.90' (Free Discharge)
↑—**2=Culvert** (Passes 22.04 cfs of 29.88 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 22.04 cfs @ 3.11 fps)

Summary for Pond CB-4D: LF TOE DITCH - CATCH BASINS

Inflow Area = 12.095 ac, 2.44% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 40.38 cfs @ 12.01 hrs, Volume= 2.138 af
Outflow = 40.40 cfs @ 12.01 hrs, Volume= 2.137 af, Atten= 0%, Lag= 0.0 min
Primary = 40.40 cfs @ 12.01 hrs, Volume= 2.137 af
Routed to Pond DP-14 : DETENTION POND 14

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 161.35' @ 12.01 hrs Surf.Area= 13 sf Storage= 57 cf
Flood Elev= 162.00' Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 0.5 min calculated for 2.136 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (843.2 - 843.1)

Volume	Invert	Avail.Storage	Storage Description
#1	156.00'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	160.50'	**30.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	158.00'	**24.0" Round Culvert X 2.00** L= 54.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.50' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=39.65 cfs @ 12.01 hrs HW=161.34' (Free Discharge)
└**2=Culvert** (Passes 39.65 cfs of 46.29 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 39.65 cfs @ 3.00 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area = 11.260 ac, 1.95% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 42.04 cfs @ 12.06 hrs, Volume= 2.099 af
Outflow = 42.30 cfs @ 12.06 hrs, Volume= 2.098 af, Atten= 0%, Lag= 0.0 min
Primary = 42.30 cfs @ 12.06 hrs, Volume= 2.098 af
Routed to Pond DP-11R : DETENTION POND 11R

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 167.44' @ 12.06 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 170.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 0.3 min calculated for 2.098 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (841.1 - 841.0)

Volume	Invert	Avail.Storage	Storage Description
#1	159.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**24.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.00' S= 0.0087 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Primary	167.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=41.29 cfs @ 12.06 hrs HW=167.39' (Free Discharge)
└**1=Culvert** (Inlet Controls 35.11 cfs @ 11.18 fps)
└**2=Orifice/Grate** (Weir Controls 6.18 cfs @ 2.03 fps)

Summary for Pond CB-4H: Catch Basin - 4H

Inflow Area = 15.096 ac, 1.13% Impervious, Inflow Depth = 2.23" for 25-yr Storm event
Inflow = 47.70 cfs @ 12.06 hrs, Volume= 2.805 af
Outflow = 47.76 cfs @ 12.06 hrs, Volume= 2.803 af, Atten= 0%, Lag= 0.0 min
Primary = 37.59 cfs @ 12.06 hrs, Volume= 2.694 af
Routed to Pond DP-11R : DETENTION POND 11R
Secondary = 10.17 cfs @ 12.06 hrs, Volume= 0.108 af
Routed to Pond CB-4G : Catch Basin - 4G

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 183.53' @ 12.06 hrs Surf.Area= 13 sf Storage= 113 cf
Flood Elev= 183.00' Surf.Area= 13 sf Storage= 113 cf

Plug-Flow detention time= 0.8 min calculated for 2.803 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (838.5 - 838.2)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	174.00'	**24.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.00' / 172.00' S= 0.0308 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	181.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	183.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=37.50 cfs @ 12.06 hrs HW=183.52' (Free Discharge)
└**1=Culvert** (Passes 37.50 cfs of 44.15 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 37.50 cfs @ 7.64 fps)

Secondary OutFlow Max=9.77 cfs @ 12.06 hrs HW=183.52' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 9.77 cfs @ 1.89 fps)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 36.42 cfs @ 12.07 hrs, Volume= 2.311 af
Outflow = 36.45 cfs @ 12.07 hrs, Volume= 2.309 af, Atten= 0%, Lag= 0.0 min
Primary = 23.94 cfs @ 12.07 hrs, Volume= 2.071 af
Routed to Reach R-10a : R-10a
Secondary = 12.52 cfs @ 12.06 hrs, Volume= 0.237 af
Routed to Pond CB-4H : Catch Basin - 4H

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 208.60' @ 12.06 hrs Surf.Area= 13 sf Storage= 108 cf
Flood Elev= 209.90' Surf.Area= 13 sf Storage= 121 cf

Plug-Flow detention time= 0.8 min calculated for 2.309 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (847.9 - 847.6)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	121 cf	**4.00'D x 9.60'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	200.00'	**24.0" Round NEW 24-INCH** L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.00' / 194.00' S= 0.0896 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	207.58'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	208.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=23.69 cfs @ 12.07 hrs HW=208.58' (Free Discharge)
↑└**1=NEW 24-INCH** (Passes 23.69 cfs of 41.66 cfs potential flow)
↑└**2=Orifice/Grate** (Orifice Controls 23.69 cfs @ 4.83 fps)

Secondary OutFlow Max=12.06 cfs @ 12.06 hrs HW=208.59' (Free Discharge)
↑└**3=Broad-Crested Rectangular Weir** (Weir Controls 12.06 cfs @ 2.06 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area = 11.663 ac, 3.68% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 24.96 cfs @ 12.17 hrs, Volume= 2.062 af
Outflow = 24.96 cfs @ 12.17 hrs, Volume= 2.060 af, Atten= 0%, Lag= 0.0 min
Primary = 22.32 cfs @ 12.17 hrs, Volume= 2.034 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 2.64 cfs @ 12.17 hrs, Volume= 0.026 af
Routed to Pond CB-4JA3 : (4JA3) New Catch Basin

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 220.63' @ 12.17 hrs Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 0.9 min calculated for 2.060 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (856.2 - 856.0)

Volume	Invert	Avail.Storage	Storage Description
#1	211.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert - 4JA** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 212.20' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=22.25 cfs @ 12.17 hrs HW=220.59' (Free Discharge)
└**1=Culvert - 4JA** (Inlet Controls 22.25 cfs @ 12.59 fps)
└**2=Orifice/Grate** (Passes 22.25 cfs of 32.50 cfs potential flow)

Secondary OutFlow Max=2.43 cfs @ 12.17 hrs HW=220.59' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 2.43 cfs @ 2.06 fps)

Summary for Pond CB-4JA3: (4JA3) New Catch Basin

Inflow	=	2.64 cfs @	12.17 hrs, Volume=	0.026 af
Outflow	=	3.10 cfs @	12.16 hrs, Volume=	0.024 af, Atten= 0%, Lag= 0.0 min
Primary	=	2.60 cfs @	12.16 hrs, Volume=	0.020 af
Routed to Pond DP-10 : DETENTION POND 10				
Secondary	=	0.50 cfs @	12.16 hrs, Volume=	0.004 af
Routed to Pond PS11 : Culvert - 4IA(C11 PS)				

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 213.11' @ 12.15 hrs Surf.Area= 0.000 ac Storage= 0.003 af
Flood Elev= 215.00' Surf.Area= 0.000 ac Storage= 0.003 af

Plug-Flow detention time= 1.2 min calculated for 0.024 af (93% of inflow)
Center-of-Mass det. time= 0.8 min (731.0 - 730.2)

Volume	Invert	Avail.Storage	Storage Description
#1	202.90'	0.003 af	**4.00'D x 10.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	204.90'	**18.0" Round NEW 24-INCH** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 204.90' / 204.00' S= 0.0150 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	212.90'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	212.90'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=2.23 cfs @ 12.16 hrs HW=213.10' (Free Discharge)
↑—**1=NEW 24-INCH** (Passes 2.23 cfs of 23.22 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 2.23 cfs @ 1.45 fps)

Secondary OutFlow Max=0.42 cfs @ 12.16 hrs HW=213.10' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 0.42 cfs @ 1.08 fps)

Summary for Pond DP-1: DETENTION POND 1

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth = 2.08" for 25-yr Storm event
Inflow = 85.57 cfs @ 12.09 hrs, Volume= 7.174 af
Outflow = 38.56 cfs @ 12.29 hrs, Volume= 6.990 af, Atten= 55%, Lag= 12.1 min
Primary = 38.56 cfs @ 12.29 hrs, Volume= 6.990 af
Routed to Reach R-1D : Reach R-1D
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1D : Reach R-1D

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 165.32' @ 12.29 hrs Surf.Area= 19,943 sf Storage= 79,584 cf
Flood Elev= 166.00' Surf.Area= 21,310 sf Storage= 93,390 cf

Plug-Flow detention time= 397.4 min calculated for 6.990 af (97% of inflow)
Center-of-Mass det. time= 340.9 min (1,285.5 - 944.6)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	115,245 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	10,750	0	0
162.00	13,540	24,290	24,290
164.00	17,070	30,610	54,900
165.00	19,300	18,185	73,085
166.00	21,310	20,305	93,390
167.00	22,400	21,855	115,245

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**30.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 159.80' / 159.35' S= 0.0060 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	160.60'	**3.0" Vert. Orifice on side** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.70'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	166.30'	**40.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=38.53 cfs @ 12.29 hrs HW=165.31' (Free Discharge)
└**1=Culvert** (Inlet Controls 38.53 cfs @ 7.85 fps)
  └**2=Orifice on side** (Passes < 0.51 cfs potential flow)
  └**3=Orifice-Top of drop inlet** (Passes < 126.40 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 76.39 cfs @ 12.01 hrs, Volume= 6.441 af
Outflow = 15.90 cfs @ 12.62 hrs, Volume= 5.911 af, Atten= 79%, Lag= 36.7 min
Primary = 14.61 cfs @ 12.62 hrs, Volume= 3.278 af
Routed to Reach E1R6 : DP-10 DISCHARGE
Secondary = 1.29 cfs @ 12.62 hrs, Volume= 2.633 af
Routed to Reach E1R6 : DP-10 DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach E1R6 : DP-10 DISCHARGE

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.48' @ 12.62 hrs Surf.Area= 61,319 sf Storage= 130,989 cf
Flood Elev= 189.00' Surf.Area= 77,500 sf Storage= 239,860 cf

Plug-Flow detention time= 779.9 min calculated for 5.911 af (92% of inflow)
Center-of-Mass det. time= 736.2 min (1,584.5 - 848.3)

Volume	Invert	Avail.Storage	Storage Description
#1	180.00'	320,610 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
180.00	10	0	0
182.00	2,300	2,310	2,310
184.00	11,000	13,300	15,610
186.00	34,000	45,000	60,610
188.00	71,000	105,000	165,610
190.00	84,000	155,000	320,610

Device	Routing	Invert	Outlet Devices
#1	Device 3	187.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.00'	**6.0" Vert. 6-in Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	181.00'	**24.0" Round 18-in Primary Culvert** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.00' / 180.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#4	Secondary	177.50'	**5.8" Round 6-in Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 177.50' / 174.00' S= 0.0159 '/' Cc= 0.900

n= 0.011, Flow Area= 0.18 sf

#5	Device 4	186.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	184.00'	**1.5" Vert. Orifice Side** X 2 rows with 0.5" cc spacing C= 0.600 Limited to weir flow at low heads
#7	Tertiary	188.00'	**10.0' long x 26.0' breadth E-Spillway Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=14.54 cfs @ 12.62 hrs HW=187.48' (Free Discharge)
└**3=18-in Primary Culvert** (Passes 14.54 cfs of 35.40 cfs potential flow)
  ├**1=Orifice/Grate** (Weir Controls 13.49 cfs @ 2.26 fps)
  └**2=6-in Orifice** (Orifice Controls 1.05 cfs @ 5.33 fps)

Secondary OutFlow Max=1.29 cfs @ 12.62 hrs HW=187.48' (Free Discharge)
└**4=6-in Culvert** (Passes 1.29 cfs of 1.37 cfs potential flow)
  ├**5=Orifice Top** (Orifice Controls 1.07 cfs @ 5.85 fps)
  └**6=Orifice Side** (Orifice Controls 0.22 cfs @ 8.87 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=180.00' (Free Discharge)
└**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 91.57 cfs @ 12.05 hrs, Volume= 5.483 af
Outflow = 3.26 cfs @ 15.01 hrs, Volume= 5.483 af, Atten= 96%, Lag= 177.6 min
Primary = 1.91 cfs @ 15.01 hrs, Volume= 2.139 af
  Routed to Reach R4G : Reach 4G
Secondary = 1.35 cfs @ 15.01 hrs, Volume= 3.345 af
  Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 160.52' @ 15.01 hrs Surf.Area= 34,204 sf Storage= 142,499 cf

Plug-Flow detention time= 644.3 min calculated for 5.481 af (100% of inflow)
Center-of-Mass det. time= 644.6 min (1,485.0 - 840.4)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.91 cfs @ 15.01 hrs HW=160.52' (Free Discharge)
└─**1=Culvert** (Passes 1.91 cfs of 31.07 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.84 cfs @ 9.65 fps)
  ├─**3=Orifice** (Orifice Controls 1.07 cfs @ 5.43 fps)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.35 cfs @ 15.01 hrs HW=160.52' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.35 cfs @ 6.86 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 2.17" for 25-yr Storm event
Inflow = 78.37 cfs @ 12.09 hrs, Volume= 5.698 af
Outflow = 1.99 cfs @ 18.63 hrs, Volume= 5.698 af, Atten= 97%, Lag= 392.2 min
Primary = 0.52 cfs @ 18.63 hrs, Volume= 0.713 af
  Routed to Reach R-2A : Reach 2A
Secondary = 1.47 cfs @ 18.63 hrs, Volume= 4.985 af
  Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 173.19' @ 18.63 hrs Surf.Area= 43,913 sf Storage= 167,588 cf

Plug-Flow detention time= 1,058.3 min calculated for 5.696 af (100% of inflow)
Center-of-Mass det. time= 1,058.7 min (1,906.2 - 847.5)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.52 cfs @ 18.63 hrs HW=173.19' (Free Discharge)
└─**1=Culvert** (Passes 0.52 cfs of 27.42 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.52 cfs @ 5.94 fps)
  ├─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.47 cfs @ 18.63 hrs HW=173.19' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.47 cfs @ 7.50 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 2.26" for 25-yr Storm event
Inflow = 24.69 cfs @ 12.00 hrs, Volume= 2.158 af
Outflow = 3.15 cfs @ 13.11 hrs, Volume= 2.158 af, Atten= 87%, Lag= 66.4 min
Primary = 1.62 cfs @ 13.11 hrs, Volume= 0.698 af
Routed to Reach R4C : Reach 4C
Secondary = 1.53 cfs @ 13.11 hrs, Volume= 1.460 af
Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 164.06' @ 13.11 hrs Surf.Area= 13,728 sf Storage= 41,613 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 174.2 min calculated for 2.157 af (100% of inflow)
Center-of-Mass det. time= 174.1 min (1,026.6 - 852.5)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	164.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.62 cfs @ 13.11 hrs HW=164.06' (Free Discharge)
└**1=Culvert** (Passes 1.62 cfs of 25.11 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.77 cfs @ 8.86 fps)
  ├**3=Orifice** (Orifice Controls 0.85 cfs @ 4.32 fps)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.53 cfs @ 13.11 hrs HW=164.06' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.53 cfs @ 7.77 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 2.11" for 25-yr Storm event
Inflow = 42.95 cfs @ 12.00 hrs, Volume= 2.369 af
Outflow = 1.50 cfs @ 14.89 hrs, Volume= 2.369 af, Atten= 97%, Lag= 173.3 min
Primary = 0.40 cfs @ 14.89 hrs, Volume= 0.386 af
Routed to Reach R4D : Reach 4D
Secondary = 1.10 cfs @ 14.89 hrs, Volume= 1.983 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 159.04' @ 14.89 hrs Surf.Area= 36,650 sf Storage= 57,194 cf

Plug-Flow detention time= 465.9 min calculated for 2.368 af (100% of inflow)
Center-of-Mass det. time= 465.9 min (1,308.8 - 842.8)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.40 cfs @ 14.89 hrs HW=159.04' (Free Discharge)
└**1=Culvert** (Passes 0.40 cfs of 15.46 cfs potential flow)
├**2=Orifice** (Orifice Controls 0.01 cfs @ 0.71 fps)
├**3=Grate** (Controls 0.00 cfs)
└**5=Orifice/Grate** (Orifice Controls 0.39 cfs @ 4.51 fps)

Secondary OutFlow Max=1.10 cfs @ 14.89 hrs HW=159.04' (Free Discharge)
└**4=Culvert** (Barrel Controls 1.10 cfs @ 5.59 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1a: DP-1a

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 28.64 cfs @ 12.05 hrs, Volume= 1.693 af
Outflow = 2.83 cfs @ 12.72 hrs, Volume= 1.566 af, Atten= 90%, Lag= 40.4 min
Primary = 2.83 cfs @ 12.72 hrs, Volume= 1.566 af
Routed to Pond DP-1 : DETENTION POND 1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 163.00' Surf.Area= 34,985 sf Storage= 146,410 cf
Peak Elev= 163.99' @ 12.72 hrs Surf.Area= 37,410 sf Storage= 182,319 cf (35,910 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (116,636 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 435.3 min (1,281.8 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	263,046 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	24,139	0	0
160.00	27,981	52,120	52,120
162.00	32,544	60,525	112,645
163.00	34,985	33,765	146,410
164.00	37,429	36,207	182,617
166.00	43,000	80,429	263,046

Device	Routing	Invert	Outlet Devices
#1	Primary	163.10'	**113.0 deg Sharp-Crested Vee/Trap Weir** Cv= 2.49 (C= 3.11)
#2	Secondary	165.60'	**18.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.83 cfs @ 12.72 hrs HW=163.99' (Free Discharge)
└**1=Sharp-Crested Vee/Trap Weir** (Weir Controls 2.83 cfs @ 2.35 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 2.10" for 25-yr Storm event
Inflow = 33.38 cfs @ 11.96 hrs, Volume= 1.728 af
Outflow = 13.32 cfs @ 12.08 hrs, Volume= 1.693 af, Atten= 60%, Lag= 7.4 min
Primary = 13.32 cfs @ 12.08 hrs, Volume= 1.693 af
Routed to Reach R-1F : Reach R-1F

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 162.30' Surf.Area= 1,330 sf Storage= 630 cf
Peak Elev= 166.85' @ 12.08 hrs Surf.Area= 11,842 sf Storage= 23,305 cf (22,675 cf above start)
Flood Elev= 167.80' Surf.Area= 17,700 sf Storage= 36,993 cf (36,363 cf above start)

Plug-Flow detention time= 65.1 min calculated for 1.678 af (97% of inflow)
Center-of-Mass det. time= 45.7 min (889.7 - 844.0)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	36,993 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,000	0	0
164.00	3,200	4,200	4,200
165.00	4,940	4,070	8,270
166.00	7,860	6,400	14,670
167.00	12,570	10,215	24,885
167.80	17,700	12,108	36,993

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.20' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	164.20'	**8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	165.40'	**2.4' long x 0.30' rise Sharp-Crested Rectangular Weir** 1 End Contraction(s)
#5	Device 1	166.60'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=13.09 cfs @ 12.08 hrs HW=166.84' (Free Discharge)
↑└**1=Culvert** (Passes 13.09 cfs of 26.37 cfs potential flow)
↑ ├**2=Orifice** (Orifice Controls 1.79 cfs @ 9.12 fps)
 ├**3=Orifice** (Orifice Controls 2.55 cfs @ 7.31 fps)
 ├**4=Sharp-Crested Rectangular Weir** (Orifice Controls 3.96 cfs @ 5.56 fps)
 └**5=Grate** (Weir Controls 4.79 cfs @ 1.60 fps)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 2.35" for 25-yr Storm event
Inflow = 54.55 cfs @ 12.01 hrs, Volume= 5.342 af
Outflow = 1.45 cfs @ 20.00 hrs, Volume= 4.663 af, Atten= 97%, Lag= 479.1 min
Primary = 1.45 cfs @ 20.00 hrs, Volume= 4.663 af
Routed to Reach R-1N : R-1N
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1N : R-1N

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 176.71' @ 20.00 hrs Surf.Area= 73,177 sf Storage= 172,607 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf

Plug-Flow detention time= 1,277.0 min calculated for 4.663 af (87% of inflow)
Center-of-Mass det. time= 1,215.0 min (2,060.1 - 845.1)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.45 cfs @ 20.00 hrs HW=176.71' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Orifice Controls 1.45 cfs @ 7.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-6 ES: DETENTION POND 6 - EMERGENCY SPILLWAY

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Secondary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 178.00' Surf.Area= 93,326 sf Storage= 273,159 cf
Peak Elev= 178.00' @ 0.00 hrs Surf.Area= 93,326 sf Storage= 273,159 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (223,485 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert X 0.00** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice X 0.00** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**20.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth = 2.60" for 25-yr Storm event
Inflow = 77.99 cfs @ 12.13 hrs, Volume= 6.497 af
Outflow = 1.83 cfs @ 19.49 hrs, Volume= 4.089 af, Atten= 98%, Lag= 441.5 min
Primary = 0.68 cfs @ 19.49 hrs, Volume= 0.589 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Secondary = 1.15 cfs @ 19.49 hrs, Volume= 3.501 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 189.98' @ 19.49 hrs Surf.Area= 86,597 sf Storage= 219,623 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,376.3 min calculated for 4.089 af (63% of inflow)
Center-of-Mass det. time= 1,264.4 min (2,102.4 - 837.9)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Primary	189.50'	**12.0" Round 12-In Outlet Culvert** L= 48.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.50' / 180.50' S= 0.1875 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	184.21'	**5.8" Round 6-In Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.21' / 180.50' S= 0.0618 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#3	Device 2	188.70'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 2	188.30'	**1.5" Vert. Orifice X 2.00** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.68 cfs @ 19.49 hrs HW=189.98' (Free Discharge)
└**1=12-In Outlet Culvert** (Inlet Controls 0.68 cfs @ 1.85 fps)

Secondary OutFlow Max=1.15 cfs @ 19.49 hrs HW=189.98' (Free Discharge)
└**2=6-In Culvert** (Passes 1.15 cfs of 1.64 cfs potential flow)
  ├**3=Orifice** (Orifice Controls 1.00 cfs @ 5.44 fps)
  └**4=Orifice** (Orifice Controls 0.15 cfs @ 6.12 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9(E): DP 9 (EMERGENCY OUTLET)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-1G: Culvert Crossing 1G

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 2.20" for 25-yr Storm event
Inflow = 5.44 cfs @ 12.05 hrs, Volume= 0.325 af
Outflow = 5.42 cfs @ 12.06 hrs, Volume= 0.325 af, Atten= 0%, Lag= 0.5 min
Primary = 3.63 cfs @ 12.06 hrs, Volume= 0.296 af
Routed to Reach R-1G : RipRap Downspout
Secondary = 1.79 cfs @ 12.06 hrs, Volume= 0.030 af
Routed to Reach R-1I : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 336.36' @ 12.06 hrs Surf.Area= 573 sf Storage= 420 cf

Plug-Flow detention time= 4.7 min calculated for 0.325 af (100% of inflow)
Center-of-Mass det. time= 4.8 min (848.5 - 843.8)

Volume	Invert	Avail.Storage	Storage Description
#1	335.50'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
335.50	400	0	0
337.50	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	**24.0" Round 24" Culvert** L= 36.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 335.50' / 331.00' S= 0.1250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	336.00'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=3.60 cfs @ 12.06 hrs HW=336.36' (Free Discharge)
1=24" Culvert (Inlet Controls 3.60 cfs @ 2.79 fps)

Secondary OutFlow Max=1.75 cfs @ 12.06 hrs HW=336.36' (Free Discharge)
2=Stone Check Dam Weir (Weir Controls 1.75 cfs @ 1.60 fps)

Summary for Pond P-1H: Modified Plunge Pool w/(2)24" Culverts P-6a

Inflow Area = 6.697 ac, 1.15% Impervious, Inflow Depth = 2.05" for 25-yr Storm event
Inflow = 18.71 cfs @ 11.95 hrs, Volume= 1.147 af
Outflow = 18.27 cfs @ 11.96 hrs, Volume= 1.144 af, Atten= 2%, Lag= 0.3 min
Primary = 18.27 cfs @ 11.96 hrs, Volume= 1.144 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 184.60' @ 11.96 hrs Surf.Area= 491 sf Storage= 606 cf
Flood Elev= 186.00' Surf.Area= 869 sf Storage= 1,551 cf

Plug-Flow detention time= 3.0 min calculated for 1.144 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (848.9 - 847.5)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	5,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	37	0	0
183.00	163	100	100
184.00	348	256	356
185.00	587	468	823
186.00	869	728	1,551
188.00	1,067	1,936	3,487
190.00	1,160	2,227	5,714

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**24.0" Round (2)24"-Culvert X 2.00** L= 56.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 183.00' / 182.00' S= 0.0179 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Secondary	185.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=17.99 cfs @ 11.96 hrs HW=184.58' (Free Discharge)
↑—**1=(2)24"-Culvert** (Inlet Controls 17.99 cfs @ 3.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P-1I: Culvert Crossing 6c

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 13.36 cfs @ 12.01 hrs, Volume= 0.720 af
Outflow = 13.17 cfs @ 12.01 hrs, Volume= 0.720 af, Atten= 1%, Lag= 0.1 min
Primary = 9.43 cfs @ 12.01 hrs, Volume= 0.672 af
Routed to Reach R-IH : RipRap Downspout
Secondary = 3.75 cfs @ 12.01 hrs, Volume= 0.048 af
Routed to Pond P-1K : Culvert Crossing 1K

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 292.01' @ 12.01 hrs Surf.Area= 800 sf Storage= 300 cf

Plug-Flow detention time= 3.4 min calculated for 0.720 af (100% of inflow)
Center-of-Mass det. time= 3.5 min (841.7 - 838.3)

Volume	Invert	Avail.Storage	Storage Description
#1	290.50'	300 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
290.50	400	0	0
291.00	800	300	300

Device	Routing	Invert	Outlet Devices
#1	Primary	290.50'	**24.0" Round 24" Culvert** L= 38.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 290.50' / 286.00' S= 0.1184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	291.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=9.33 cfs @ 12.01 hrs HW=292.00' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 9.33 cfs @ 3.68 fps)

Secondary OutFlow Max=3.62 cfs @ 12.01 hrs HW=292.00' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Orifice Controls 3.62 cfs @ 1.89 fps)

Summary for Pond P-1J-1: (2) 24" CULVERTS

Inflow Area = 6.104 ac, 1.82% Impervious, Inflow Depth = 2.08" for 25-yr Storm event
Inflow = 19.41 cfs @ 11.96 hrs, Volume= 1.060 af
Outflow = 19.32 cfs @ 11.96 hrs, Volume= 1.060 af, Atten= 0%, Lag= 0.2 min
Primary = 17.08 cfs @ 11.96 hrs, Volume= 1.042 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 2.25 cfs @ 11.96 hrs, Volume= 0.018 af
Routed to Pond P-1J-2 : 18" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 191.53' @ 11.96 hrs Surf.Area= 308 sf Storage= 242 cf

Plug-Flow detention time= 0.2 min calculated for 1.059 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (842.6 - 842.4)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	410 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
190.00	10	0	0
192.00	400	410	410

Device	Routing	Invert	Outlet Devices
#1	Primary	190.00'	**24.0" Round Culvert X 2.00** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 190.00' / 189.60' S= 0.0108 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	191.20'	**170.0 deg x 1.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Primary OutFlow Max=16.82 cfs @ 11.96 hrs HW=191.51' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 16.82 cfs @ 3.30 fps)

Secondary OutFlow Max=2.07 cfs @ 11.96 hrs HW=191.51' (Free Discharge)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 2.07 cfs @ 1.45 fps)

Summary for Pond P-1J-2: 18" CULVERT

Inflow	=	2.25 cfs @	11.96 hrs, Volume=	0.018 af
Outflow	=	1.76 cfs @	11.99 hrs, Volume=	0.019 af, Atten= 22%, Lag= 1.9 min
Primary	=	1.76 cfs @	11.99 hrs, Volume=	0.019 af

Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.49' @ 11.99 hrs Surf.Area= 672 sf Storage= 166 cf

Plug-Flow detention time= 1.3 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (719.0 - 717.5)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	32,056 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	10	0	0
188.00	1,367	689	689
190.00	3,000	4,367	5,056
192.00	6,000	9,000	14,056
194.00	12,000	18,000	32,056

Device	Routing	Invert	Outlet Devices
#1	Primary	186.80'	**18.0" Round 18" Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 186.80' / 185.97' S= 0.0208 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.66 cfs @ 11.99 hrs HW=187.47' (Free Discharge)
↑—**1=18" Culvert** (Inlet Controls 1.66 cfs @ 2.19 fps)

Summary for Pond P-1K: Culvert Crossing 1K

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 2.31" for 25-yr Storm event
Inflow = 20.38 cfs @ 11.95 hrs, Volume= 0.825 af
Outflow = 19.42 cfs @ 11.96 hrs, Volume= 0.825 af, Atten= 5%, Lag= 0.7 min
Primary = 12.70 cfs @ 11.96 hrs, Volume= 0.740 af
Routed to Reach R-1J : RipRap Downspout
Secondary = 6.72 cfs @ 11.96 hrs, Volume= 0.085 af
Routed to Reach R-1L : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 256.39' @ 11.96 hrs Surf.Area= 677 sf Storage= 747 cf

Plug-Flow detention time= 0.4 min calculated for 0.825 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (829.9 - 829.5)

Volume	Invert	Avail.Storage	Storage Description
#1	255.00'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.00	400	0	0
257.00	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**24.0" Round 24" Culvert** L= 33.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 254.50' / 252.00' S= 0.0758 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	255.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=12.40 cfs @ 11.96 hrs HW=256.35' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 12.40 cfs @ 4.09 fps)

Secondary OutFlow Max=6.46 cfs @ 11.96 hrs HW=256.35' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Orifice Controls 6.46 cfs @ 3.37 fps)

Summary for Pond PS11: Culvert - 4IA(C11 PS)

Inflow = 0.50 cfs @ 12.16 hrs, Volume= 0.004 af
Outflow = 0.39 cfs @ 12.20 hrs, Volume= 0.004 af, Atten= 22%, Lag= 2.5 min
Primary = 0.39 cfs @ 12.20 hrs, Volume= 0.004 af
Routed to Pond CB-4I : Catch Basin - 4I

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 213.33' @ 12.20 hrs Surf.Area= 216 sf Storage= 46 cf
Flood Elev= 215.10' Surf.Area= 1,133 sf Storage= 1,237 cf

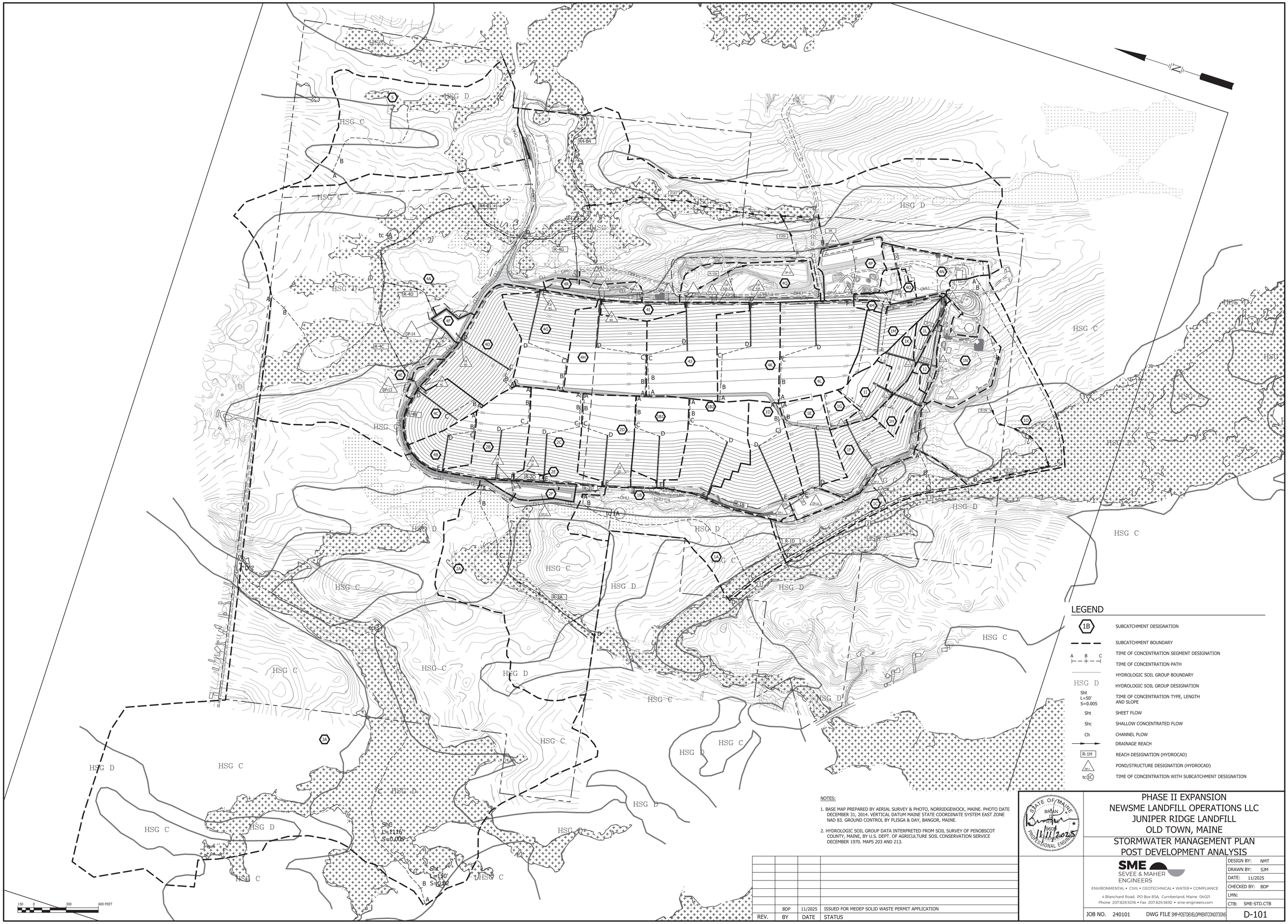
Plug-Flow detention time= 2.4 min calculated for 0.004 af (97% of inflow)
Center-of-Mass det. time= 2.3 min (733.3 - 731.0)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,353 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
212.90	5	0	0
213.04	63	5	5
215.20	1,185	1,348	1,353

Device	Routing	Invert	Outlet Devices
#1	Primary	213.05'	**24.0" Round Culvert - 4IA(C11 PS)** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.05' / 212.15' S= 0.0225 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=0.38 cfs @ 12.20 hrs HW=213.33' (Free Discharge)
↑—**1=Culvert - 4IA(C11 PS)** (Inlet Controls 0.38 cfs @ 1.42 fps)



LEGEND

1B	SUBCATCHMENT DESIGNATION
	SUBCATCHMENT BOUNDARY
A B C	TIME OF CONCENTRATION SEGMENT DESIGNATION
	TIME OF CONCENTRATION PATH
	HYDROLOGIC SOIL GROUP BOUNDARY
HSG D	HYDROLOGIC SOIL GROUP DESIGNATION
Sht L=50' S=0.005	TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE
Sht	SHEET FLOW
Shc	SHALLOW CONCENTRATED FLOW
Ch	CHANNEL FLOW
	DRAINAGE REACH
R-1H	REACH DESIGNATION (HYDROCAD)
DP-1	POND/STRUCTURE DESIGNATION (HYDROCAD)
tc 1C	TIME OF CONCENTRATION WITH SUBCATCHMENT DESIGNATION

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO, NORRIDGEWOCK, MAINE. PHOTO DATE DECEMBER 31, 2014. VERTICAL DATUM MAINE STATE COORDINATE SYSTEM EAST ZONE NAD 83. GROUND CONTROL BY PLISGA & DAY, BANGOR, MAINE.
2. HYDROLOGIC SOIL GROUP DATA INTERPRETED FROM SOIL SURVEY OF PENOBSCOT COUNTY, MAINE, BY U.S. DEPT. OF AGRICULTURE SOIL CONSERVATION SERVICE DECEMBER 1970. MAPS 203 AND 213.

REV.	BY	DATE	STATUS
	BDP	11/2025	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

STATE OF MAINE — BRIAN D. PERRY — 9601 — REGISTERED PROFESSIONAL ENGINEER — 11/11/2025

PHASE II EXPANSION
NEWSME LANDFILL OPERATIONS LLC
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE
STORMWATER MANAGEMENT PLAN
POST DEVELOPMENT ANALYSIS

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	NMT
DRAWN BY:	SJM
DATE:	11/2025
CHECKED BY:	BDP
LMN:	
CTB:	SME-STD.CTB

JOB NO. 240101 DWG FILE SMP-POSTDEVELOPMENTCONDITIONS D-101

\\server\SCDatabase\SMP\Current\SMP\Current Phase 1 Expansion\Acad\Plans\SMP Post Development Conditions.dwg, SMP-D-101, 11/11/2025 8:39:48 AM, sjm

APPENDIX C

DETENTION POND DESIGN

C-1 ANTI-SEEP COLLAR DESIGN
C-2 PLUNGE POOL DESIGN
C-3 LEVEL SPREADER DESIGN
C-4 EMERGENCY SPILLWAY DESIGN

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C-1

ANTI-SEEP COLLAR DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

PIPE ANTI-SEEP COLLAR DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 3/24/2025
Checked By: BDP
Date: 5/6/2025

OBJECTIVE

Design anti-seep collars for detention pound pipe outlets.

REFERENCES

1. Maryland Specifications for Soil Erosion and Sediment Control, Maryland Department of Environment, 1994.
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001.

ANALYSIS

1. Calculate Length of Pipe in Saturated Zone (LS)
2. Determing Number and Size of Anti-Seep Collars
3. Choose one size for all Anti-Seep Collars

CONCLUSION

1.

Ls= Length of Pipe in Saturated Zone (ft).
Y= Distance in feet from upstream invert of pipe to highest normal water level expected to occur during life of structure. Usually top of riser (ft)
S_0= Slope of Pipe (ft/ft).
Z= Slope of upstream embankment as a ratio of Z feet horizontal to one foot vertical. (In this case approximately 2.5
U= Upstream invert of pipe (feet).
H= highest normal water level expected (feet)
N= Number of Collars. Table 16
D= Collar Size (ft).
LS= $Y(Z+4)/(1-4S_0)$
V= Collar Protection (ft), Table 16

2.

DP-11R

Flood Elevation			Structure			Outlet Pipe			Anti Seep		
Pond Bottom=	154	ft	Diameter=	4	ft	Diameter=	24	in	$Ls=Y(Z+4)/(1-4S_0)$=	45.9	ft
Pond Berm=	168	ft	Top Elevation=	161	ft	Inlet Elevation=	155.3	ft	V=	1.75	ft
2 Year=	156.6	ft	Orifice Diameter=	6	in	Outlet Elevation=	154	ft	N=	3	
10 Year=	158.9	ft	Orifice Elevation=	159	ft	Length=	55	ft	Size=	4.5	ft
25 Year=	160.5	ft	Spillway Elevation=	166	ft	Slope (S_0)=	0.02	ft/ft	Spacing=Ls/(N+1)	11	ft

3. Choose one size for anti-seep collars that will fit all situations.

SME
SEVEE & MAHER ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

PIPE ANTI-SEEP COLLAR DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 3/24/2025
Checked By: BDP
Date: 5/6/2025

OBJECTIVE

Design anti-seep collars for detention pound pipe outlets.

REFERENCES

1. Maryland Specifications for Soil Erosion and Sediment Control, Maryland Department of Environment, 1994.
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001.

ANALYSIS

1. Calculate Length of Pipe in Saturated Zone (LS)
2. Determing Number and Size of Anti-Seep Collars
3. Choose one size for all Anti-Seep Collars

CONCLUSION

1.

Ls= Length of Pipe in Saturated Zone (ft).
Y= Distance in feet from upstream invert of pipe to highest normal water level expected to occur during life of structure. Usually top of riser (ft)
S_0= Slope of Pipe (ft/ft).
Z= Slope of upstream embankment as a ratio of Z feet horizontal to one fott vertical. (In this case approximately 2.5
U= Upstream invert of pipe (feet).
H= highest normal water level expected (feet)
N= Number of Collars. Table 16
D= Collar Size (ft).
LS= $Y(Z+4)/(1-4S_0)$
V= Collar Protection (ft), Table 16

2.

DP-12

Flood Elevation			Structure			Outlet Pipe			Anti Seep		
Pond Bottom=	168	ft	Diameter=	4	ft	Diameter=	24	in	$Ls=Y(Z+4)/(1-4S_0)$=	33.3	ft
Pond Berm=	180	ft	Top Elevation=	175	ft	Inlet Elevation=	168.9	ft	V=	1.75	ft
2 Year=	169.9	ft	Orifice Diameter=	6	in	Outlet Elevation=	168.5	ft	N=	2	
10 Year=	171.7	ft	Orifice Elevation=	174	ft	Length=	66	ft	Size=	4.5	ft
25 Year=	173	ft	Spillway Elevation=	178	ft	Slope (S_0)=	0.006	ft/ft	Spacing=Ls/(N+1)	11	ft

3. Choose one size for anti-seep collars that will fit all situations.

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

PIPE ANTI-SEEP COLLAR DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 3/24/2025
Checked By: BDP
Date: 5/6/2025

OBJECTIVE

Design anti-seep collars for detention pound pipe outlets.

REFERENCES

1. Maryland Specifications for Soil Erosion and Sediment Control, Maryland Department of Environment, 1994.
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001.

ANALYSIS

1. Calculate Length of Pipe in Saturated Zone (LS)
2. Determing Number and Size of Anti-Seep Collars
3. Choose one size for all Anti-Seep Collars

CONCLUSION

1.

Ls= Length of Pipe in Saturated Zone (ft).
Y= Distance in feet from upstream invert of pipe to highest normal water level expected to occur during life of structure. Usually top of riser (ft)
S_0= Slope of Pipe (ft/ft).
Z= Slope of upstream embankment as a ratio of Z feet horizontal to one foot vertical. (In this case approximately 2.5
U= Upstream invert of pipe (feet).
H= highest normal water level expected (feet)
N= Number of Collars. Table 16
D= Collar Size (ft).
LS= $Y(Z+4)/(1-4S_0)$
V= Collar Protection (ft), Table 16

2.

DP-13

Flood Elevation			Structure			Outlet Pipe			Anti Seep		
Pond Bottom=	160	ft	Diameter=	4	ft	Diameter=	24	in	Ls=Y(Z+4)/(1-4S_0)=	30.2	ft
Pond Berm=	168	ft	Top Elevation=	164.3	ft	Inlet Elevation=	160.3	ft	V=	1.75	ft
2 Year=	161.5	ft	Orifice Diameter=	6	in	Outlet Elevation=	159	ft	N=	2	
10 Year=	162.8	ft	Orifice Elevation=	163	ft	Length=	30	ft	Size=	4.5	ft
25 Year=	163.9	ft	Spillway Elevation=	166	ft	Slope (S_0)=	0.04	ft/ft	Spacing=Ls/(N+1)	10	ft

3. Choose one size for anti-seep collars that will fit all situations.

SME
SEVEE & MAHER ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

PIPE ANTI-SEEP COLLAR DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 24010
By: NMT
Date: 3/24/2025
Checked By: BDP
Date: 5/6/2025

OBJECTIVE

Design anti-seep collars for detention pound pipe outlets.

REFERENCES

1. Maryland Specifications for Soil Erosion and Sediment Control, Maryland Department of Environment, 1994.
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001.

ANALYSIS

1. Calculate Length of Pipe in Saturated Zone (LS)
2. Determing Number and Size of Anti-Seep Collars
3. Choose one size for all Anti-Seep Collars

CONCLUSION

1.

Ls= Length of Pipe in Saturated Zone (ft).
Y= Distance in feet from upstream invert of pipe to highest normal water level expected to occur during life of structure. Usually top of riser (ft)
S_0= Slope of Pipe (ft/ft).
Z= Slope of upstream embankment as a ratio of Z feet horizontal to one foot vertical. (In this case approximately 2.5
U= Upstream invert of pipe (feet).
H= highest normal water level expected (feet)
N= Number of Collars. Table 16
D= Collar Size (ft).
LS= $Y(Z+4)/(1-4S_0)$
V= Collar Protection (ft), Table 16

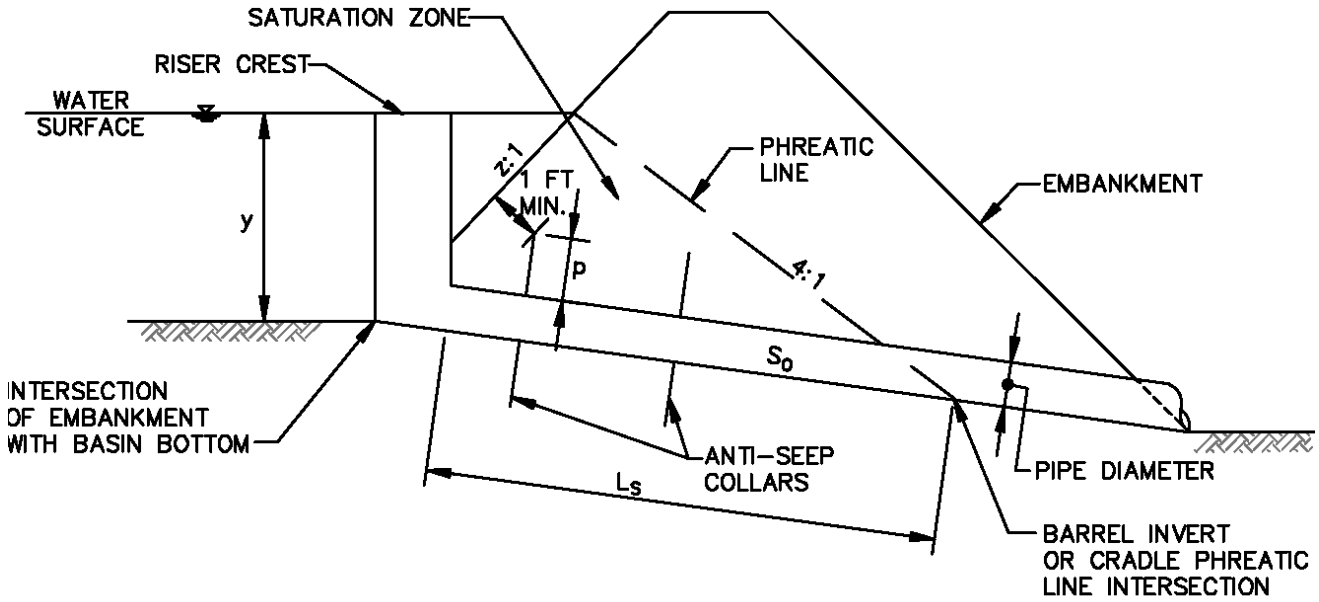
2.

DP-14

Flood Elevation			Structure			Outlet Pipe			Anti Seep		
Pond Bottom=	157	ft	Diameter=	4	ft	Diameter=	24	in	$Ls=Y(Z+4)/(1-4S_0)$=	14.1	ft
Pond Berm=	162	ft	Top Elevation=	159.8	ft	Inlet Elevation=	157	ft	V=	1.75	ft
2 Year=	157.7	ft	Orifice Diameter=	6	in	Outlet Elevation=	156	ft	N=	1	
10 Year=	158.4	ft	Orifice Elevation=	158	ft	Length=	55	ft	Size=	4.5	ft
25 Year=	159.0	ft	Spillway Elevation=	160	ft	Slope (S_0)=	0.02	ft/ft	Spacing=Ls/(N+1)	7	ft

3. Choose one size for anti-seep collars that will fit all situations.

Figure G.5: Anti-Seep Collar Design



ANTI-SEEP COLLAR DESIGN

LEGEND

p = PERPENDICULAR PROJECTION OF ANTI-SEEP COLLAR (FEET). (2 FEET MINIMUM)

L_S = LENGTH OF PIPE IN THE SATURATED ZONE (FEET)

y = DISTANCE IN FEET FROM UPSTREAM INVERT OF PIPE TO THE CREST OF THE RISER OR THE 10-YR WATER SURFACE ELEVATION FOR A PERMANENT STRUCTURE, WHICHEVER IS HIGHER

z = SLOPE OF UPSTREAM EMBANKMENT AS A RATIO OF z FEET HORIZONTAL TO ONE FOOT VERTICAL

S_O = SLOPE OF PIPE IN FEET PER FOOT

NOTE: IF BASIN IS TO BE A PERMANENT STORMWATER MANAGEMENT FACILITY, A FILTER DIAPHRAGM IS PREFERRED IN LIEU OF ANTI-SEEP COLLARS.

Refer to Instruction Sheet for Designing Anti-Seep Collars.

INSTRUCTION SHEET FOR DESIGNING ANTI-SEEP COLLARS

(Refer to Figure G.5)

1. Determine the length of pipe within the embankment's saturation zone (L_S) either graphically or if the upstream slope of the embankment intersects the invert of the pipe at its upstream end, and the slope of the pipe (S_o) is constant, the following equation may be used.

$$L_S = \frac{y(z+4)}{(1-4S_o)}$$

2. Determine the total perpendicular projection (P) required to increase L_S by 15 percent either graphically as shown on Figure G.6 or by using the equation:

$$P = 0.075\ L_S$$

3. Select the perpendicular projection (2 feet minimum) of the anti-seep collar(s) (p) when using multiple collars.

4. Determine the number of anti-seep collars (N) required of the projection (P) using equation:

$$P/p = N$$

5. Either round up N, or repeat steps 3 and 4, to determine optimum p/N relationship.

6. Provide construction specifications relative to the materials to be used and method for attaching the anti-seep collar(s) to the pipe in a watertight manner.

7. Space anti-seep collar(s) between 5 and 14 times the projection of each collar.

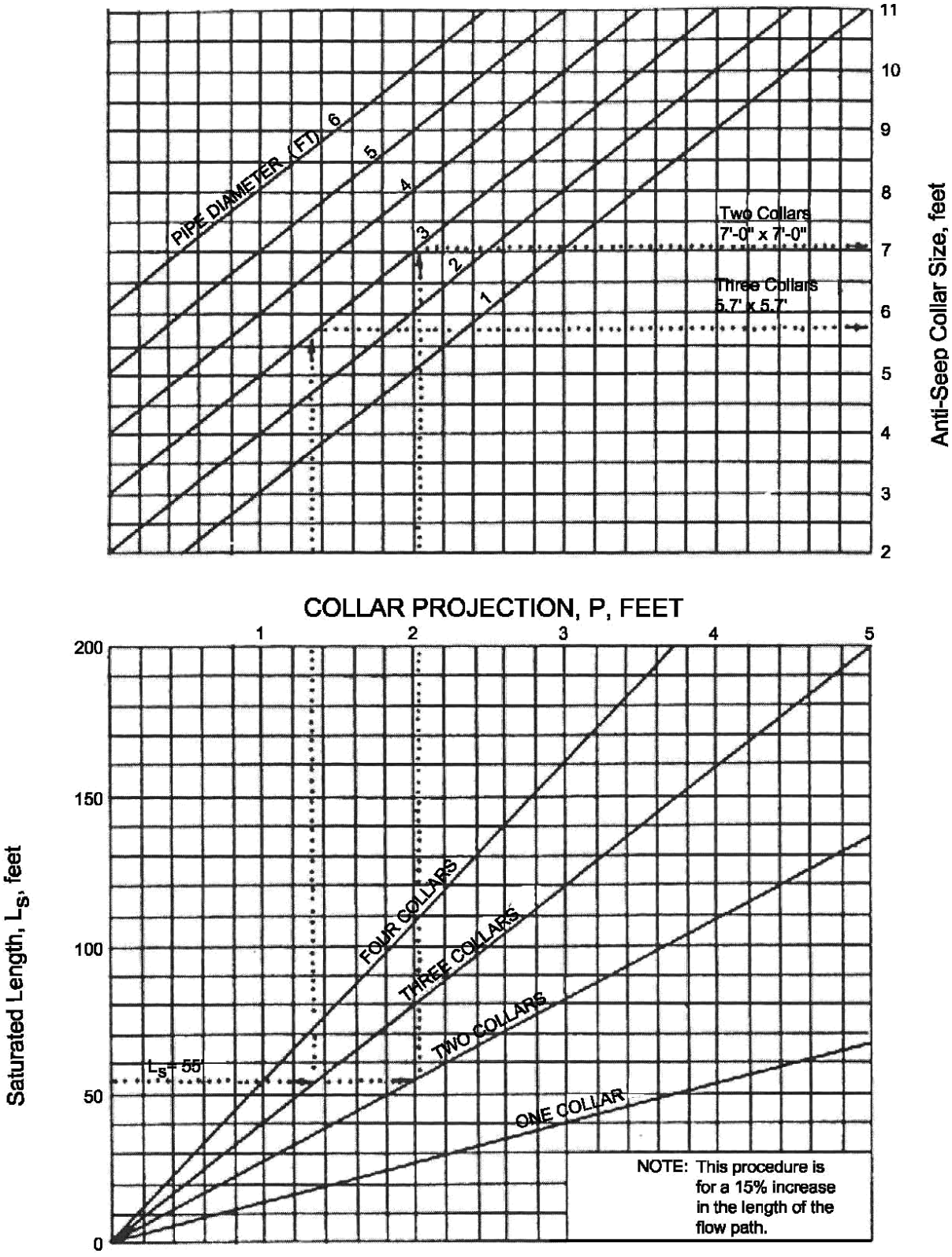
8. Place anti-seep collars a minimum of two feet from pipe joints.

9. Place anti-seep collars within the saturation zone. In cases where the spacing limit will not allow this, place at least one collar in the saturation zone.

10. Use anti-seep collars constructed of the same material as the barrel pipe.

.

Figure G.6: Anti-Seep Collar Design Chart



C-2

PLUNGE POOL DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

PLUNGE POOL DESIGN

Project Name: Juniper Ridge
Project Location: Old Town, ME
240101
NMT
4/4/2025
TJM

OBJECTIVE: Design plunge pool to protect the outlet of culverts from scour and deterioration.

REFERENCES:

1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, October 2016
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001

DESIGN PROCEDURE:

1. Use design flows for 25-year, 24-hour storm event and attached Outlet Plunge Pool table to determine plunge pool dimensions and riprap size.

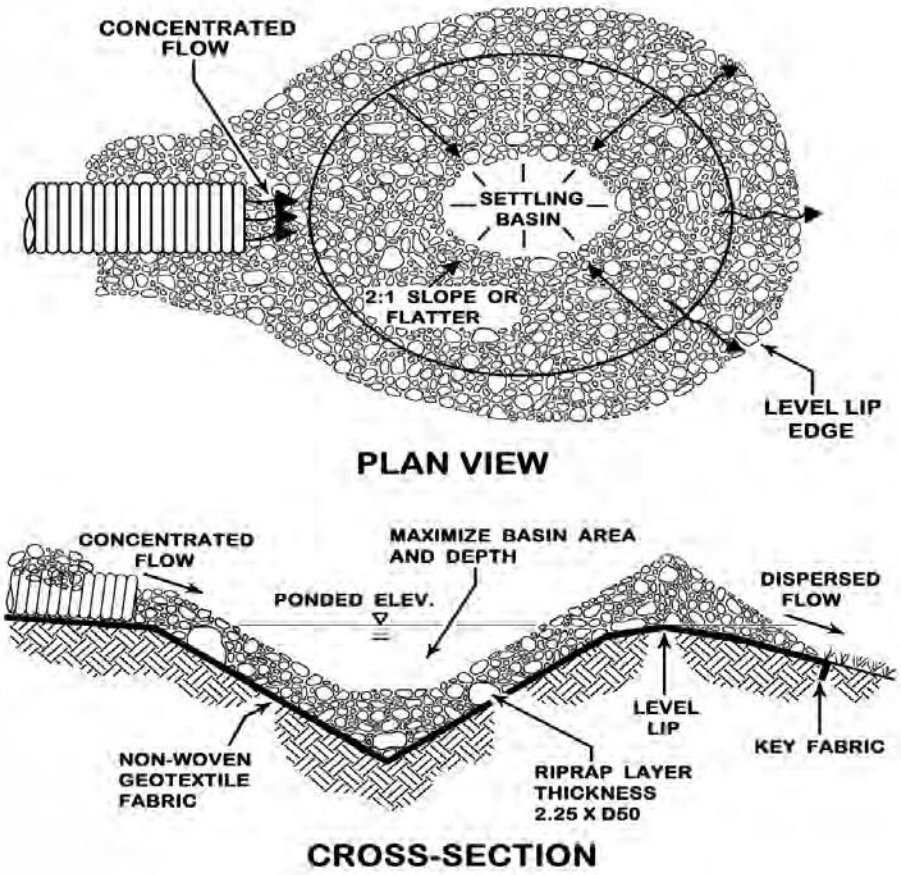
SUMMARY OF RESULTS:

				Riprap			
Plunge Pool Designation	Flow From	Q_{25} (cfs)	Culvert Dia. (in)	D_{50} (in)	Thickness (in)	Length (ft)	Width (ft)
11R	Pond DP-11R	3.3	24	10	20	8	8
12	Pond DP-12	2.0	24	10	20	8	8
13	Pond DP-13	4.8	24	10	20	8	8
14	Pond DP-14	1.5	24	10	20	8	8

PLUNGE POOL SIZING (minimum)				
SIZE	***RIPRAP SIZING (D_{50})***	***WIDTH At the narrow end of pipe***	***LENGTH For slow flows (no pressure head)***	***LENGTH For high flows (with pressure head)***
12”	5”	3-4’	4-6’	8-10’
18”	8”	4-6’	6-8’	12-18’
24”	10”	6-8’	8-10’	18-22’
30”	12”	8-10’	12-14’	22-28’
36”	14”	10-12’	14-16’	28-32’
The diameter of the largest stone size in the mix should be about 1.5 times the D_{50} and the smallest one about one half the size. The thickness of riprap should never be less than 2 times the rock D_{50}.				

CONSTRUCTION SPECIFICATIONS

- If the pipe discharges onto a flat area, the apron should have a width that is three times the outlet pipe’s diameter. If the pipe flows have the potential of causing a gully, a level spreader should be provided.
- The channel side slopes should be no steeper than 2:1. Riprap on the sides of the plunge pool should extend to the top of the channel.
- The plunge pool sizing and the median sized riprap can be determined from the following table. The thickness of riprap should not be less than 2 times the rock D_{50}.
- A geotextile or appropriate gravel filter should be used to protect against piping of soil fines from beneath the rock.
- In a channel that can be revegetated, seed and mulch should be applied within 7 days from final construction.



C-3

LEVEL SPREADER DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

STANDARD LEVEL SPREADER DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 3/24/2025
Checked By: TJM
Date: 4/3/2025

OBJECTIVE

Design level spreaders in accordance with Erosion and Sediment Control Standards.

REFERENCES

1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, October 2016.
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001.

ANALYSIS

1. Level Spreader Length shall be such that flow from the spreader during the 10-year storm event does not exceed 0.25 cfs per linear foot of spreader. (Minimum Length= 15')

CONCLUSION

Level Spreader Designation	Discharge From	Q_{10} (cfs)	Rqd Rate (cfs/ft)	Min. Rqd. Length (ft)	Specified Length (ft)
11R	Pond DP-11R	1.9	0.25	7.6	15
12	Pond DP-12	1.4	0.25	5.6	15
13	Pond DP-13	1.8	0.25	7.2	15
14	Pond DP-14	1.3	0.25	5.2	15

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 56.32 cfs @ 12.06 hrs, Volume= 3.543 af
Outflow = 1.86 cfs @ 15.94 hrs, Volume= 3.543 af, Atten= 97%, Lag= 233.0 min
Primary = 0.65 cfs @ 15.94 hrs, Volume= 0.853 af
Routed to Reach R4G : Reach 4G
Secondary = 1.21 cfs @ 15.94 hrs, Volume= 2.690 af
Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 158.89' @ 15.94 hrs Surf.Area= 28,727 sf Storage= 91,332 cf

Plug-Flow detention time= 621.8 min calculated for 3.542 af (100% of inflow)
Center-of-Mass det. time= 622.0 min (1,476.4 - 854.4)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.65 cfs @ 15.94 hrs HW=158.89' (Free Discharge)
└─**1=Culvert** (Passes 0.65 cfs of 24.35 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.65 cfs @ 7.45 fps)
  ├─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.21 cfs @ 15.94 hrs HW=158.89' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.21 cfs @ 6.15 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 1.43" for 10-yr Storm event
Inflow = 50.07 cfs @ 12.10 hrs, Volume= 3.756 af
Outflow = 1.43 cfs @ 18.64 hrs, Volume= 3.756 af, Atten= 97%, Lag= 392.2 min
Primary = 0.11 cfs @ 18.64 hrs, Volume= 0.061 af
Routed to Reach R-2A : Reach 2A
Secondary = 1.32 cfs @ 18.64 hrs, Volume= 3.696 af
Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.74' @ 18.64 hrs Surf.Area= 39,716 sf Storage= 107,124 cf

Plug-Flow detention time= 897.1 min calculated for 3.755 af (100% of inflow)
Center-of-Mass det. time= 897.4 min (1,757.4 - 860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.11 cfs @ 18.64 hrs HW=171.74' (Free Discharge)
└─**1=Culvert** (Passes 0.11 cfs of 18.93 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.11 cfs @ 1.67 fps)
  ├─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.32 cfs @ 18.64 hrs HW=171.74' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.32 cfs @ 6.70 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 1.50" for 10-yr Storm event
Inflow = 15.85 cfs @ 12.00 hrs, Volume= 1.435 af
Outflow = 1.97 cfs @ 13.29 hrs, Volume= 1.435 af, Atten= 88%, Lag= 76.9 min
Primary = 0.62 cfs @ 13.29 hrs, Volume= 0.314 af
Routed to Reach R4C : Reach 4C
Secondary = 1.36 cfs @ 13.29 hrs, Volume= 1.121 af
Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 162.83' @ 13.29 hrs Surf.Area= 11,800 sf Storage= 25,985 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 139.9 min calculated for 1.435 af (100% of inflow)
Center-of-Mass det. time= 139.9 min (1,006.1 - 866.2)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	164.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.62 cfs @ 13.29 hrs HW=162.83' (Free Discharge)
└─**1=Culvert** (Passes 0.62 cfs of 18.72 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.62 cfs @ 7.08 fps)
  ├─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.36 cfs @ 13.29 hrs HW=162.83' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.36 cfs @ 6.91 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 27.78 cfs @ 12.00 hrs, Volume= 1.551 af
Outflow = 1.21 cfs @ 14.17 hrs, Volume= 1.551 af, Atten= 96%, Lag= 130.2 min
Primary = 0.21 cfs @ 14.17 hrs, Volume= 0.110 af
Routed to Reach R4D : Reach 4D
Secondary = 1.00 cfs @ 14.17 hrs, Volume= 1.441 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 158.41' @ 14.17 hrs Surf.Area= 35,143 sf Storage= 34,295 cf

Plug-Flow detention time= 350.6 min calculated for 1.550 af (100% of inflow)
Center-of-Mass det. time= 350.6 min (1,206.1 - 855.4)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.21 cfs @ 14.17 hrs HW=158.41' (Free Discharge)
└─**1=Culvert** (Passes 0.21 cfs of 9.53 cfs potential flow)
  ├─**2=Orifice** (Controls 0.00 cfs)
  ├─**3=Grate** (Controls 0.00 cfs)
  └─**5=Orifice/Grate** (Orifice Controls 0.21 cfs @ 2.36 fps)

Secondary OutFlow Max=1.00 cfs @ 14.17 hrs HW=158.41' (Free Discharge)
└─**4=Culvert** (Barrel Controls 1.00 cfs @ 5.11 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

C-4

EMERGENCY SPILLWAY DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

RIPRAP CHANNEL DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 3/24/2025
Checked By: BDP
Date: 5/29/2025

OBJECTIVE

Design riprap channel with adequate lining to convey stormwater flows from 25-year or 100-year, 24-hour storm event assuming vegetative conditions.

REFERENCES

1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, October 2016
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001.
3. Channel Design Program HYCHL Version 6.1

ANALYSIS

Determine peak stormwater flows for 25-year and 100-year, 24-hour storm events using TR-20. (See Attached Hydrocad Printouts). Evaluate permanent channel lining using maximum flow rate. Assume normal outlets are clogged for 25-year storm and all outlets working during 100-year event.

CONCLUSION

							Riprap	
Riprap Ditch	Flow From	Slope (Max.) (ft/ft)	Q_{25} (cfs)	Q_{100} (cfs)	Bottom Width (feet)	Side Slopes (H:1V)	D_{50} (in)	Thickness (in)
DP-11R Emergency Spillway	DP-11R	0.33	NA	NA	10	2	4	9
DP-12 Emergency Spillway	DP-12	0.33	NA	NA	10	2	4	9
DP-13 Emergency Spillway	DP-13	0.33	0.94	NA	10	2	4	9
DP-14 Emergency Spillway	DP-14	0.33	0.57	NA	10	2	4	9

Note: No discharge during 100-year storm event.

****** HYCHL ****** (Version 6.1) ****** Date 05-29-2025

Commands Read From File: C:\DP13ES.CHL

```
      JOB DP13 ES
      UNI 0
** UNITS PARAMETER = 0 (ENGLISH)
      CHL .40    .94
** LEFT SIDE SLOPE    2.0 AND RIGHT SIDE SLOPE    2.0
** THE BASE WIDTH OF THE TRAPEZOID (ft)   10.00
      LRR .33    2 42     2.65   .15
** D50 (ft)    .33
** ANGLE OF REPOSE (DEGREES)   42.00
** SPECIFIC GRAVITY    2.65
** SHIELDS PARAMETER    .150
      END
***************END OF COMMAND FILE************
```

DP13 ES

INPUT REVIEW

DESIGN PARAMETERS:

DESIGN DISCHARGE (ft^3/s):	.94
CHANNEL SHAPE:	TRAPEZOIDAL
CHANNEL SLOPE (ft/ft):	.400

*** WARNING: DEPTH DID NOT CONVERGE. PROGRAM WILL CONTINUE WITH MOST RECENT VALUE

HYDRAULIC CALCULATIONS USING BATHURST

FLOW (cfs)	.94
MAX DEPTH (ft)	.04
AREA (ft^2)	.56
WETTED PERIMETER (ft)	10.25
HYDRAULIC RADIUS (ft)	.06
AVG VELOCITY (ft/s)	1.66
MANNINGS EQUIVALENT	.446
Davg / D50	.17
FROUDE NUMBER	1.49
REYNOLDS NUMBER (10^5)	.43

STABILITY ANALYSIS

CONDITION	LINING TYPE	PERMIS SHR (LB/FT^2)	CALC. SHR (LB/FT^2)	STAB. FACTOR	REMARKS
BOTTOM; STRAIGHT	RIPRAP	5.10	.97	5.27	STABLE
SIDE; STRAIGHT	RIPRAP	3.79	.75	5.03	STABLE

*** NORMAL END OF HYCHL ***

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 91.57 cfs @ 12.05 hrs, Volume= 5.483 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4G : Reach 4G

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 163.02' @ 24.90 hrs Surf.Area= 43,058 sf Storage= 238,848 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 3.89" for 100-yr Storm event
Inflow = 166.60 cfs @ 12.05 hrs, Volume= 9.537 af
Outflow = 37.67 cfs @ 12.34 hrs, Volume= 9.537 af, Atten= 77%, Lag= 17.5 min
Primary = 36.21 cfs @ 12.34 hrs, Volume= 5.725 af
Routed to Reach R4G : Reach 4G
Secondary = 1.47 cfs @ 12.34 hrs, Volume= 3.812 af
Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 162.03' @ 12.34 hrs Surf.Area= 39,466 sf Storage= 198,102 cf

Plug-Flow detention time= 472.9 min calculated for 9.533 af (100% of inflow)
Center-of-Mass det. time= 473.4 min (1,296.2 - 822.8)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=36.20 cfs @ 12.34 hrs HW=162.03' (Free Discharge)
└─**1=Culvert** (Inlet Controls 36.20 cfs @ 11.52 fps)
  ├─**2=Orifice** (Passes < 0.99 cfs potential flow)
  ├─**3=Orifice** (Passes < 1.58 cfs potential flow)
  └─**4=Grate** (Passes < 42.77 cfs potential flow)

Secondary OutFlow Max=1.47 cfs @ 12.34 hrs HW=162.03' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.47 cfs @ 7.47 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 2.17" for 25-yr Storm event
Inflow = 78.37 cfs @ 12.09 hrs, Volume= 5.698 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 174.92' @ 34.65 hrs Surf.Area= 49,069 sf Storage= 248,202 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 3.64" for 100-yr Storm event
Inflow = 133.74 cfs @ 12.08 hrs, Volume= 9.546 af
Outflow = 6.57 cfs @ 14.18 hrs, Volume= 9.546 af, Atten= 95%, Lag= 125.6 min
Primary = 4.90 cfs @ 14.18 hrs, Volume= 3.046 af
Secondary = 1.66 cfs @ 14.18 hrs, Volume= 6.499 af
Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 175.18' @ 14.18 hrs Surf.Area= 49,848 sf Storage= 260,943 cf

Plug-Flow detention time= 1,062.2 min calculated for 9.542 af (100% of inflow)
Center-of-Mass det. time= 1,062.9 min (1,895.2 - 832.4)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.82 cfs @ 14.18 hrs HW=175.18' (Free Discharge)
└─**1=Culvert** (Passes 4.82 cfs of 34.76 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.79 cfs @ 9.02 fps)
  ├─**3=Orifice** (Orifice Controls 0.91 cfs @ 4.64 fps)
  └─**4=Grate** (Weir Controls 3.12 cfs @ 1.38 fps)

Secondary OutFlow Max=1.66 cfs @ 14.18 hrs HW=175.18' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.66 cfs @ 8.48 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 2.26" for 25-yr Storm event
Inflow = 24.69 cfs @ 12.00 hrs, Volume= 2.158 af
Outflow = 0.94 cfs @ 16.81 hrs, Volume= 0.516 af, Atten= 96%, Lag= 288.2 min
Primary = 0.94 cfs @ 16.81 hrs, Volume= 0.516 af
Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 166.10' @ 16.81 hrs Surf.Area= 17,264 sf Storage= 73,336 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 486.8 min calculated for 0.515 af (24% of inflow)
Center-of-Mass det. time= 343.0 min (1,195.4 - 852.5)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.90 cfs @ 16.81 hrs HW=166.10' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.90 cfs @ 0.87 fps)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 3.75" for 100-yr Storm event
Inflow = 42.15 cfs @ 12.00 hrs, Volume= 3.581 af
Outflow = 23.86 cfs @ 12.32 hrs, Volume= 3.581 af, Atten= 43%, Lag= 19.3 min
Primary = 22.29 cfs @ 12.32 hrs, Volume= 1.848 af
Routed to Reach R4C : Reach 4C
Secondary = 1.57 cfs @ 12.32 hrs, Volume= 1.733 af
Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 164.43' @ 12.32 hrs Surf.Area= 14,366 sf Storage= 46,837 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 131.7 min calculated for 3.580 af (100% of inflow)
Center-of-Mass det. time= 131.7 min (967.8 - 836.1)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	163.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=22.07 cfs @ 12.32 hrs HW=164.42' (Free Discharge)
└─**1=Culvert** (Passes 22.07 cfs of 26.73 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.81 cfs @ 9.33 fps)
  ├─**3=Orifice** (Orifice Controls 1.02 cfs @ 5.22 fps)
  └─**4=Grate** (Weir Controls 20.23 cfs @ 2.58 fps)

Secondary OutFlow Max=1.57 cfs @ 12.32 hrs HW=164.42' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.57 cfs @ 8.01 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 2.11" for 25-yr Storm event
Inflow = 42.95 cfs @ 12.00 hrs, Volume= 2.369 af
Outflow = 0.57 cfs @ 23.49 hrs, Volume= 0.227 af, Atten= 99%, Lag= 689.8 min
Primary = 0.57 cfs @ 23.49 hrs, Volume= 0.227 af
Routed to Reach R4D : Reach 4D

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 160.07' @ 23.49 hrs Surf.Area= 39,113 sf Storage= 96,233 cf

Plug-Flow detention time= 713.1 min calculated for 0.227 af (10% of inflow)
Center-of-Mass det. time= 559.9 min (1,402.8 - 842.8)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.55 cfs @ 23.49 hrs HW=160.07' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.55 cfs @ 0.73 fps)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 3.56" for 100-yr Storm event
Inflow = 72.37 cfs @ 11.99 hrs, Volume= 3.997 af
Outflow = 4.97 cfs @ 12.95 hrs, Volume= 3.997 af, Atten= 93%, Lag= 57.1 min
Primary = 3.74 cfs @ 12.95 hrs, Volume= 1.453 af
Routed to Reach R4D : Reach 4D
Secondary = 1.22 cfs @ 12.95 hrs, Volume= 2.544 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 159.95' @ 12.95 hrs Surf.Area= 38,791 sf Storage= 91,376 cf

Plug-Flow detention time= 463.0 min calculated for 3.995 af (100% of inflow)
Center-of-Mass det. time= 463.2 min (1,290.9 - 827.7)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.74 cfs @ 12.95 hrs HW=159.95' (Free Discharge)
└**1=Culvert** (Passes 3.74 cfs of 21.12 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.79 cfs @ 4.03 fps)
  ├**3=Grate** (Weir Controls 2.39 cfs @ 1.27 fps)
  └**5=Orifice/Grate** (Orifice Controls 0.56 cfs @ 6.43 fps)

Secondary OutFlow Max=1.22 cfs @ 12.95 hrs HW=159.95' (Free Discharge)
└**4=Culvert** (Barrel Controls 1.22 cfs @ 6.22 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

APPENDIX D

FINAL SITE DRAINAGE PLAN AND DETENTION POND DETAILS

SME
SEVEE & MAHER
ENGINEERS

A. GENERAL

1. All soil erosion and sediment control will be done in accordance with: (1) the Maine Erosion and Sediment Control Handbook: Best Management Practices, Maine Department of Environmental Protection (MEDEP), October 2016; (2) the project specific stormwater pollution prevention plan.

2. The site contractor (to be determined) will be responsible for the repair/replacement/maintenance of all erosion control measures until all disturbed areas are stabilized.

3. Disturbed areas will be permanently stabilized within 7 days of final grading. Disturbed areas not to be worked upon within 14 days of disturbance will be temporarily stabilized within 7 days of the disturbance.

4. In all areas, removal of trees, bushes and other vegetation, as well as disturbance of topsoil will be kept to a minimum while allowing proper site operations.

5. Any suitable topsoil will be stripped and stockpiled for reuse as directed by the owner. Topsoil will be stockpiled in a manner such that natural drainage is not obstructed and no off-site sediment damage will result. In any event, stockpiles will not be located within 100 feet of wetlands and will be at least 50 feet upgradient of the stockpile's perimeter silt fence. The sideslopes of the topsoil stockpile will not exceed 2:1. Silt fence will be installed around the perimeter of all topsoil stockpiles. Topsoil stockpiles will be surrounded with siltation fencing and will be temporarily seeded with Aroostook rye, annual or perennial ryegrass within 7 days of formation, or temporarily mulched.

B. TEMPORARY MEASURES

1. STABILIZED CONSTRUCTION ENTRANCE/EXIT

A crushed stone stabilized construction entrance/exit will be placed at any point of vehicular access to the site.

2. SILT FENCE

a. Silt fence will be installed prior to all construction activity, where soil disturbance may result in erosion. Silt fence will be erected at locations shown on the plans and/or downgradient of all construction activity.

b. Silt fences will be removed when they have served their useful purpose, but not before the upgradient areas have been permanently stabilized.

c. Silt fences will be inspected immediately after each rainfall and at least daily during prolonged rainfall. They will be inspected if there are any signs of erosion or sedimentation below them. Any required repairs will be made immediately. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water behind them, they will be replaced with a temporary crushed stone check dam.

d. Sediment deposits will be removed after each storm event if significant build-up has occurred or if deposits exceed half the height of the barrier.

3. STONE CHECK DAMS

Stone check dams will be installed in grass-lined swales and ditches during construction.

4. BARK MULCH SEDIMENT BARRIER

a. Where approved, bark mulch sediment barriers may be used as a substitute for silt fence. See the details in this drawing set for specifications.

b. Rock Filter Berms: To provide more filtering capacity or to act as a velocity check dam, a berm's center can be composed of clean crushed rock ranging in size from the french drain stone to riprap.

5. TEMPORARY SEEDING

Stabilize disturbed areas that will not be brought to final grade for a year or less and reduce problems associated with mud and dust production from exposed soil surface during construction with temporary vegetation.

6. TEMPORARY MULCHING

Use temporary mulch in the following locations and/or circumstances:

- In sensitive areas (within 100 feet of streams, wetlands and in lake watersheds) temporary mulch will be applied within 7 days of exposing spill or prior to any storm event.
- Apply temporary mulch within 14 days of disturbance or prior to any storm event in all other areas.
- Areas which have been temporarily or permanently seeded will be mulched immediately following seeding.
- Areas which cannot be seeded within the growing season will be mulched for over-winter protection and the area will be seeded at the beginning of the growing season.
- Mulch can be used in conjunction with tree, shrub, vine, and ground cover plantings.
- Mulch anchoring will be used on slopes greater than 5 percent in late fall (past September 1), and over-winter (September 1 - April 25).

The following materials may be used for temporary mulch:

a. Hay or Straw material shall be air-dried, free of seeds and coarse material. Apply 2-3 tons/acre or 3 bales (90-130 lbs per 1,000 sf).

b. Erosion Control Mix: It can be used as a stand-alone reinforcement:
- on slopes 2 horizontal to 1 vertical or less;
- on frozen ground or forested areas; and
- at the edge of gravel parking areas and areas under construction.

c. Erosion control mix alone is not suitable:
- on slopes with groundwater seepage;
- at low points with concentrated flows and in gullies;
- at the bottom of steep perimeter slopes exceeding 100 feet in length;
- below culvert outlet aprons; and around catch basins and closed storm systems.

d. Chemical Mulches and Soil Binders: Wide ranges of synthetic spray-on materials are marketed to protect the soil surface. These are emulsions that are mixed with water and applied to the soil. They may be used alone, but most often are used to hold wood fiber, hydro-mulches or straw to the soil surface.

e. Erosion Control Blankets and Mats: Mats are manufactured combinations of mulch and netting designed to retain soil moisture and modify soil temperature. During the growing season (April 25 to August 31) use mats indicated on drawings or North American Green (NAG) C125 BN (or mulch and netting) on:
- the base of grassed waterways;
- steep slopes (15 percent or greater); and
- any disturbed soil within 100 feet of lakes, streams, or wetlands.

During the late fall and winter (September 1 to April 25) use heavy grade mats indicated on drawings for NAG SC250 on all areas noted above plus use lighter grade mats NAG C125BN (or mulch and netting) on:
- sideslopes of grassed waterways; and
- moderate slopes (between 8 and 15 percent).

7. TEMPORARY DUST CONTROL

To prevent the blowing and movement of dust from exposed soil surfaces, and reduce the presence of dust, use water to control dusting by preserving the moisture level in the road surface materials. The use of calcium chloride or any other chemicals for dust control is prohibited

8. CONSTRUCTION DE-WATERING

a. Water from construction de-watering operations shall be cleaned of sediment before reaching wetlands, water bodies, streams or site boundaries. Utilize temporary sediment basins, erosion control soil filter berms backed by staked hay bales, or other approved Best Management Practices (BMP's).

b. In sensitive areas near streams or ponds, discharge the water from the de-watering operation into a temporary sediment basin created by a surrounding filter berm of uncompacted erosion control mix immediately backed by staked hay bales (see the site details). Locate the temporary sediment basin at lease 100 feet from the nearest water body, such that the filtered water will flow through undisturbed vegetated soil areas prior to reaching the water body or property line.

A. PERMANENT MEASURES

1. Riprapped Aprons: All storm drain pipe outlets and the inlet and outlet of culverts will have riprap aprons to protect against scour and deterioration.

2. Topsoil, Seed, and Mulch: All areas disturbed during construction, but not subject to other restoration (paving, riprap, etc.) will be loamed, limed, fertilized, seeded, and mulched.

a. Seeded Preparation: Use stockpiled materials spread to the depths shown on the plans, if available. Approved topsoil substitutes may be used. Grade the site as needed.

b. Seeding will be completed by August 31 of each year. Late season seeding may be done between September 1 and April 25. Areas not seeded or which do not obtain satisfactory growth by August 31, will be seeded with Aroostook Rye or mulched. After November 1, or the first killing frost, disturbed areas will be seeded at double the specified application rates, mulched, and anchored.

PERMANENT SEEDING SPECIFICATIONS

Mixture:	Grassed areas (lbs/acre)
Tall Fescue	54
Creeping Red Fescue	25
Red Top	5
Ladino Clover	13
Annual Ryegrass	8
Birdsfoot Trefoil	5
Timothy	10

c. Mulch in accordance with specifications for temporary mulching.

d. If permanent vegetated stabilization cannot be established due to the season of the year, all exposed and disturbed areas not to undergo further disturbance are to have dormant seeding applied and be temporarily mulched to protect the site.

3. Ditches and Channels: All ditches on-site will be lined with North American Green S75 erosion control mesh (or an approved equal) upon installation of loam and seed.

B. WINTER CONSTRUCTION AND STABILIZATION

1. Winter excavation and earthwork will be completed so as to minimize exposed areas while satisfactorily completing the project. Limit exposed areas to those areas in which work is to occur during the following 15 days and that can be mulched in one day prior to any snow event. All areas will be considered denuded until the subbase gravel is installed in roadway areas or the areas of future loam and seed have been loamed, seeded, and mulched.

Install any added measures necessary to control erosion/sedimentation. The particular measure used will be dependent upon site conditions, the size of the area to be protected, and weather conditions.

To minimize areas without erosion control protection, continuation of earthwork operations on additional areas will not begin until the exposed soil surface on the area being worked has been stabilized.

2. Natural Resource Protection: During winter construction, or within 100-feet of a natural resource (i.e., wetland) a double-row of sediment barriers (i.e., silt fence backed with hay bales or erosion control mix) will be placed between any natural resource and the disturbed area. Projects crossing the natural resource will be protected a minimum distance of 100 feet on either side from the resource.

3. Sediment Barriers: During frozen conditions, sediment barriers may consist of erosion control mix berms or any other recognized sediment barriers as frozen soil prevents the proper installation of hay bales or silt fences.

4. Mulching: All areas will be considered to be denuded until seeded and mulched. Hay and straw mulch will be applied at a rate of twice the normal accepted rate.

Mulch will not be spread on top of snow.

After each day of final grading, the area will be properly stabilized with anchored hay or straw or erosion control matting.

Between the dates of September 1 and April 25, all mulch will be anchored by either mulch netting, emulsion chemical, tracking or wood cellulose fiber.

5. Soil Stockpiling: Stockpiles of soil or subsoil will be mulched for over-winter protection with hay or straw at twice the normal rate or with a 4-inch layer of erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Any soil stockpiles shall not be placed (even covered with mulch) within 100 feet from any natural resources.

6. Seeding: Dormant seeding may be placed prior to the placement of mulch or erosion control blankets. If dormant seeding is used for the site, all disturbed areas will receive 4 inches of loam and seed at an application rate of three times the rate for permanent seeding. All areas seeded during the winter will be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 85 percent catch) will be revegetated by replacing loam, seed, and mulch.

If dormant seeding is not used for the site, all disturbed areas will be revegetated in the spring.

7. Maintenance: Maintenance measures will be applied as needed during the entire construction season. After each rainfall, snow storm, or period of thawing and runoff, the site contractor will perform a visual inspection of all installed erosion control measures and perform repairs as needed to ensure their continuous function.

Following the temporary and/or final seeding and mulching, the contractor will, in the spring, inspect and repair any damages and/or bare spots. An established vegetative cover means a minimum of 90 percent of areas vegetated with vigorous growth.

A. OVER-WINTER CONSTRUCTION EROSION CONTROL MEASURES

1. Stabilization of Disturbed Soil: By August 31, all disturbed soils on areas having a slope less than 15 percent will be seeded and mulched. If the contractor fails to stabilize these soils by this date, then the contractor shall stabilize the soil for late fall and winter, by using either temporary seeding or mulching.

2. Stabilization of Disturbed Slopes: All slopes to be vegetated will be completed by August 31. The owner will consider any area having a grade greater than 15 percent (6.5H:1V) to be a slope. Slopes not vegetated by August 31 will receive one of the following actions to stabilize the slope for late fall and winter:

a. Stabilize the soil with temporary vegetation and erosion control mesh.
b. Stabilize the slope with erosion control mix.
c. Stabilize the slope with stone riprap.

3. Stabilization of Ditches and Channels: All stone-lined ditches and channels to be used to convey runoff through the winter will be constructed and stabilized by November 15. Grass-lined ditches and channels will be complete by September 15. Grass-lined ditches not stabilized by September 15 shall be lined with either sod or riprap.

E. MAINTENANCE PLAN

1. Routine Maintenance: Inspection will be performed as outlined in the project's Erosion Control Plan. Inspection will be by a qualified person during wet weather to ensure that the facility performs as intended. Inspection priorities will include checking erosion controls for accumulation of sediments.

A. Housekeeping

1. Spill prevention. Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

2. Groundwater protection. During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

3. Fugitive sediment and dust. Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

4. Debris and other materials. Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

5. Trench or foundation de-watering. Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the department.

6. Non-stormwater discharges. Identify and prevent contamination by non-stormwater discharges.

7. Additional requirements. Additional requirements may be applied on a site-specific basis.

B. CONSTRUCTION SEQUENCE

It is anticipated that construction will commence upon receipt of all necessary permits and approvals. The following outlines the preliminary construction sequence:

a. Install silt fence and other temporary erosion control measures for the construction of Cell and accessory facilities such as berms, and service roads;

b. Construct upslope stormwater diversion berms, ditches, culvert outlets, and control structures:

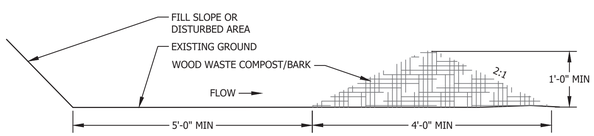
c. Perform stormwater upgrades;

d. Construct service road;

e. Construct Cell base grade;

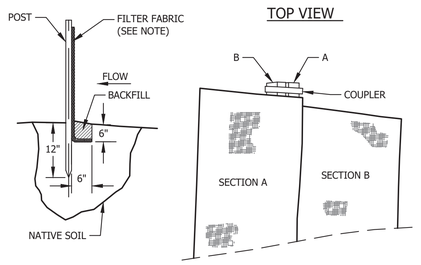
f. Construct Cell liner system;

g. As permanent erosion control measures become stabilized, remove temporary measures (e.g., silt fence, stone check dams).



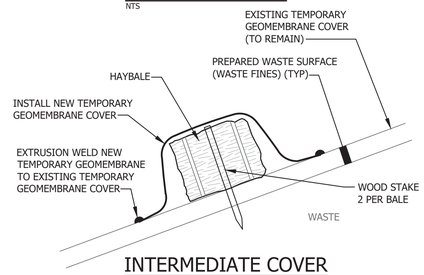
NOTE:
BARK MULCH SEDIMENT BARRIERS MAY BE USED AS AN ALTERNATE TO SILT FENCE WHEN APPROVED BY THE ENGINEER.

EROSION CONTROL MIX BERM
NTS

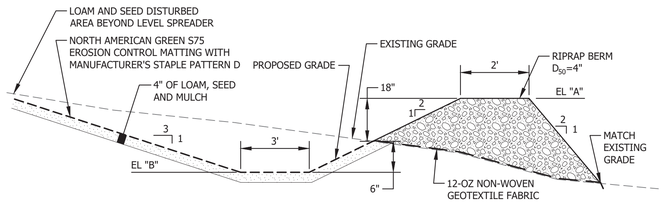


TOE-IN DETAIL — JOINING SECTIONS

SILTATION FENCE
NTS



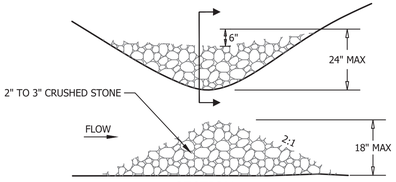
INTERMEDIATE COVER STORMWATER DIVERSION BERM
NTS



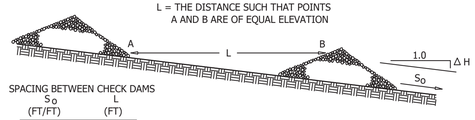
NOTES:
1. CONSTRUCT LEVEL LIP AND SPREADER ON ZERO PERCENT GRADE.
2. STORM RUNOFF CONVERTED TO SHEET FLOW SHALL OUTLET ONTO STABILIZED AREA. WATER SHALL NOT BE CHANNELIZED IMMEDIATELY BELOW POINT OF DISCHARGE.

LEVEL SPREADER NO.	EL "A"	EL "B"	LENGTH (FT)
DP-11R	151.5	150.0	15.0
DP-12	165.8	164.3	15.0
DP-13	158.0	156.5	15.0
DP-14	154.0	152.5	25.0

LEVEL SPREADER
NTS



SECTION

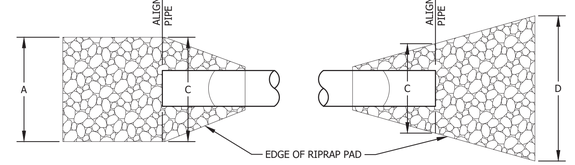


SPACING BETWEEN CHECK DAMS

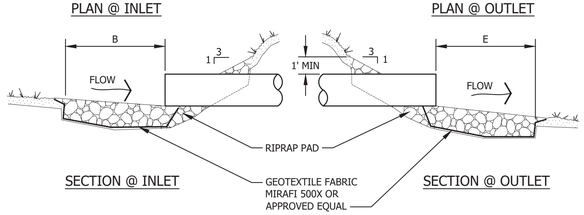
So (FT/FT)	L (FT)
0.020	75
0.030	50
0.040	40
0.050	30
0.080	20
0.100	10

STONE CHECK DAM
NTS

CROSS SECTION



PLAN @ INLET — PLAN @ OUTLET



SECTION @ INLET — SECTION @ OUTLET

RIPRAP PAD MUST BE INSTALLED WITHIN 48 HOURS OF INSTALLING NEW PIPE OR CULVERT.

PIPE	PIPE DIA (IN)	C (FT)	D (FT)	E (FT)	PAD DEPTH (IN)	D50 (IN)
DP-11R	24	6	15	20	20	10
DP-12	24	6	15	20	20	10
DP-13	24	6	15	20	20	10
DP-14	24	6	15	20	20	10
SC-2D	24	6	15	20	20	10
UNDERDRAIN DISCHARGE STRUCTURE	4	4	4	4	8	4

PIPE INLET/OUTLET DETAILS
NTS

REV.	BY	DATE	STATUS
	BDP	11/2025	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

STATE OF MAINE — BRIAN D. EMERSON — 9601 — LICENSED PROFESSIONAL ENGINEER — 11/11/2025

PHASE II EXPANSION
NEWSME LANDFILL OPERATIONS LLC
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SECTIONS AND DETAILS

SME SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	DPW/NMT
DRAWN BY:	SJM
DATE:	11/10/2025
CHECKED BY:	BDP
LMN:	LMN
CTB:	SME-STD.CTB

JOB NO. 240101.00 DWG FILE DETAILS

C-308

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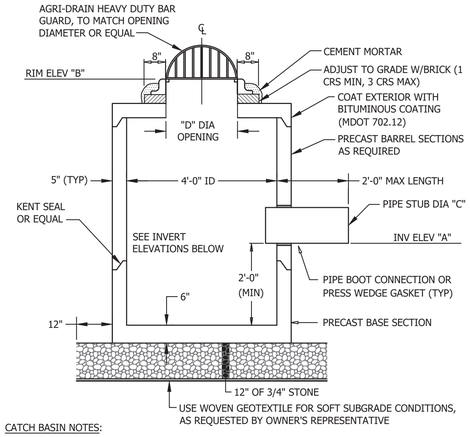


CATCH BASIN NOTES:

THE CONTRACTOR SHALL PROVIDE SUBMITTALS TO THE ENGINEER FOR APPROVAL. SUBMITTALS SHALL INCLUDE BUT NOT LIMITED TO THE FOLLOWING:

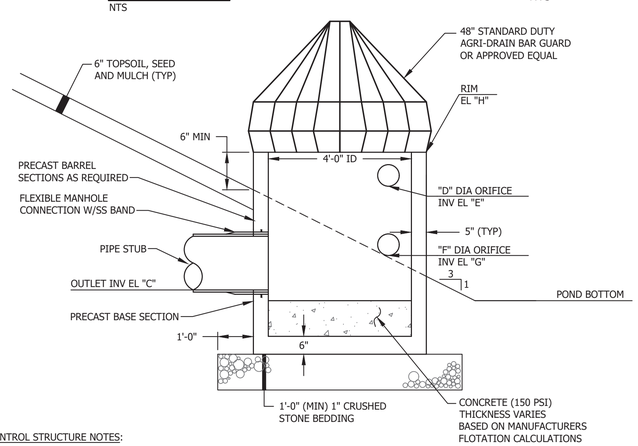
PRODUCT DATA: SUBMIT PRODUCT DATA FOR ALL MATERIALS USED ON THE JOB FOR REVIEW FOR LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH INFORMATION GIVEN AND DESIGN CONCEPT EXPRESSED IN CONTRACT DOCUMENTS.

SHOP DRAWINGS: SUBMIT FOR REVIEW SHOP DRAWINGS OF ALL PRECAST UNITS. MANUFACTURER'S INFORMATION SHALL BE SUBMITTED FOR JOINT SEALANTS AND WATERPROOFING. MANUFACTURER SHALL PROVIDE ANTI-FLOTATION DESIGN SHOP DRAWINGS AND CALCULATIONS, INCLUDING ANY EXTENDED BASE SLABS AS NECESSARY, FOR PROPOSED MANHOLES. MANUFACTURER SHALL ASSUME GROUNDWATER LEVELS EQUAL TOP OF GROUND ELEVATIONS AND PROVIDE FOR A 1.2 FACTOR OF SAFETY AGAINST FLOTATION.

CATCH BASIN SCHEDULE A

CATCH BASIN DESIGNATION	PIPE INV EL	RIM EL	PIPE DIA	TOP OPENING
	"A" (FT)	"B" (FT)	"C" (IN)	DIA "D" (IN)
CB-2B	173.0	179.0	24	30
CB-2G	173.0	179.0	24	30
CB-2D	192.0	201.0	24	30
CB-4C	167.0	171.0	24	30
CB-4D	158.00	160.5	24	30
CB-4G	161.00	167.0	24	30
CB-4H	174.0	181.0	24	30

CATCH BASIN
NTS



OUTLET CONTROL STRUCTURE NOTES:

THE CONTRACTOR SHALL PROVIDE SUBMITTALS TO THE ENGINEER FOR APPROVAL. SUBMITTALS SHALL INCLUDE BUT NOT LIMITED TO THE FOLLOWING:

PRODUCT DATA: SUBMIT PRODUCT DATA FOR ALL MATERIALS USED ON THE JOB FOR REVIEW FOR LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH INFORMATION GIVEN AND DESIGN CONCEPT EXPRESSED IN CONTRACT DOCUMENTS.

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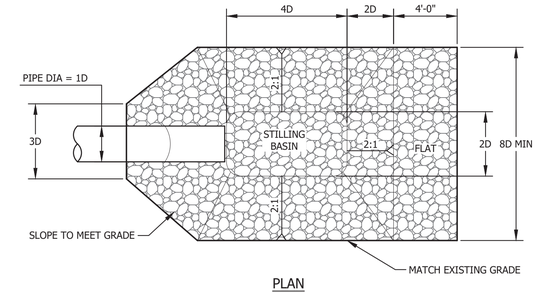
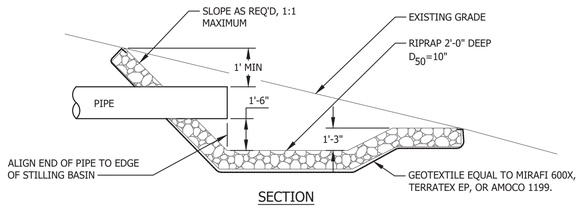
STRUCTURE DESIGNATION	OUTLET INV EL	ORIFICE DIA	ORIFICE INV EL	ORIFICE DIA	ORIFICE INV EL	RIM EL	OUTLET (C) CULVERT	CULVERT	CULVERT SLOPE
	"C" (FT)	"D" (IN)	"E" (FT)	"F" (IN)	"G" (FT)	"H" (FT)	DIAMETER (IN)	LENGTH (FT)	(FT/FT)
DP-11R	155.3	6.0	159.0	4.0	156.50	161.00	24 (CORR PE)	55.00	0.02
DP-12	168.9	6.0	174.0	4.0	171.50	175.00	24 (CORR PE)	66.00	0.01
DP-13	160.3	6.0	163.0	4.0	160.50	163.80	24 (CORR PE)	30.00	0.04
DP-14	157.0	6.0	159.0	4.0	158.00	159.80	24 (CORR PE)	55.00	0.02

OUTLET CONTROL STRUCTURE
NTS



PLAN

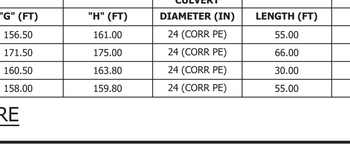


SECTION

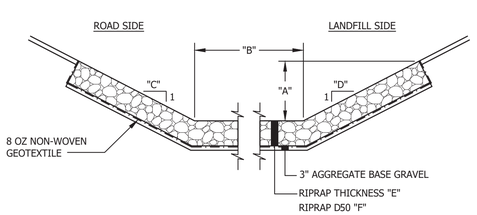
NOTES:

1. INSTALL SILT FENCE DOWNSTREAM PRIOR TO EXCAVATION.
2. LOAM AND SEED ALL AREAS DISTURBED BY CONSTRUCTION OF PLUNGE POOL.

STANDARD PLUNGE POOL
NTS



POND UNDERDRAIN
NTS

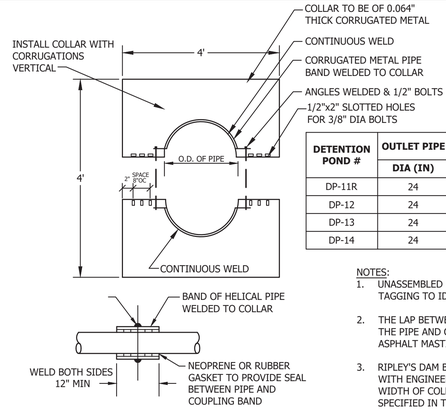


DITCH	A	B	C	D	E	F
	(FT)	(FT)			(IN)	(IN)
TOE DITCH	3	3	2	2	22	10
DITCH 2D	3	3	2	2	22	10

RIPRAP DITCH
NTS

STORM DRAIN	DIAMETER	MATERIAL	LENGTH	SLOPE	INV IN	INV OUT
	(in.)		(ft.)	(%)		
SD-2B	24	CORR PE	90.0	0.010	173.00	172.00
SD-2E	24	CORR PE	80.0	0.010	173.00	172.00
SD-2D	24	CORR PE	30.0	0.020	192.00	191.50
SD-4C	24	CORR PE	52.0	0.009	167.00	166.50
SD-4D	24	CORR PE	54.5	0.009	158.00	157.50
SD-4G	24	CORR PE	115.0	0.008	161.00	160.00
SD-4H	24	CORR PE	65.0	0.030	174.00	172.00

STORM DRAIN PIPES
NTS

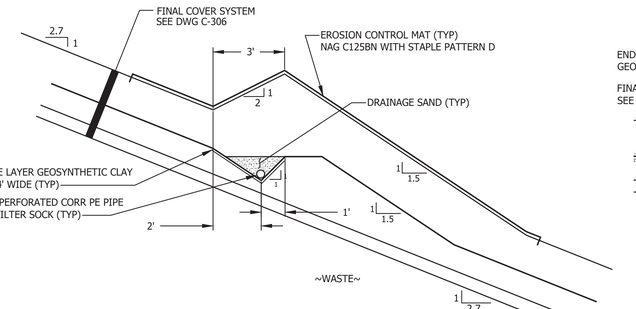


DETENTION POND #	OUTLET PIPE	PIPE LENGTH	SATURATED LENGTH	# OF	SPACING
	DIA (IN)	(FT)	(FT)	COLLARS	(FT)
DP-11R	24	55	46.2	2	15
DP-12	24	66	35.2	2	12
DP-13	24	30	42.5	2	14
DP-14	24	55	22.8	2	8

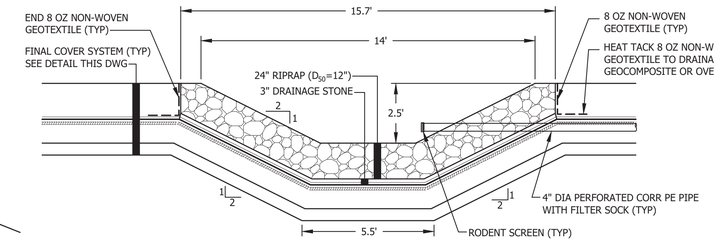
NOTES:

1. UNASSEMBLED COLLAR SHALL BE MARKED BY PAINTING OR TAGGING TO IDENTIFY MATCHING PARTS.
2. THE LAP BETWEEN THE TWO HALF SECTIONS AND BETWEEN THE PIPE AND CONNECTING BAND SHALL BE CAULKED WITH ASPHALT MASTIC AT TIME OF INSTALLATION.
3. RIPLEY'S DAM BY MCRIP MANUFACTURING MAY BE USED WITH ENGINEERS APPROVAL PROVIDING THAT LENGTH AND WIDTH OF COLLAR IS EQUAL TO OR GREATER THAN THAT SPECIFIED IN THE DETAIL.

ANTI-SEEP COLLAR
NTS



FINAL COVER SURFACE TERRACE
NTS



FINAL COVER RIPRAP DOWNSPOUT
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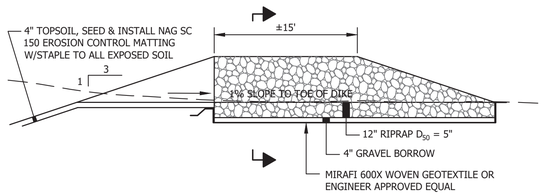
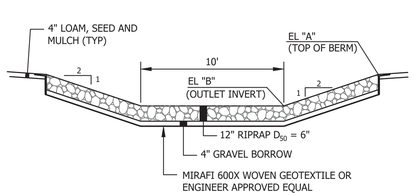


ELEVATION



SECTION

STRUCTURE DESIGNATION	BOTTOM WIDTH (FT)	LENGTH (FT)	EL "A" (FT)	D_{50} (IN)	THICKNESS (IN)	EL "B" (FT)
DP-11R	10	±15	168.0	6	12	166.5
DP-12	10	±15	180.0	6	12	178.5
DP-13	10	±15	168.0	6	12	166.5
DP-14	10	±15	162.0	6	12	160.5

EMERGENCY SPILLWAY
NTS

REV.	BY	DATE	STATUS
	BDP	11/2025	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

STATE OF MAINE — BRIAN D. PIERCE — 9600 — 11/11/2025 — PROFESSIONAL ENGINEER

PHASE II EXPANSION
NEWSME LANDFILL OPERATIONS LLC
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SECTIONS AND DETAILS

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	DPW/NMT
DRAWN BY:	SJM
DATE:	11/10/2025
CHECKED BY:	BDP
LMN:	LMN
CTB:	SME-STD.CTB

JOB NO. 240101.00 DWG FILE DETAILS

C-309

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APPENDIX L

EROSION AND SEDIMENTATION CONTROL PLAN

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PHASE II EXPANSION APPLICATION
JUNIPER RIDGE LANDFILL
EROSION AND SEDIMENTATION CONTROL PLAN

Prepared for

STATE OF MAINE BUREAU OF GENERAL SERVICES
as Owner
and
NEWSME LANDFILL OPERATIONS, LLC
as Operator

November 2025

4 Blanchard Road
P.O. Box 85A
Cumberland, Maine 04021

Tel: 207.829.5016 sme-engineers.com

SME
SEVEE & MAHER
ENGINEERS

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PHASE II EXPANSION APPLICATION
JUNIPER RIDGE LANDFILL
EROSION AND SEDIMENTATION CONTROL PLAN

1.0 INTRODUCTION

This erosion and sedimentation control plan (ESCP) for the Juniper Ridge Landfill (JRL) Phase II Expansion located in Old Town, Maine was designed to comply with the requirements of 06-096 CMR Chapter 400, Section 4.J of the Maine Solid Waste Management Rules.

This plan has been prepared to address the standards and submission requirements, including the following:

- That the facility be located on soils suitable for their intended purpose;
- That the facility does not cause unreasonable sedimentation or erosion of soil; and
- That the facility is not located in a Federal Flood Insurance Administration 100-year frequency floodplain.

2.0 SITE DESCRIPTION

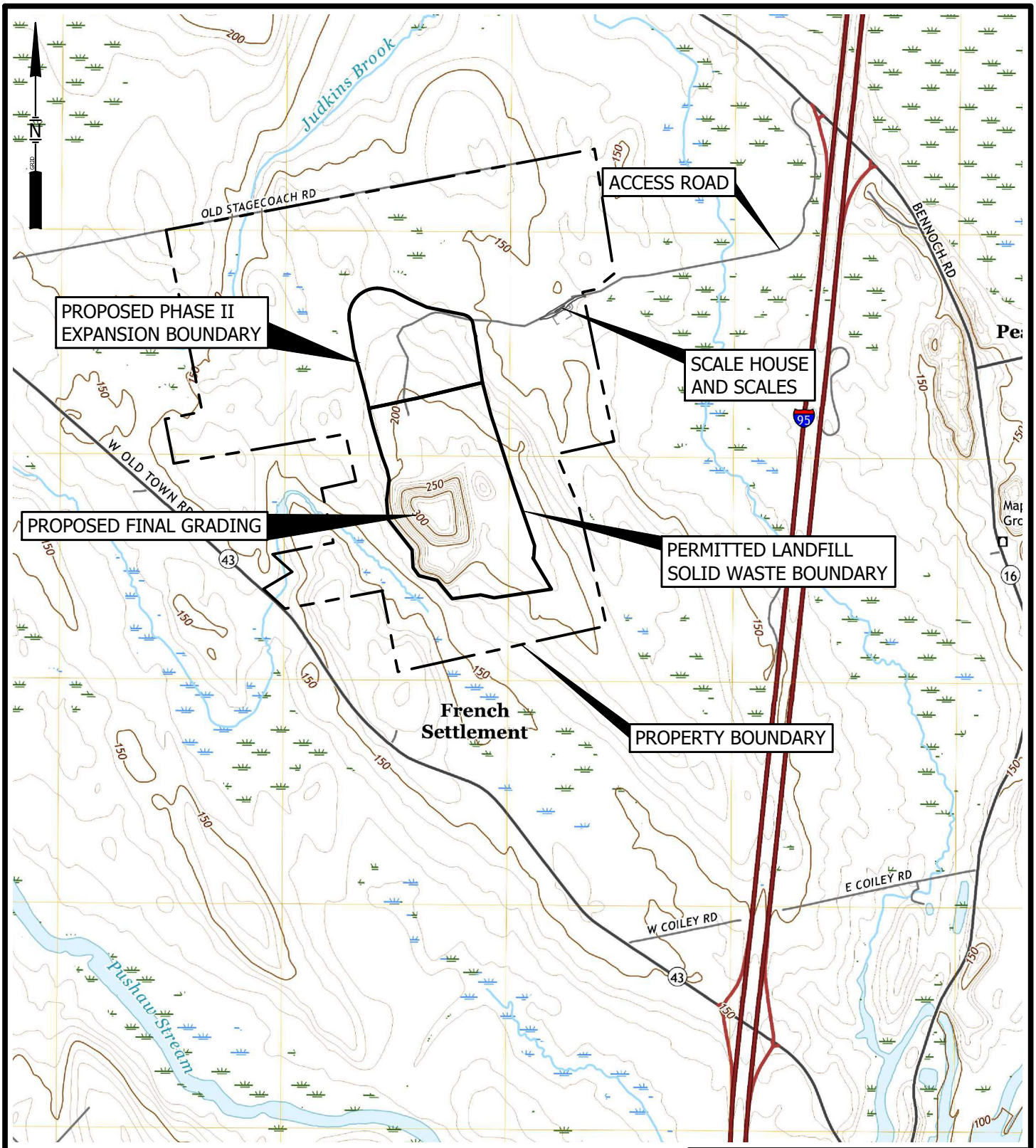
The existing landfill and the Phase II Expansion are located on an approximately 780-acre parcel of land located approximately one mile west of Interstate 95 in Old Town, Maine (see Figure 2-1).

The existing landfill consists of the previously permitted 122-acre solid waste footprint (of which approximately 115 acres are currently developed). The existing landfill infrastructure also includes a 2-mile primary access road, a maintenance/administration building, several storage buildings, a dual-scale house, a former leachate storage pond now used for stormwater detention, a leachate storage tank, five primary leachate pump stations, one leachate haul truck loading rack, one water truck loading rack, multiple detention/sedimentation ponds, soil borrow areas, construction material laydown/soil stockpile areas, parking areas and other grassed areas (i.e., berm slopes etc.), Thiopaq and Sulfa Treat gas scrubbing systems, a storage/processing pad for clean wood debris and railroad ties, a perimeter access road, a Renewable Natural Gas (RNG) Processing Facility, and two landfill gas flares (one belonging to the JRL, and the other to the owners of the RNG Processing Facility).

The Phase II Expansion will be located adjacent to and generally north of the existing landfill and will expand the solid waste footprint by approximately 57 acres. The total area of development for Phase II, including supporting site infrastructure (e.g., access roads, stormwater management ponds, etc.), will be approximately 72 acres.

The development of the Phase II Expansion is anticipated to begin in 2027 and will be constructed in a phased fashion over an approximate 10-year period. As the project progresses, subsequent landfill cells will be constructed, and intermediate or final cover will be placed on cells as they reach capacity. Development of the Phase II Expansion will also include the construction of additional site infrastructure, including stormwater management and erosion control structures, an additional leachate tank, leachate pump stations, force mains, landfill gas system infrastructure, and overhead and buried utilities.

Detention ponds will be used primarily for detention (peak stormwater flow control), but will also serve as a means of sediment control. Stormwater discharge from the ponds will be spread using level spreaders to limit erosion associated with the point discharges.



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE
OLD TOWN, MAINE - 2021
GREENBUSH, MAINE - 2021

1000 0 2000 FEET

DWG: SITELOC LMN: USGS MAP CTB: SME-STD REV: 5/30/2025

FIGURE 2-1
SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

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SEVEE & MAHER
ENGINEERS

\\Nserver\cfs\Casella\OldTownLandfill\Expansion\Phase II Expansion\Acad\Figures\SITELOC.dwg, A_FIG 2-1, 5/30/2025 2:33:46 PM, sjm

3.0 SITE SETTING

The majority of the northern portion of the 780-acre parcel is wooded, with hardwoods predominating in the upper elevations, and softwoods predominating in the lower elevations. The parcel is irregularly shaped and the existing landfill is positioned in the southern portion of the parcel. A drumlin oriented in a northwest to southeast direction effectively divides the parcel into four watersheds, east, northeast, northwest, and southwest. The northeast and the northwest watersheds both contribute to Judkins Brook and eventually Birch Stream. These watersheds will not be influenced by the Phase II Expansion. The southwest watershed contributes to an unnamed tributary to Pushaw Stream, and the east watershed drains to an unnamed and unmapped tributary to Judkins Brook. Both Birch Stream and Pushaw Stream are tributaries to the Stillwater River, which flows to the Penobscot River.

This project is not within the direct watershed of lakes most at risk for new development or an urban impaired stream, as listed in Appendices A and B of the Maine Department of Environmental Protection (MEDEP) Rules, 06-096 CMR, Chapter 502: *Direct Watersheds of Lakes Most At Risk from New Development and Urban Impaired Streams.*

The ground elevation within the Phase II Expansion area currently ranges from approximately 152 to 200 feet-MSL. The Phase II Expansion area is mostly wooded with a mixed stand of hardwood and softwood overlying underbrush along the forest floor. The existing ground within the Phase II Expansion area slopes radially from the top of the drumlin toward the property boundary at grades varying from 1 to 20 percent. Surface drainage within the Phase II Expansion area consists of sheet and shallow concentrated flow with some channelization occurring in existing roadside ditches.

The surficial soils at the site are primarily Plaisted and Howland series along with some Monarda, Buxton, and Scantic, as shown on Figure 3-1. Surficial soils at the site were delineated based on mapping shown on the Soil Conservation Service Medium Intensity Soils Survey for Penobscot County. Table 3-1 shows the hydrologic soil group (HSG) for the various soil series at the site.

TABLE 3-1

SITE SURFICIAL SOIL SUMMARY

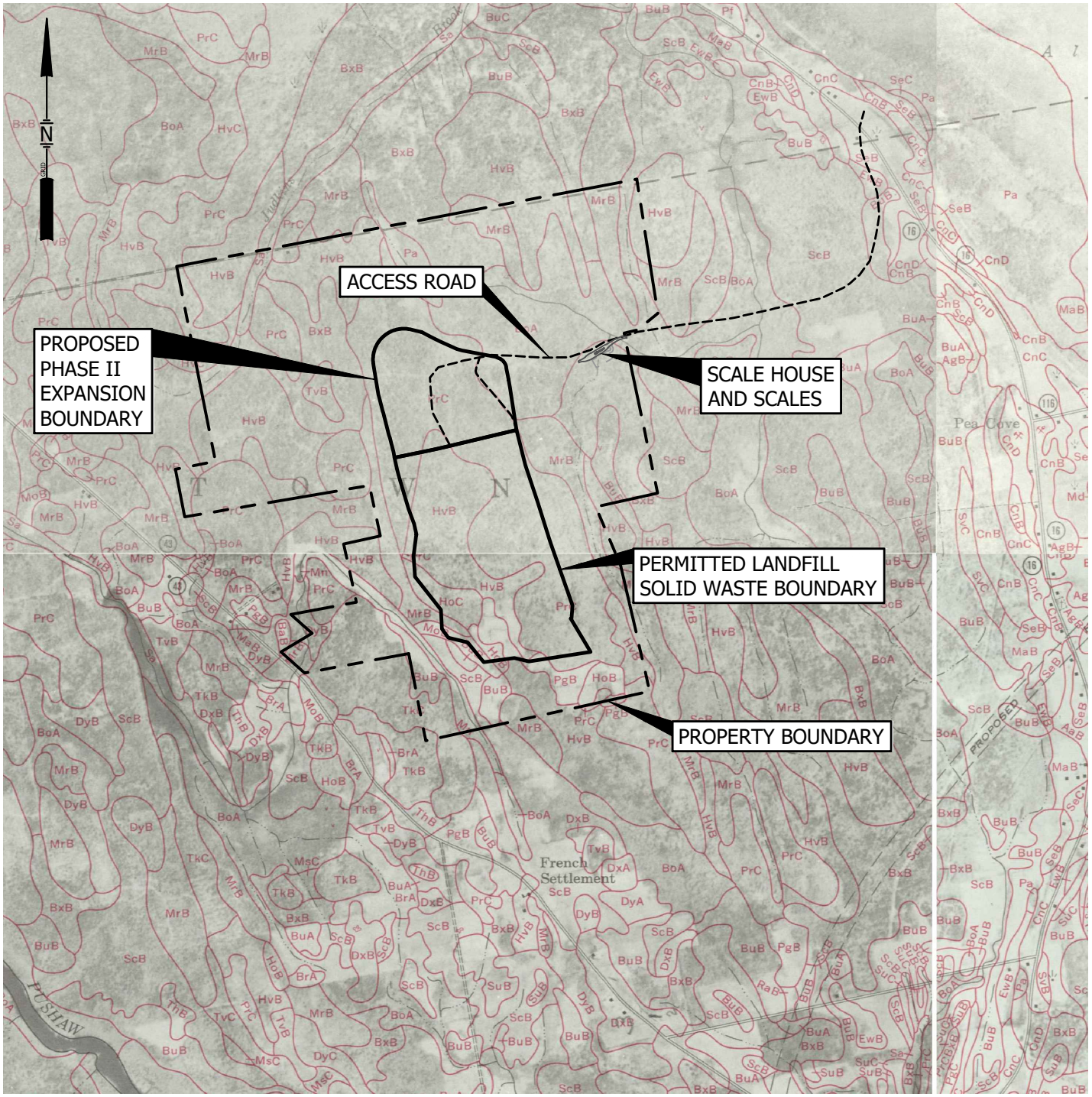
Soil Series	Hydrologic Soil Group
Plaisted	C
Howland	C
Monarda	D
Buxton	C
Scantic	D
Landfill Cover	C
Gravel Surfaces	C/D
Buildings/Roofs/Pond/Paved Surfaces	Impervious Surface

On-site observations within the landfill site have not identified areas that would be considered highly susceptible to erosion (i.e., exposed eroded sideslopes); however, US Department of Agriculture Natural Resources Conservation Services (2002) indicates that Plaisted and Howland soils with slopes greater than 15 percent should be considered highly erodible. Given the presence of these soils on-site, design and implementation of suitable erosion control practices (timing and sequence of land disturbance, temporary measures , permanent measures, inspection, and maintenance) are critical to project development.

The Phase II Expansion area and proposed detention ponds were located outside the limits of the Federal Emergency Management Agency (FEMA) 100-year floodplain shown on D-100 in Appendix A.

An emergent marsh area that forms the headwaters to an unnamed tributary that feeds Pushaw Stream is downgradient and to the southwest of the Phase II Expansion. The marsh can be classified as in good condition and stable with a heavy growth of marsh grasses and no apparent signs of erosion problems. A minimum 100-foot wooded buffer will be maintained between any site development and the emergent wetland marsh to the southwest of the existing landfill.

Design of the proposed facility was performed with a major consideration being to minimize impacts to wetland areas. Existing drainage courses will be utilized where feasible to convey stormwater from the developed site. All the runoff from the developed site will be conveyed through detention basins that attenuate peak flow rates to the unnamed tributaries feeding Pushaw Stream and Judkins Brook. Level spreaders will be installed on all detention basin outlets to disperse flows and keep surface water velocities low.



MAPPING SOURCE

NATURAL RESOURCES CONSERVATION SERVICE, WEB SOIL SURVEY OF PENOBSCOT COUNTY, MAINE, 2014. SOIL CONSERVATION SERVICE MEDIUM INTENSITY SOIL MAPS FOR PENOBSCOT COUNTY, SHEETS 203 & 213 COMPILED IN 1962.

LEGEND

BoA	BIDDEFORD MUCKY PEAT
BuB	BUXTON SILT LOAM
HoC	HOWLAND GRAVELLY LOAM
HvB	HOWLAND VERY STONY LOAM
MoB	MONARDA SILT LOAM
MrB	MONARDA-BURNHAM COMPLEX
PgB	PLAISTED GRAVELLY LOAM
PrC	PLAISTED VERY STONY LOAM
ScB	SCANTIC SILT LOAM

1000 0 2000 FEET

FIGURE 3-1
MEDIUM INTENSITY SOIL TYPES
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
SEVEE & MAHER ENGINEERS

DWG: SITELOC LMN: SOILS CTB: SME-STD JOB#: 240101.00 REV: 10/9/2025

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4.0 EXISTING AND PROPOSED DRAINAGE FACILITIES

4.1 Existing Detention Ponds

There are several existing drainage structures within the existing landfill project site. The locations of these drainage structures are shown on Drawing C-109 in Appendix A. Design considerations for each of the ponds are included in the facility's Phase II Stormwater Management Plan.

Detention Pond 1

Detention Pond 1 is located to the west of the existing landfill cells and will remain in operation throughout the Phase II Expansion development and operation. This detention pond also served as a sedimentation pond during the site's initial years of development. Detention Pond 1 currently functions as a detention and sedimentation basin and will not require any additional modifications and can adequately accommodate the peak flow both during and after the Phase II Expansion development.

Detention Pond 1A

Detention Pond 1A is located west of the existing landfill cells and adjacent to Detention Pond 1. It is used to temporarily store stormwater runoff from the developed portions of the landfill. The water collected in Pond 1A is discharged into Detention Pond 1 by way of a pipe that connects the two ponds. There are no proposed modifications to Detention Pond 1A as part of the Phase II Expansion.

Detention Ponds 2 and 6

Detention Ponds 2 and 6 are located to the south of the existing landfill and will remain in place for the life of the facility. There are no proposed modifications to either Pond 2 or Pond 6 as part of the Phase II Expansion.

Detention Pond 9

Detention Pond 9 is located in the eastern watershed, east of the permitted wood waste handling areas, and receives stormwater flow from the wood waste handling area, the maintenance/administrative building and parking area, the landfill gas treatment facility, the RNG processing facility, and the construction material laydown/soil stockpile areas. There are no proposed modifications to Pond 9 as a result of the Phase II Expansion.

Detention Pond 10

Detention Pond 10 is located in the eastern watershed. There are no proposed modifications to the detention pond as part of the Phase II Expansion.

Detention Pond 11

Detention Pond 11 is in the eastern watershed and within the footprint of future Cell 18. This detention pond will be replaced with Detention Pond 11R as part of Cell 18 Construction.

4.2 Proposed Drainage Facilities

Proposed drainage facilities used to manage stormwater associated with the Phase II Expansion will include grass-lined and riprap-lined channels, catch basins, culverts, storm drains, detention ponds, riprap aprons, riprap plunge pools, and level spreaders.

Stormwater runoff from the developed areas of the Phase II Expansion will be conveyed by a series of drainage structures including channels, catch basins, and culverts as summarized on Table 4-1. Locations of the proposed permanent channels, catch basins, and culverts are shown on Drawing C-109 included in Appendix A. The post-development stormwater analysis, provided in Drawing D-101 in Appendix A, shows the drainage area for each of the above-mentioned structures. A printout of the post-development stormwater analysis is included in Appendix B of the Phase II Expansion Stormwater Management Plan. These structures were sized to handle the peak flows from the 25-year/24-hour rainfall event.

TABLE 4-1

SUMMARY OF STORMWATER STORM DRAINS, CATCH BASINS, AND CHANNELS

Culverts	Diameter (in.)	Material	Length (ft.)	Slope (%)	Inv. In.	Inv. Out
P-1G	24	HDPE	36	0.13	335.5	331
P-1H	24(2)	CMP	56	0.017	183	182
P-1I	24	HDPE	38	0.12	290.5	286
P-1J-1	24(2)	HDPE	37	0.01	190	189.6
P-1J-2	18	HDPE	40	0.02	186.8	186
P-1K	24	HDPE	33	0.075	254.5	252
1P	24(2)	HDPE	76	0.013	206	205
12P	24(2)	HDPE	98	0.025	197.9	195.5
15P	12	HDPE	121	0.06	197.4	189.9
C-2B	24	HDPE	90	0.01	173	172
C-2E	24	HDPE	80	0.01	173	172
C-2D	24	HDPE	30	0.02	192	191.5
C-4C	24	HDPE	52	0.009	167	166.5
C-4D	24	HDPE	54.5	0.009	158	157.5
C-4G	24	HDPE	115	0.008	161	160
C-4H	24	HDPE	65	0.03	174	172
C-4IA	24	HDPE	40	0.023	213	212.2
C-4JA	18	HDPE	56	0.01	213	212.2
C-4JA3	24	HDPE	60	0.02	204.9	204
C-4JC	24	HDPE	73	0.021	211.5	210
C-4K	24	HDPE	51	0.043	216.5	214.3
C-4L	18	HDPE	121	0.017	213	211
C-4N	18	HDPE	33	0.03	184	183

Catch Basin	Basin Dia. (ft)	Grate Opening (in.)	Depth (ft)	Dia. (in.)
CB-2B	4	30	8	24
CB-2E	4	30	8	24
CB-2D	4	30	11	24
CB-4C	4	30	6	24
CB-4D	4	30	4.5	24
CB-4G	4	30	8	24
CB-4H	4	30	9	24
CB-4I	4	30	9.6	24
CB-4JA	4	30	7	18
CB-4JA3	4	30	10	24
CB-4K	4	30	4.5	24
CB-4L	4	24	4	18

Channels	Base Width (ft.)	Depth (ft.)	Sideslope Z-Value ('/')	Lining
Detention Pond 11R Emergency Spillway	10	2	2	Riprap (D50=6", t=12")
Perimeter (toe) PH II	3'	3'	2 '/'	Riprap (D50=10", t=22")
Terrace Drain	0' - V-ditch	1.5’	2 '/'	NAG C125BN erosion mat
Downspouts	4'	2'	2 '/'	Riprap (D50=12" and t=24”)

Notes:
1 Existing culverts and storm drains to remain for Post-Development condition.
2 Location of structures shown on Drawing C-109 contained in Appendix D.

Peak flows to each of the stormwater drainage structures was based on SCS TR20 methodology. Culverts and catch basins were sized using *HydroCAD* computer stormwater modeling system by Applied Microcomputer Systems of Chocorua, New Hampshire. Ditches were sized using the *Hydraulic Design Series No. 4, Design of Roadside Drainage Channels*. Channel linings and culvert inlet/outlet protection was designed using SCS guidance found in the *Maine Erosion and Sediment Control Best Management Practices (BMPs)* (SCS, 10/2016). These calculations are attached in Appendix B. Calculations for the proposed pond level spreaders, plunge pools, and emergency spillways are included in the Phase II Expansion Stormwater Management Plan.

Proposed culverts will be corrugated polyethylene pipe (CPE) with smooth interior and have diameters of 24 inches. The culverts were designed with riprap inlet aprons and riprap-lined aprons or plunge pools at their perimeter outlet. Riprap for culvert inlet and outlet protection has a D_{50} rating (i.e., 50 percent of riprap) that ranges from 4 to 10 inches. Culvert outflows will be routed through level spreaders to limit the potential for erosion.

The Phase II Expansion perimeter drainage channels will be riprap-lined channels (D_{50} of 10 inches) with a minimum base width of 3 feet, depth of 3 feet, and sideslopes of 2 horizontal to 1 vertical (2H:1V).

Riprap downspouts on the landfill cover will be lined with riprap (D_{50} of 12 inches) and have a base width of 4 feet, depth of two feet, and maximum sideslopes of 2H:1V. Riprap downspout sizing was based on the maximum longitudinal slope. Riprap downspouts were uniformly sized for capacity based on the largest contributing drainage area and riprap size based on contributing area and slope.

Surface terrace channels on the sideslopes of the landfill cover will be grass-lined 'v'-channels with a depth of 1.5 feet, longitudinal pitch of 7 percent (typical), and maximum sideslopes of 2H:1V. Surface terrace channel linings were uniformly sized based on the largest contributing drainage area and maximum expected slope.

HYDRAIN 6.01 (1996), Integrated Drainage Design Computer System, from the Federal Highway Administration (FHWA) was used to evaluate size of the riprap for downspouts and channels.

Erosion Control Materials Design Software (ECMDS) Version 4.2 (2002) from the North American Green Co. (N.A.G.) was used to evaluate temporary erosion matting for grass-lined and vegetated channels.

The HYCHL Module of the FHWA HYDRAIN 6.01 software and the ECMDS software are designed to provide recommendations for effective temporary and permanent erosion protection of stormwater ditches and channels conveying intermittent, concentrated, uniform water flows. The channel lining analysis and performance evaluations are conducted using the maximum shear stress (tractive force) method as outlined in the Federal Highway Administration's HEC-15. The stability check for channel lining materials

is based on its capability to physically survive and effectively control soil loss on the channel surface under the calculated shear stresses for a specified flow period.

The proposed detention ponds for the Phase II Expansion (Detention Ponds 11R, 12, 13, and 14) were designed to provide flow control and sedimentation during construction. Proposed Detention Ponds 11R, 12, 13, and 14 will each have a composite outlet structure consisting of a 4-foot-diameter drop inlet with side-mounted orifices which will discharge to a 24-inch-diameter HDPE outlet culvert. Each outlet culvert will have anti-seep collars to minimize "piping" of water along the outside of the outlet pipe. Each culvert outlet discharges to a riprap-lined plunge pool. From this plunge pool, stormwater discharges will flow to level spreaders that discharge to the adjacent wooded buffer areas. Plunge pools and level spreaders were designed to meet the requirements of *Maine Erosion and Sediment Control BMPs* (SCS 10/2016). Detention Ponds 11R, 12, 13, and 14 will have a riprap-lined channel emergency spillway designed to pass the 100-year/24-hour storm event with at least one foot of freeboard.

Each detention pond will include an underdrain installed in the bottom of the pond that is independently routed to the pond's exterior. This underdrain system will allow the pond to drain completely during dry times of the year.

Design calculations for the ponds, including riprap plunge pools, level spreaders, anti-seep collars, and emergency spillways, are included in the Phase II Expansion Stormwater Management Plan.

5.0 TIMING AND SEQUENCE OF LAND DISTURBANCE ACTIVITIES

The proposed timing and sequence of land disturbance activities associated with the Phase II Expansion construction activities (cell construction, cover construction, etc.) be as follows:

- Submittal of a notice of intent to comply, Maine Construction General Permit at least 14 calendar days prior to project start;
- Install silt fence and other temporary erosion control measures for the construction activities and accessory facilities such as stormwater pumping systems, detention ponds, berms, and service roads;
- Clear and grub area (if necessary);
- Construct upslope stormwater diversion berms, ditches, culvert outlets, and outlet control structures (if necessary);
- Construct service road(s) (if necessary);
- Perform construction activities;
- As permanent erosion control measures become stabilized, remove temporary measures (e.g., silt fence, stone check dams); and
- Submittal of Maine Construction General Permit notice of termination, after project completion and permanent control measures have been established.

Site construction activities will follow the landfill construction drawings and specifications that will contain detailed requirements for erosion and sedimentation control. These requirements are as discussed in Section 6.0 of this plan.

6.0 EROSION CONTROL MEASURES

To minimize erosion during Phase II Expansion cell construction, operations, and cover placement, temporary and permanent erosion control measures will be implemented. Temporary measures (e.g., silt fences, temporary seeding, mulching, and stone check dams) and permanent measures (e.g., downspouts, detention basins, permanent seeding, mulching, and culvert inlet and outlet protection) will be monitored on a regular basis. The Contractor and/or landfill operator (whichever entity is performing the construction activity) will ensure that structures are functioning properly and will perform necessary maintenance as required. Construction project technical specifications will contain an erosion and sedimentation control section. A typical specification that will be used on the project is contained in Appendix C.

6.1 Temporary Erosion Control

Temporary erosion control measures will be implemented during the Phase II Expansion cell construction, operation, and cover placement. The greatest potential for erosion to occur is during grubbing and grading operations. This is when stumps and topsoil are removed from the site, the base grades prepared, and perimeter dikes constructed. Before beginning the grubbing phase, or any other project that requires erosion control measures, a siltation fence will be placed and stone check dams will be installed in surface water drainage channels, as necessary. Once the perimeter dikes, culverts, channels, and roadway embankments are completed, they will be mulched and seeded within seven days of final grading. Areas that are disturbed and cannot be completed for periods of more than 14 days will receive temporary seeding. The seeding specifications are included on Table 6-1.

6.2 Permanent Erosion Control

Permanent erosion control measures will be implemented during the Phase II Expansion cell construction, operation, and cover placement. During landfill operations, stormwater falling within the open area of the landfill cell will be collected internally and treated as leachate. Surface water within the active cell will be collected internally within the cells and directed to the cell's leachate sump.

Upon reaching final grade, topsoil, seed, lime, fertilizer, and mulch will be applied to disturbed areas in accordance with the seeding specifications listed in Table 6-1.

TABLE 6-1

SEEDING SPECIFICATIONS

Seed Type	Permanent Seeding (120 lbs/acre)	Temorary Seeding (120 lbs/acre)
Tall Fescue	54	Winter Rye
Creeping Red Fescue	25	
Red Top	5	
White Clover (Ladino)	13	
Annual Ryegrass	8	
Birdsfoot Trefoil	5	
Timothy	10	
Fertilizer: Apply 1,300 pounds per acre of 10-10-10 fertilizer or equivalent per acre (29.8 lbs/1,000 sq. ft). Lime: Apply liquid limestone at a rate of 3 tons per acre (138-lbs/1,000 sq. ft.). Mulch: Mulch with weed-free hay or straw at 2.0 – 3.0 tons per acre with tack or 4,000 lb/acre fiber mulch. Tackifier: Use engineer approved non-asphaltic tackifier at rates specified by manufacturer or 4,000 lbs/acre of fiber mulch		

Permanent seeding operations typically occur between April 26 and August 31, at which time the soil shall be protected with mulch consisting of either hay or straw, a temporary seed mixture, and an erosion control blanket, as necessary in accordance with the Maine Erosion and Sediment Control BMPs. The mulch may be required to be secured with either netting or twine. Seeding operations shall be done on 100-by-100-foot blocks. Problem areas and continually eroding areas shall be repaired immediately and, in these areas, temporary erosion control blankets shall be used. The blankets shall conform and be installed in accordance with the manufacturer's recommendations. Silt fence shall also be installed at the toe of slopes of greater than 100 feet in length. Ditches constructed to convey water off the intermediate cover shall be protected with stone check dams. Details of erosion control fencing, stone check dams and other erosion control measures are shown on the typical erosion control drawing included in Appendix C. The detention ponds and drainage channels shall be cleaned and repaired, as necessary.

6.3 Standard Erosion Control Procedures

In addition to the measures listed in the section above, the following erosion control procedures will be implemented during the Phase II Expansion cell construction, cover placement, and operations:

- Soil erosion and sedimentation control measures will be performed in accordance with procedures outlined in the Maine Erosion and Sediment Control Best Management Practices (BMPs) (2016).
- The removal of trees, brush, and other vegetation, as well as disturbance of soil, will be kept to a minimum during site development.

- Usable topsoil will be stripped and stockpiled for reuse. Excess topsoil will be removed from the project site and disposed of or reused in an approved manner. Topsoil needed for on-site reuse will be stockpiled on-site within the permitted till borrow pit area for use in final grading. Topsoil will be stockpiled such that natural drainage is not obstructed and no off-site sedimentation will result. Sideslopes of the stockpiled topsoil will not exceed 2 horizontal to 1 vertical (2H:1V), and the stockpile will be surrounded with a siltation fence if needed to control sediment runoff. Soil Stockpiles shall be temporarily mulched as necessary, in accordance with the Maine Erosion and Sediment Control BMPs if seeding cannot be done within the recommended seeding dates.
- The site will be brought to approximate finish grades and stabilized without extended delays. This includes the application of mulch to surfaces designated for revegetation and placement of riprap where shown. Erosion and sedimentation control measures, such as bark mulch sediment barriers, stone check dams, and siltation fences, will be installed as shown, and/or adjusted to suit construction after a cut or fill slope has been created.
- The siltation fences and/or sediment barriers will be inspected after each rainfall that exceeds one (1) inch in 24 hours and at least daily during prolonged rainfall. Required repairs will be made. Sediment deposits will be removed periodically from the upstream side of the silt barriers and will be spread and stabilized in site areas not subject to erosion. The siltation fences will be replaced, as necessary, to provide proper filtering action.
- Riprap required at culverts will consist of fieldstone or rough unhewn quarry stone of approximately rectangular shape. Stones will be of a size as noted on the Construction Drawings.
- Following final grading, all graded or disturbed areas, not to be used as gravel roadways, parking areas or landfill structures, will be spread with a minimum compacted depth of four (4) inches of vegetative soil and seeded to provide a permanent vegetative cover.
- All areas receiving vegetative soil will be seeded. Permanent seeding will normally occur between April 26 and August 31. For winter construction, permanent seeding will occur after April 26 the following spring. Surface water runoff control measures (e.g., drainage ditches, berms, and culverts) will be constructed before seeding; all grading also will be performed before seeding. The top layer of soil will be loosened by tracking, raking, discing, or other acceptable means before seeding. Application rates for the lime, fertilizer, seed, and mulch are as presented in Table 6-1. The seed will be applied uniformly with a hydroseeder, drill, or cultipack seeder. Seed will not be planted if there is danger of frost shortly after seed germination. Maximum seeding depth is one-quarter-inch when using methods other than hydroseeding.
- Wood fiber, cellulose mulch or hay mulch will be spread uniformly upon completion of the seedbed preparation, liming, fertilization, and seeding. The mulch may be anchored in-place by uniformly applying an acceptable mulch binder such as Geltac or Terratac. During winter construction and on sideslopes greater than 5H:1V, hay mulch shall be anchored with mulch netting.

- If germination is unsuccessful (i.e., less than 90 percent catch) or there is unsatisfactory growth in the next year, the area will be reseeded in accordance with seeding specifications described herein.

6.4 Additional Erosion Control Procedures (Project Specific)

Expansion-related construction projects that include a disturbed area of greater than one acre will be required to obtain a Construction General Permit (CGP) that requires creation of a project-specific Stormwater Pollution Prevention Plan (SWPPP). The CGP SWPPP will contain a site plan; provide project-specific erosion and sedimentation controls; and include inspection, maintenance, and housekeeping requirements. In the case of large construction activities (greater than 5 acres of disturbed area), the SWPPP will also include a construction sequence, setbacks, temporary sedimentation basins (if necessary), stump dumps (if applicable), minimum required on-site mulch storage, soil testing requirements, identify elevated erosion risk subcatchments, require a MEDEP-certified contractor perform the work, require inspection and documentation by MEDEP Certified Erosion Control Inspector, and provide calculations supporting design of the items listed in the sections above. A project-specific CGP SWPPP will be created and submitted with the CGP prior to each individual phase of development.

7.0 MAINTENANCE

7.1 Routine Maintenance

Inspection shall be performed annually by a qualified person during wet weather to ensure that the stormwater control structures and the erosion and sediment control systems perform as intended. Inspection priorities shall include checking erosion controls for accumulation of sediments, functioning of inlet/outlet structures of the ponds, and the integrity of the ponds' earthen berms.

Maintenance of the detention ponds will be an ongoing process, consisting of routine inspections of the inlet structures, containment dikes, and outlet structures. Periodically (every two years), sediment will be removed from the ponds and deposited within the limits of the landfill where future erosion of the sediment is unlikely.

7.2 Grassed Areas

Routine maintenance of grassed areas shall consist of:

- Applying lime according to a soil test as necessary; and
- Topdressing with fertilizer in the early spring (before May 15) one year after planting, with a balanced fertilizer, applying 50 pounds of nitrogen/acre (500 pounds of 10-20-20 per acre).

8.0 INSPECTIONS

Inspections will be undertaken by the Landfill Operator or a qualified person to assure that temporary and permanent erosion and sedimentation controls are properly installed and correctly functioning, and that additional erosion control measures are installed if needed. Such inspections will occur bi-weekly and after each significant rainfall event (1 inch or more within a 24-hour period) during construction until permanent erosion control measures have been properly installed and the site is stabilized.

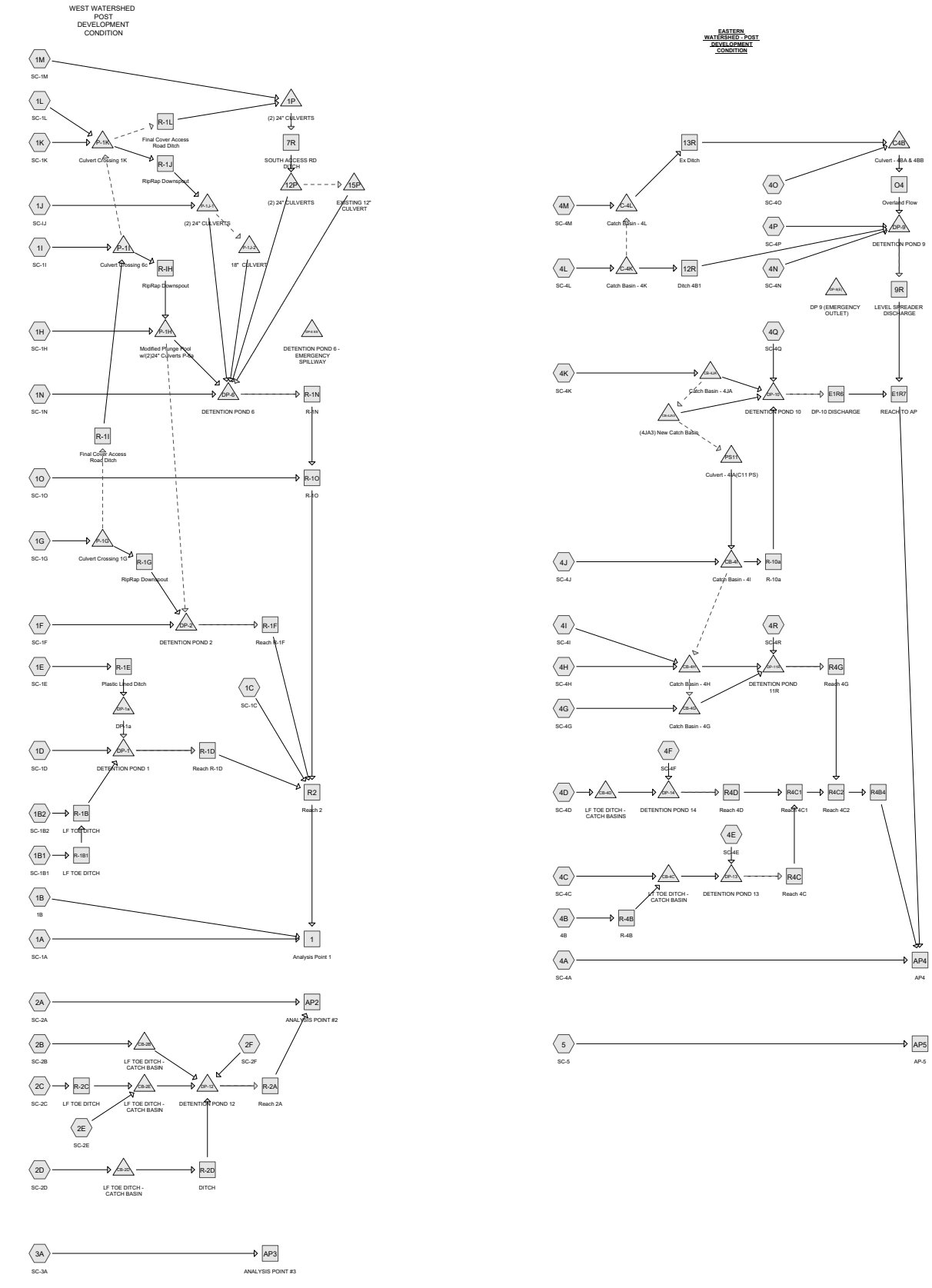
9.0 CONCLUSION

The Phase II Expansion is located on soils suitable for landfill development, and that will not cause unreasonable sedimentation or erosion of soil if constructed, inspected, and maintained in accordance with this plan.

APPENDIX A

POST-DEVELOPMENT STORMWATER ANALYSIS DRAWING D-101 AND FINAL SITE DRAINAGE PLAN DRAWING C-109

SME
SEVEE & MAHER
ENGINEERS



Routing Diagram for Post-Development_20250312

Prepared by Sevee & Maher Engineers, Printed 5/29/2025

HydroCAD® 10.20-7a s/n 01260 © 2025 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr Storm	Type II 24-hr		Default	24.00	1	2.70	2
2	10-yr Storm	Type II 24-hr		Default	24.00	1	3.90	2
3	25-yr Storm	Type II 24-hr		Default	24.00	1	4.90	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
3.393	79	50-75% Grass cover, Fair, HSG C (4Q)
14.519	74	>75% Grass cover, Good, HSG C (2F, 4N, 4O, 4P, 4Q, 4R)
1.074	70	Brush, Fair, HSG C (4O)
0.338	98	Building/Concrete Slabs (4N)
3.930	98	Existing Waterbody (2A, 3A)
0.032	91	Fallow, bare soil, HSG C, rip rap (1H)
6.452	91	Gravel (1F, 1J, 4A, 4N, 4P)
2.122	96	Gravel Surface (1A, 1C, 1D, 1E, 1G, 1N, 1O)
2.329	89	Gravel roads, HSG C (1K, 1L, 4A, 4O, 4P)
2.879	98	Impervious Surface (1A, 1O, 4A, 4O)
168.865	71	Landfill Final Cover (1B, 1B2, 1D, 1E, 1F, 1G, 1I, 1J, 1K, 1L, 1M, 2B, 2C, 2D, 2E, 4B, 4C, 4D, 4G, 4H, 4I, 4J, 4K, 4L, 4M)
17.694	78	Meadow HSG D (1A, 1C, 1N, 1O)
50.348	71	Meadow, non-grazed, HSG C (1A, 1B1, 1C, 1H, 1O, 2A, 3A, 4A, 4E, 4F, 4N)
5.359	98	Paved Area (1O, 2A, 3A, 4A, 4N, 4O, 4P)
0.283	92	Paved roads w/open ditches, 50% imp, HSG C (1M)
2.758	93	Paved roads w/open ditches, 50% imp, HSG D (2F, 4Q, 4R, 5)
3.819	98	Pond (1N, 4P, 4Q)
0.800	78	Pond, Meadow HSG D (1D)
5.663	98	Riprap (1B1, 1B2, 1D, 1E, 1I, 1K, 2B, 2C, 2D, 2E, 4B, 4C, 4D, 4G, 4H, 4I, 4J, 4K, 4L, 4M)
0.007	98	Roofs, HSG C (1F)
255.568	70	Woods, Good, HSG C (1A, 1C, 1N, 1O, 2A, 3A, 4A, 5)
307.674	77	Woods, Good, HSG D (1A, 1C, 1O, 2A, 3A, 4A, 5)
855.906	**74**	**TOTAL AREA**

Summary for Subcatchment 1A: SC-1A

Runoff = 5.44 cfs @ 13.15 hrs, Volume= 1.359 af, Depth= 0.72"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.084	70	Woods, Good, HSG C
*	7.750	77	Woods, Good, HSG D
*	1.540	71	Meadow, non-grazed, HSG C
*	1.760	78	Meadow HSG D
*	0.070	96	Gravel Surface
*	0.330	98	Impervious Surface
	22.534	74	Weighted Average
	22.204		98.54% Pervious Area
	0.330		1.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.4	1,840		1.50		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
93.1	2,250	Total			

Summary for Subcatchment 1B: 1B

Runoff = 0.39 cfs @ 11.94 hrs, Volume= 0.017 af, Depth= 0.59"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.344	71	Landfill Final Cover
	0.344		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segement A-B**

Summary for Subcatchment 1B1: SC-1B1

Runoff = 6.76 cfs @ 12.06 hrs, Volume= 0.451 af, Depth= 0.64"
Routed to Reach R-1B1 : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	8.111	71	Meadow, non-grazed, HSG C
*	0.400	98	Riprap
	8.511	72	Weighted Average
	8.111		95.30% Pervious Area
	0.400		4.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	140	0.1000	4.74		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	240	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	482	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.8	1,012	Total			

Summary for Subcatchment 1B2: SC-1B2

Runoff = 8.63 cfs @ 12.07 hrs, Volume= 0.583 af, Depth= 0.64"
Routed to Reach R-1B : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	10.600	71	Landfill Final Cover
*	0.403	98	Riprap
	11.003	72	Weighted Average
	10.600		96.34% Pervious Area
	0.403		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.6	75	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	403	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	554	0.3300	19.66	314.62	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.050 Mountain streams w/large boulders
13.1	1,182	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 4.26 cfs @ 12.90 hrs, Volume= 0.872 af, Depth= 0.82"
Routed to Reach R2 : Reach 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	6.100	77	Woods, Good, HSG D
*	0.690	70	Woods, Good, HSG C
*	3.100	78	Meadow HSG D
*	2.580	71	Meadow, non-grazed, HSG C
*	0.310	96	Gravel Surface
	12.780	76	Weighted Average
	12.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.6	170	0.0133	1.73		**Shallow Concentrated Flow, Segment ID: B-C** Grassed Waterway Kv= 15.0 fps
16.7					**Direct Entry, Segment ID: C-D**
75.0	370	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 9.74 cfs @ 12.06 hrs, Volume= 0.647 af, Depth= 0.64"
Routed to Pond DP-1 : DETENTION POND 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.000	71	Landfill Final Cover
*	0.110	96	Gravel Surface
*	0.800	78	Pond, Meadow HSG D
*	0.300	98	Riprap
	12.210	72	Weighted Average
	11.910		97.54% Pervious Area
	0.300		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.3	241	0.0700	12.78	172.52	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.025
0.3	556	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
12.7	1,057	Total			

Summary for Subcatchment 1E: SC-1E

Runoff = 7.89 cfs @ 12.05 hrs, Volume= 0.508 af, Depth= 0.64"
Routed to Reach R-1E : Plastic Lined Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	9.100	71	Landfill Final Cover
*	0.200	96	Gravel Surface
*	0.280	98	Riprap
	9.580	72	Weighted Average
	9.300		97.08% Pervious Area
	0.280		2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	146	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	296	0.0700	16.72	200.67	**Trap/Vee/Rect Channel Flow, Segment ID: B-C** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.025
0.3	537	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
0.3	186	0.0700	10.28	57.82	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 '/' Top.W=7.50' n= 0.030 Earth, grassed & winding
11.9	1,165	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 8.89 cfs @ 11.97 hrs, Volume= 0.429 af, Depth= 0.64"
Routed to Pond DP-2 : DETENTION POND 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	7.747	71	Landfill Final Cover
*	0.349	91	Gravel
	0.007	98	Roofs, HSG C
	8.103	72	Weighted Average
	8.096		99.91% Pervious Area
	0.007		0.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	100	0.3800	0.51		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	293	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.2	300	0.3800	29.77	669.83	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.50' Z= 2.0 '/' Top.W=14.00' n= 0.040 Earth, cobble bottom, clean sides
4.7	693	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 1.55 cfs @ 12.06 hrs, Volume= 0.100 af, Depth= 0.68"
Routed to Pond P-1G : Culvert Crossing 1G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	1.625	71	Landfill Final Cover
*	0.147	96	Gravel Surface
	1.772	73	Weighted Average
	1.772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	142	0.1500	2.71		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	154	0.0700	8.95	60.43	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.035 Earth, dense weeds

12.5 446 Total

Summary for Subcatchment 1H: SC-1H

Runoff = 3.09 cfs @ 11.95 hrs, Volume= 0.138 af, Depth= 0.59"
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.032	91	Fallow, bare soil, HSG C, rip rap
	2.759	71	Meadow, non-grazed, HSG C
	2.791	71	Weighted Average
	2.791		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	66	0.3900	0.47		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
0.3	140	0.0800	9.12	27.13	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.030 Earth, grassed & winding
0.2	190	0.1430	16.62	49.46	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.022 Earth, clean & straight
2.8	396	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 3.66 cfs @ 12.02 hrs, Volume= 0.207 af, Depth= 0.64"
Routed to Pond P-1I : Culvert Crossing 6c

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	3.829	71	Landfill Final Cover
*	0.077	98	Riprap
	3.906	72	Weighted Average
	3.829		98.03% Pervious Area
	0.077		1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	150	0.1000	0.32		**Sheet Flow, Segment AB** Grass: Short n= 0.150 P2= 2.70"
0.4	106	0.1000	4.74		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
0.4	260	0.0700	10.44	70.50	**Trap/Vee/Rect Channel Flow, Segment C - D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.030 Earth, grassed & winding
0.1	140	0.3300	39.33	629.24	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.025 Rubble masonry, cemented
8.7	656	Total			

Summary for Subcatchment 1J: SC-IJ

Runoff = 2.13 cfs @ 11.95 hrs, Volume= 0.096 af, Depth= 0.64"
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	1.763	71	Landfill Final Cover
*	0.046	91	Gravel
	1.809	72	Weighted Average
	1.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	67	0.5000	0.52		**Sheet Flow, SEGMENT AB** Grass: Short n= 0.150 P2= 2.70"
0.8	325	0.1900	6.54		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	325	0.0300	12.44	149.28	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.022 Earth, clean & straight
3.3	717	Total			

Summary for Subcatchment 1K: SC-1K

Runoff = 3.34 cfs @ 11.95 hrs, Volume= 0.148 af, Depth= 0.68"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	2.350	71	Landfill Final Cover
	0.163	89	Gravel roads, HSG C
*	0.111	98	Riprap
	2.624	73	Weighted Average
	2.513		95.77% Pervious Area
	0.111		4.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	68	0.3300	0.44		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 2.70"
0.4	93	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.3	249	0.3300	12.60	201.68	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.078 Riprap, 12-inch
3.3	410	Total			

Summary for Subcatchment 1L: SC-1L

Runoff = 1.95 cfs @ 11.95 hrs, Volume= 0.089 af, Depth= 0.64"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	1.607	71	Landfill Final Cover
	0.064	89	Gravel roads, HSG C
	1.671	72	Weighted Average
	1.671		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	67	0.4000	0.48		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	442	0.1000	6.15	49.59	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=2.00' D=1.50' Z= 2.0 & 2.5 '/' Top.W=8.75' n= 0.069 Riprap, 6-inch
3.5	509	Total			

Summary for Subcatchment 1M: SC-1M

Runoff = 4.52 cfs @ 12.06 hrs, Volume= 0.299 af, Depth= 0.64"
Routed to Pond 1P : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	5.368	71	Landfill Final Cover
	0.283	92	Paved roads w/open ditches, 50% imp, HSG C
	5.651	72	Weighted Average
	5.509		97.50% Pervious Area
	0.141		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	73	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	174	0.0700	11.06	265.40	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=2.00' Z= 2.0 & 10.0 '/' Top.W=24.00' n= 0.035 Earth, dense weeds
0.5	413	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.6	810	Total			

Summary for Subcatchment 1N: SC-1N

Runoff = 7.05 cfs @ 12.30 hrs, Volume= 0.754 af, Depth= 1.03"
Routed to Pond DP-6 : DETENTION POND 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	2.942	70	Woods, Good, HSG C
*	3.662	78	Meadow HSG D
*	0.572	96	Gravel Surface
*	1.607	98	Pond
	8.783	80	Weighted Average
	7.176		81.70% Pervious Area
	1.607		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.7	123	0.0569	1.19		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
0.5	370	0.0189	12.43	801.88	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=2.00' D=3.00' Z= 10.0 & 3.0 '/' Top.W=41.00' n= 0.022 Earth, clean & straight
33.0	593	Total			

Summary for Subcatchment 1O: SC-1O

Runoff = 17.81 cfs @ 12.39 hrs, Volume= 2.246 af, Depth= 0.87"
Routed to Reach R-1O : R-1O

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	13.230	77	Woods, Good, HSG D
*	5.712	70	Woods, Good, HSG C
*	9.172	78	Meadow HSG D
*	1.195	71	Meadow, non-grazed, HSG C
*	0.713	96	Gravel Surface
*	0.515	98	Impervious Surface
*	0.494	98	Paved Area
	31.031	77	Weighted Average
	30.022		96.75% Pervious Area
	1.009		3.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0100	0.07		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
15.1	1,875	0.0190	2.07		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
12.8	856	0.0500	1.12		**Shallow Concentrated Flow, Segment CD** Woodland Kv= 5.0 fps
39.7	2,781	Total			

Summary for Subcatchment 2A: SC-2A

Runoff = 8.33 cfs @ 13.94 hrs, Volume= 2.898 af, Depth= 0.72"
Routed to Reach AP2 : ANALYSIS POINT #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	24.340	70	Woods, Good, HSG C
	15.830	77	Woods, Good, HSG D
*	5.898	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area
	1.600	98	Existing Waterbody
	48.048	74	Weighted Average
	46.068		95.88% Pervious Area
	1.980		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
42.6	534	0.0070	0.21		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
10.6	1,213		1.90		**Direct Entry, Segment C-D (STWC, 0.008)**
144.3	1,897	Total			

Summary for Subcatchment 2B: SC-2B

Runoff = 6.91 cfs @ 12.09 hrs, Volume= 0.493 af, Depth= 0.64"
Routed to Pond CB-2B : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	9.090	71	Landfill Final Cover
*	0.218	98	Riprap
	9.308	72	Weighted Average
	9.090		97.66% Pervious Area
	0.218		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.3	178	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	252	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	455	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
0.8	136	0.0100	3.00	81.02	**Trap/Vee/Rect Channel Flow, Segment E-F** Bot.W=3.00' D=3.00' Z= 2.0 '/' Top.W=15.00' n= 0.069 Riprap, 6-inch
14.4	1,171	Total			

Summary for Subcatchment 2C: SC-2C

Runoff = 7.41 cfs @ 12.08 hrs, Volume= 0.516 af, Depth= 0.64"
Routed to Reach R-2C : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	9.383	71	Landfill Final Cover
*	0.357	98	Riprap
	9.740	72	Weighted Average
	9.383		96.33% Pervious Area
	0.357		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	158	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.6	308	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	474	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,090	Total			

Summary for Subcatchment 2D: SC-2D

Runoff = 7.14 cfs @ 12.07 hrs, Volume= 0.493 af, Depth= 0.64"
Routed to Pond CB-2D : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	8.931	71	Landfill Final Cover
*	0.366	98	Riprap
	9.297	72	Weighted Average
	8.931		96.06% Pervious Area
	0.366		3.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	157	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	248	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	475	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.6	1,030	Total			

Summary for Subcatchment 2E: SC-2E

Runoff = 0.80 cfs @ 11.94 hrs, Volume= 0.035 af, Depth= 0.77"
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.466	71	Landfill Final Cover
*	0.073	98	Riprap
	0.539	75	Weighted Average
	0.466		86.46% Pervious Area
	0.073		13.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 2F: SC-2F

Runoff = 4.93 cfs @ 11.94 hrs, Volume= 0.211 af, Depth= 0.97"
Routed to Pond DP-12 : DETENTION POND 12

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
1.947	74	>75% Grass cover, Good, HSG C
0.655	93	Paved roads w/open ditches, 50% imp, HSG D
2.602	79	Weighted Average
2.274		87.41% Pervious Area
0.327		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 3A: SC-3A

Runoff = 29.28 cfs @ 15.25 hrs, Volume= 15.029 af, Depth= 0.68"
Routed to Reach AP3 : ANALYSIS POINT #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	158.900	70	Woods, Good, HSG C
	102.800	77	Woods, Good, HSG D
	1.000	71	Meadow, non-grazed, HSG C
*	0.564	98	Paved Area
*	2.330	98	Existing Waterbody
	265.594	73	Weighted Average
	262.700		98.91% Pervious Area
	2.894		1.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
105.2	1,116	0.0050	0.18		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
78.7	3,093		0.66		**Direct Entry, Segment C-D (STWC, 0.001)**
240.2	4,359	Total			

Summary for Subcatchment 4A: SC-4A

Runoff = 22.65 cfs @ 16.26 hrs, Volume= 14.143 af, Depth= 0.82"
Routed to Reach AP4 : AP4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	130.444	77	Woods, Good, HSG D
	44.640	70	Woods, Good, HSG C
*	23.410	71	Meadow, non-grazed, HSG C
*	3.300	98	Paved Area
*	2.520	91	Gravel
	1.000	89	Gravel roads, HSG C
*	2.000	98	Impervious Surface
	207.314	76	Weighted Average
	202.014		97.44% Pervious Area
	5.300		2.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
200.8	1,905	0.0040	0.16		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
17.7	1,592		1.50		**Direct Entry, Segment C-D (STWC, 0.0031)**
7.9	760		1.60		**Direct Entry, Segment D-E (STWC, 0.005)**
6.7	963		2.40		**Direct Entry, Segment E-F (STWC, 0.0125)**
324.2	5,370	Total			

Summary for Subcatchment 4B: 4B

Runoff = 4.35 cfs @ 12.06 hrs, Volume= 0.278 af, Depth= 0.72"
Routed to Reach R-4B : R-4B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	4.150	71	Landfill Final Cover
*	0.452	98	Riprap
	4.602	74	Weighted Average
	4.150		90.18% Pervious Area
	0.452		9.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	32	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	240	0.0700	8.81	49.56	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 3.0 '/' Top.W=7.50' n= 0.035 Earth, dense weeds
0.4	342	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.5	764	Total			

Summary for Subcatchment 4C: SC-4C

Runoff = 6.23 cfs @ 12.02 hrs, Volume= 0.353 af, Depth= 0.72"
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.566	98	Riprap
*	5.290	71	Landfill Final Cover
	5.856	74	Weighted Average
	5.290		90.33% Pervious Area
	0.566		9.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	101	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	442	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 Earth, dense weeds
0.4	365	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.4	908	Total			

Summary for Subcatchment 4D: SC-4D

Runoff = 11.18 cfs @ 12.02 hrs, Volume= 0.641 af, Depth= 0.64"
Routed to Pond CB-4D : LF TOE DITCH - CATCH BASINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.800	71	Landfill Final Cover
*	0.295	98	Riprap
	12.095	72	Weighted Average
	11.800		97.56% Pervious Area
	0.295		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.2	117	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	504	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.0	721	Total			

Summary for Subcatchment 4E: SC-4E

Runoff = 1.09 cfs @ 11.95 hrs, Volume= 0.049 af, Depth= 0.59"
Routed to Pond DP-13 : DETENTION POND 13

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.992	71	Meadow, non-grazed, HSG C
0.992		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	300		1.67		**Direct Entry, Segment A-B**

Summary for Subcatchment 4F: SC-4F

Runoff = 1.53 cfs @ 11.94 hrs, Volume= 0.068 af, Depth= 0.59"
Routed to Pond DP-14 : DETENTION POND 14

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
1.366	71	Meadow, non-grazed, HSG C
1.366		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	500		4.17		**Direct Entry, Segment A-B**

Summary for Subcatchment 4G: SC-4G

Runoff = 8.57 cfs @ 12.08 hrs, Volume= 0.597 af, Depth= 0.64"
Routed to Pond CB-4G : Catch Basin - 4G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.040	71	Landfill Final Cover
*	0.220	98	Riprap
	11.260	72	Weighted Average
	11.040		98.05% Pervious Area
	0.220		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	143	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	390	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	497	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,180	Total			

Summary for Subcatchment 4H: SC-4H

Runoff = 8.50 cfs @ 12.09 hrs, Volume= 0.617 af, Depth= 0.59"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	12.330	71	Landfill Final Cover
*	0.135	98	Riprap
	12.465	71	Weighted Average
	12.330		98.92% Pervious Area
	0.135		1.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	232	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	464	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	440	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.3	1,286	Total			

Summary for Subcatchment 4I: SC-4I

Runoff = 2.90 cfs @ 11.95 hrs, Volume= 0.130 af, Depth= 0.59"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	2.595	71	Landfill Final Cover
*	0.036	98	Riprap
	2.631	71	Weighted Average
	2.595		98.63% Pervious Area
	0.036		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, A-B**

Summary for Subcatchment 4J: SC-4J

Runoff = 9.80 cfs @ 12.08 hrs, Volume= 0.692 af, Depth= 0.64"
Routed to Pond CB-4I : Catch Basin - 4I

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	12.590	71	Landfill Final Cover
*	0.462	98	Riprap
	13.052	72	Weighted Average
	12.590		96.46% Pervious Area
	0.462		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	223	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	386	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.4	376	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.1	1,135	Total			

Summary for Subcatchment 4K: SC-4K

Runoff = 6.51 cfs @ 12.19 hrs, Volume= 0.618 af, Depth= 0.64"
Routed to Pond CB-4JA : Catch Basin - 4JA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	11.234	71	Landfill Final Cover
*	0.429	98	Riprap
	11.663	72	Weighted Average
	11.234		96.32% Pervious Area
	0.429		3.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
10.3	432	0.0100	0.70		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	432	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	392	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
22.9	1,406	Total			

Summary for Subcatchment 4L: SC-4L

Runoff = 10.40 cfs @ 12.10 hrs, Volume= 0.765 af, Depth= 0.64"
Routed to Pond C-4K : Catch Basin - 4K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	14.000	71	Landfill Final Cover
*	0.437	98	Riprap
	14.437	72	Weighted Average
	14.000		96.97% Pervious Area
	0.437		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
2.6	242	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.9	476	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	406	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
15.3	1,274	Total			

Summary for Subcatchment 4M: SC-4M

Runoff = 0.88 cfs @ 11.93 hrs, Volume= 0.038 af, Depth= 0.68"
Routed to Pond C-4L : Catch Basin - 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	0.633	71	Landfill Final Cover
*	0.046	98	Riprap
	0.679	73	Weighted Average
	0.633		93.23% Pervious Area
	0.046		6.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 4N: SC-4N

Runoff = 6.78 cfs @ 12.13 hrs, Volume= 0.515 af, Depth= 1.03"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	2.512	74	>75% Grass cover, Good, HSG C
*	0.245	98	Paved Area
*	0.338	98	Building/Concrete Slabs
*	1.404	91	Gravel
	1.497	71	Meadow, non-grazed, HSG C
	5.996	80	Weighted Average
	5.413		90.28% Pervious Area
	0.583		9.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	61	0.0200	1.14		**Sheet Flow, Segment A-B** Smooth surfaces n= 0.011 P2= 2.70"
10.5	61	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
7.9	955	0.0180	2.01		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
19.3	1,077	Total			

Summary for Subcatchment 4O: SC-4O

Runoff = 3.16 cfs @ 12.06 hrs, Volume= 0.197 af, Depth= 0.97"
Routed to Pond C4B : Culvert - 4BA & 4BB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	1.074	70	Brush, Fair, HSG C
*	0.034	98	Impervious Surface
	0.687	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
*	0.240	98	Paved Area
	2.422	79	Weighted Average
	2.148		88.69% Pervious Area
	0.274		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	24	0.0200	0.95		**Sheet Flow, Segment AB** Smooth surfaces n= 0.011 P2= 2.70"
0.8	19	0.5000	0.41		**Sheet Flow, Segment BC** Grass: Short n= 0.150 P2= 2.70"
11.9	584	0.0137	0.82		**Shallow Concentrated Flow, Segment CD** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0250	7.14	85.66	**Trap/Vee/Rect Channel Flow, Segment DE** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.035
13.2	667	Total			

Summary for Subcatchment 4P: SC-4P

Runoff = 7.66 cfs @ 12.29 hrs, Volume= 0.800 af, Depth= 1.48"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	0.415	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.500	98	Pond
*	0.136	98	Paved Area
	6.488	87	Weighted Average
	4.852		74.78% Pervious Area
	1.636		25.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	125	0.0216	0.12		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	25	0.0520	0.78		**Sheet Flow, Segment B-C** n= 0.023 P2= 2.70"
2.0	270	0.0190	2.22		**Shallow Concentrated Flow, Segment C-D** Unpaved Kv= 16.1 fps
0.2	44	0.3300	4.02		**Shallow Concentrated Flow, Segment D-E** Short Grass Pasture Kv= 7.0 fps
2.0	102	0.0150	0.86		**Shallow Concentrated Flow, Segment E-F** Short Grass Pasture Kv= 7.0 fps
11.2	258	0.0030	0.38		**Shallow Concentrated Flow, Segment F-G** Short Grass Pasture Kv= 7.0 fps
33.9	824	Total			

Summary for Subcatchment 4Q: SC-4Q

Runoff = 16.86 cfs @ 11.99 hrs, Volume= 0.831 af, Depth= 0.97"
Routed to Pond DP-10 : DETENTION POND 10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	3.393	79	50-75% Grass cover, Fair, HSG C
	1.056	93	Paved roads w/open ditches, 50% imp, HSG D
*	0.712	98	Pond
	5.073	74	>75% Grass cover, Good, HSG C
	10.234	79	Weighted Average
	8.994		87.88% Pervious Area
	1.240		12.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	150	0.0500	0.59		**Sheet Flow, AB** Fallow n= 0.050 P2= 2.70"
0.2	85	0.1600	6.44		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
2.5	625	0.0800	4.24		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
6.9	860	Total			

Summary for Subcatchment 4R: SC-4R

Runoff = 4.24 cfs @ 12.04 hrs, Volume= 0.248 af, Depth= 0.97"
Routed to Pond DP-11R : DETENTION POND 11R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.757	93	Paved roads w/open ditches, 50% imp, HSG D
2.296	74	>75% Grass cover, Good, HSG C
3.053	79	Weighted Average
2.674		87.60% Pervious Area
0.378		12.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	37	0.0200	1.04		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 2.70"
0.4	215	0.3300	9.25		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
10.4	338	0.0060	0.54		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.4	590	Total			

Summary for Subcatchment 5: SC-5

Runoff = 6.25 cfs @ 14.50 hrs, Volume= 2.665 af, Depth= 0.82"
Routed to Reach AP5 : AP-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
31.520	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
39.070	76	Weighted Average
38.925		99.63% Pervious Area
0.145		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
122.7	1,930	0.0110	0.26		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
2.5	275		1.80		**Direct Entry, Segment C-D (STWC, 0.007)**
192.1	2,355	Total			

Summary for Reach 1: Analysis Point 1

Inflow Area = 145.103 ac, 3.22% Impervious, Inflow Depth > 0.66" for 2-yr Storm event
Inflow = 26.41 cfs @ 12.90 hrs, Volume= 7.921 af
Outflow = 26.41 cfs @ 12.90 hrs, Volume= 7.921 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach 7R: SOUTH ACCESS RD DITCH

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 4.35 cfs @ 12.09 hrs, Volume= 0.299 af
Outflow = 4.21 cfs @ 12.12 hrs, Volume= 0.299 af, Atten= 3%, Lag= 1.7 min
Routed to Pond 12P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.27 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.29 fps, Avg. Travel Time= 3.4 min

Peak Storage= 266 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 4.14'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 173.05 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 262.0' Slope= 0.0271 '/'
Inlet Invert= 205.00', Outlet Invert= 197.90'

Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth > 0.10" for 2-yr Storm event
Inflow = 0.05 cfs @ 24.71 hrs, Volume= 0.259 af
Outflow = 0.04 cfs @ 28.29 hrs, Volume= 0.254 af, Atten= 1%, Lag= 214.7 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.05 fps, Min. Travel Time= 84.1 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 98.9 min

Peak Storage= 226 cf @ 26.89 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 20.81'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 11.46 cfs

20.00' x 1.00' deep channel, n= 0.800 Sheet flow: Woods+dense brush
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 273.0' Slope= 0.0623 '/'
Inlet Invert= 180.00', Outlet Invert= 163.00'

‡

Summary for Reach 12R: Ditch 4B1

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 10.52 cfs @ 12.10 hrs, Volume= 0.764 af
Outflow = 10.00 cfs @ 12.15 hrs, Volume= 0.764 af, Atten= 5%, Lag= 3.1 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.53 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.30 fps, Avg. Travel Time= 4.5 min

Peak Storage= 1,019 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.80' , Surface Width= 5.21'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.02 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 352.0' Slope= 0.0085 '/'
Inlet Invert= 213.50', Outlet Invert= 210.50'

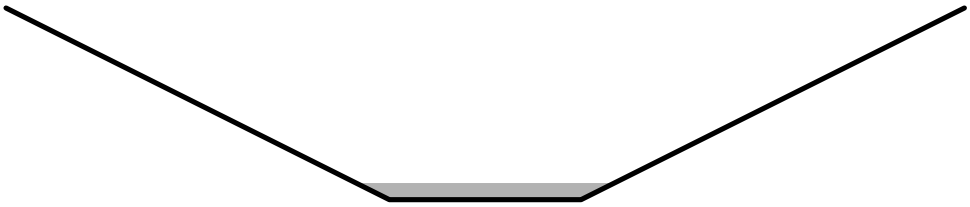
Summary for Reach 13R: Ex Ditch

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 0.18" for 2-yr Storm event
Inflow = 0.78 cfs @ 11.93 hrs, Volume= 0.010 af
Outflow = 0.67 cfs @ 11.99 hrs, Volume= 0.010 af, Atten= 14%, Lag= 3.5 min
Routed to Pond C4B : Culvert - 4BA & 4BB

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.77 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 5.5 min

Peak Storage= 91 cf @ 11.95 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 2.69'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 81.05 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 225.0' Slope= 0.0164 '/'
Inlet Invert= 209.70', Outlet Invert= 206.00'



Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 79.534 ac, 4.18% Impervious, Inflow Depth = 0.70" for 2-yr Storm event
Inflow = 9.00 cfs @ 13.96 hrs, Volume= 4.639 af
Outflow = 9.00 cfs @ 13.96 hrs, Volume= 4.639 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 265.594 ac, 1.09% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 29.28 cfs @ 15.25 hrs, Volume= 15.029 af
Outflow = 29.28 cfs @ 15.25 hrs, Volume= 15.029 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 326.605 ac, 3.82% Impervious, Inflow Depth > 0.70" for 2-yr Storm event
Inflow = 23.89 cfs @ 16.55 hrs, Volume= 19.005 af
Outflow = 23.89 cfs @ 16.55 hrs, Volume= 19.005 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: AP-5

Inflow Area = 39.070 ac, 0.37% Impervious, Inflow Depth = 0.82" for 2-yr Storm event
Inflow = 6.25 cfs @ 14.50 hrs, Volume= 2.665 af
Outflow = 6.25 cfs @ 14.50 hrs, Volume= 2.665 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach E1R6: DP-10 DISCHARGE

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth > 0.56" for 2-yr Storm event
Inflow = 0.78 cfs @ 19.76 hrs, Volume= 1.643 af
Outflow = 0.78 cfs @ 19.94 hrs, Volume= 1.641 af, Atten= 0%, Lag= 10.5 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.98 fps, Min. Travel Time= 6.1 min
Avg. Velocity = 0.66 fps, Avg. Travel Time= 9.0 min

Peak Storage= 283 cf @ 19.84 hrs
Average Depth at Peak Storage= 0.04' , Surface Width= 20.78'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 827.94 cfs

20.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 357.0' Slope= 0.0672 '/'
Inlet Invert= 178.00', Outlet Invert= 154.00'

‡

Summary for Reach E1R7: REACH TO AP

Inflow Area = 64.971 ac, 7.86% Impervious, Inflow Depth > 0.35" for 2-yr Storm event
Inflow = 0.78 cfs @ 20.01 hrs, Volume= 1.895 af
Outflow = 0.78 cfs @ 21.09 hrs, Volume= 1.882 af, Atten= 0%, Lag= 65.2 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.00 fps, Min. Travel Time= 36.3 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 57.4 min

Peak Storage= 1,690 cf @ 20.49 hrs
Average Depth at Peak Storage= 0.28' , Surface Width= 3.65'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 48.12 cfs

2.00' x 2.00' deep channel, n= 0.045 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 2,170.0' Slope= 0.0074 '/'
Inlet Invert= 158.00', Outlet Invert= 142.00'

Summary for Reach O4: Overland Flow

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 0.80" for 2-yr Storm event
Inflow = 3.60 cfs @ 12.06 hrs, Volume= 0.207 af
Outflow = 3.56 cfs @ 12.06 hrs, Volume= 0.207 af, Atten= 1%, Lag= 0.5 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.99 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 9.99 fps, Avg. Travel Time= 0.3 min

Peak Storage= 60 cf @ 12.06 hrs
Average Depth at Peak Storage= 0.06'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.87 cfs

Custom stage-perimeter table, n= 0.035 Earth, dense weeds
100 Intermediate values determined by Multi-point interpolation
Length= 168.0' Slope= 0.0554 '/'
Inlet Invert= 201.30', Outlet Invert= 192.00'

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
2.00	12.0	12.0	2,016	119.87

Summary for Reach R-10a: R-10a

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 0.63" for 2-yr Storm event
Inflow = 9.33 cfs @ 12.07 hrs, Volume= 0.683 af
Outflow = 8.84 cfs @ 12.16 hrs, Volume= 0.683 af, Atten= 5%, Lag= 5.7 min
Routed to Pond DP-10 : DETENTION POND 10

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.85 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.32 fps, Avg. Travel Time= 8.1 min

Peak Storage= 1,477 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.43' , Surface Width= 6.61'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 437.98 cfs

4.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 641.0' Slope= 0.0137 '/'
Inlet Invert= 194.00', Outlet Invert= 185.25'

‡

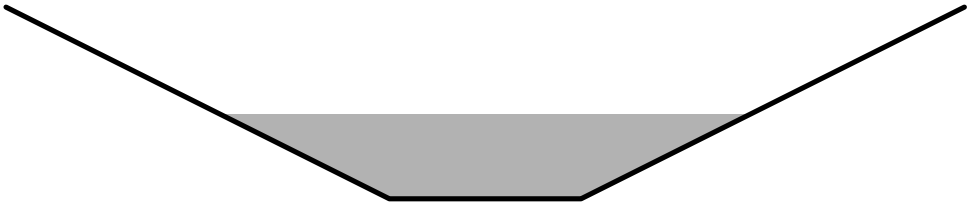
Summary for Reach R-1B: LF TOE DITCH

Inflow Area = 19.514 ac, 4.11% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 14.45 cfs @ 12.09 hrs, Volume= 1.034 af
Outflow = 13.81 cfs @ 12.16 hrs, Volume= 1.034 af, Atten= 4%, Lag= 3.9 min
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.19 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.48 fps, Avg. Travel Time= 6.1 min

Peak Storage= 1,805 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.89' , Surface Width= 5.55'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 540.0' Slope= 0.0278 '/'
Inlet Invert= 181.00', Outlet Invert= 166.00'



Summary for Reach R-1B1: LF TOE DITCH

Inflow Area = 8.511 ac, 4.70% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 6.76 cfs @ 12.06 hrs, Volume= 0.451 af
Outflow = 6.36 cfs @ 12.13 hrs, Volume= 0.451 af, Atten= 6%, Lag= 3.7 min
Routed to Reach R-1B : LF TOE DITCH

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.95 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.35 fps, Avg. Travel Time= 5.9 min

Peak Storage= 791 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.54' , Surface Width= 4.15'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 478.0' Slope= 0.0418 '/'
Inlet Invert= 204.00', Outlet Invert= 184.00'

Summary for Reach R-1D: Reach R-1D

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 0.55" for 2-yr Storm event
Inflow = 1.11 cfs @ 17.26 hrs, Volume= 1.882 af
Outflow = 1.11 cfs @ 17.45 hrs, Volume= 1.881 af, Atten= 0%, Lag= 11.6 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.94 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 14.1 min

Peak Storage= 436 cf @ 17.34 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 12.13'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 67.93 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 370.0' Slope= 0.0324 '/'
Inlet Invert= 159.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1E: Plastic Lined Ditch

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.89 cfs @ 12.05 hrs, Volume= 0.508 af
Outflow = 7.77 cfs @ 12.06 hrs, Volume= 0.508 af, Atten= 2%, Lag= 0.5 min
Routed to Pond DP-1a : DP-1a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.39 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 3.24 fps, Avg. Travel Time= 1.0 min

Peak Storage= 168 cf @ 12.06 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 4.77'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 1,302.19 cfs

4.00' x 3.00' deep channel, n= 0.011
Side Slope Z-value= 2.0 '/' Top Width= 16.00'
Length= 200.0' Slope= 0.0500 '/'
Inlet Invert= 176.00', Outlet Invert= 166.00'

Summary for Reach R-1F: Reach R-1F

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 0.60" for 2-yr Storm event
Inflow = 1.94 cfs @ 12.35 hrs, Volume= 0.496 af
Outflow = 1.93 cfs @ 12.44 hrs, Volume= 0.496 af, Atten= 0%, Lag= 5.5 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.08 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 9.6 min

Peak Storage= 377 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 21.72'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 140.14 cfs

20.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 210.0' Slope= 0.0524 '/'
Inlet Invert= 158.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1G: RipRap Downspout

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 1.47 cfs @ 12.09 hrs, Volume= 0.100 af
Outflow = 1.41 cfs @ 12.17 hrs, Volume= 0.100 af, Atten= 4%, Lag= 4.8 min
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.87 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 1.13 fps, Avg. Travel Time= 7.3 min

Peak Storage= 242 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 4.46'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 368.81 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 493.0' Slope= 0.3428 '/'
Inlet Invert= 333.00', Outlet Invert= 164.00'

Summary for Reach R-1I: Final Cover Access Road Ditch

Inflow = 0.02 cfs @ 12.09 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 12.49 hrs, Volume= 0.000 af, Atten= 84%, Lag= 23.5 min
Routed to Pond P-1I : Culvert Crossing 6c

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.46 fps, Min. Travel Time= 19.2 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 19.2 min

Peak Storage= 4 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.00' , Surface Width= 2.02'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 80.08 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 524.0' Slope= 0.0849 '/'
Inlet Invert= 335.00', Outlet Invert= 290.50'

Summary for Reach R-1J: RipRap Downspout

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 4.97 cfs @ 11.97 hrs, Volume= 0.237 af
Outflow = 4.80 cfs @ 11.98 hrs, Volume= 0.237 af, Atten= 3%, Lag= 1.1 min
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.59 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.34 fps, Avg. Travel Time= 2.0 min

Peak Storage= 174 cf @ 11.98 hrs
Average Depth at Peak Storage= 0.24' , Surface Width= 4.95'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 387.31 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 164.0' Slope= 0.3780 '/'
Inlet Invert= 252.00', Outlet Invert= 190.00'

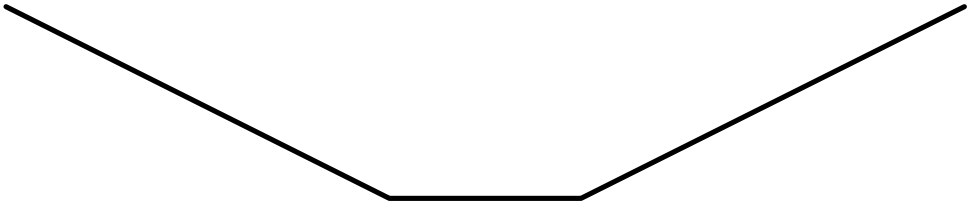
Summary for Reach R-1L: Final Cover Access Road Ditch

Inflow = 0.01 cfs @ 11.95 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 12.37 hrs, Volume= 0.000 af, Atten= 88%, Lag= 25.0 min
Routed to Pond 1P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.44 fps, Min. Travel Time= 21.2 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 21.2 min

Peak Storage= 1 cf @ 12.01 hrs
Average Depth at Peak Storage= 0.00' , Surface Width= 2.00'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 77.46 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 560.0' Slope= 0.0795 '/'
Inlet Invert= 254.50', Outlet Invert= 210.00'



Summary for Reach R-1N: R-1N

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 0.46" for 2-yr Storm event
Inflow = 0.63 cfs @ 19.70 hrs, Volume= 1.051 af
Outflow = 0.63 cfs @ 20.37 hrs, Volume= 1.051 af, Atten= 0%, Lag= 40.3 min
Routed to Reach R-1O : R-1O

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.63 fps, Min. Travel Time= 24.8 min
Avg. Velocity = 0.27 fps, Avg. Travel Time= 58.0 min

Peak Storage= 939 cf @ 19.95 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 11.83'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.97 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 940.0' Slope= 0.0176 '/'
Inlet Invert= 168.00', Outlet Invert= 151.50'

‡

Summary for Reach R-1O: R-1O

Inflow Area = 58.266 ac, 5.06% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 17.81 cfs @ 12.39 hrs, Volume= 3.297 af
Outflow = 16.43 cfs @ 12.66 hrs, Volume= 3.297 af, Atten= 8%, Lag= 15.9 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.39 fps, Min. Travel Time= 8.8 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 44.1 min

Peak Storage= 8,670 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.70' , Surface Width= 23.91'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 151.21 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 735.0' Slope= 0.0020 '/'
Inlet Invert= 151.50', Outlet Invert= 150.00'

‡

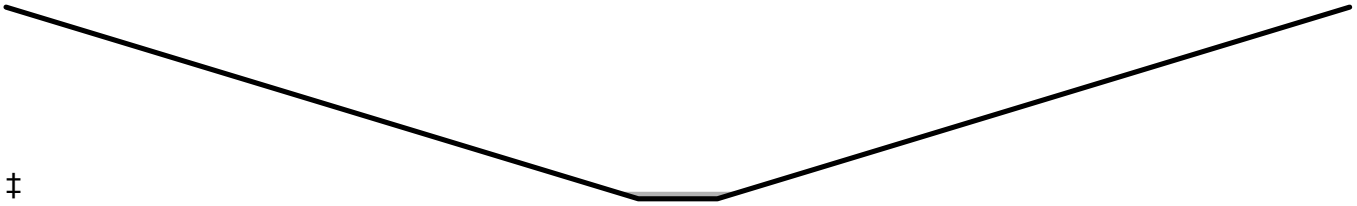
Summary for Reach R-2A: Reach 2A

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 1.08 cfs @ 15.98 hrs, Volume= 1.741 af
Outflow = 1.08 cfs @ 18.39 hrs, Volume= 1.741 af, Atten= 0%, Lag= 144.4 min
Routed to Reach AP2 : ANALYSIS POINT #2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.44 fps, Min. Travel Time= 61.2 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 87.0 min

Peak Storage= 3,970 cf @ 17.37 hrs
Average Depth at Peak Storage= 0.07' , Surface Width= 39.95'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,332.75 cfs

25.00' x 2.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,630.0' Slope= 0.0092 '/'
Inlet Invert= 166.00', Outlet Invert= 151.00'



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Summary for Reach R-2C: LF TOE DITCH

Inflow Area = 9.740 ac, 3.67% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.41 cfs @ 12.08 hrs, Volume= 0.516 af
Outflow = 6.99 cfs @ 12.17 hrs, Volume= 0.516 af, Atten= 6%, Lag= 5.5 min
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.42 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.48 fps, Avg. Travel Time= 9.3 min

Peak Storage= 1,307 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.99' , Surface Width= 6.96'
Defined Flood Depth= 2.00' Flow Area= 14.0 sf, Capacity= 29.12 cfs
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 70.39 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 265.0' Slope= 0.0075 '/'
Inlet Invert= 181.00', Outlet Invert= 179.00'

Summary for Reach R-2D: DITCH

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 0.63" for 2-yr Storm event
Inflow = 7.13 cfs @ 12.07 hrs, Volume= 0.489 af
Outflow = 6.88 cfs @ 12.11 hrs, Volume= 0.489 af, Atten= 4%, Lag= 2.4 min
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.82 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 3.9 min

Peak Storage= 563 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.60' , Surface Width= 5.39'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 183.17 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 225.0' Slope= 0.0511 '/'
Inlet Invert= 191.50', Outlet Invert= 180.00'

Summary for Reach R-4B: R-4B

Inflow Area = 4.602 ac, 9.82% Impervious, Inflow Depth = 0.72" for 2-yr Storm event
Inflow = 4.35 cfs @ 12.06 hrs, Volume= 0.278 af
Outflow = 2.44 cfs @ 12.46 hrs, Volume= 0.278 af, Atten= 44%, Lag= 24.0 min
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.05 fps, Min. Travel Time= 16.0 min
Avg. Velocity = 0.32 fps, Avg. Travel Time= 53.1 min

Peak Storage= 2,361 cf @ 12.19 hrs
Average Depth at Peak Storage= 0.57' , Surface Width= 5.27'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 69.96 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 1,006.0' Slope= 0.0075 '/'
Inlet Invert= 178.50', Outlet Invert= 171.00'

Summary for Reach R-IH: RipRap Downspout

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 3.72 cfs @ 12.01 hrs, Volume= 0.207 af
Outflow = 3.50 cfs @ 12.05 hrs, Volume= 0.207 af, Atten= 6%, Lag= 2.1 min
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.14 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.27 fps, Avg. Travel Time= 3.4 min

Peak Storage= 226 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 4.80'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 385.75 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 256.0' Slope= 0.3750 '/'
Inlet Invert= 286.00', Outlet Invert= 190.00'

Summary for Reach R2: Reach 2

Inflow Area = 122.225 ac, 3.55% Impervious, Inflow Depth > 0.64" for 2-yr Storm event
Inflow = 22.27 cfs @ 12.67 hrs, Volume= 6.546 af
Outflow = 21.46 cfs @ 12.88 hrs, Volume= 6.545 af, Atten= 4%, Lag= 12.4 min
Routed to Reach 1 : Analysis Point 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.73 fps, Min. Travel Time= 6.8 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 28.1 min

Peak Storage= 8,721 cf @ 12.77 hrs
Average Depth at Peak Storage= 0.72' , Surface Width= 24.46'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 183.33 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 700.0' Slope= 0.0030 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'

‡

Summary for Reach R4B4:

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 2.40 cfs @ 24.25 hrs, Volume= 2.980 af
Outflow = 2.39 cfs @ 24.97 hrs, Volume= 2.980 af, Atten= 0%, Lag= 43.1 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.65 fps, Min. Travel Time= 24.8 min
Avg. Velocity = 0.23 fps, Avg. Travel Time= 69.8 min

Peak Storage= 3,558 cf @ 24.56 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 17.08'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 131.94 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 963.0' Slope= 0.0094 '/'
Inlet Invert= 142.00', Outlet Invert= 132.96'

‡

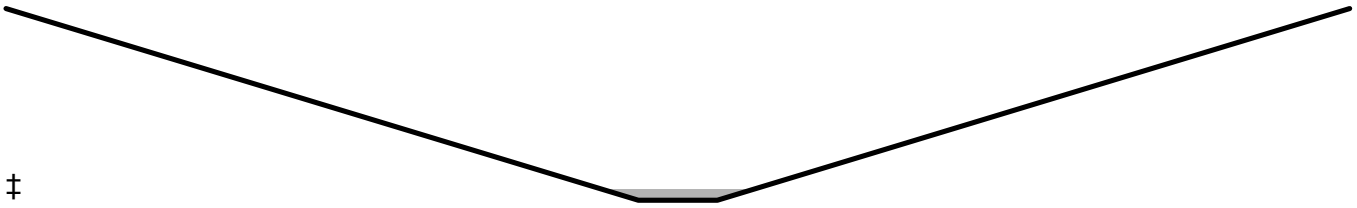
Summary for Reach R4C: Reach 4C

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 0.71" for 2-yr Storm event
Inflow = 1.38 cfs @ 13.06 hrs, Volume= 0.678 af
Outflow = 1.25 cfs @ 15.27 hrs, Volume= 0.678 af, Atten= 9%, Lag= 132.5 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.29 fps, Min. Travel Time= 56.4 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 114.4 min

Peak Storage= 4,223 cf @ 14.33 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 48.63'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 669.12 cfs

25.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 970.0' Slope= 0.0093 '/'
Inlet Invert= 159.00', Outlet Invert= 150.00'



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Summary for Reach R4C1: Reach 4C1

Inflow Area = 24.911 ac, 5.27% Impervious, Inflow Depth = 0.67" for 2-yr Storm event
Inflow = 2.12 cfs @ 15.40 hrs, Volume= 1.386 af
Outflow = 1.48 cfs @ 23.02 hrs, Volume= 1.386 af, Atten= 30%, Lag= 457.7 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.16 fps, Min. Travel Time= 239.0 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 526.5 min

Peak Storage= 21,267 cf @ 19.04 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 117.45'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 562.82 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 2,240.0' Slope= 0.0031 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Reach R4C2: Reach 4C2

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 2.42 cfs @ 22.97 hrs, Volume= 2.980 af
Outflow = 2.40 cfs @ 24.25 hrs, Volume= 2.980 af, Atten= 1%, Lag= 76.7 min
Routed to Reach R4B4 :

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.17 fps, Min. Travel Time= 44.5 min
Avg. Velocity = 0.07 fps, Avg. Travel Time= 106.2 min

Peak Storage= 6,407 cf @ 23.51 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 125.52'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 477.27 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 445.0' Slope= 0.0022 '/'
Inlet Invert= 143.00', Outlet Invert= 142.00'

‡

Summary for Reach R4D: Reach 4D

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 0.63" for 2-yr Storm event
Inflow = 0.89 cfs @ 13.36 hrs, Volume= 0.707 af
Outflow = 0.88 cfs @ 16.16 hrs, Volume= 0.707 af, Atten= 1%, Lag= 168.2 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 54.2 min
Avg. Velocity = 0.13 fps, Avg. Travel Time= 76.2 min

Peak Storage= 2,856 cf @ 15.26 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 109.02'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 1,002.64 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 605.0' Slope= 0.0099 '/'
Inlet Invert= 156.00', Outlet Invert= 150.00'

‡

Summary for Reach R4G: Reach 4G

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 0.65" for 2-yr Storm event
Inflow = 1.13 cfs @ 15.41 hrs, Volume= 1.595 af
Outflow = 1.12 cfs @ 15.76 hrs, Volume= 1.595 af, Atten= 0%, Lag= 21.2 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.47 fps, Min. Travel Time= 12.9 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 16.8 min

Peak Storage= 871 cf @ 15.54 hrs
Average Depth at Peak Storage= 0.11' , Surface Width= 22.27'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 199.54 cfs

20.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 363.0' Slope= 0.0193 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Pond 1P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 4.52 cfs @ 12.06 hrs, Volume= 0.299 af
Outflow = 4.35 cfs @ 12.09 hrs, Volume= 0.299 af, Atten= 4%, Lag= 1.9 min
Primary = 4.35 cfs @ 12.09 hrs, Volume= 0.299 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 206.65' @ 12.09 hrs Surf.Area= 1,195 sf Storage= 686 cf
Flood Elev= 210.00' Surf.Area= 3,240 sf Storage= 7,740 cf

Plug-Flow detention time= 7.6 min calculated for 0.299 af (100% of inflow)
Center-of-Mass det. time= 7.7 min (892.3 - 884.6)

Volume	Invert	Avail.Storage	Storage Description
#1	206.00'	7,740 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
206.00	900	0	0
208.00	1,800	2,700	2,700
210.00	3,240	5,040	7,740

Device	Routing	Invert	Outlet Devices
#1	Primary	206.00'	**24.0" Round 24"Culvert (X2) X 2.00** L= 76.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 206.00' / 205.00' S= 0.0132 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	209.60'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=4.29 cfs @ 12.09 hrs HW=206.65' (Free Discharge)
↑—**1=24"Culvert (X2)** (Inlet Controls 4.29 cfs @ 2.42 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=206.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 12P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 4.21 cfs @ 12.12 hrs, Volume= 0.299 af
Outflow = 4.13 cfs @ 12.15 hrs, Volume= 0.299 af, Atten= 2%, Lag= 1.5 min
Primary = 4.13 cfs @ 12.15 hrs, Volume= 0.299 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 15P : EXISTING 12" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 198.54' @ 12.15 hrs Surf.Area= 933 sf Storage= 375 cf
Flood Elev= 200.50' Surf.Area= 2,548 sf Storage= 3,866 cf

Plug-Flow detention time= 1.5 min calculated for 0.299 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (897.2 - 895.6)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	3,866 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676
200.50	2,548	1,190	3,866

Device	Routing	Invert	Outlet Devices
#1	Primary	197.90'	**24.0" Round 24"Culvert (X2) X 2.00** L= 98.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 197.90' / 195.47' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Secondary	200.00'	**14.0' long x 11.0' breadth Broad-Crested Rectangular Weir-Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Primary OutFlow Max=4.11 cfs @ 12.15 hrs HW=198.54' (Free Discharge)
1=24"Culvert (X2) (Inlet Controls 4.11 cfs @ 2.39 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
2=Broad-Crested Rectangular Weir-Overflow(Controls 0.00 cfs)

Summary for Pond 15P: EXISTING 12" CULVERT

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 198.00' @ 0.00 hrs Surf.Area= 464 sf Storage= 0 cf
Flood Elev= 200.50' Surf.Area= 2,212 sf Storage= 2,676 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	2,676 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676

Device	Routing	Invert	Outlet Devices
#1	Primary	197.40'	**12.0" Round 24"Culvert (X2)** L= 121.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 197.40' / 189.90' S= 0.0620 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	198.00'	**10.0' long x 50.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**1=24"Culvert (X2)** (Passes 0.00 cfs of 1.02 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 10.40 cfs @ 12.10 hrs, Volume= 0.765 af
Outflow = 10.52 cfs @ 12.10 hrs, Volume= 0.764 af, Atten= 0%, Lag= 0.1 min
Primary = 10.52 cfs @ 12.10 hrs, Volume= 0.764 af
Routed to Reach 12R : Ditch 4B1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond C-4L : Catch Basin - 4L

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 218.55' @ 12.10 hrs Surf.Area= 13 sf Storage= 51 cf

Plug-Flow detention time= 1.0 min calculated for 0.764 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (887.4 - 887.1)

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	216.50'	**24.0" Round Culvert - 4K** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.50' / 214.50' S= 0.0392 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	218.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=10.45 cfs @ 12.10 hrs HW=218.55' (Free Discharge)
└**1=Culvert - 4K** (Passes 10.45 cfs of 15.49 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 10.45 cfs @ 2.42 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=214.50' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C-4L: Catch Basin - 4L

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 0.88 cfs @ 11.93 hrs, Volume= 0.038 af
Outflow = 0.78 cfs @ 11.93 hrs, Volume= 0.010 af, Atten= 12%, Lag= 0.0 min
Primary = 0.78 cfs @ 11.93 hrs, Volume= 0.010 af
Routed to Reach 13R : Ex Ditch
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 214.61' @ 11.93 hrs Surf.Area= 13 sf Storage= 43 cf

Plug-Flow detention time= 3.7 min calculated for 0.010 af (27% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	210.50'	43 cf	**4.00'D x 3.40'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.50'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.50' / 210.50' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	214.50'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads
#3	Secondary	215.00'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.72 cfs @ 11.93 hrs HW=214.61' (Free Discharge)
↑**1=Culvert 4L** (Passes 0.72 cfs of 9.91 cfs potential flow)
↑**2=Orifice-Top of catch basin** (Weir Controls 0.72 cfs @ 1.07 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=210.50' (Free Discharge)
↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 0.80" for 2-yr Storm event
Inflow = 3.62 cfs @ 12.04 hrs, Volume= 0.207 af
Outflow = 3.60 cfs @ 12.06 hrs, Volume= 0.207 af, Atten= 1%, Lag= 0.8 min
Primary = 3.60 cfs @ 12.06 hrs, Volume= 0.207 af
Routed to Reach O4 : Overland Flow

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 205.03' @ 12.06 hrs Surf.Area= 510 sf Storage= 160 cf

Plug-Flow detention time= 0.7 min calculated for 0.207 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (852.6 - 851.9)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,690 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
204.40	0	0	0
206.00	1,300	1,040	1,040
208.00	4,200	5,500	6,540
209.00	6,100	5,150	11,690

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0152 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=3.56 cfs @ 12.06 hrs HW=205.02' (Free Discharge)
└**1=Culvert - 4B** (Inlet Controls 3.56 cfs @ 2.12 fps)

Summary for Pond CB-2B: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.308 ac, 2.34% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 6.91 cfs @ 12.09 hrs, Volume= 0.493 af
Outflow = 7.01 cfs @ 12.07 hrs, Volume= 0.491 af, Atten= 0%, Lag= 0.0 min
Primary = 7.01 cfs @ 12.07 hrs, Volume= 0.491 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 179.42' @ 12.07 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 3.4 min calculated for 0.491 af (100% of inflow)
Center-of-Mass det. time= 1.3 min (887.6 - 886.3)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	173.00'	**24.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.71 cfs @ 12.07 hrs HW=179.41' (Free Discharge)
└**2=Culvert** (Passes 6.71 cfs of 35.18 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 6.71 cfs @ 2.09 fps)

Summary for Pond CB-2D: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.14 cfs @ 12.07 hrs, Volume= 0.493 af
Outflow = 7.13 cfs @ 12.07 hrs, Volume= 0.489 af, Atten= 0%, Lag= 0.1 min
Primary = 7.13 cfs @ 12.07 hrs, Volume= 0.489 af
Routed to Reach R-2D : DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 201.42' @ 12.07 hrs Surf.Area= 13 sf Storage= 138 cf
Flood Elev= 200.65' Surf.Area= 13 sf Storage= 134 cf

Plug-Flow detention time= 4.8 min calculated for 0.489 af (99% of inflow)
Center-of-Mass det. time= 1.2 min (886.7 - 885.5)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	138 cf	**4.00'D x 11.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	201.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	192.00'	**24.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 192.00' / 191.50' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.92 cfs @ 12.07 hrs HW=201.42' (Free Discharge)
↑**2=Culvert** (Passes 6.92 cfs of 34.65 cfs potential flow)
↑**1=Orifice/Grate** (Weir Controls 6.92 cfs @ 2.11 fps)

Summary for Pond CB-2E: LF TOE DITCH - CATCH BASIN

Inflow Area = 10.279 ac, 4.18% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.11 cfs @ 12.17 hrs, Volume= 0.551 af
Outflow = 7.18 cfs @ 12.16 hrs, Volume= 0.549 af, Atten= 0%, Lag= 0.0 min
Primary = 7.18 cfs @ 12.16 hrs, Volume= 0.549 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 179.43' @ 12.16 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 3.2 min calculated for 0.548 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (894.0 - 893.0)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#2	Primary	173.00'	**24.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.97 cfs @ 12.16 hrs HW=179.42' (Free Discharge)
↑—**2=Culvert** (Passes 6.97 cfs of 35.21 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 6.97 cfs @ 2.12 fps)

Summary for Pond CB-4C: LT TOE DITCH - CATCH BASIN

Inflow Area = 10.458 ac, 9.73% Impervious, Inflow Depth = 0.72" for 2-yr Storm event
Inflow = 6.24 cfs @ 12.02 hrs, Volume= 0.631 af
Outflow = 6.35 cfs @ 12.03 hrs, Volume= 0.629 af, Atten= 0%, Lag= 0.6 min
Primary = 6.35 cfs @ 12.03 hrs, Volume= 0.629 af
Routed to Pond DP-13 : DETENTION POND 13

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.39' @ 12.03 hrs Surf.Area= 13 sf Storage= 80 cf
Flood Elev= 174.00' Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 2.5 min calculated for 0.629 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (895.9 - 895.4)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	171.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	167.00'	**24.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.00' / 166.50' S= 0.0096 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=6.07 cfs @ 12.03 hrs HW=171.38' (Free Discharge)
↑—**2=Culvert** (Passes 6.07 cfs of 27.82 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 6.07 cfs @ 2.02 fps)

Summary for Pond CB-4D: LF TOE DITCH - CATCH BASINS

Inflow Area = 12.095 ac, 2.44% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 11.18 cfs @ 12.02 hrs, Volume= 0.641 af
Outflow = 11.20 cfs @ 12.02 hrs, Volume= 0.640 af, Atten= 0%, Lag= 0.0 min
Primary = 11.20 cfs @ 12.02 hrs, Volume= 0.640 af
Routed to Pond DP-14 : DETENTION POND 14

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 160.86' @ 12.02 hrs Surf.Area= 13 sf Storage= 57 cf
Flood Elev= 162.00' Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 1.5 min calculated for 0.640 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (881.7 - 881.2)

Volume	Invert	Avail.Storage	Storage Description
#1	156.00'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	160.50'	**30.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	158.00'	**24.0" Round Culvert X 2.00** L= 54.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.50' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=10.79 cfs @ 12.02 hrs HW=160.85' (Free Discharge)
└**2=Culvert** (Passes 10.79 cfs of 39.73 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 10.79 cfs @ 1.94 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area = 11.260 ac, 1.95% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 8.57 cfs @ 12.08 hrs, Volume= 0.597 af
Outflow = 8.62 cfs @ 12.08 hrs, Volume= 0.596 af, Atten= 0%, Lag= 0.3 min
Primary = 8.62 cfs @ 12.08 hrs, Volume= 0.596 af
Routed to Pond DP-11R : DETENTION POND 11R

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 162.32' @ 12.08 hrs Surf.Area= 13 sf Storage= 42 cf
Flood Elev= 170.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 0.8 min calculated for 0.596 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (885.9 - 885.6)

Volume	Invert	Avail.Storage	Storage Description
#1	159.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**24.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.00' S= 0.0087 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Primary	167.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=8.40 cfs @ 12.08 hrs HW=162.30' (Free Discharge)
└**1=Culvert** (Inlet Controls 8.40 cfs @ 3.88 fps)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond CB-4H: Catch Basin - 4H

Inflow Area = 15.096 ac, 1.13% Impervious, Inflow Depth = 0.60" for 2-yr Storm event
Inflow = 9.67 cfs @ 12.07 hrs, Volume= 0.753 af
Outflow = 9.69 cfs @ 12.07 hrs, Volume= 0.751 af, Atten= 0%, Lag= 0.0 min
Primary = 9.69 cfs @ 12.07 hrs, Volume= 0.751 af
Routed to Pond DP-11R : DETENTION POND 11R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4G : Catch Basin - 4G

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 181.52' @ 12.07 hrs Surf.Area= 13 sf Storage= 113 cf
Flood Elev= 183.00' Surf.Area= 13 sf Storage= 113 cf

Plug-Flow detention time= 2.6 min calculated for 0.751 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (888.0 - 887.3)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	174.00'	**24.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.00' / 172.00' S= 0.0308 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	181.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	183.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=9.46 cfs @ 12.07 hrs HW=181.51' (Free Discharge)
└**1=Culvert** (Passes 9.46 cfs of 38.61 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 9.46 cfs @ 2.34 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 9.80 cfs @ 12.08 hrs, Volume= 0.692 af
Outflow = 10.00 cfs @ 12.07 hrs, Volume= 0.689 af, Atten= 0%, Lag= 0.0 min
Primary = 9.33 cfs @ 12.07 hrs, Volume= 0.683 af
Routed to Reach R-10a : R-10a
Secondary = 0.67 cfs @ 12.07 hrs, Volume= 0.006 af
Routed to Pond CB-4H : Catch Basin - 4H

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 208.09' @ 12.07 hrs Surf.Area= 13 sf Storage= 102 cf
Flood Elev= 209.90' Surf.Area= 13 sf Storage= 121 cf

Plug-Flow detention time= 2.4 min calculated for 0.689 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (886.6 - 886.0)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	121 cf	**4.00'D x 9.60'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	200.00'	**24.0" Round NEW 24-INCH** L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.00' / 194.00' S= 0.0896 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	207.58'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	208.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=9.01 cfs @ 12.07 hrs HW=208.08' (Free Discharge)
└**1=NEW 24-INCH** (Passes 9.01 cfs of 40.24 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 9.01 cfs @ 2.31 fps)

Secondary OutFlow Max=0.50 cfs @ 12.07 hrs HW=208.08' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.50 cfs @ 0.65 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area = 11.663 ac, 3.68% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 6.51 cfs @ 12.19 hrs, Volume= 0.618 af
Outflow = 6.74 cfs @ 12.20 hrs, Volume= 0.616 af, Atten= 0%, Lag= 0.3 min
Primary = 6.74 cfs @ 12.20 hrs, Volume= 0.616 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4JA3 : (4JA3) New Catch Basin

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 219.11' @ 12.20 hrs Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 2.5 min calculated for 0.616 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (895.2 - 894.1)

Volume	Invert	Avail.Storage	Storage Description
#1	211.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert - 4JA** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 212.20' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=6.68 cfs @ 12.20 hrs HW=219.11' (Free Discharge)
└─**1=Culvert - 4JA** (Passes 6.68 cfs of 19.69 cfs potential flow)
└─**2=Orifice/Grate** (Weir Controls 6.68 cfs @ 2.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=211.00' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond CB-4JA3: (4JA3) New Catch Basin

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond PS11 : Culvert - 4IA(C11 PS)

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 202.90' @ 0.00 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 215.00' Surf.Area= 0.000 ac Storage= 0.003 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	202.90'	0.003 af	**4.00'D x 10.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	204.90'	**18.0" Round NEW 24-INCH** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 204.90' / 204.00' S= 0.0150 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	212.90'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	212.90'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=202.90' (Free Discharge)
└**1=NEW 24-INCH** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=202.90' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1: DETENTION POND 1

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 0.60" for 2-yr Storm event
Inflow = 21.44 cfs @ 12.12 hrs, Volume= 2.064 af
Outflow = 1.11 cfs @ 17.26 hrs, Volume= 1.882 af, Atten= 95%, Lag= 308.2 min
Primary = 1.11 cfs @ 17.26 hrs, Volume= 1.882 af
Routed to Reach R-1D : Reach R-1D
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1D : Reach R-1D

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 163.74' @ 17.26 hrs Surf.Area= 16,618 sf Storage= 50,977 cf
Flood Elev= 166.00' Surf.Area= 21,310 sf Storage= 93,390 cf

Plug-Flow detention time= 1,290.1 min calculated for 1.881 af (91% of inflow)
Center-of-Mass det. time= 1,118.4 min (2,212.0 - 1,093.6)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	115,245 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	10,750	0	0
162.00	13,540	24,290	24,290
164.00	17,070	30,610	54,900
165.00	19,300	18,185	73,085
166.00	21,310	20,305	93,390
167.00	22,400	21,855	115,245

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**30.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 159.80' / 159.35' S= 0.0060 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	160.60'	**3.0" Vert. Orifice on side** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.70'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	166.30'	**40.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.97 cfs @ 17.26 hrs HW=163.74' (Free Discharge)
└**1=Culvert** (Passes 0.97 cfs of 30.62 cfs potential flow)
  ├**2=Orifice on side** (Orifice Controls 0.41 cfs @ 8.37 fps)
  └**3=Orifice-Top of drop inlet** (Weir Controls 0.56 cfs @ 0.68 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth = 0.73" for 2-yr Storm event
Inflow = 22.81 cfs @ 12.02 hrs, Volume= 2.131 af
Outflow = 0.78 cfs @ 19.76 hrs, Volume= 1.643 af, Atten= 97%, Lag= 464.8 min
Primary = 0.17 cfs @ 19.76 hrs, Volume= 0.117 af
Routed to Reach E1R6 : DP-10 DISCHARGE
Secondary = 0.61 cfs @ 19.76 hrs, Volume= 1.525 af
Routed to Reach E1R6 : DP-10 DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach E1R6 : DP-10 DISCHARGE

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 186.25' @ 19.76 hrs Surf.Area= 38,562 sf Storage= 69,558 cf
Flood Elev= 189.00' Surf.Area= 77,500 sf Storage= 239,860 cf

Plug-Flow detention time= 2,088.8 min calculated for 1.642 af (77% of inflow)
Center-of-Mass det. time= 1,992.4 min (2,871.6 - 879.2)

Volume	Invert	Avail.Storage	Storage Description
#1	180.00'	320,610 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
180.00	10	0	0
182.00	2,300	2,310	2,310
184.00	11,000	13,300	15,610
186.00	34,000	45,000	60,610
188.00	71,000	105,000	165,610
190.00	84,000	155,000	320,610

Device	Routing	Invert	Outlet Devices
#1	Device 3	187.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.00'	**6.0" Vert. 6-in Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	181.00'	**24.0" Round 18-in Primary Culvert** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.00' / 180.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#4	Secondary	177.50'	**5.8" Round 6-in Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 177.50' / 174.00' S= 0.0159 '/' Cc= 0.900

n= 0.011, Flow Area= 0.18 sf

#5	Device 4	186.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	184.00'	**1.5" Vert. Orifice Side** X 2 rows with 0.5" cc spacing C= 0.600 Limited to weir flow at low heads
#7	Tertiary	188.00'	**10.0' long x 26.0' breadth E-Spillway Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.16 cfs @ 19.76 hrs HW=186.25' (Free Discharge)
└**3=18-in Primary Culvert** (Passes 0.16 cfs of 31.17 cfs potential flow)
  ├**1=Orifice/Grate** (Controls 0.00 cfs)
  └**2=6-in Orifice** (Orifice Controls 0.16 cfs @ 1.69 fps)

Secondary OutFlow Max=0.61 cfs @ 19.76 hrs HW=186.25' (Free Discharge)
└**4=6-in Culvert** (Passes 0.61 cfs of 1.31 cfs potential flow)
  ├**5=Orifice Top** (Orifice Controls 0.44 cfs @ 2.39 fps)
  └**6=Orifice Side** (Orifice Controls 0.17 cfs @ 7.08 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=180.00' (Free Discharge)
└**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 0.65" for 2-yr Storm event
Inflow = 22.31 cfs @ 12.07 hrs, Volume= 1.595 af
Outflow = 1.13 cfs @ 15.41 hrs, Volume= 1.595 af, Atten= 95%, Lag= 200.4 min
Primary = 0.15 cfs @ 15.41 hrs, Volume= 0.044 af
  Routed to Reach R4G : Reach 4G
Secondary = 0.98 cfs @ 15.41 hrs, Volume= 1.551 af
  Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 156.64' @ 15.41 hrs Surf.Area= 21,446 sf Storage= 34,924 cf

Plug-Flow detention time= 411.3 min calculated for 1.594 af (100% of inflow)
Center-of-Mass det. time= 411.4 min (1,293.8 - 882.4)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.16 cfs @ 15.41 hrs HW=156.64' (Free Discharge)
└**1=Culvert** (Passes 0.16 cfs of 8.82 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.16 cfs @ 1.80 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.98 cfs @ 15.41 hrs HW=156.64' (Free Discharge)
└**5=Culvert** (Barrel Controls 0.98 cfs @ 4.99 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 20.74 cfs @ 12.13 hrs, Volume= 1.741 af
Outflow = 1.08 cfs @ 15.98 hrs, Volume= 1.741 af, Atten= 95%, Lag= 231.2 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-2A : Reach 2A
Secondary = 1.08 cfs @ 15.98 hrs, Volume= 1.741 af
  Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 169.89' @ 15.98 hrs Surf.Area= 33,302 sf Storage= 38,655 cf

Plug-Flow detention time= 422.3 min calculated for 1.740 af (100% of inflow)
Center-of-Mass det. time= 422.3 min (1,308.2 - 885.9)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
  ├**2=Orifice** (Controls 0.00 cfs)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.08 cfs @ 15.98 hrs HW=169.89' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.08 cfs @ 5.52 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 0.71" for 2-yr Storm event
Inflow = 6.68 cfs @ 12.02 hrs, Volume= 0.678 af
Outflow = 1.38 cfs @ 13.06 hrs, Volume= 0.678 af, Atten= 79%, Lag= 62.7 min
Primary = 0.29 cfs @ 13.06 hrs, Volume= 0.057 af
  Routed to Reach R4C : Reach 4C
Secondary = 1.08 cfs @ 13.06 hrs, Volume= 0.621 af
  Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 161.15' @ 13.06 hrs Surf.Area= 8,690 sf Storage= 8,606 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 59.2 min calculated for 0.678 af (100% of inflow)
Center-of-Mass det. time= 59.2 min (954.0 - 894.8)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	164.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.29 cfs @ 13.06 hrs HW=161.15' (Free Discharge)
└**1=Culvert** (Passes 0.29 cfs of 4.03 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.29 cfs @ 3.36 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.08 cfs @ 13.06 hrs HW=161.15' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.08 cfs @ 5.52 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 0.63" for 2-yr Storm event
Inflow = 11.86 cfs @ 12.01 hrs, Volume= 0.707 af
Outflow = 0.89 cfs @ 13.36 hrs, Volume= 0.707 af, Atten= 93%, Lag= 81.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4D : Reach 4D
Secondary = 0.89 cfs @ 13.36 hrs, Volume= 0.707 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 157.72' @ 13.36 hrs Surf.Area= 26,310 sf Storage= 11,692 cf

Plug-Flow detention time= 129.3 min calculated for 0.707 af (100% of inflow)
Center-of-Mass det. time= 129.3 min (1,010.7 - 881.4)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**1=Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Controls 0.00 cfs)
└**3=Grate** (Controls 0.00 cfs)
└**5=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.89 cfs @ 13.36 hrs HW=157.72' (Free Discharge)
└**4=Culvert** (Barrel Controls 0.89 cfs @ 4.53 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1a: DP-1a

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.77 cfs @ 12.06 hrs, Volume= 0.508 af
Outflow = 0.22 cfs @ 18.99 hrs, Volume= 0.383 af, Atten= 97%, Lag= 415.8 min
Primary = 0.22 cfs @ 18.99 hrs, Volume= 0.383 af
Routed to Pond DP-1 : DETENTION POND 1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 163.00' Surf.Area= 34,985 sf Storage= 146,410 cf
Peak Elev= 163.42' @ 18.99 hrs Surf.Area= 36,006 sf Storage= 161,235 cf (14,825 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (116,636 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 1,101.3 min (1,986.4 - 885.1)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	263,046 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	24,139	0	0
160.00	27,981	52,120	52,120
162.00	32,544	60,525	112,645
163.00	34,985	33,765	146,410
164.00	37,429	36,207	182,617
166.00	43,000	80,429	263,046

Device	Routing	Invert	Outlet Devices
#1	Primary	163.10'	**113.0 deg Sharp-Crested Vee/Trap Weir** Cv= 2.49 (C= 3.11)
#2	Secondary	165.60'	**18.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=0.21 cfs @ 18.99 hrs HW=163.42' (Free Discharge)
1=Sharp-Crested Vee/Trap Weir (Weir Controls 0.21 cfs @ 1.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 9.03 cfs @ 11.97 hrs, Volume= 0.530 af
Outflow = 1.94 cfs @ 12.35 hrs, Volume= 0.496 af, Atten= 79%, Lag= 22.7 min
Primary = 1.94 cfs @ 12.35 hrs, Volume= 0.496 af
Routed to Reach R-1F : Reach R-1F

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 162.30' Surf.Area= 1,330 sf Storage= 630 cf
Peak Elev= 164.75' @ 12.35 hrs Surf.Area= 4,507 sf Storage= 7,257 cf (6,627 cf above start)
Flood Elev= 167.80' Surf.Area= 17,700 sf Storage= 36,993 cf (36,363 cf above start)

Plug-Flow detention time= 114.7 min calculated for 0.481 af (91% of inflow)
Center-of-Mass det. time= 60.0 min (941.1 - 881.1)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	36,993 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,000	0	0
164.00	3,200	4,200	4,200
165.00	4,940	4,070	8,270
166.00	7,860	6,400	14,670
167.00	12,570	10,215	24,885
167.80	17,700	12,108	36,993

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.20' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	164.20'	**8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	165.40'	**2.4' long x 0.30' rise Sharp-Crested Rectangular Weir** 1 End Contraction(s)
#5	Device 1	166.60'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.94 cfs @ 12.35 hrs HW=164.75' (Free Discharge)
└**1=Culvert** (Passes 1.94 cfs of 14.84 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 1.16 cfs @ 5.90 fps)
  ├**3=Orifice** (Orifice Controls 0.78 cfs @ 2.53 fps)
  ├**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**5=Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 0.76" for 2-yr Storm event
Inflow = 15.20 cfs @ 12.01 hrs, Volume= 1.729 af
Outflow = 0.63 cfs @ 19.70 hrs, Volume= 1.051 af, Atten= 96%, Lag= 461.0 min
Primary = 0.63 cfs @ 19.70 hrs, Volume= 1.051 af
Routed to Reach R-1N : R-1N
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1N : R-1N

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 174.51' @ 19.70 hrs Surf.Area= 35,172 sf Storage= 52,033 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf

Plug-Flow detention time= 748.0 min calculated for 1.051 af (61% of inflow)
Center-of-Mass det. time= 615.1 min (1,496.3 - 881.3)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.63 cfs @ 19.70 hrs HW=174.51' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Orifice Controls 0.63 cfs @ 3.44 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-6 ES: DETENTION POND 6 - EMERGENCY SPILLWAY

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Secondary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 178.00' Surf.Area= 93,326 sf Storage= 273,159 cf
Peak Elev= 178.00' @ 0.00 hrs Surf.Area= 93,326 sf Storage= 273,159 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (223,485 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert X 0.00** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice X 0.00** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**20.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth = 0.91" for 2-yr Storm event
Inflow = 25.56 cfs @ 12.15 hrs, Volume= 2.286 af
Outflow = 0.05 cfs @ 24.71 hrs, Volume= 0.259 af, Atten= 100%, Lag= 753.8 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Secondary = 0.05 cfs @ 24.71 hrs, Volume= 0.259 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 188.51' @ 24.71 hrs Surf.Area= 80,385 sf Storage= 98,824 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 3,035.2 min calculated for 0.259 af (11% of inflow)
Center-of-Mass det. time= 2,873.1 min (3,739.6 - 866.5)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Primary	189.50'	**12.0" Round 12-In Outlet Culvert** L= 48.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.50' / 180.50' S= 0.1875 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	184.21'	**5.8" Round 6-In Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.21' / 180.50' S= 0.0618 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#3	Device 2	188.70'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 2	188.30'	**1.5" Vert. Orifice X 2.00** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**1=12-In Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.05 cfs @ 24.71 hrs HW=188.51' (Free Discharge)
└**2=6-In Culvert** (Passes 0.05 cfs of 1.41 cfs potential flow)
  └**3=Orifice** (Controls 0.00 cfs)
  └**4=Orifice** (Orifice Controls 0.05 cfs @ 1.85 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9(E): DP 9 (EMERGENCY OUTLET)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P-1G: Culvert Crossing 1G

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 1.55 cfs @ 12.06 hrs, Volume= 0.100 af
Outflow = 1.49 cfs @ 12.09 hrs, Volume= 0.100 af, Atten= 4%, Lag= 1.8 min
Primary = 1.47 cfs @ 12.09 hrs, Volume= 0.100 af
Routed to Reach R-1G : RipRap Downspout
Secondary = 0.02 cfs @ 12.09 hrs, Volume= 0.000 af
Routed to Reach R-1I : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 336.03' @ 12.09 hrs Surf.Area= 507 sf Storage= 242 cf

Plug-Flow detention time= 8.3 min calculated for 0.100 af (100% of inflow)
Center-of-Mass det. time= 8.3 min (888.7 - 880.4)

Volume	Invert	Avail.Storage	Storage Description
#1	335.50'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
335.50	400	0	0
337.50	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	**24.0" Round 24" Culvert** L= 36.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 335.50' / 331.00' S= 0.1250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	336.00'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=1.45 cfs @ 12.09 hrs HW=336.03' (Free Discharge)
↑**1=24" Culvert** (Inlet Controls 1.45 cfs @ 2.18 fps)

Secondary OutFlow Max=0.02 cfs @ 12.09 hrs HW=336.03' (Free Discharge)
↑**2=Stone Check Dam Weir** (Weir Controls 0.02 cfs @ 0.52 fps)

Summary for Pond P-1H: Modified Plunge Pool w/(2)24" Culverts P-6a

Inflow Area = 6.697 ac, 1.15% Impervious, Inflow Depth = 0.62" for 2-yr Storm event
Inflow = 5.07 cfs @ 11.99 hrs, Volume= 0.345 af
Outflow = 5.00 cfs @ 12.00 hrs, Volume= 0.343 af, Atten= 1%, Lag= 0.4 min
Primary = 5.00 cfs @ 12.00 hrs, Volume= 0.343 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 183.75' @ 12.00 hrs Surf.Area= 302 sf Storage= 275 cf
Flood Elev= 186.00' Surf.Area= 869 sf Storage= 1,551 cf

Plug-Flow detention time= 6.3 min calculated for 0.343 af (99% of inflow)
Center-of-Mass det. time= 2.6 min (889.1 - 886.5)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	5,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	37	0	0
183.00	163	100	100
184.00	348	256	356
185.00	587	468	823
186.00	869	728	1,551
188.00	1,067	1,936	3,487
190.00	1,160	2,227	5,714

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**24.0" Round (2)24"-Culvert X 2.00** L= 56.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 183.00' / 182.00' S= 0.0179 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Secondary	185.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=5.00 cfs @ 12.00 hrs HW=183.75' (Free Discharge)
1=(2)24"-Culvert (Barrel Controls 5.00 cfs @ 3.43 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-1I: Culvert Crossing 6c

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 3.66 cfs @ 12.02 hrs, Volume= 0.207 af
Outflow = 3.72 cfs @ 12.01 hrs, Volume= 0.207 af, Atten= 0%, Lag= 0.0 min
Primary = 3.72 cfs @ 12.01 hrs, Volume= 0.207 af
Routed to Reach R-IH : RipRap Downspout
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-1K : Culvert Crossing 1K

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 291.38' @ 12.01 hrs Surf.Area= 800 sf Storage= 300 cf

Plug-Flow detention time= 6.8 min calculated for 0.207 af (100% of inflow)
Center-of-Mass det. time= 6.5 min (887.4 - 880.9)

Volume	Invert	Avail.Storage	Storage Description
#1	290.50'	300 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
290.50	400	0	0
291.00	800	300	300

Device	Routing	Invert	Outlet Devices
#1	Primary	290.50'	**24.0" Round 24" Culvert** L= 38.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 290.50' / 286.00' S= 0.1184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	291.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=3.59 cfs @ 12.01 hrs HW=291.36' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 3.59 cfs @ 2.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=290.50' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Controls 0.00 cfs)

Summary for Pond P-1J-1: (2) 24" CULVERTS

Inflow Area = 6.104 ac, 1.82% Impervious, Inflow Depth = 0.65" for 2-yr Storm event
Inflow = 6.69 cfs @ 11.97 hrs, Volume= 0.333 af
Outflow = 6.68 cfs @ 11.98 hrs, Volume= 0.333 af, Atten= 0%, Lag= 0.4 min
Primary = 6.68 cfs @ 11.98 hrs, Volume= 0.333 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond P-1J-2 : 18" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 190.88' @ 11.98 hrs Surf.Area= 182 sf Storage= 84 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.3 min (876.2 - 875.9)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	410 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
190.00	10	0	0
192.00	400	410	410

Device	Routing	Invert	Outlet Devices
#1	Primary	190.00'	**24.0" Round Culvert X 2.00** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 190.00' / 189.60' S= 0.0108 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	191.20'	**170.0 deg x 1.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Primary OutFlow Max=6.38 cfs @ 11.98 hrs HW=190.86' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 6.38 cfs @ 2.49 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=190.00' (Free Discharge)
↑—**2=Sharp-Crested Vee/Trap Weir** (Controls 0.00 cfs)

Summary for Pond P-1J-2: 18" CULVERT

Inflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.00' @ 0.00 hrs Surf.Area= 10 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	32,056 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	10	0	0
188.00	1,367	689	689
190.00	3,000	4,367	5,056
192.00	6,000	9,000	14,056
194.00	12,000	18,000	32,056

Device	Routing	Invert	Outlet Devices
#1	Primary	186.80'	**18.0" Round 18" Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 186.80' / 185.97' S= 0.0208 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
↑—**1=18" Culvert** (Passes 0.00 cfs of 0.17 cfs potential flow)

Summary for Pond P-1K: Culvert Crossing 1K

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 0.66" for 2-yr Storm event
Inflow = 5.29 cfs @ 11.95 hrs, Volume= 0.237 af
Outflow = 4.98 cfs @ 11.97 hrs, Volume= 0.237 af, Atten= 6%, Lag= 1.0 min
Primary = 4.97 cfs @ 11.97 hrs, Volume= 0.237 af
Routed to Reach R-1J : RipRap Downspout
Secondary = 0.01 cfs @ 11.95 hrs, Volume= 0.000 af
Routed to Reach R-1L : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 255.53' @ 11.97 hrs Surf.Area= 506 sf Storage= 241 cf

Plug-Flow detention time= 0.3 min calculated for 0.237 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (873.7 - 873.5)

Volume	Invert	Avail.Storage	Storage Description
#1	255.00'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.00	400	0	0
257.00	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**24.0" Round 24" Culvert** L= 33.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 254.50' / 252.00' S= 0.0758 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	255.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=4.76 cfs @ 11.97 hrs HW=255.51' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 4.76 cfs @ 3.01 fps)

Secondary OutFlow Max=0.01 cfs @ 11.95 hrs HW=255.52' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Weir Controls 0.01 cfs @ 0.41 fps)

Summary for Pond PS11: Culvert - 4IA(C11 PS)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4I : Catch Basin - 4I

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 212.90' @ 0.00 hrs Surf.Area= 5 sf Storage= 0 cf
Flood Elev= 215.10' Surf.Area= 1,133 sf Storage= 1,237 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,353 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
212.90	5	0	0
213.04	63	5	5
215.20	1,185	1,348	1,353

Device	Routing	Invert	Outlet Devices
#1	Primary	213.05'	**24.0" Round Culvert - 4IA(C11 PS)** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.05' / 212.15' S= 0.0225 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=212.90' (Free Discharge)
↑—**1=Culvert - 4IA(C11 PS)** (Controls 0.00 cfs)

Summary for Subcatchment 1A: SC-1A

Runoff = 12.59 cfs @ 13.12 hrs, Volume= 2.861 af, Depth= 1.52"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.084	70	Woods, Good, HSG C
*	7.750	77	Woods, Good, HSG D
*	1.540	71	Meadow, non-grazed, HSG C
*	1.760	78	Meadow HSG D
*	0.070	96	Gravel Surface
*	0.330	98	Impervious Surface
	22.534	74	Weighted Average
	22.204		98.54% Pervious Area
	0.330		1.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.4	1,840		1.50		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
93.1	2,250	Total			

Summary for Subcatchment 1B: 1B

Runoff = 0.89 cfs @ 11.93 hrs, Volume= 0.038 af, Depth= 1.33"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.344	71	Landfill Final Cover
	0.344		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segement A-B**

Summary for Subcatchment 1B1: SC-1B1

Runoff = 16.03 cfs @ 12.06 hrs, Volume= 0.986 af, Depth= 1.39"
Routed to Reach R-1B1 : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	8.111	71	Meadow, non-grazed, HSG C
*	0.400	98	Riprap
	8.511	72	Weighted Average
	8.111		95.30% Pervious Area
	0.400		4.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	140	0.1000	4.74		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	240	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	482	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.8	1,012	Total			

Summary for Subcatchment 1B2: SC-1B2

Runoff = 20.51 cfs @ 12.06 hrs, Volume= 1.275 af, Depth= 1.39"
Routed to Reach R-1B : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	10.600	71	Landfill Final Cover
*	0.403	98	Riprap
	11.003	72	Weighted Average
	10.600		96.34% Pervious Area
	0.403		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.6	75	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	403	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	554	0.3300	19.66	314.62	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.050 Mountain streams w/large boulders
13.1	1,182	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 9.30 cfs @ 12.86 hrs, Volume= 1.770 af, Depth= 1.66"
Routed to Reach R2 : Reach 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	6.100	77	Woods, Good, HSG D
*	0.690	70	Woods, Good, HSG C
*	3.100	78	Meadow HSG D
*	2.580	71	Meadow, non-grazed, HSG C
*	0.310	96	Gravel Surface
	12.780	76	Weighted Average
	12.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.6	170	0.0133	1.73		**Shallow Concentrated Flow, Segment ID: B-C** Grassed Waterway Kv= 15.0 fps
16.7					**Direct Entry, Segment ID: C-D**
75.0	370	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 23.10 cfs @ 12.05 hrs, Volume= 1.415 af, Depth= 1.39"
Routed to Pond DP-1 : DETENTION POND 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.000	71	Landfill Final Cover
*	0.110	96	Gravel Surface
*	0.800	78	Pond, Meadow HSG D
*	0.300	98	Riprap
	12.210	72	Weighted Average
	11.910		97.54% Pervious Area
	0.300		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.3	241	0.0700	12.78	172.52	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.025
0.3	556	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
12.7	1,057	Total			

Summary for Subcatchment 1E: SC-1E

Runoff = 18.64 cfs @ 12.05 hrs, Volume= 1.110 af, Depth= 1.39"
Routed to Reach R-1E : Plastic Lined Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	9.100	71	Landfill Final Cover
*	0.200	96	Gravel Surface
*	0.280	98	Riprap
	9.580	72	Weighted Average
	9.300		97.08% Pervious Area
	0.280		2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	146	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	296	0.0700	16.72	200.67	**Trap/Vee/Rect Channel Flow, Segment ID: B-C** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.025
0.3	537	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
0.3	186	0.0700	10.28	57.82	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 '/' Top.W=7.50' n= 0.030 Earth, grassed & winding
11.9	1,165	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 20.48 cfs @ 11.96 hrs, Volume= 0.939 af, Depth= 1.39"
Routed to Pond DP-2 : DETENTION POND 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	7.747	71	Landfill Final Cover
*	0.349	91	Gravel
	0.007	98	Roofs, HSG C
	8.103	72	Weighted Average
	8.096		99.91% Pervious Area
	0.007		0.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	100	0.3800	0.51		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	293	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.2	300	0.3800	29.77	669.83	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.50' Z= 2.0 '/' Top.W=14.00' n= 0.040 Earth, cobble bottom, clean sides
4.7	693	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 3.55 cfs @ 12.05 hrs, Volume= 0.215 af, Depth= 1.46"
Routed to Pond P-1G : Culvert Crossing 1G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	1.625	71	Landfill Final Cover
*	0.147	96	Gravel Surface
	1.772	73	Weighted Average
	1.772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	142	0.1500	2.71		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	154	0.0700	8.95	60.43	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.035 Earth, dense weeds

12.5 446 Total

Summary for Subcatchment 1H: SC-1H

Runoff = 7.21 cfs @ 11.94 hrs, Volume= 0.308 af, Depth= 1.33"
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.032	91	Fallow, bare soil, HSG C, rip rap
	2.759	71	Meadow, non-grazed, HSG C
	2.791	71	Weighted Average
	2.791		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	66	0.3900	0.47		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
0.3	140	0.0800	9.12	27.13	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.030 Earth, grassed & winding
0.2	190	0.1430	16.62	49.46	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.022 Earth, clean & straight
2.8	396	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 8.56 cfs @ 12.01 hrs, Volume= 0.453 af, Depth= 1.39"
Routed to Pond P-1I : Culvert Crossing 6c

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	3.829	71	Landfill Final Cover
*	0.077	98	Riprap
	3.906	72	Weighted Average
	3.829		98.03% Pervious Area
	0.077		1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	150	0.1000	0.32		**Sheet Flow, Segment AB** Grass: Short n= 0.150 P2= 2.70"
0.4	106	0.1000	4.74		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
0.4	260	0.0700	10.44	70.50	**Trap/Vee/Rect Channel Flow, Segment C - D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.030 Earth, grassed & winding
0.1	140	0.3300	39.33	629.24	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.025 Rubble masonry, cemented
8.7	656	Total			

Summary for Subcatchment 1J: SC-IJ

Runoff = 4.85 cfs @ 11.94 hrs, Volume= 0.210 af, Depth= 1.39"
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	1.763	71	Landfill Final Cover
*	0.046	91	Gravel
	1.809	72	Weighted Average
	1.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	67	0.5000	0.52		**Sheet Flow, SEGMENT AB** Grass: Short n= 0.150 P2= 2.70"
0.8	325	0.1900	6.54		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	325	0.0300	12.44	149.28	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.022 Earth, clean & straight
3.3	717	Total			

Summary for Subcatchment 1K: SC-1K

Runoff = 7.38 cfs @ 11.94 hrs, Volume= 0.318 af, Depth= 1.46"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	2.350	71	Landfill Final Cover
	0.163	89	Gravel roads, HSG C
*	0.111	98	Riprap
	2.624	73	Weighted Average
	2.513		95.77% Pervious Area
	0.111		4.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	68	0.3300	0.44		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 2.70"
0.4	93	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.3	249	0.3300	12.60	201.68	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.078 Riprap, 12-inch
3.3	410	Total			

Summary for Subcatchment 1L: SC-1L

Runoff = 4.45 cfs @ 11.95 hrs, Volume= 0.194 af, Depth= 1.39"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	1.607	71	Landfill Final Cover
	0.064	89	Gravel roads, HSG C
	1.671	72	Weighted Average
	1.671		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	67	0.4000	0.48		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	442	0.1000	6.15	49.59	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=2.00' D=1.50' Z= 2.0 & 2.5 '/' Top.W=8.75' n= 0.069 Riprap, 6-inch
3.5	509	Total			

Summary for Subcatchment 1M: SC-1M

Runoff = 10.72 cfs @ 12.05 hrs, Volume= 0.655 af, Depth= 1.39"
Routed to Pond 1P : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	5.368	71	Landfill Final Cover
	0.283	92	Paved roads w/open ditches, 50% imp, HSG C
	5.651	72	Weighted Average
	5.509		97.50% Pervious Area
	0.141		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	73	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	174	0.0700	11.06	265.40	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=2.00' Z= 2.0 & 10.0 '/' Top.W=24.00' n= 0.035 Earth, dense weeds
0.5	413	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.6	810	Total			

Summary for Subcatchment 1N: SC-1N

Runoff = 13.88 cfs @ 12.29 hrs, Volume= 1.434 af, Depth= 1.96"
Routed to Pond DP-6 : DETENTION POND 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	2.942	70	Woods, Good, HSG C
*	3.662	78	Meadow HSG D
*	0.572	96	Gravel Surface
*	1.607	98	Pond
	8.783	80	Weighted Average
	7.176		81.70% Pervious Area
	1.607		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.7	123	0.0569	1.19		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
0.5	370	0.0189	12.43	801.88	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=2.00' D=3.00' Z= 10.0 & 3.0 '/' Top.W=41.00' n= 0.022 Earth, clean & straight
33.0	593	Total			

Summary for Subcatchment 1O: SC-1O

Runoff = 37.78 cfs @ 12.38 hrs, Volume= 4.484 af, Depth= 1.73"
Routed to Reach R-1O : R-1O

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	13.230	77	Woods, Good, HSG D
*	5.712	70	Woods, Good, HSG C
*	9.172	78	Meadow HSG D
*	1.195	71	Meadow, non-grazed, HSG C
*	0.713	96	Gravel Surface
*	0.515	98	Impervious Surface
*	0.494	98	Paved Area
	31.031	77	Weighted Average
	30.022		96.75% Pervious Area
	1.009		3.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0100	0.07		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
15.1	1,875	0.0190	2.07		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
12.8	856	0.0500	1.12		**Shallow Concentrated Flow, Segment CD** Woodland Kv= 5.0 fps
39.7	2,781	Total			

Summary for Subcatchment 2A: SC-2A

Runoff = 19.04 cfs @ 13.82 hrs, Volume= 6.099 af, Depth= 1.52"
Routed to Reach AP2 : ANALYSIS POINT #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	24.340	70	Woods, Good, HSG C
	15.830	77	Woods, Good, HSG D
*	5.898	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area
	1.600	98	Existing Waterbody
	48.048	74	Weighted Average
	46.068		95.88% Pervious Area
	1.980		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
42.6	534	0.0070	0.21		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
10.6	1,213		1.90		**Direct Entry, Segment C-D (STWC, 0.008)**
144.3	1,897	Total			

Summary for Subcatchment 2B: SC-2B

Runoff = 16.53 cfs @ 12.07 hrs, Volume= 1.078 af, Depth= 1.39"
Routed to Pond CB-2B : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	9.090	71	Landfill Final Cover
*	0.218	98	Riprap
	9.308	72	Weighted Average
	9.090		97.66% Pervious Area
	0.218		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.3	178	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	252	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	455	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
0.8	136	0.0100	3.00	81.02	**Trap/Vee/Rect Channel Flow, Segment E-F** Bot.W=3.00' D=3.00' Z= 2.0 '/' Top.W=15.00' n= 0.069 Riprap, 6-inch
14.4	1,171	Total			

Summary for Subcatchment 2C: SC-2C

Runoff = 17.76 cfs @ 12.06 hrs, Volume= 1.129 af, Depth= 1.39"
Routed to Reach R-2C : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	9.383	71	Landfill Final Cover
*	0.357	98	Riprap
	9.740	72	Weighted Average
	9.383		96.33% Pervious Area
	0.357		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	158	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.6	308	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	474	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,090	Total			

Summary for Subcatchment 2D: SC-2D

Runoff = 17.01 cfs @ 12.06 hrs, Volume= 1.077 af, Depth= 1.39"
Routed to Pond CB-2D : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	8.931	71	Landfill Final Cover
*	0.366	98	Riprap
	9.297	72	Weighted Average
	8.931		96.06% Pervious Area
	0.366		3.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	157	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	248	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	475	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.6	1,030	Total			

Summary for Subcatchment 2E: SC-2E

Runoff = 1.67 cfs @ 11.94 hrs, Volume= 0.072 af, Depth= 1.59"
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.466	71	Landfill Final Cover
*	0.073	98	Riprap
	0.539	75	Weighted Average
	0.466		86.46% Pervious Area
	0.073		13.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 2F: SC-2F

Runoff = 9.48 cfs @ 11.94 hrs, Volume= 0.408 af, Depth= 1.88"
Routed to Pond DP-12 : DETENTION POND 12

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
1.947	74	>75% Grass cover, Good, HSG C
0.655	93	Paved roads w/open ditches, 50% imp, HSG D
2.602	79	Weighted Average
2.274		87.41% Pervious Area
0.327		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 3A: SC-3A

Runoff = 68.13 cfs @ 15.21 hrs, Volume= 32.228 af, Depth= 1.46"
Routed to Reach AP3 : ANALYSIS POINT #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	158.900	70	Woods, Good, HSG C
	102.800	77	Woods, Good, HSG D
	1.000	71	Meadow, non-grazed, HSG C
*	0.564	98	Paved Area
*	2.330	98	Existing Waterbody
	265.594	73	Weighted Average
	262.700		98.91% Pervious Area
	2.894		1.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
105.2	1,116	0.0050	0.18		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
78.7	3,093		0.66		**Direct Entry, Segment C-D (STWC, 0.001)**
240.2	4,359	Total			

Summary for Subcatchment 4A: SC-4A

Runoff = 48.86 cfs @ 16.22 hrs, Volume= 28.718 af, Depth= 1.66"
Routed to Reach AP4 : AP4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	130.444	77	Woods, Good, HSG D
	44.640	70	Woods, Good, HSG C
*	23.410	71	Meadow, non-grazed, HSG C
*	3.300	98	Paved Area
*	2.520	91	Gravel
	1.000	89	Gravel roads, HSG C
*	2.000	98	Impervious Surface
	207.314	76	Weighted Average
	202.014		97.44% Pervious Area
	5.300		2.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
200.8	1,905	0.0040	0.16		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
17.7	1,592		1.50		**Direct Entry, Segment C-D (STWC, 0.0031)**
7.9	760		1.60		**Direct Entry, Segment D-E (STWC, 0.005)**
6.7	963		2.40		**Direct Entry, Segment E-F (STWC, 0.0125)**
324.2	5,370	Total			

Summary for Subcatchment 4B: 4B

Runoff = 9.69 cfs @ 12.05 hrs, Volume= 0.584 af, Depth= 1.52"
Routed to Reach R-4B : R-4B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	4.150	71	Landfill Final Cover
*	0.452	98	Riprap
	4.602	74	Weighted Average
	4.150		90.18% Pervious Area
	0.452		9.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	32	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	240	0.0700	8.81	49.56	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 3.0 '/' Top.W=7.50' n= 0.035 Earth, dense weeds
0.4	342	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.5	764	Total			

Summary for Subcatchment 4C: SC-4C

Runoff = 13.75 cfs @ 12.01 hrs, Volume= 0.743 af, Depth= 1.52"
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.566	98	Riprap
*	5.290	71	Landfill Final Cover
	5.856	74	Weighted Average
	5.290		90.33% Pervious Area
	0.566		9.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	101	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	442	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 Earth, dense weeds
0.4	365	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.4	908	Total			

Summary for Subcatchment 4D: SC-4D

Runoff = 26.16 cfs @ 12.01 hrs, Volume= 1.401 af, Depth= 1.39"
Routed to Pond CB-4D : LF TOE DITCH - CATCH BASINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.800	71	Landfill Final Cover
*	0.295	98	Riprap
	12.095	72	Weighted Average
	11.800		97.56% Pervious Area
	0.295		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.2	117	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	504	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.0	721	Total			

Summary for Subcatchment 4E: SC-4E

Runoff = 2.55 cfs @ 11.94 hrs, Volume= 0.110 af, Depth= 1.33"
Routed to Pond DP-13 : DETENTION POND 13

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
0.992	71	Meadow, non-grazed, HSG C
0.992		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	300		1.67		**Direct Entry, Segment A-B**

Summary for Subcatchment 4F: SC-4F

Runoff = 3.55 cfs @ 11.93 hrs, Volume= 0.151 af, Depth= 1.33"
Routed to Pond DP-14 : DETENTION POND 14

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
1.366	71	Meadow, non-grazed, HSG C
1.366		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	500		4.17		**Direct Entry, Segment A-B**

Summary for Subcatchment 4G: SC-4G

Runoff = 20.53 cfs @ 12.06 hrs, Volume= 1.305 af, Depth= 1.39"
Routed to Pond CB-4G : Catch Basin - 4G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.040	71	Landfill Final Cover
*	0.220	98	Riprap
	11.260	72	Weighted Average
	11.040		98.05% Pervious Area
	0.220		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	143	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	390	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	497	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,180	Total			

Summary for Subcatchment 4H: SC-4H

Runoff = 21.06 cfs @ 12.07 hrs, Volume= 1.378 af, Depth= 1.33"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	12.330	71	Landfill Final Cover
*	0.135	98	Riprap
	12.465	71	Weighted Average
	12.330		98.92% Pervious Area
	0.135		1.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	232	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	464	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	440	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.3	1,286	Total			

Summary for Subcatchment 4I: SC-4I

Runoff = 6.77 cfs @ 11.94 hrs, Volume= 0.291 af, Depth= 1.33"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	2.595	71	Landfill Final Cover
*	0.036	98	Riprap
	2.631	71	Weighted Average
	2.595		98.63% Pervious Area
	0.036		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, A-B**

Summary for Subcatchment 4J: SC-4J

Runoff = 23.44 cfs @ 12.07 hrs, Volume= 1.512 af, Depth= 1.39"
Routed to Pond CB-4I : Catch Basin - 4I

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	12.590	71	Landfill Final Cover
*	0.462	98	Riprap
	13.052	72	Weighted Average
	12.590		96.46% Pervious Area
	0.462		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	223	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	386	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.4	376	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.1	1,135	Total			

Summary for Subcatchment 4K: SC-4K

Runoff = 15.93 cfs @ 12.17 hrs, Volume= 1.351 af, Depth= 1.39"
Routed to Pond CB-4JA : Catch Basin - 4JA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	11.234	71	Landfill Final Cover
*	0.429	98	Riprap
	11.663	72	Weighted Average
	11.234		96.32% Pervious Area
	0.429		3.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
10.3	432	0.0100	0.70		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	432	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	392	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
22.9	1,406	Total			

Summary for Subcatchment 4L: SC-4L

Runoff = 24.84 cfs @ 12.08 hrs, Volume= 1.673 af, Depth= 1.39"
Routed to Pond C-4K : Catch Basin - 4K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	14.000	71	Landfill Final Cover
*	0.437	98	Riprap
	14.437	72	Weighted Average
	14.000		96.97% Pervious Area
	0.437		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
2.6	242	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.9	476	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	406	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
15.3	1,274	Total			

Summary for Subcatchment 4M: SC-4M

Runoff = 1.94 cfs @ 11.93 hrs, Volume= 0.082 af, Depth= 1.46"
Routed to Pond C-4L : Catch Basin - 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
*	0.633	71	Landfill Final Cover
*	0.046	98	Riprap
	0.679	73	Weighted Average
	0.633		93.23% Pervious Area
	0.046		6.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 4N: SC-4N

Runoff = 13.24 cfs @ 12.12 hrs, Volume= 0.979 af, Depth= 1.96"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	2.512	74	>75% Grass cover, Good, HSG C
*	0.245	98	Paved Area
*	0.338	98	Building/Concrete Slabs
*	1.404	91	Gravel
	1.497	71	Meadow, non-grazed, HSG C
	5.996	80	Weighted Average
	5.413		90.28% Pervious Area
	0.583		9.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	61	0.0200	1.14		**Sheet Flow, Segment A-B** Smooth surfaces n= 0.011 P2= 2.70"
10.5	61	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
7.9	955	0.0180	2.01		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
19.3	1,077	Total			

Summary for Subcatchment 4O: SC-4O

Runoff = 6.22 cfs @ 12.05 hrs, Volume= 0.380 af, Depth= 1.88"
Routed to Pond C4B : Culvert - 4BA & 4BB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	1.074	70	Brush, Fair, HSG C
*	0.034	98	Impervious Surface
	0.687	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
*	0.240	98	Paved Area
	2.422	79	Weighted Average
	2.148		88.69% Pervious Area
	0.274		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	24	0.0200	0.95		**Sheet Flow, Segment AB** Smooth surfaces n= 0.011 P2= 2.70"
0.8	19	0.5000	0.41		**Sheet Flow, Segment BC** Grass: Short n= 0.150 P2= 2.70"
11.9	584	0.0137	0.82		**Shallow Concentrated Flow, Segment CD** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0250	7.14	85.66	**Trap/Vee/Rect Channel Flow, Segment DE** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.035
13.2	667	Total			

Summary for Subcatchment 4P: SC-4P

Runoff = 13.18 cfs @ 12.29 hrs, Volume= 1.376 af, Depth= 2.55"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	0.415	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.500	98	Pond
*	0.136	98	Paved Area
	6.488	87	Weighted Average
	4.852		74.78% Pervious Area
	1.636		25.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	125	0.0216	0.12		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	25	0.0520	0.78		**Sheet Flow, Segment B-C** n= 0.023 P2= 2.70"
2.0	270	0.0190	2.22		**Shallow Concentrated Flow, Segment C-D** Unpaved Kv= 16.1 fps
0.2	44	0.3300	4.02		**Shallow Concentrated Flow, Segment D-E** Short Grass Pasture Kv= 7.0 fps
2.0	102	0.0150	0.86		**Shallow Concentrated Flow, Segment E-F** Short Grass Pasture Kv= 7.0 fps
11.2	258	0.0030	0.38		**Shallow Concentrated Flow, Segment F-G** Short Grass Pasture Kv= 7.0 fps
33.9	824	Total			

Summary for Subcatchment 4Q: SC-4Q

Runoff = 32.71 cfs @ 11.98 hrs, Volume= 1.606 af, Depth= 1.88"
Routed to Pond DP-10 : DETENTION POND 10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

	Area (ac)	CN	Description
	3.393	79	50-75% Grass cover, Fair, HSG C
	1.056	93	Paved roads w/open ditches, 50% imp, HSG D
*	0.712	98	Pond
	5.073	74	>75% Grass cover, Good, HSG C
	10.234	79	Weighted Average
	8.994		87.88% Pervious Area
	1.240		12.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	150	0.0500	0.59		**Sheet Flow, AB** Fallow n= 0.050 P2= 2.70"
0.2	85	0.1600	6.44		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
2.5	625	0.0800	4.24		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
6.9	860	Total			

Summary for Subcatchment 4R: SC-4R

Runoff = 8.32 cfs @ 12.03 hrs, Volume= 0.479 af, Depth= 1.88"
Routed to Pond DP-11R : DETENTION POND 11R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
0.757	93	Paved roads w/open ditches, 50% imp, HSG D
2.296	74	>75% Grass cover, Good, HSG C
3.053	79	Weighted Average
2.674		87.60% Pervious Area
0.378		12.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	37	0.0200	1.04		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 2.70"
0.4	215	0.3300	9.25		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
10.4	338	0.0060	0.54		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.4	590	Total			

Summary for Subcatchment 5: SC-5

Runoff = 13.69 cfs @ 14.32 hrs, Volume= 5.412 af, Depth= 1.66"
Routed to Reach AP5 : AP-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-yr Storm Rainfall=3.90"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
31.520	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
39.070	76	Weighted Average
38.925		99.63% Pervious Area
0.145		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
122.7	1,930	0.0110	0.26		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
2.5	275		1.80		**Direct Entry, Segment C-D (STWC, 0.007)**
192.1	2,355	Total			

Summary for Reach 1: Analysis Point 1

Inflow Area = 145.103 ac, 3.22% Impervious, Inflow Depth > 1.46" for 10-yr Storm event
Inflow = 72.63 cfs @ 12.71 hrs, Volume= 17.639 af
Outflow = 72.63 cfs @ 12.71 hrs, Volume= 17.639 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach 7R: SOUTH ACCESS RD DITCH

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 12.24 cfs @ 12.08 hrs, Volume= 0.682 af
Outflow = 11.96 cfs @ 12.10 hrs, Volume= 0.682 af, Atten= 2%, Lag= 1.3 min
Routed to Pond 12P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.92 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.57 fps, Avg. Travel Time= 2.8 min

Peak Storage= 540 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.51' , Surface Width= 5.05'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 173.05 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 262.0' Slope= 0.0271 '/'
Inlet Invert= 205.00', Outlet Invert= 197.90'

Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth > 0.85" for 10-yr Storm event
Inflow = 0.82 cfs @ 24.20 hrs, Volume= 2.133 af
Outflow = 0.82 cfs @ 24.83 hrs, Volume= 2.125 af, Atten= 0%, Lag= 38.2 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.16 fps, Min. Travel Time= 28.2 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 51.1 min

Peak Storage= 1,379 cf @ 24.36 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 24.54'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 11.46 cfs

20.00' x 1.00' deep channel, n= 0.800 Sheet flow: Woods+dense brush
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 273.0' Slope= 0.0623 '/'
Inlet Invert= 180.00', Outlet Invert= 163.00'

‡

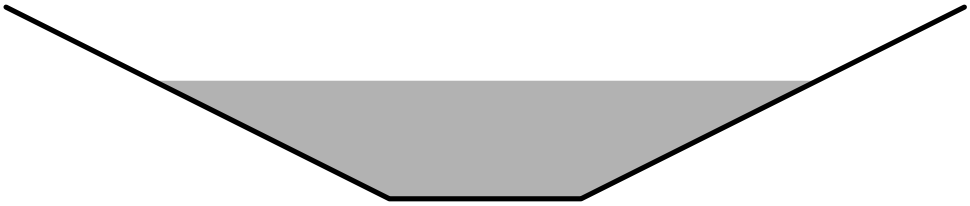
Summary for Reach 12R: Ditch 4B1

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 24.63 cfs @ 12.08 hrs, Volume= 1.671 af
Outflow = 24.01 cfs @ 12.12 hrs, Volume= 1.671 af, Atten= 3%, Lag= 2.5 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.46 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.58 fps, Avg. Travel Time= 3.7 min

Peak Storage= 1,938 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.23' , Surface Width= 6.93'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.02 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 352.0' Slope= 0.0085 '/'
Inlet Invert= 213.50', Outlet Invert= 210.50'



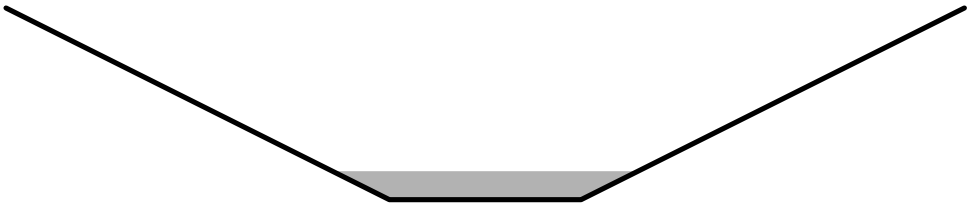
Summary for Reach 13R: Ex Ditch

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 1.93 cfs @ 11.93 hrs, Volume= 0.078 af
Outflow = 1.73 cfs @ 11.97 hrs, Volume= 0.078 af, Atten= 11%, Lag= 2.3 min
Routed to Pond C4B : Culvert - 4BA & 4BB

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.40 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 5.9 min

Peak Storage= 175 cf @ 11.94 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 3.19'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 81.05 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 225.0' Slope= 0.0164 '/'
Inlet Invert= 209.70', Outlet Invert= 206.00'



Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 79.534 ac, 4.18% Impervious, Inflow Depth = 1.49" for 10-yr Storm event
Inflow = 19.98 cfs @ 13.90 hrs, Volume= 9.856 af
Outflow = 19.98 cfs @ 13.90 hrs, Volume= 9.856 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 265.594 ac, 1.09% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 68.13 cfs @ 15.21 hrs, Volume= 32.228 af
Outflow = 68.13 cfs @ 15.21 hrs, Volume= 32.228 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 326.605 ac, 3.82% Impervious, Inflow Depth > 1.51" for 10-yr Storm event
Inflow = 54.33 cfs @ 16.22 hrs, Volume= 41.205 af
Outflow = 54.33 cfs @ 16.22 hrs, Volume= 41.205 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: AP-5

Inflow Area = 39.070 ac, 0.37% Impervious, Inflow Depth = 1.66" for 10-yr Storm event
Inflow = 13.69 cfs @ 14.32 hrs, Volume= 5.412 af
Outflow = 13.69 cfs @ 14.32 hrs, Volume= 5.412 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach E1R6: DP-10 DISCHARGE

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth > 1.32" for 10-yr Storm event
Inflow = 3.63 cfs @ 14.10 hrs, Volume= 3.849 af
Outflow = 3.62 cfs @ 14.20 hrs, Volume= 3.847 af, Atten= 0%, Lag= 5.7 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.77 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.75 fps, Avg. Travel Time= 7.9 min

Peak Storage= 733 cf @ 14.14 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 21.96'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 827.94 cfs

20.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 357.0' Slope= 0.0672 '/'
Inlet Invert= 178.00', Outlet Invert= 154.00'

‡

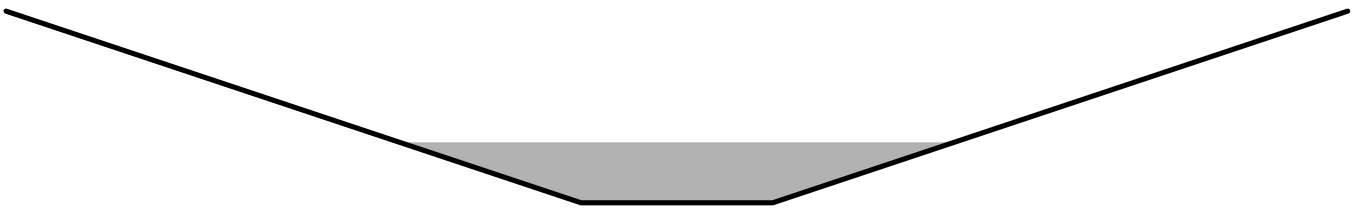
Summary for Reach E1R7: REACH TO AP

Inflow Area = 64.971 ac, 7.86% Impervious, Inflow Depth > 1.10" for 10-yr Storm event
Inflow = 3.89 cfs @ 14.49 hrs, Volume= 5.972 af
Outflow = 3.83 cfs @ 15.27 hrs, Volume= 5.957 af, Atten= 2%, Lag= 46.8 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.56 fps, Min. Travel Time= 23.1 min
Avg. Velocity = 0.81 fps, Avg. Travel Time= 44.4 min

Peak Storage= 5,312 cf @ 14.89 hrs
Average Depth at Peak Storage= 0.63' , Surface Width= 5.78'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 48.12 cfs

2.00' x 2.00' deep channel, n= 0.045 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 2,170.0' Slope= 0.0074 '/'
Inlet Invert= 158.00', Outlet Invert= 142.00'



Summary for Reach O4: Overland Flow

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 1.77" for 10-yr Storm event
Inflow = 7.26 cfs @ 12.05 hrs, Volume= 0.458 af
Outflow = 7.21 cfs @ 12.05 hrs, Volume= 0.458 af, Atten= 1%, Lag= 0.5 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.99 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 9.99 fps, Avg. Travel Time= 0.3 min

Peak Storage= 122 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.87 cfs

Custom stage-perimeter table, n= 0.035 Earth, dense weeds
100 Intermediate values determined by Multi-point interpolation
Length= 168.0' Slope= 0.0554 '/'
Inlet Invert= 201.30', Outlet Invert= 192.00'

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
2.00	12.0	12.0	2,016	119.87

Summary for Reach R-10a: R-10a

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 1.30" for 10-yr Storm event
Inflow = 17.93 cfs @ 12.07 hrs, Volume= 1.416 af
Outflow = 17.28 cfs @ 12.14 hrs, Volume= 1.416 af, Atten= 4%, Lag= 4.1 min
Routed to Pond DP-10 : DETENTION POND 10

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.73 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.63 fps, Avg. Travel Time= 6.6 min

Peak Storage= 2,375 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.63' , Surface Width= 7.78'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 437.98 cfs

4.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 641.0' Slope= 0.0137 '/'
Inlet Invert= 194.00', Outlet Invert= 185.25'

‡

Summary for Reach R-1B: LF TOE DITCH

Inflow Area = 19.514 ac, 4.11% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 34.92 cfs @ 12.08 hrs, Volume= 2.261 af
Outflow = 33.52 cfs @ 12.13 hrs, Volume= 2.261 af, Atten= 4%, Lag= 3.1 min
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.32 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 5.1 min

Peak Storage= 3,493 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.37' , Surface Width= 7.47'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 540.0' Slope= 0.0278 '/'
Inlet Invert= 181.00', Outlet Invert= 166.00'

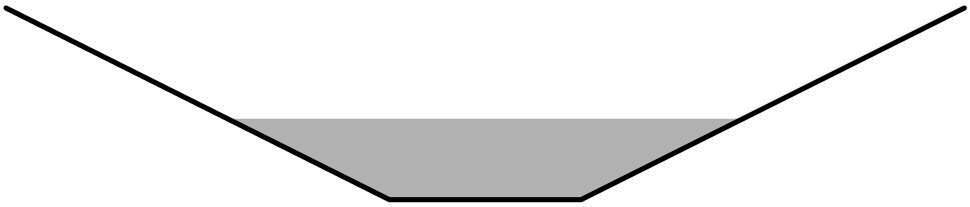
Summary for Reach R-1B1: LF TOE DITCH

Inflow Area = 8.511 ac, 4.70% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 16.03 cfs @ 12.06 hrs, Volume= 0.986 af
Outflow = 15.31 cfs @ 12.10 hrs, Volume= 0.986 af, Atten= 5%, Lag= 2.9 min
Routed to Reach R-1B : LF TOE DITCH

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.00 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.64 fps, Avg. Travel Time= 4.8 min

Peak Storage= 1,487 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.84' , Surface Width= 5.38'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 478.0' Slope= 0.0418 '/'
Inlet Invert= 204.00', Outlet Invert= 184.00'



Summary for Reach R-1D: Reach R-1D

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 1.30" for 10-yr Storm event
Inflow = 22.23 cfs @ 12.32 hrs, Volume= 4.476 af
Outflow = 21.25 cfs @ 12.41 hrs, Volume= 4.475 af, Atten= 4%, Lag= 5.5 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.45 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.51 fps, Avg. Travel Time= 12.2 min

Peak Storage= 3,226 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.56' , Surface Width= 21.19'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 67.93 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 370.0' Slope= 0.0324 '/'
Inlet Invert= 159.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1E: Plastic Lined Ditch

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 18.64 cfs @ 12.05 hrs, Volume= 1.110 af
Outflow = 18.46 cfs @ 12.05 hrs, Volume= 1.110 af, Atten= 1%, Lag= 0.4 min
Routed to Pond DP-1a : DP-1a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 12.67 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.73 fps, Avg. Travel Time= 0.9 min

Peak Storage= 294 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.32' , Surface Width= 5.27'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 1,302.19 cfs

4.00' x 3.00' deep channel, n= 0.011
Side Slope Z-value= 2.0 '/' Top Width= 16.00'
Length= 200.0' Slope= 0.0500 '/'
Inlet Invert= 176.00', Outlet Invert= 166.00'

Summary for Reach R-1F: Reach R-1F

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 1.35" for 10-yr Storm event
Inflow = 6.22 cfs @ 12.15 hrs, Volume= 1.110 af
Outflow = 6.21 cfs @ 12.21 hrs, Volume= 1.110 af, Atten= 0%, Lag= 3.8 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.66 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 8.3 min

Peak Storage= 784 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 23.44'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 140.14 cfs

20.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 210.0' Slope= 0.0524 '/'
Inlet Invert= 158.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1G: RipRap Downspout

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 2.75 cfs @ 12.06 hrs, Volume= 0.205 af
Outflow = 2.66 cfs @ 12.13 hrs, Volume= 0.205 af, Atten= 3%, Lag= 3.9 min
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.64 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 6.8 min

Peak Storage= 364 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.17' , Surface Width= 4.68'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 368.81 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 493.0' Slope= 0.3428 '/'
Inlet Invert= 333.00', Outlet Invert= 164.00'

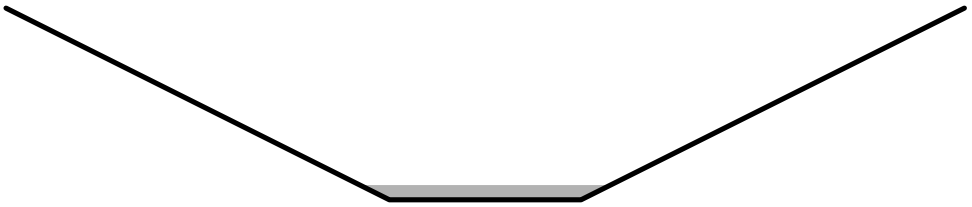
Summary for Reach R-1I: Final Cover Access Road Ditch

Inflow = 0.78 cfs @ 12.06 hrs, Volume= 0.011 af
Outflow = 0.56 cfs @ 12.21 hrs, Volume= 0.011 af, Atten= 28%, Lag= 9.1 min
Routed to Pond P-1I : Culvert Crossing 6c

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.60 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 15.0 min

Peak Storage= 185 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 2.61'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 80.08 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 524.0' Slope= 0.0849 '/'
Inlet Invert= 335.00', Outlet Invert= 290.50'



Summary for Reach R-1J: RipRap Downspout

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 9.02 cfs @ 11.96 hrs, Volume= 0.495 af
Outflow = 8.80 cfs @ 11.97 hrs, Volume= 0.495 af, Atten= 2%, Lag= 0.8 min
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.72 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.63 fps, Avg. Travel Time= 1.7 min

Peak Storage= 257 cf @ 11.96 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 5.34'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 387.31 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 164.0' Slope= 0.3780 '/'
Inlet Invert= 252.00', Outlet Invert= 190.00'

Summary for Reach R-1L: Final Cover Access Road Ditch

Inflow = 3.11 cfs @ 11.96 hrs, Volume= 0.027 af
Outflow = 2.01 cfs @ 12.06 hrs, Volume= 0.027 af, Atten= 35%, Lag= 6.3 min
Routed to Pond 1P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.45 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 15.2 min

Peak Storage= 502 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.34' , Surface Width= 3.34'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 77.46 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 560.0' Slope= 0.0795 '/'
Inlet Invert= 254.50', Outlet Invert= 210.00'

Summary for Reach R-1N: R-1N

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 1.28" for 10-yr Storm event
Inflow = 1.19 cfs @ 19.28 hrs, Volume= 2.901 af
Outflow = 1.19 cfs @ 19.82 hrs, Volume= 2.901 af, Atten= 0%, Lag= 32.5 min
Routed to Reach R-1O : R-1O

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.79 fps, Min. Travel Time= 19.8 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 42.4 min

Peak Storage= 1,412 cf @ 19.49 hrs
Average Depth at Peak Storage= 0.13' , Surface Width= 12.65'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.97 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 940.0' Slope= 0.0176 '/'
Inlet Invert= 168.00', Outlet Invert= 151.50'

‡

Summary for Reach R-1O: R-1O

Inflow Area = 58.266 ac, 5.06% Impervious, Inflow Depth = 1.52" for 10-yr Storm event
Inflow = 37.78 cfs @ 12.38 hrs, Volume= 7.385 af
Outflow = 35.67 cfs @ 12.59 hrs, Volume= 7.385 af, Atten= 6%, Lag= 12.8 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.73 fps, Min. Travel Time= 7.1 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 34.8 min

Peak Storage= 15,244 cf @ 12.47 hrs
Average Depth at Peak Storage= 1.02' , Surface Width= 30.49'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 151.21 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 735.0' Slope= 0.0020 '/'
Inlet Invert= 151.50', Outlet Invert= 150.00'

‡

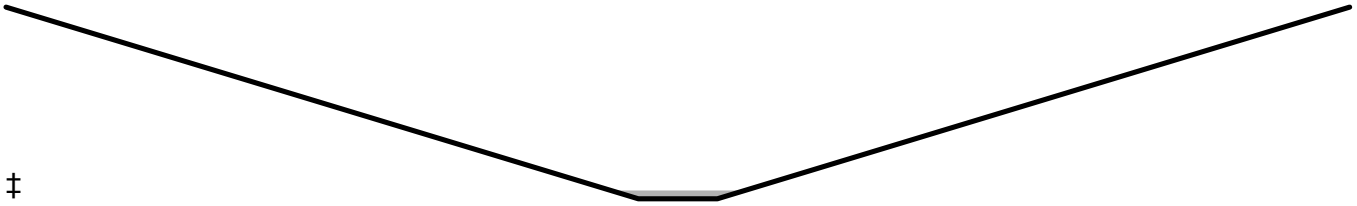
Summary for Reach R-2A: Reach 2A

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 1.43" for 10-yr Storm event
Inflow = 1.43 cfs @ 18.64 hrs, Volume= 3.756 af
Outflow = 1.42 cfs @ 20.22 hrs, Volume= 3.756 af, Atten= 0%, Lag= 95.2 min
Routed to Reach AP2 : ANALYSIS POINT #2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.48 fps, Min. Travel Time= 56.2 min
Avg. Velocity = 0.36 fps, Avg. Travel Time= 76.1 min

Peak Storage= 4,798 cf @ 19.29 hrs
Average Depth at Peak Storage= 0.09' , Surface Width= 42.41'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,332.75 cfs

25.00' x 2.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,630.0' Slope= 0.0092 '/'
Inlet Invert= 166.00', Outlet Invert= 151.00'



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Summary for Reach R-2C: LF TOE DITCH

Inflow Area = 9.740 ac, 3.67% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 17.76 cfs @ 12.06 hrs, Volume= 1.129 af
Outflow = 16.84 cfs @ 12.14 hrs, Volume= 1.129 af, Atten= 5%, Lag= 4.5 min
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.81 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 7.7 min

Peak Storage= 2,503 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.55' , Surface Width= 9.20'
Defined Flood Depth= 2.00' Flow Area= 14.0 sf, Capacity= 29.12 cfs
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 70.39 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 265.0' Slope= 0.0075 '/'
Inlet Invert= 181.00', Outlet Invert= 179.00'

Summary for Reach R-2D: DITCH

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 16.93 cfs @ 12.07 hrs, Volume= 1.074 af
Outflow = 16.49 cfs @ 12.10 hrs, Volume= 1.074 af, Atten= 3%, Lag= 1.8 min
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.60 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 1.21 fps, Avg. Travel Time= 3.1 min

Peak Storage= 1,045 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.95' , Surface Width= 6.80'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 183.17 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 225.0' Slope= 0.0511 '/'
Inlet Invert= 191.50', Outlet Invert= 180.00'

Summary for Reach R-4B: R-4B

Inflow Area = 4.602 ac, 9.82% Impervious, Inflow Depth = 1.52" for 10-yr Storm event
Inflow = 9.69 cfs @ 12.05 hrs, Volume= 0.584 af
Outflow = 6.58 cfs @ 12.35 hrs, Volume= 0.584 af, Atten= 32%, Lag= 18.2 min
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.39 fps, Min. Travel Time= 12.0 min
Avg. Velocity = 0.37 fps, Avg. Travel Time= 45.7 min

Peak Storage= 4,758 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.96' , Surface Width= 6.84'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 69.96 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 1,006.0' Slope= 0.0075 '/'
Inlet Invert= 178.50', Outlet Invert= 171.00'

Summary for Reach R-IH: RipRap Downspout

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 7.21 cfs @ 12.02 hrs, Volume= 0.453 af
Outflow = 7.22 cfs @ 12.03 hrs, Volume= 0.453 af, Atten= 0%, Lag= 0.7 min
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.34 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.48 fps, Avg. Travel Time= 2.9 min

Peak Storage= 354 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 5.20'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 385.75 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 256.0' Slope= 0.3750 '/'
Inlet Invert= 286.00', Outlet Invert= 190.00'

Summary for Reach R2: Reach 2

Inflow Area = 122.225 ac, 3.55% Impervious, Inflow Depth > 1.45" for 10-yr Storm event
Inflow = 64.41 cfs @ 12.52 hrs, Volume= 14.741 af
Outflow = 62.80 cfs @ 12.69 hrs, Volume= 14.741 af, Atten= 2%, Lag= 10.0 min
Routed to Reach 1 : Analysis Point 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.31 fps, Min. Travel Time= 5.0 min
Avg. Velocity = 0.50 fps, Avg. Travel Time= 23.4 min

Peak Storage= 19,061 cf @ 12.60 hrs
Average Depth at Peak Storage= 1.22' , Surface Width= 34.48'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 183.33 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 700.0' Slope= 0.0030 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'

‡

Summary for Reach R4B4:

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 1.44" for 10-yr Storm event
Inflow = 4.31 cfs @ 23.80 hrs, Volume= 6.530 af
Outflow = 4.31 cfs @ 24.39 hrs, Volume= 6.530 af, Atten= 0%, Lag= 34.9 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.78 fps, Min. Travel Time= 20.5 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 56.1 min

Peak Storage= 5,292 cf @ 24.05 hrs
Average Depth at Peak Storage= 0.35' , Surface Width= 19.07'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 131.94 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 963.0' Slope= 0.0094 '/'
Inlet Invert= 142.00', Outlet Invert= 132.96'

‡

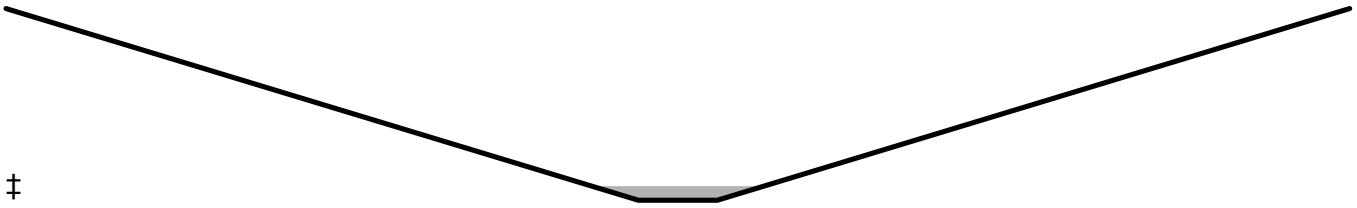
Summary for Reach R4C: Reach 4C

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 1.50" for 10-yr Storm event
Inflow = 1.97 cfs @ 13.29 hrs, Volume= 1.435 af
Outflow = 1.91 cfs @ 15.45 hrs, Volume= 1.435 af, Atten= 3%, Lag= 129.9 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.32 fps, Min. Travel Time= 49.8 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 99.5 min

Peak Storage= 5,697 cf @ 14.62 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 54.50'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 669.12 cfs

25.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 970.0' Slope= 0.0093 '/'
Inlet Invert= 159.00', Outlet Invert= 150.00'



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Summary for Reach R4C1: Reach 4C1

Inflow Area = 24.911 ac, 5.27% Impervious, Inflow Depth = 1.44" for 10-yr Storm event
Inflow = 3.10 cfs @ 15.58 hrs, Volume= 2.987 af
Outflow = 2.58 cfs @ 23.02 hrs, Volume= 2.987 af, Atten= 17%, Lag= 446.9 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.19 fps, Min. Travel Time= 196.5 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 467.5 min

Peak Storage= 30,413 cf @ 19.75 hrs
Average Depth at Peak Storage= 0.12' , Surface Width= 124.22'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 562.82 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 2,240.0' Slope= 0.0031 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Reach R4C2: Reach 4C2

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 1.44" for 10-yr Storm event
Inflow = 4.32 cfs @ 22.76 hrs, Volume= 6.530 af
Outflow = 4.31 cfs @ 23.80 hrs, Volume= 6.530 af, Atten= 0%, Lag= 62.4 min
Routed to Reach R4B4 :

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.20 fps, Min. Travel Time= 36.4 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 88.8 min

Peak Storage= 9,414 cf @ 23.20 hrs
Average Depth at Peak Storage= 0.18' , Surface Width= 135.87'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 477.27 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 445.0' Slope= 0.0022 '/'
Inlet Invert= 143.00', Outlet Invert= 142.00'

‡

Summary for Reach R4D: Reach 4D

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 1.21 cfs @ 14.17 hrs, Volume= 1.551 af
Outflow = 1.20 cfs @ 16.05 hrs, Volume= 1.551 af, Atten= 1%, Lag= 112.4 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.21 fps, Min. Travel Time= 48.3 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 66.3 min

Peak Storage= 3,482 cf @ 15.24 hrs
Average Depth at Peak Storage= 0.05' , Surface Width= 110.90'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 1,002.64 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 605.0' Slope= 0.0099 '/'
Inlet Invert= 156.00', Outlet Invert= 150.00'

‡

Summary for Reach R4G: Reach 4G

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 1.86 cfs @ 15.94 hrs, Volume= 3.543 af
Outflow = 1.86 cfs @ 16.23 hrs, Volume= 3.543 af, Atten= 0%, Lag= 17.6 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.56 fps, Min. Travel Time= 10.7 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 14.4 min

Peak Storage= 1,194 cf @ 16.06 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 23.06'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 199.54 cfs

20.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 363.0' Slope= 0.0193 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Pond 1P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 12.73 cfs @ 12.06 hrs, Volume= 0.682 af
Outflow = 12.24 cfs @ 12.08 hrs, Volume= 0.682 af, Atten= 4%, Lag= 1.4 min
Primary = 12.24 cfs @ 12.08 hrs, Volume= 0.682 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 207.16' @ 12.08 hrs Surf.Area= 1,422 sf Storage= 1,348 cf
Flood Elev= 210.00' Surf.Area= 3,240 sf Storage= 7,740 cf

Plug-Flow detention time= 5.1 min calculated for 0.682 af (100% of inflow)
Center-of-Mass det. time= 5.2 min (858.8 - 853.6)

Volume	Invert	Avail.Storage	Storage Description
#1	206.00'	7,740 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
206.00	900	0	0
208.00	1,800	2,700	2,700
210.00	3,240	5,040	7,740

Device	Routing	Invert	Outlet Devices
#1	Primary	206.00'	**24.0" Round 24"Culvert (X2) X 2.00** L= 76.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 206.00' / 205.00' S= 0.0132 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	209.60'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=11.91 cfs @ 12.08 hrs HW=207.14' (Free Discharge)
↑—**1=24"Culvert (X2)** (Inlet Controls 11.91 cfs @ 3.21 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=206.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 12P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 11.96 cfs @ 12.10 hrs, Volume= 0.682 af
Outflow = 11.64 cfs @ 12.12 hrs, Volume= 0.682 af, Atten= 3%, Lag= 1.3 min
Primary = 11.64 cfs @ 12.12 hrs, Volume= 0.682 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 15P : EXISTING 12" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 199.03' @ 12.12 hrs Surf.Area= 1,362 sf Storage= 939 cf
Flood Elev= 200.50' Surf.Area= 2,548 sf Storage= 3,866 cf

Plug-Flow detention time= 1.6 min calculated for 0.682 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (862.9 - 861.3)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	3,866 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676
200.50	2,548	1,190	3,866

Device	Routing	Invert	Outlet Devices
#1	Primary	197.90'	**24.0" Round 24"Culvert (X2) X 2.00** L= 98.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 197.90' / 195.47' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Secondary	200.00'	**14.0' long x 11.0' breadth Broad-Crested Rectangular Weir-Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Primary OutFlow Max=11.35 cfs @ 12.12 hrs HW=199.01' (Free Discharge)
1=24"Culvert (X2) (Inlet Controls 11.35 cfs @ 3.17 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
2=Broad-Crested Rectangular Weir-Overflow(Controls 0.00 cfs)

Summary for Pond 15P: EXISTING 12" CULVERT

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 198.00' @ 0.00 hrs Surf.Area= 464 sf Storage= 0 cf
Flood Elev= 200.50' Surf.Area= 2,212 sf Storage= 2,676 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	2,676 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676

Device	Routing	Invert	Outlet Devices
#1	Primary	197.40'	**12.0" Round 24"Culvert (X2)** L= 121.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 197.40' / 189.90' S= 0.0620 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	198.00'	**10.0' long x 50.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**1=24"Culvert (X2)** (Passes 0.00 cfs of 1.02 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 24.84 cfs @ 12.08 hrs, Volume= 1.673 af
Outflow = 24.78 cfs @ 12.08 hrs, Volume= 1.672 af, Atten= 0%, Lag= 0.0 min
Primary = 24.63 cfs @ 12.08 hrs, Volume= 1.671 af
Routed to Reach 12R : Ditch 4B1
Secondary = 0.17 cfs @ 12.10 hrs, Volume= 0.001 af
Routed to Pond C-4L : Catch Basin - 4L

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 220.15' @ 12.08 hrs Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 0.5 min calculated for 1.672 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (861.6 - 861.5)

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	216.50'	**24.0" Round Culvert - 4K** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.50' / 214.50' S= 0.0392 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	218.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=24.24 cfs @ 12.08 hrs HW=220.07' (Free Discharge)
└**1=Culvert - 4K** (Inlet Controls 24.24 cfs @ 7.72 fps)
└**2=Orifice/Grate** (Passes 24.24 cfs of 34.00 cfs potential flow)

Secondary OutFlow Max=0.17 cfs @ 12.10 hrs HW=220.10' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.17 cfs @ 0.80 fps)

Summary for Pond C-4L: Catch Basin - 4L

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 1.47" for 10-yr Storm event
Inflow = 1.94 cfs @ 11.93 hrs, Volume= 0.083 af
Outflow = 1.93 cfs @ 11.93 hrs, Volume= 0.078 af, Atten= 0%, Lag= 0.0 min
Primary = 1.93 cfs @ 11.93 hrs, Volume= 0.078 af
Routed to Reach 13R : Ex Ditch
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 214.71' @ 11.93 hrs Surf.Area= 13 sf Storage= 43 cf

Plug-Flow detention time= 24.4 min calculated for 0.078 af (94% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	210.50'	43 cf	**4.00'D x 3.40'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.50'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.50' / 210.50' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	214.50'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads
#3	Secondary	215.00'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.81 cfs @ 11.93 hrs HW=214.70' (Free Discharge)
↑└**1=Culvert 4L** (Passes 1.81 cfs of 10.24 cfs potential flow)
↑└**2=Orifice-Top of catch basin** (Weir Controls 1.81 cfs @ 1.46 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=210.50' (Free Discharge)
↑└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 1.77" for 10-yr Storm event
Inflow = 7.30 cfs @ 12.03 hrs, Volume= 0.458 af
Outflow = 7.26 cfs @ 12.05 hrs, Volume= 0.458 af, Atten= 0%, Lag= 1.0 min
Primary = 7.26 cfs @ 12.05 hrs, Volume= 0.458 af
Routed to Reach O4 : Overland Flow

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 205.32' @ 12.05 hrs Surf.Area= 747 sf Storage= 343 cf

Plug-Flow detention time= 0.7 min calculated for 0.458 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (840.4 - 839.7)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,690 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
204.40	0	0	0
206.00	1,300	1,040	1,040
208.00	4,200	5,500	6,540
209.00	6,100	5,150	11,690

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0152 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=7.21 cfs @ 12.05 hrs HW=205.32' (Free Discharge)
└**1=Culvert - 4B** (Inlet Controls 7.21 cfs @ 2.57 fps)

Summary for Pond CB-2B: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.308 ac, 2.34% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 16.53 cfs @ 12.07 hrs, Volume= 1.078 af
Outflow = 16.60 cfs @ 12.07 hrs, Volume= 1.076 af, Atten= 0%, Lag= 0.0 min
Primary = 16.60 cfs @ 12.07 hrs, Volume= 1.076 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 179.75' @ 12.07 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 1.7 min calculated for 1.076 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (861.2 - 860.6)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	173.00'	**24.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=16.16 cfs @ 12.07 hrs HW=179.73' (Free Discharge)
└**2=Culvert** (Passes 16.16 cfs of 36.22 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 16.16 cfs @ 2.80 fps)

Summary for Pond CB-2D: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 17.01 cfs @ 12.06 hrs, Volume= 1.077 af
Outflow = 16.93 cfs @ 12.07 hrs, Volume= 1.074 af, Atten= 0%, Lag= 0.1 min
Primary = 16.93 cfs @ 12.07 hrs, Volume= 1.074 af
Routed to Reach R-2D : DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 201.76' @ 12.07 hrs Surf.Area= 13 sf Storage= 138 cf
Flood Elev= 200.65' Surf.Area= 13 sf Storage= 134 cf

Plug-Flow detention time= 2.3 min calculated for 1.074 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (860.5 - 859.9)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	138 cf	**4.00'D x 11.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	201.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	192.00'	**24.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 192.00' / 191.50' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=16.58 cfs @ 12.07 hrs HW=201.75' (Free Discharge)
↑**2=Culvert** (Passes 16.58 cfs of 35.32 cfs potential flow)
↑**1=Orifice/Grate** (Weir Controls 16.58 cfs @ 2.83 fps)

Summary for Pond CB-2E: LF TOE DITCH - CATCH BASIN

Inflow Area = 10.279 ac, 4.18% Impervious, Inflow Depth = 1.40" for 10-yr Storm event
Inflow = 17.07 cfs @ 12.14 hrs, Volume= 1.200 af
Outflow = 17.07 cfs @ 12.14 hrs, Volume= 1.198 af, Atten= 0%, Lag= 0.0 min
Primary = 17.07 cfs @ 12.14 hrs, Volume= 1.198 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 179.76' @ 12.14 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 1.7 min calculated for 1.198 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (866.1 - 865.7)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#2	Primary	173.00'	**24.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=16.80 cfs @ 12.14 hrs HW=179.75' (Free Discharge)
↑—**2=Culvert** (Passes 16.80 cfs of 36.28 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 16.80 cfs @ 2.84 fps)

Summary for Pond CB-4C: LT TOE DITCH - CATCH BASIN

Inflow Area = 10.458 ac, 9.73% Impervious, Inflow Depth = 1.52" for 10-yr Storm event
Inflow = 14.38 cfs @ 12.02 hrs, Volume= 1.328 af
Outflow = 14.39 cfs @ 12.02 hrs, Volume= 1.326 af, Atten= 0%, Lag= 0.0 min
Primary = 14.39 cfs @ 12.02 hrs, Volume= 1.326 af
Routed to Pond DP-13 : DETENTION POND 13

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.68' @ 12.02 hrs Surf.Area= 13 sf Storage= 84 cf
Flood Elev= 174.00' Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 1.7 min calculated for 1.326 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (867.3 - 867.0)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	171.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	167.00'	**24.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.00' / 166.50' S= 0.0096 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=13.97 cfs @ 12.02 hrs HW=171.67' (Free Discharge)
↑—**2=Culvert** (Passes 13.97 cfs of 28.96 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 13.97 cfs @ 2.67 fps)

Summary for Pond CB-4D: LF TOE DITCH - CATCH BASINS

Inflow Area = 12.095 ac, 2.44% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 26.16 cfs @ 12.01 hrs, Volume= 1.401 af
Outflow = 26.17 cfs @ 12.01 hrs, Volume= 1.400 af, Atten= 0%, Lag= 0.0 min
Primary = 26.17 cfs @ 12.01 hrs, Volume= 1.400 af
Routed to Pond DP-14 : DETENTION POND 14

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 161.14' @ 12.01 hrs Surf.Area= 13 sf Storage= 57 cf
Flood Elev= 162.00' Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 0.7 min calculated for 1.400 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (855.8 - 855.6)

Volume	Invert	Avail.Storage	Storage Description
#1	156.00'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	160.50'	**30.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	158.00'	**24.0" Round Culvert X 2.00** L= 54.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.50' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=25.52 cfs @ 12.01 hrs HW=161.13' (Free Discharge)
↑**2=Culvert** (Passes 25.52 cfs of 43.57 cfs potential flow)
↑**1=Orifice/Grate** (Weir Controls 25.52 cfs @ 2.59 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area = 11.260 ac, 1.95% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 20.53 cfs @ 12.06 hrs, Volume= 1.305 af
Outflow = 20.52 cfs @ 12.07 hrs, Volume= 1.304 af, Atten= 0%, Lag= 0.0 min
Primary = 20.52 cfs @ 12.07 hrs, Volume= 1.304 af
Routed to Pond DP-11R : DETENTION POND 11R

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 163.84' @ 12.07 hrs Surf.Area= 13 sf Storage= 61 cf
Flood Elev= 170.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 0.4 min calculated for 1.304 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (860.1 - 860.0)

Volume	Invert	Avail.Storage	Storage Description
#1	159.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**24.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.00' S= 0.0087 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Primary	167.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=20.09 cfs @ 12.07 hrs HW=163.76' (Free Discharge)
↑**1=Culvert** (Inlet Controls 20.09 cfs @ 6.40 fps)
2=Orifice/Grate (Controls 0.00 cfs)

Summary for Pond CB-4H: Catch Basin - 4H

Inflow Area = 15.096 ac, 1.13% Impervious, Inflow Depth = 1.40" for 10-yr Storm event
Inflow = 27.85 cfs @ 12.06 hrs, Volume= 1.762 af
Outflow = 27.74 cfs @ 12.06 hrs, Volume= 1.760 af, Atten= 0%, Lag= 0.1 min
Primary = 27.74 cfs @ 12.06 hrs, Volume= 1.760 af
Routed to Pond DP-11R : DETENTION POND 11R
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4G : Catch Basin - 4G

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 182.38' @ 12.06 hrs Surf.Area= 13 sf Storage= 113 cf
Flood Elev= 183.00' Surf.Area= 13 sf Storage= 113 cf

Plug-Flow detention time= 1.2 min calculated for 1.759 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (854.7 - 854.3)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	174.00'	**24.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.00' / 172.00' S= 0.0308 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	181.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	183.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=27.45 cfs @ 12.06 hrs HW=182.35' (Free Discharge)
└**1=Culvert** (Passes 27.45 cfs of 41.01 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 27.45 cfs @ 5.59 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 23.44 cfs @ 12.07 hrs, Volume= 1.512 af
Outflow = 23.46 cfs @ 12.07 hrs, Volume= 1.510 af, Atten= 0%, Lag= 0.0 min
Primary = 17.93 cfs @ 12.07 hrs, Volume= 1.416 af
Routed to Reach R-10a : R-10a
Secondary = 5.53 cfs @ 12.07 hrs, Volume= 0.094 af
Routed to Pond CB-4H : Catch Basin - 4H

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 208.37' @ 12.07 hrs Surf.Area= 13 sf Storage= 105 cf
Flood Elev= 209.90' Surf.Area= 13 sf Storage= 121 cf

Plug-Flow detention time= 1.2 min calculated for 1.509 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (860.7 - 860.3)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	121 cf	**4.00'D x 9.60'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	200.00'	**24.0" Round NEW 24-INCH** L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.00' / 194.00' S= 0.0896 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	207.58'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	208.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=17.58 cfs @ 12.07 hrs HW=208.36' (Free Discharge)
└**1=NEW 24-INCH** (Passes 17.58 cfs of 41.03 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 17.58 cfs @ 2.88 fps)

Secondary OutFlow Max=5.26 cfs @ 12.07 hrs HW=208.36' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 5.26 cfs @ 1.47 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area = 11.663 ac, 3.68% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 15.93 cfs @ 12.17 hrs, Volume= 1.351 af
Outflow = 15.90 cfs @ 12.18 hrs, Volume= 1.349 af, Atten= 0%, Lag= 0.1 min
Primary = 15.90 cfs @ 12.18 hrs, Volume= 1.349 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4JA3 : (4JA3) New Catch Basin

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 219.43' @ 12.18 hrs Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 1.2 min calculated for 1.349 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (868.8 - 868.5)

Volume	Invert	Avail.Storage	Storage Description
#1	211.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert - 4JA** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 212.20' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=15.71 cfs @ 12.18 hrs HW=219.42' (Free Discharge)
└**1=Culvert - 4JA** (Passes 15.71 cfs of 20.26 cfs potential flow)
└**2=Orifice/Grate** (Weir Controls 15.71 cfs @ 2.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=211.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Summary for Pond CB-4JA3: (4JA3) New Catch Basin

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond PS11 : Culvert - 4IA(C11 PS)

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 202.90' @ 0.00 hrs Surf.Area= 0.000 ac Storage= 0.000 af
Flood Elev= 215.00' Surf.Area= 0.000 ac Storage= 0.003 af

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	202.90'	0.003 af	**4.00'D x 10.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	204.90'	**18.0" Round NEW 24-INCH** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 204.90' / 204.00' S= 0.0150 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	212.90'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	212.90'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=202.90' (Free Discharge)
└**1=NEW 24-INCH** (Controls 0.00 cfs)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=202.90' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1: DETENTION POND 1

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 1.35" for 10-yr Storm event
Inflow = 53.86 cfs @ 12.10 hrs, Volume= 4.659 af
Outflow = 22.23 cfs @ 12.32 hrs, Volume= 4.476 af, Atten= 59%, Lag= 13.5 min
Primary = 22.23 cfs @ 12.32 hrs, Volume= 4.476 af
Routed to Reach R-1D : Reach R-1D
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1D : Reach R-1D

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 164.20' @ 12.32 hrs Surf.Area= 17,516 sf Storage= 58,540 cf
Flood Elev= 166.00' Surf.Area= 21,310 sf Storage= 93,390 cf

Plug-Flow detention time= 596.4 min calculated for 4.474 af (96% of inflow)
Center-of-Mass det. time= 514.0 min (1,503.7 - 989.6)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	115,245 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	10,750	0	0
162.00	13,540	24,290	24,290
164.00	17,070	30,610	54,900
165.00	19,300	18,185	73,085
166.00	21,310	20,305	93,390
167.00	22,400	21,855	115,245

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**30.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 159.80' / 159.35' S= 0.0060 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	160.60'	**3.0" Vert. Orifice on side** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.70'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	166.30'	**40.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=21.61 cfs @ 12.32 hrs HW=164.19' (Free Discharge)
└**1=Culvert** (Passes 21.61 cfs of 33.07 cfs potential flow)
  ├**2=Orifice on side** (Orifice Controls 0.44 cfs @ 8.96 fps)
  └**3=Orifice-Top of drop inlet** (Weir Controls 21.17 cfs @ 2.29 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth = 1.50" for 10-yr Storm event
Inflow = 51.38 cfs @ 12.01 hrs, Volume= 4.371 af
Outflow = 3.63 cfs @ 14.10 hrs, Volume= 3.849 af, Atten= 93%, Lag= 125.2 min
Primary = 2.49 cfs @ 14.10 hrs, Volume= 1.384 af
  Routed to Reach E1R6 : DP-10 DISCHARGE
Secondary = 1.14 cfs @ 14.10 hrs, Volume= 2.465 af
  Routed to Reach E1R6 : DP-10 DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach E1R6 : DP-10 DISCHARGE

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.11' @ 14.10 hrs Surf.Area= 54,592 sf Storage= 109,916 cf
Flood Elev= 189.00' Surf.Area= 77,500 sf Storage= 239,860 cf

Plug-Flow detention time= 1,133.6 min calculated for 3.847 af (88% of inflow)
Center-of-Mass det. time= 1,076.2 min (1,934.6 - 858.4)

Volume	Invert	Avail.Storage	Storage Description
#1	180.00'	320,610 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
180.00	10	0	0
182.00	2,300	2,310	2,310
184.00	11,000	13,300	15,610
186.00	34,000	45,000	60,610
188.00	71,000	105,000	165,610
190.00	84,000	155,000	320,610

Device	Routing	Invert	Outlet Devices
#1	Device 3	187.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.00'	**6.0" Vert. 6-in Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	181.00'	**24.0" Round 18-in Primary Culvert** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.00' / 180.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#4	Secondary	177.50'	**5.8" Round 6-in Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 177.50' / 174.00' S= 0.0159 '/' Cc= 0.900

n= 0.011, Flow Area= 0.18 sf

#5	Device 4	186.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	184.00'	**1.5" Vert. Orifice Side** X 2 rows with 0.5" cc spacing C= 0.600 Limited to weir flow at low heads
#7	Tertiary	188.00'	**10.0' long x 26.0' breadth E-Spillway Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=2.44 cfs @ 14.10 hrs HW=187.11' (Free Discharge)
└**3=18-in Primary Culvert** (Passes 2.44 cfs of 34.20 cfs potential flow)
  ├**1=Orifice/Grate** (Weir Controls 1.56 cfs @ 1.10 fps)
  └**2=6-in Orifice** (Orifice Controls 0.88 cfs @ 4.47 fps)

Secondary OutFlow Max=1.14 cfs @ 14.10 hrs HW=187.11' (Free Discharge)
└**4=6-in Culvert** (Passes 1.14 cfs of 1.35 cfs potential flow)
  ├**5=Orifice Top** (Orifice Controls 0.93 cfs @ 5.08 fps)
  └**6=Orifice Side** (Orifice Controls 0.21 cfs @ 8.38 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=180.00' (Free Discharge)
└**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 56.32 cfs @ 12.06 hrs, Volume= 3.543 af
Outflow = 1.86 cfs @ 15.94 hrs, Volume= 3.543 af, Atten= 97%, Lag= 233.0 min
Primary = 0.65 cfs @ 15.94 hrs, Volume= 0.853 af
  Routed to Reach R4G : Reach 4G
Secondary = 1.21 cfs @ 15.94 hrs, Volume= 2.690 af
  Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 158.89' @ 15.94 hrs Surf.Area= 28,727 sf Storage= 91,332 cf

Plug-Flow detention time= 621.8 min calculated for 3.542 af (100% of inflow)
Center-of-Mass det. time= 622.0 min (1,476.4 - 854.4)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.65 cfs @ 15.94 hrs HW=158.89' (Free Discharge)
└**1=Culvert** (Passes 0.65 cfs of 24.35 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.65 cfs @ 7.45 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.21 cfs @ 15.94 hrs HW=158.89' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.21 cfs @ 6.15 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 1.43" for 10-yr Storm event
Inflow = 50.07 cfs @ 12.10 hrs, Volume= 3.756 af
Outflow = 1.43 cfs @ 18.64 hrs, Volume= 3.756 af, Atten= 97%, Lag= 392.2 min
Primary = 0.11 cfs @ 18.64 hrs, Volume= 0.061 af
  Routed to Reach R-2A : Reach 2A
Secondary = 1.32 cfs @ 18.64 hrs, Volume= 3.696 af
  Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.74' @ 18.64 hrs Surf.Area= 39,716 sf Storage= 107,124 cf

Plug-Flow detention time= 897.1 min calculated for 3.755 af (100% of inflow)
Center-of-Mass det. time= 897.4 min (1,757.4 - 860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.11 cfs @ 18.64 hrs HW=171.74' (Free Discharge)
└**1=Culvert** (Passes 0.11 cfs of 18.93 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.11 cfs @ 1.67 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.32 cfs @ 18.64 hrs HW=171.74' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.32 cfs @ 6.70 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 1.50" for 10-yr Storm event
Inflow = 15.85 cfs @ 12.00 hrs, Volume= 1.435 af
Outflow = 1.97 cfs @ 13.29 hrs, Volume= 1.435 af, Atten= 88%, Lag= 76.9 min
Primary = 0.62 cfs @ 13.29 hrs, Volume= 0.314 af
  Routed to Reach R4C : Reach 4C
Secondary = 1.36 cfs @ 13.29 hrs, Volume= 1.121 af
  Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 162.83' @ 13.29 hrs Surf.Area= 11,800 sf Storage= 25,985 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 139.9 min calculated for 1.435 af (100% of inflow)
Center-of-Mass det. time= 139.9 min (1,006.1 - 866.2)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	164.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.62 cfs @ 13.29 hrs HW=162.83' (Free Discharge)
└**1=Culvert** (Passes 0.62 cfs of 18.72 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.62 cfs @ 7.08 fps)
  ├**3=Orifice** (Controls 0.00 cfs)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.36 cfs @ 13.29 hrs HW=162.83' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.36 cfs @ 6.91 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 27.78 cfs @ 12.00 hrs, Volume= 1.551 af
Outflow = 1.21 cfs @ 14.17 hrs, Volume= 1.551 af, Atten= 96%, Lag= 130.2 min
Primary = 0.21 cfs @ 14.17 hrs, Volume= 0.110 af
Routed to Reach R4D : Reach 4D
Secondary = 1.00 cfs @ 14.17 hrs, Volume= 1.441 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 158.41' @ 14.17 hrs Surf.Area= 35,143 sf Storage= 34,295 cf

Plug-Flow detention time= 350.6 min calculated for 1.550 af (100% of inflow)
Center-of-Mass det. time= 350.6 min (1,206.1 - 855.4)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.21 cfs @ 14.17 hrs HW=158.41' (Free Discharge)
└**1=Culvert** (Passes 0.21 cfs of 9.53 cfs potential flow)
├**2=Orifice** (Controls 0.00 cfs)
├**3=Grate** (Controls 0.00 cfs)
└**5=Orifice/Grate** (Orifice Controls 0.21 cfs @ 2.36 fps)

Secondary OutFlow Max=1.00 cfs @ 14.17 hrs HW=158.41' (Free Discharge)
└**4=Culvert** (Barrel Controls 1.00 cfs @ 5.11 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1a: DP-1a

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 18.46 cfs @ 12.05 hrs, Volume= 1.110 af
Outflow = 1.09 cfs @ 13.70 hrs, Volume= 0.983 af, Atten= 94%, Lag= 98.7 min
Primary = 1.09 cfs @ 13.70 hrs, Volume= 0.983 af
Routed to Pond DP-1 : DETENTION POND 1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 163.00' Surf.Area= 34,985 sf Storage= 146,410 cf
Peak Elev= 163.71' @ 13.70 hrs Surf.Area= 36,712 sf Storage= 171,743 cf (25,333 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (116,636 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 601.8 min (1,461.0 - 859.2)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	263,046 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	24,139	0	0
160.00	27,981	52,120	52,120
162.00	32,544	60,525	112,645
163.00	34,985	33,765	146,410
164.00	37,429	36,207	182,617
166.00	43,000	80,429	263,046

Device	Routing	Invert	Outlet Devices
#1	Primary	163.10'	**113.0 deg Sharp-Crested Vee/Trap Weir** Cv= 2.49 (C= 3.11)
#2	Secondary	165.60'	**18.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=1.08 cfs @ 13.70 hrs HW=163.71' (Free Discharge)
↑**1=Sharp-Crested Vee/Trap Weir** (Weir Controls 1.08 cfs @ 1.94 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 21.60 cfs @ 11.96 hrs, Volume= 1.143 af
Outflow = 6.22 cfs @ 12.15 hrs, Volume= 1.110 af, Atten= 71%, Lag= 11.2 min
Primary = 6.22 cfs @ 12.15 hrs, Volume= 1.110 af
Routed to Reach R-1F : Reach R-1F

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 162.30' Surf.Area= 1,330 sf Storage= 630 cf
Peak Elev= 166.08' @ 12.15 hrs Surf.Area= 8,250 sf Storage= 15,517 cf (14,887 cf above start)
Flood Elev= 167.80' Surf.Area= 17,700 sf Storage= 36,993 cf (36,363 cf above start)

Plug-Flow detention time= 75.7 min calculated for 1.096 af (96% of inflow)
Center-of-Mass det. time= 48.6 min (904.5 - 856.0)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	36,993 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,000	0	0
164.00	3,200	4,200	4,200
165.00	4,940	4,070	8,270
166.00	7,860	6,400	14,670
167.00	12,570	10,215	24,885
167.80	17,700	12,108	36,993

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.20' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	164.20'	**8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	165.40'	**2.4' long x 0.30' rise Sharp-Crested Rectangular Weir** 1 End Contraction(s)
#5	Device 1	166.60'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=6.22 cfs @ 12.15 hrs HW=166.08' (Free Discharge)
└**1=Culvert** (Passes 6.22 cfs of 22.86 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 1.59 cfs @ 8.10 fps)
  ├**3=Orifice** (Orifice Controls 2.09 cfs @ 5.99 fps)
  ├**4=Sharp-Crested Rectangular Weir** (Orifice Controls 2.54 cfs @ 3.57 fps)
  └**5=Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 1.58" for 10-yr Storm event
Inflow = 35.27 cfs @ 12.00 hrs, Volume= 3.580 af
Outflow = 1.19 cfs @ 19.28 hrs, Volume= 2.901 af, Atten= 97%, Lag= 436.7 min
Primary = 1.19 cfs @ 19.28 hrs, Volume= 2.901 af
  Routed to Reach R-1N : R-1N
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-1N : R-1N

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 175.82' @ 19.28 hrs Surf.Area= 58,872 sf Storage= 109,652 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf

Plug-Flow detention time= 999.1 min calculated for 2.901 af (81% of inflow)
Center-of-Mass det. time= 915.4 min (1,772.8 - 857.4)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.19 cfs @ 19.28 hrs HW=175.82' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Orifice Controls 1.19 cfs @ 6.49 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-6 ES: DETENTION POND 6 - EMERGENCY SPILLWAY

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Secondary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 178.00' Surf.Area= 93,326 sf Storage= 273,159 cf
Peak Elev= 178.00' @ 0.00 hrs Surf.Area= 93,326 sf Storage= 273,159 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (223,485 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert X 0.00** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice X 0.00** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**20.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth = 1.79" for 10-yr Storm event
Inflow = 53.20 cfs @ 12.13 hrs, Volume= 4.484 af
Outflow = 0.82 cfs @ 24.20 hrs, Volume= 2.133 af, Atten= 98%, Lag= 724.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Secondary = 0.82 cfs @ 24.20 hrs, Volume= 2.133 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 189.33' @ 24.20 hrs Surf.Area= 83,859 sf Storage= 166,368 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,571.3 min calculated for 2.132 af (48% of inflow)
Center-of-Mass det. time= 1,446.0 min (2,294.1 - 848.1)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Primary	189.50'	**12.0" Round 12-In Outlet Culvert** L= 48.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.50' / 180.50' S= 0.1875 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	184.21'	**5.8" Round 6-In Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.21' / 180.50' S= 0.0618 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#3	Device 2	188.70'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 2	188.30'	**1.5" Vert. Orifice X 2.00** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**1=12-In Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.82 cfs @ 24.20 hrs HW=189.33' (Free Discharge)
└**2=6-In Culvert** (Passes 0.82 cfs of 1.54 cfs potential flow)
  └**3=Orifice** (Orifice Controls 0.70 cfs @ 3.82 fps)
  └**4=Orifice** (Orifice Controls 0.12 cfs @ 4.74 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9(E): DP 9 (EMERGENCY OUTLET)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-1G: Culvert Crossing 1G

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 3.55 cfs @ 12.05 hrs, Volume= 0.215 af
Outflow = 3.53 cfs @ 12.06 hrs, Volume= 0.215 af, Atten= 1%, Lag= 0.7 min
Primary = 2.75 cfs @ 12.06 hrs, Volume= 0.205 af
Routed to Reach R-1G : RipRap Downspout
Secondary = 0.78 cfs @ 12.06 hrs, Volume= 0.011 af
Routed to Reach R-1I : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 336.24' @ 12.06 hrs Surf.Area= 549 sf Storage= 352 cf

Plug-Flow detention time= 5.7 min calculated for 0.215 af (100% of inflow)
Center-of-Mass det. time= 5.7 min (861.7 - 855.9)

Volume	Invert	Avail.Storage	Storage Description
#1	335.50'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
335.50	400	0	0
337.50	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	**24.0" Round 24" Culvert** L= 36.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 335.50' / 331.00' S= 0.1250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	336.00'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=2.71 cfs @ 12.06 hrs HW=336.24' (Free Discharge)
1=24" Culvert (Inlet Controls 2.71 cfs @ 2.58 fps)

Secondary OutFlow Max=0.74 cfs @ 12.06 hrs HW=336.24' (Free Discharge)
2=Stone Check Dam Weir (Weir Controls 0.74 cfs @ 1.33 fps)

Summary for Pond P-1H: Modified Plunge Pool w/(2)24" Culverts P-6a

Inflow Area = 6.697 ac, 1.15% Impervious, Inflow Depth = 1.36" for 10-yr Storm event
Inflow = 12.69 cfs @ 11.96 hrs, Volume= 0.761 af
Outflow = 12.41 cfs @ 11.97 hrs, Volume= 0.759 af, Atten= 2%, Lag= 0.3 min
Primary = 12.41 cfs @ 11.97 hrs, Volume= 0.759 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 184.25' @ 11.97 hrs Surf.Area= 409 sf Storage= 452 cf
Flood Elev= 186.00' Surf.Area= 869 sf Storage= 1,551 cf

Plug-Flow detention time= 3.4 min calculated for 0.758 af (100% of inflow)
Center-of-Mass det. time= 1.7 min (860.5 - 858.8)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	5,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	37	0	0
183.00	163	100	100
184.00	348	256	356
185.00	587	468	823
186.00	869	728	1,551
188.00	1,067	1,936	3,487
190.00	1,160	2,227	5,714

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**24.0" Round (2)24"-Culvert X 2.00** L= 56.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 183.00' / 182.00' S= 0.0179 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Secondary	185.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=12.03 cfs @ 11.97 hrs HW=184.23' (Free Discharge)
1=(2)24"-Culvert (Barrel Controls 12.03 cfs @ 4.25 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-1I: Culvert Crossing 6c

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 1.42" for 10-yr Storm event
Inflow = 8.56 cfs @ 12.01 hrs, Volume= 0.463 af
Outflow = 8.24 cfs @ 12.02 hrs, Volume= 0.463 af, Atten= 4%, Lag= 0.7 min
Primary = 7.21 cfs @ 12.02 hrs, Volume= 0.453 af
Routed to Reach R-IH : RipRap Downspout
Secondary = 1.03 cfs @ 12.02 hrs, Volume= 0.011 af
Routed to Pond P-1K : Culvert Crossing 1K

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 291.78' @ 12.02 hrs Surf.Area= 800 sf Storage= 300 cf

Plug-Flow detention time= 4.3 min calculated for 0.463 af (100% of inflow)
Center-of-Mass det. time= 4.3 min (857.0 - 852.6)

Volume	Invert	Avail.Storage	Storage Description
#1	290.50'	300 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
290.50	400	0	0
291.00	800	300	300

Device	Routing	Invert	Outlet Devices
#1	Primary	290.50'	**24.0" Round 24" Culvert** L= 38.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 290.50' / 286.00' S= 0.1184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	291.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=7.14 cfs @ 12.02 hrs HW=291.77' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 7.14 cfs @ 3.39 fps)

Secondary OutFlow Max=0.97 cfs @ 12.02 hrs HW=291.77' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Weir Controls 0.97 cfs @ 1.41 fps)

Summary for Pond P-1J-1: (2) 24" CULVERTS

Inflow Area = 6.104 ac, 1.82% Impervious, Inflow Depth = 1.39" for 10-yr Storm event
Inflow = 13.51 cfs @ 11.96 hrs, Volume= 0.705 af
Outflow = 13.43 cfs @ 11.96 hrs, Volume= 0.705 af, Atten= 1%, Lag= 0.3 min
Primary = 13.26 cfs @ 11.96 hrs, Volume= 0.704 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.17 cfs @ 11.95 hrs, Volume= 0.001 af
Routed to Pond P-1J-2 : 18" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 191.30' @ 11.96 hrs Surf.Area= 264 sf Storage= 178 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (853.9 - 853.7)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	410 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
190.00	10	0	0
192.00	400	410	410

Device	Routing	Invert	Outlet Devices
#1	Primary	190.00'	**24.0" Round Culvert X 2.00** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 190.00' / 189.60' S= 0.0108 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	191.20'	**170.0 deg x 1.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Primary OutFlow Max=12.96 cfs @ 11.96 hrs HW=191.28' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 12.96 cfs @ 3.04 fps)

Secondary OutFlow Max=0.16 cfs @ 11.95 hrs HW=191.29' (Free Discharge)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 0.16 cfs @ 0.84 fps)

Summary for Pond P-1J-2: 18" CULVERT

Inflow	=	0.17 cfs @	11.95 hrs, Volume=	0.001 af
Outflow	=	0.15 cfs @	11.96 hrs, Volume=	0.001 af, Atten= 12%, Lag= 0.3 min
Primary	=	0.15 cfs @	11.96 hrs, Volume=	0.001 af

Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.04' @ 11.96 hrs Surf.Area= 58 sf Storage= 1 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.5 min (717.9 - 717.4)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	32,056 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	10	0	0
188.00	1,367	689	689
190.00	3,000	4,367	5,056
192.00	6,000	9,000	14,056
194.00	12,000	18,000	32,056

Device	Routing	Invert	Outlet Devices
#1	Primary	186.80'	**18.0" Round 18" Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 186.80' / 185.97' S= 0.0208 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.23 cfs @ 11.96 hrs HW=187.03' (Free Discharge)
↑—**1=18" Culvert** (Inlet Controls 0.23 cfs @ 1.30 fps)

Summary for Pond P-1K: Culvert Crossing 1K

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 12.41 cfs @ 11.95 hrs, Volume= 0.523 af
Outflow = 12.13 cfs @ 11.96 hrs, Volume= 0.523 af, Atten= 2%, Lag= 0.4 min
Primary = 9.02 cfs @ 11.96 hrs, Volume= 0.495 af
Routed to Reach R-1J : RipRap Downspout
Secondary = 3.11 cfs @ 11.96 hrs, Volume= 0.027 af
Routed to Reach R-1L : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 255.97' @ 11.96 hrs Surf.Area= 594 sf Storage= 482 cf

Plug-Flow detention time= 0.3 min calculated for 0.522 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (846.3 - 846.0)

Volume	Invert	Avail.Storage	Storage Description
#1	255.00'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.00	400	0	0
257.00	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**24.0" Round 24" Culvert** L= 33.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 254.50' / 252.00' S= 0.0758 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	255.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=8.89 cfs @ 11.96 hrs HW=255.96' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 8.89 cfs @ 3.63 fps)

Secondary OutFlow Max=2.95 cfs @ 11.96 hrs HW=255.96' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Weir Controls 2.95 cfs @ 1.79 fps)

Summary for Pond PS11: Culvert - 4IA(C11 PS)

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond CB-4I : Catch Basin - 4I

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 212.90' @ 0.00 hrs Surf.Area= 5 sf Storage= 0 cf
Flood Elev= 215.10' Surf.Area= 1,133 sf Storage= 1,237 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,353 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
212.90	5	0	0
213.04	63	5	5
215.20	1,185	1,348	1,353

Device	Routing	Invert	Outlet Devices
#1	Primary	213.05'	**24.0" Round Culvert - 4IA(C11 PS)** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.05' / 212.15' S= 0.0225 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=212.90' (Free Discharge)
↑—**1=Culvert - 4IA(C11 PS)** (Controls 0.00 cfs)

Summary for Subcatchment 1A: SC-1A

Runoff = 19.42 cfs @ 13.10 hrs, Volume= 4.290 af, Depth= 2.28"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.084	70	Woods, Good, HSG C
*	7.750	77	Woods, Good, HSG D
*	1.540	71	Meadow, non-grazed, HSG C
*	1.760	78	Meadow HSG D
*	0.070	96	Gravel Surface
*	0.330	98	Impervious Surface
	22.534	74	Weighted Average
	22.204		98.54% Pervious Area
	0.330		1.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.4	1,840		1.50		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
93.1	2,250	Total			

Summary for Subcatchment 1B: 1B

Runoff = 1.37 cfs @ 11.93 hrs, Volume= 0.059 af, Depth= 2.04"
Routed to Reach 1 : Analysis Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.344	71	Landfill Final Cover
	0.344		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segement A-B**

Summary for Subcatchment 1B1: SC-1B1

Runoff = 24.87 cfs @ 12.05 hrs, Volume= 1.504 af, Depth= 2.12"
Routed to Reach R-1B1 : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	8.111	71	Meadow, non-grazed, HSG C
*	0.400	98	Riprap
	8.511	72	Weighted Average
	8.111		95.30% Pervious Area
	0.400		4.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	140	0.1000	4.74		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	240	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	482	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.8	1,012	Total			

Summary for Subcatchment 1B2: SC-1B2

Runoff = 31.82 cfs @ 12.05 hrs, Volume= 1.945 af, Depth= 2.12"
Routed to Reach R-1B : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	10.600	71	Landfill Final Cover
*	0.403	98	Riprap
	11.003	72	Weighted Average
	10.600		96.34% Pervious Area
	0.403		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.6	75	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	403	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	554	0.3300	19.66	314.62	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.050 Mountain streams w/large boulders
13.1	1,182	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 14.02 cfs @ 12.84 hrs, Volume= 2.613 af, Depth= 2.45"
Routed to Reach R2 : Reach 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	6.100	77	Woods, Good, HSG D
*	0.690	70	Woods, Good, HSG C
*	3.100	78	Meadow HSG D
*	2.580	71	Meadow, non-grazed, HSG C
*	0.310	96	Gravel Surface
	12.780	76	Weighted Average
	12.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.7	200	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.6	170	0.0133	1.73		**Shallow Concentrated Flow, Segment ID: B-C** Grassed Waterway Kv= 15.0 fps
16.7					**Direct Entry, Segment ID: C-D**
75.0	370	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 35.81 cfs @ 12.05 hrs, Volume= 2.158 af, Depth= 2.12"
Routed to Pond DP-1 : DETENTION POND 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.000	71	Landfill Final Cover
*	0.110	96	Gravel Surface
*	0.800	78	Pond, Meadow HSG D
*	0.300	98	Riprap
	12.210	72	Weighted Average
	11.910		97.54% Pervious Area
	0.300		2.46% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	110	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.3	241	0.0700	12.78	172.52	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.025
0.3	556	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
12.7	1,057	Total			

Summary for Subcatchment 1E: SC-1E

Runoff = 28.86 cfs @ 12.04 hrs, Volume= 1.693 af, Depth= 2.12"
Routed to Reach R-1E : Plastic Lined Ditch

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	9.100	71	Landfill Final Cover
*	0.200	96	Gravel Surface
*	0.280	98	Riprap
	9.580	72	Weighted Average
	9.300		97.08% Pervious Area
	0.280		2.92% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	146	0.1000	0.22		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	296	0.0700	16.72	200.67	**Trap/Vee/Rect Channel Flow, Segment ID: B-C** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.025
0.3	537	0.3300	28.09	449.46	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.035
0.3	186	0.0700	10.28	57.82	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=1.50' Z= 3.0 & 2.0 '/' Top.W=7.50' n= 0.030 Earth, grassed & winding
11.9	1,165	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 31.43 cfs @ 11.96 hrs, Volume= 1.432 af, Depth= 2.12"
Routed to Pond DP-2 : DETENTION POND 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	7.747	71	Landfill Final Cover
*	0.349	91	Gravel
	0.007	98	Roofs, HSG C
	8.103	72	Weighted Average
	8.096		99.91% Pervious Area
	0.007		0.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	100	0.3800	0.51		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	293	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.2	300	0.3800	29.77	669.83	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.50' Z= 2.0 '/' Top.W=14.00' n= 0.040 Earth, cobble bottom, clean sides
4.7	693	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 5.44 cfs @ 12.05 hrs, Volume= 0.325 af, Depth= 2.20"
Routed to Pond P-1G : Culvert Crossing 1G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	1.625	71	Landfill Final Cover
*	0.147	96	Gravel Surface
	1.772	73	Weighted Average
	1.772		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	142	0.1500	2.71		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	154	0.0700	8.95	60.43	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.035 Earth, dense weeds

12.5 446 Total

Summary for Subcatchment 1H: SC-1H

Runoff = 11.12 cfs @ 11.94 hrs, Volume= 0.475 af, Depth= 2.04"
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.032	91	Fallow, bare soil, HSG C, rip rap
	2.759	71	Meadow, non-grazed, HSG C
	2.791	71	Weighted Average
	2.791		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	66	0.3900	0.47		**Sheet Flow, Segment A-B** Grass: Short n= 0.150 P2= 2.70"
0.3	140	0.0800	9.12	27.13	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.030 Earth, grassed & winding
0.2	190	0.1430	16.62	49.46	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.15' Z= 2.5 & 2.0 '/' Top.W=5.17' n= 0.022 Earth, clean & straight
2.8	396	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 13.20 cfs @ 12.00 hrs, Volume= 0.690 af, Depth= 2.12"
Routed to Pond P-1I : Culvert Crossing 6c

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	3.829	71	Landfill Final Cover
*	0.077	98	Riprap
	3.906	72	Weighted Average
	3.829		98.03% Pervious Area
	0.077		1.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	150	0.1000	0.32		**Sheet Flow, Segment AB** Grass: Short n= 0.150 P2= 2.70"
0.4	106	0.1000	4.74		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
0.4	260	0.0700	10.44	70.50	**Trap/Vee/Rect Channel Flow, Segment C - D** Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00' n= 0.030 Earth, grassed & winding
0.1	140	0.3300	39.33	629.24	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.025 Rubble masonry, cemented
8.7	656	Total			

Summary for Subcatchment 1J: SC-IJ

Runoff = 7.41 cfs @ 11.94 hrs, Volume= 0.320 af, Depth= 2.12"
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	1.763	71	Landfill Final Cover
*	0.046	91	Gravel
	1.809	72	Weighted Average
	1.809		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	67	0.5000	0.52		**Sheet Flow, SEGMENT AB** Grass: Short n= 0.150 P2= 2.70"
0.8	325	0.1900	6.54		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.4	325	0.0300	12.44	149.28	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.022 Earth, clean & straight
3.3	717	Total			

Summary for Subcatchment 1K: SC-1K

Runoff = 11.15 cfs @ 11.94 hrs, Volume= 0.482 af, Depth= 2.20"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	2.350	71	Landfill Final Cover
	0.163	89	Gravel roads, HSG C
*	0.111	98	Riprap
	2.624	73	Weighted Average
	2.513		95.77% Pervious Area
	0.111		4.23% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.6	68	0.3300	0.44		**Sheet Flow, AB** Grass: Short n= 0.150 P2= 2.70"
0.4	93	0.0700	3.97		**Shallow Concentrated Flow, Segment B-C** Grassed Waterway Kv= 15.0 fps
0.3	249	0.3300	12.60	201.68	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.078 Riprap, 12-inch
3.3	410	Total			

Summary for Subcatchment 1L: SC-1L

Runoff = 6.81 cfs @ 11.94 hrs, Volume= 0.295 af, Depth= 2.12"
Routed to Pond P-1K : Culvert Crossing 1K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	1.607	71	Landfill Final Cover
	0.064	89	Gravel roads, HSG C
	1.671	72	Weighted Average
	1.671		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	67	0.4000	0.48		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 2.70"
1.2	442	0.1000	6.15	49.59	**Trap/Vee/Rect Channel Flow, B-C** Bot.W=2.00' D=1.50' Z= 2.0 & 2.5 '/' Top.W=8.75' n= 0.069 Riprap, 6-inch
3.5	509	Total			

Summary for Subcatchment 1M: SC-1M

Runoff = 16.63 cfs @ 12.05 hrs, Volume= 0.999 af, Depth= 2.12"
Routed to Pond 1P : (2) 24" CULVERTS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	5.368	71	Landfill Final Cover
	0.283	92	Paved roads w/open ditches, 50% imp, HSG C
	5.651	72	Weighted Average
	5.509		97.50% Pervious Area
	0.141		2.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	73	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.3	174	0.0700	11.06	265.40	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=2.00' Z= 2.0 & 10.0 '/' Top.W=24.00' n= 0.035 Earth, dense weeds
0.5	413	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.6	810	Total			

Summary for Subcatchment 1N: SC-1N

Runoff = 20.01 cfs @ 12.28 hrs, Volume= 2.054 af, Depth= 2.81"
Routed to Pond DP-6 : DETENTION POND 6

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	2.942	70	Woods, Good, HSG C
*	3.662	78	Meadow HSG D
*	0.572	96	Gravel Surface
*	1.607	98	Pond
	8.783	80	Weighted Average
	7.176		81.70% Pervious Area
	1.607		18.30% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	100	0.0400	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
1.7	123	0.0569	1.19		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
0.5	370	0.0189	12.43	801.88	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=2.00' D=3.00' Z= 10.0 & 3.0 '/' Top.W=41.00' n= 0.022 Earth, clean & straight
33.0	593	Total			

Summary for Subcatchment 1O: SC-1O

Runoff = 56.18 cfs @ 12.37 hrs, Volume= 6.567 af, Depth= 2.54"
Routed to Reach R-1O : R-1O

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	13.230	77	Woods, Good, HSG D
*	5.712	70	Woods, Good, HSG C
*	9.172	78	Meadow HSG D
*	1.195	71	Meadow, non-grazed, HSG C
*	0.713	96	Gravel Surface
*	0.515	98	Impervious Surface
*	0.494	98	Paved Area
	31.031	77	Weighted Average
	30.022		96.75% Pervious Area
	1.009		3.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0100	0.07		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
15.1	1,875	0.0190	2.07		**Shallow Concentrated Flow, Segment BC** Grassed Waterway Kv= 15.0 fps
12.8	856	0.0500	1.12		**Shallow Concentrated Flow, Segment CD** Woodland Kv= 5.0 fps
39.7	2,781	Total			

Summary for Subcatchment 2A: SC-2A

Runoff = 29.38 cfs @ 13.79 hrs, Volume= 9.148 af, Depth= 2.28"
Routed to Reach AP2 : ANALYSIS POINT #2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	24.340	70	Woods, Good, HSG C
	15.830	77	Woods, Good, HSG D
*	5.898	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area
	1.600	98	Existing Waterbody
	48.048	74	Weighted Average
	46.068		95.88% Pervious Area
	1.980		4.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
42.6	534	0.0070	0.21		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
10.6	1,213		1.90		**Direct Entry, Segment C-D (STWC, 0.008)**
144.3	1,897	Total			

Summary for Subcatchment 2B: SC-2B

Runoff = 25.70 cfs @ 12.07 hrs, Volume= 1.645 af, Depth= 2.12"
Routed to Pond CB-2B : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	9.090	71	Landfill Final Cover
*	0.218	98	Riprap
	9.308	72	Weighted Average
	9.090		97.66% Pervious Area
	0.218		2.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.3	178	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	252	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	455	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
0.8	136	0.0100	3.00	81.02	**Trap/Vee/Rect Channel Flow, Segment E-F** Bot.W=3.00' D=3.00' Z= 2.0 '/' Top.W=15.00' n= 0.069 Riprap, 6-inch
14.4	1,171	Total			

Summary for Subcatchment 2C: SC-2C

Runoff = 27.58 cfs @ 12.06 hrs, Volume= 1.722 af, Depth= 2.12"
Routed to Reach R-2C : LF TOE DITCH

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	9.383	71	Landfill Final Cover
*	0.357	98	Riprap
	9.740	72	Weighted Average
	9.383		96.33% Pervious Area
	0.357		3.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	158	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.6	308	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	474	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,090	Total			

Summary for Subcatchment 2D: SC-2D

Runoff = 26.42 cfs @ 12.06 hrs, Volume= 1.643 af, Depth= 2.12"
Routed to Pond CB-2D : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	8.931	71	Landfill Final Cover
*	0.366	98	Riprap
	9.297	72	Weighted Average
	8.931		96.06% Pervious Area
	0.366		3.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	157	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	248	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	475	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.6	1,030	Total			

Summary for Subcatchment 2E: SC-2E

Runoff = 2.47 cfs @ 11.94 hrs, Volume= 0.106 af, Depth= 2.37"
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.466	71	Landfill Final Cover
*	0.073	98	Riprap
	0.539	75	Weighted Average
	0.466		86.46% Pervious Area
	0.073		13.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 2F: SC-2F

Runoff = 13.50 cfs @ 11.94 hrs, Volume= 0.589 af, Depth= 2.72"
Routed to Pond DP-12 : DETENTION POND 12

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
1.947	74	>75% Grass cover, Good, HSG C
0.655	93	Paved roads w/open ditches, 50% imp, HSG D
2.602	79	Weighted Average
2.274		87.41% Pervious Area
0.327		12.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 3A: SC-3A

Runoff = 105.89 cfs @ 15.20 hrs, Volume= 48.744 af, Depth= 2.20"
Routed to Reach AP3 : ANALYSIS POINT #3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	158.900	70	Woods, Good, HSG C
	102.800	77	Woods, Good, HSG D
	1.000	71	Meadow, non-grazed, HSG C
*	0.564	98	Paved Area
*	2.330	98	Existing Waterbody
	265.594	73	Weighted Average
	262.700		98.91% Pervious Area
	2.894		1.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
56.3	150	0.0200	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
105.2	1,116	0.0050	0.18		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
78.7	3,093		0.66		**Direct Entry, Segment C-D (STWC, 0.001)**
240.2	4,359	Total			

Summary for Subcatchment 4A: SC-4A

Runoff = 73.65 cfs @ 16.21 hrs, Volume= 42.385 af, Depth= 2.45"
Routed to Reach AP4 : AP4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	130.444	77	Woods, Good, HSG D
	44.640	70	Woods, Good, HSG C
*	23.410	71	Meadow, non-grazed, HSG C
*	3.300	98	Paved Area
*	2.520	91	Gravel
	1.000	89	Gravel roads, HSG C
*	2.000	98	Impervious Surface
	207.314	76	Weighted Average
	202.014		97.44% Pervious Area
	5.300		2.56% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
91.1	150	0.0060	0.03		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
200.8	1,905	0.0040	0.16		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
17.7	1,592		1.50		**Direct Entry, Segment C-D (STWC, 0.0031)**
7.9	760		1.60		**Direct Entry, Segment D-E (STWC, 0.005)**
6.7	963		2.40		**Direct Entry, Segment E-F (STWC, 0.0125)**
324.2	5,370	Total			

Summary for Subcatchment 4B: 4B

Runoff = 14.68 cfs @ 12.05 hrs, Volume= 0.876 af, Depth= 2.28"
Routed to Reach R-4B : R-4B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	4.150	71	Landfill Final Cover
*	0.452	98	Riprap
	4.602	74	Weighted Average
	4.150		90.18% Pervious Area
	0.452		9.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.3	32	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.5	240	0.0700	8.81	49.56	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 3.0 '/' Top.W=7.50' n= 0.035 Earth, dense weeds
0.4	342	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
12.5	764	Total			

Summary for Subcatchment 4C: SC-4C

Runoff = 20.76 cfs @ 12.01 hrs, Volume= 1.115 af, Depth= 2.28"
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.566	98	Riprap
*	5.290	71	Landfill Final Cover
	5.856	74	Weighted Average
	5.290		90.33% Pervious Area
	0.566		9.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	101	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.8	442	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment B-C** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 Earth, dense weeds
0.4	365	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.4	908	Total			

Summary for Subcatchment 4D: SC-4D

Runoff = 40.38 cfs @ 12.01 hrs, Volume= 2.138 af, Depth= 2.12"
Routed to Pond CB-4D : LF TOE DITCH - CATCH BASINS

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.800	71	Landfill Final Cover
*	0.295	98	Riprap
	12.095	72	Weighted Average
	11.800		97.56% Pervious Area
	0.295		2.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	100	0.1000	0.20		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.2	117	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	504	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
9.0	721	Total			

Summary for Subcatchment 4E: SC-4E

Runoff = 3.94 cfs @ 11.94 hrs, Volume= 0.169 af, Depth= 2.04"
Routed to Pond DP-13 : DETENTION POND 13

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
0.992	71	Meadow, non-grazed, HSG C
0.992		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	300		1.67		**Direct Entry, Segment A-B**

Summary for Subcatchment 4F: SC-4F

Runoff = 5.46 cfs @ 11.93 hrs, Volume= 0.232 af, Depth= 2.04"
Routed to Pond DP-14 : DETENTION POND 14

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
1.366	71	Meadow, non-grazed, HSG C
1.366		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0	500		4.17		**Direct Entry, Segment A-B**

Summary for Subcatchment 4G: SC-4G

Runoff = 31.88 cfs @ 12.06 hrs, Volume= 1.990 af, Depth= 2.12"
Routed to Pond CB-4G : Catch Basin - 4G

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.040	71	Landfill Final Cover
*	0.220	98	Riprap
	11.260	72	Weighted Average
	11.040		98.05% Pervious Area
	0.220		1.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	143	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	390	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.6	497	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
13.7	1,180	Total			

Summary for Subcatchment 4H: SC-4H

Runoff = 33.16 cfs @ 12.07 hrs, Volume= 2.120 af, Depth= 2.04"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	12.330	71	Landfill Final Cover
*	0.135	98	Riprap
	12.465	71	Weighted Average
	12.330		98.92% Pervious Area
	0.135		1.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	232	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	464	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	440	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.3	1,286	Total			

Summary for Subcatchment 4I: SC-4I

Runoff = 10.45 cfs @ 11.94 hrs, Volume= 0.448 af, Depth= 2.04"
Routed to Pond CB-4H : Catch Basin - 4H

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	2.595	71	Landfill Final Cover
*	0.036	98	Riprap
	2.631	71	Weighted Average
	2.595		98.63% Pervious Area
	0.036		1.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0					**Direct Entry, A-B**

Summary for Subcatchment 4J: SC-4J

Runoff = 36.42 cfs @ 12.07 hrs, Volume= 2.307 af, Depth= 2.12"
Routed to Pond CB-4I : Catch Basin - 4I

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	12.590	71	Landfill Final Cover
*	0.462	98	Riprap
	13.052	72	Weighted Average
	12.590		96.46% Pervious Area
	0.462		3.54% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	223	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.7	386	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.4	376	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.1	1,135	Total			

Summary for Subcatchment 4K: SC-4K

Runoff = 24.96 cfs @ 12.17 hrs, Volume= 2.062 af, Depth= 2.12"
Routed to Pond CB-4JA : Catch Basin - 4JA

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	11.234	71	Landfill Final Cover
*	0.429	98	Riprap
	11.663	72	Weighted Average
	11.234		96.32% Pervious Area
	0.429		3.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
10.3	432	0.0100	0.70		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	432	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	392	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
22.9	1,406	Total			

Summary for Subcatchment 4L: SC-4L

Runoff = 38.63 cfs @ 12.08 hrs, Volume= 2.552 af, Depth= 2.12"
Routed to Pond C-4K : Catch Basin - 4K

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	14.000	71	Landfill Final Cover
*	0.437	98	Riprap
	14.437	72	Weighted Average
	14.000		96.97% Pervious Area
	0.437		3.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
2.6	242	0.0500	1.57		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.9	476	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	406	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
15.3	1,274	Total			

Summary for Subcatchment 4M: SC-4M

Runoff = 2.92 cfs @ 11.93 hrs, Volume= 0.125 af, Depth= 2.20"
Routed to Pond C-4L : Catch Basin - 4L

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	0.633	71	Landfill Final Cover
*	0.046	98	Riprap
	0.679	73	Weighted Average
	0.633		93.23% Pervious Area
	0.046		6.77% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, Segment A-B**

Summary for Subcatchment 4N: SC-4N

Runoff = 19.00 cfs @ 12.12 hrs, Volume= 1.402 af, Depth= 2.81"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	2.512	74	>75% Grass cover, Good, HSG C
*	0.245	98	Paved Area
*	0.338	98	Building/Concrete Slabs
*	1.404	91	Gravel
	1.497	71	Meadow, non-grazed, HSG C
	5.996	80	Weighted Average
	5.413		90.28% Pervious Area
	0.583		9.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	61	0.0200	1.14		**Sheet Flow, Segment A-B** Smooth surfaces n= 0.011 P2= 2.70"
10.5	61	0.0200	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.70"
7.9	955	0.0180	2.01		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
19.3	1,077	Total			

Summary for Subcatchment 4O: SC-4O

Runoff = 8.97 cfs @ 12.05 hrs, Volume= 0.548 af, Depth= 2.72"
Routed to Pond C4B : Culvert - 4BA & 4BB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	1.074	70	Brush, Fair, HSG C
*	0.034	98	Impervious Surface
	0.687	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
*	0.240	98	Paved Area
	2.422	79	Weighted Average
	2.148		88.69% Pervious Area
	0.274		11.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.4	24	0.0200	0.95		**Sheet Flow, Segment AB** Smooth surfaces n= 0.011 P2= 2.70"
0.8	19	0.5000	0.41		**Sheet Flow, Segment BC** Grass: Short n= 0.150 P2= 2.70"
11.9	584	0.0137	0.82		**Shallow Concentrated Flow, Segment CD** Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0250	7.14	85.66	**Trap/Vee/Rect Channel Flow, Segment DE** Bot.W=2.00' D=2.00' Z= 2.0 '/' Top.W=10.00' n= 0.035
13.2	667	Total			

Summary for Subcatchment 4P: SC-4P

Runoff = 17.88 cfs @ 12.28 hrs, Volume= 1.878 af, Depth= 3.47"
Routed to Pond DP-9 : DETENTION POND 9

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	0.415	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.500	98	Pond
*	0.136	98	Paved Area
	6.488	87	Weighted Average
	4.852		74.78% Pervious Area
	1.636		25.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.0	125	0.0216	0.12		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	25	0.0520	0.78		**Sheet Flow, Segment B-C** n= 0.023 P2= 2.70"
2.0	270	0.0190	2.22		**Shallow Concentrated Flow, Segment C-D** Unpaved Kv= 16.1 fps
0.2	44	0.3300	4.02		**Shallow Concentrated Flow, Segment D-E** Short Grass Pasture Kv= 7.0 fps
2.0	102	0.0150	0.86		**Shallow Concentrated Flow, Segment E-F** Short Grass Pasture Kv= 7.0 fps
11.2	258	0.0030	0.38		**Shallow Concentrated Flow, Segment F-G** Short Grass Pasture Kv= 7.0 fps
33.9	824	Total			

Summary for Subcatchment 4Q: SC-4Q

Runoff = 46.82 cfs @ 11.98 hrs, Volume= 2.316 af, Depth= 2.72"
Routed to Pond DP-10 : DETENTION POND 10

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
	3.393	79	50-75% Grass cover, Fair, HSG C
	1.056	93	Paved roads w/open ditches, 50% imp, HSG D
*	0.712	98	Pond
	5.073	74	>75% Grass cover, Good, HSG C
	10.234	79	Weighted Average
	8.994		87.88% Pervious Area
	1.240		12.12% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	150	0.0500	0.59		**Sheet Flow, AB** Fallow n= 0.050 P2= 2.70"
0.2	85	0.1600	6.44		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
2.5	625	0.0800	4.24		**Shallow Concentrated Flow, CD** Grassed Waterway Kv= 15.0 fps
6.9	860	Total			

Summary for Subcatchment 4R: SC-4R

Runoff = 11.97 cfs @ 12.03 hrs, Volume= 0.691 af, Depth= 2.72"
Routed to Pond DP-11R : DETENTION POND 11R

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
0.757	93	Paved roads w/open ditches, 50% imp, HSG D
2.296	74	>75% Grass cover, Good, HSG C
3.053	79	Weighted Average
2.674		87.60% Pervious Area
0.378		12.40% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.6	37	0.0200	1.04		**Sheet Flow, AB** Smooth surfaces n= 0.011 P2= 2.70"
0.4	215	0.3300	9.25		**Shallow Concentrated Flow, Segment BC** Unpaved Kv= 16.1 fps
10.4	338	0.0060	0.54		**Shallow Concentrated Flow, CD** Short Grass Pasture Kv= 7.0 fps
11.4	590	Total			

Summary for Subcatchment 5: SC-5

Runoff = 20.73 cfs @ 14.31 hrs, Volume= 7.988 af, Depth= 2.45"
Routed to Reach AP5 : AP-5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
31.520	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
39.070	76	Weighted Average
38.925		99.63% Pervious Area
0.145		0.37% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.9	150	0.0130	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
122.7	1,930	0.0110	0.26		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
2.5	275		1.80		**Direct Entry, Segment C-D (STWC, 0.007)**
192.1	2,355	Total			

Summary for Reach 1: Analysis Point 1

Inflow Area = 145.103 ac, 3.22% Impervious, Inflow Depth = 2.22" for 25-yr Storm event
Inflow = 123.36 cfs @ 12.71 hrs, Volume= 26.874 af
Outflow = 123.36 cfs @ 12.71 hrs, Volume= 26.874 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach 7R: SOUTH ACCESS RD DITCH

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 2.30" for 25-yr Storm event
Inflow = 21.68 cfs @ 12.07 hrs, Volume= 1.084 af
Outflow = 21.20 cfs @ 12.09 hrs, Volume= 1.084 af, Atten= 2%, Lag= 1.1 min
Routed to Pond 12P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.98 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 2.5 min

Peak Storage= 806 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.70' , Surface Width= 5.80'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 173.05 cfs

3.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 262.0' Slope= 0.0271 '/'
Inlet Invert= 205.00', Outlet Invert= 197.90'

Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth > 1.63" for 25-yr Storm event
Inflow = 1.83 cfs @ 19.49 hrs, Volume= 4.089 af
Outflow = 1.83 cfs @ 20.08 hrs, Volume= 4.082 af, Atten= 0%, Lag= 35.5 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.21 fps, Min. Travel Time= 21.3 min
Avg. Velocity = 0.11 fps, Avg. Travel Time= 41.6 min

Peak Storage= 2,336 cf @ 19.73 hrs
Average Depth at Peak Storage= 0.36' , Surface Width= 27.24'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 11.46 cfs

20.00' x 1.00' deep channel, n= 0.800 Sheet flow: Woods+dense brush
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 273.0' Slope= 0.0623 '/'
Inlet Invert= 180.00', Outlet Invert= 163.00'

‡

Summary for Reach 12R: Ditch 4B1

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 2.03" for 25-yr Storm event
Inflow = 29.87 cfs @ 12.08 hrs, Volume= 2.446 af
Outflow = 29.57 cfs @ 12.12 hrs, Volume= 2.446 af, Atten= 1%, Lag= 2.2 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.69 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.73 fps, Avg. Travel Time= 3.4 min

Peak Storage= 2,235 cf @ 12.10 hrs
Average Depth at Peak Storage= 1.35' , Surface Width= 7.40'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 70.02 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 352.0' Slope= 0.0085 '/'
Inlet Invert= 213.50', Outlet Invert= 210.50'

Summary for Reach 13R: Ex Ditch

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 3.94" for 25-yr Storm event
Inflow = 8.74 cfs @ 12.08 hrs, Volume= 0.223 af
Outflow = 8.21 cfs @ 12.11 hrs, Volume= 0.223 af, Atten= 6%, Lag= 1.6 min
Routed to Pond C4B : Culvert - 4BA & 4BB

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.76 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 4.9 min

Peak Storage= 519 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.68' , Surface Width= 4.74'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 81.05 cfs

2.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 225.0' Slope= 0.0164 '/'
Inlet Invert= 209.70', Outlet Invert= 206.00'

Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 79.534 ac, 4.18% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 30.74 cfs @ 13.81 hrs, Volume= 14.846 af
Outflow = 30.74 cfs @ 13.81 hrs, Volume= 14.846 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 265.594 ac, 1.09% Impervious, Inflow Depth = 2.20" for 25-yr Storm event
Inflow = 105.89 cfs @ 15.20 hrs, Volume= 48.744 af
Outflow = 105.89 cfs @ 15.20 hrs, Volume= 48.744 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 326.605 ac, 3.82% Impervious, Inflow Depth > 2.29" for 25-yr Storm event
Inflow = 82.47 cfs @ 16.20 hrs, Volume= 62.372 af
Outflow = 82.47 cfs @ 16.20 hrs, Volume= 62.372 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: AP-5

Inflow Area = 39.070 ac, 0.37% Impervious, Inflow Depth = 2.45" for 25-yr Storm event
Inflow = 20.73 cfs @ 14.31 hrs, Volume= 7.988 af
Outflow = 20.73 cfs @ 14.31 hrs, Volume= 7.988 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Summary for Reach E1R6: DP-10 DISCHARGE

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth > 2.03" for 25-yr Storm event
Inflow = 15.90 cfs @ 12.62 hrs, Volume= 5.911 af
Outflow = 15.85 cfs @ 12.68 hrs, Volume= 5.910 af, Atten= 0%, Lag= 3.5 min
Routed to Reach E1R7 : REACH TO AP

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.04 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.79 fps, Avg. Travel Time= 7.5 min

Peak Storage= 1,864 cf @ 12.65 hrs
Average Depth at Peak Storage= 0.23' , Surface Width= 24.67'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 827.94 cfs

20.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 357.0' Slope= 0.0672 '/'
Inlet Invert= 178.00', Outlet Invert= 154.00'

‡

Summary for Reach E1R7: REACH TO AP

Inflow Area = 64.971 ac, 7.86% Impervious, Inflow Depth > 1.85" for 25-yr Storm event
Inflow = 15.86 cfs @ 12.68 hrs, Volume= 9.992 af
Outflow = 13.83 cfs @ 13.28 hrs, Volume= 9.977 af, Atten= 13%, Lag= 36.1 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.19 fps, Min. Travel Time= 16.5 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 40.0 min

Peak Storage= 13,716 cf @ 13.01 hrs
Average Depth at Peak Storage= 1.16' , Surface Width= 8.94'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 48.12 cfs

2.00' x 2.00' deep channel, n= 0.045 Winding stream, pools & shoals
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 2,170.0' Slope= 0.0074 '/'
Inlet Invert= 158.00', Outlet Invert= 142.00'

Summary for Reach O4: Overland Flow

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 2.98" for 25-yr Storm event
Inflow = 16.05 cfs @ 12.10 hrs, Volume= 0.771 af
Outflow = 15.83 cfs @ 12.11 hrs, Volume= 0.771 af, Atten= 1%, Lag= 0.5 min
Routed to Pond DP-9 : DETENTION POND 9

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.99 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 9.99 fps, Avg. Travel Time= 0.3 min

Peak Storage= 269 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.87 cfs

Custom stage-perimeter table, n= 0.035 Earth, dense weeds
100 Intermediate values determined by Multi-point interpolation
Length= 168.0' Slope= 0.0554 '/'
Inlet Invert= 201.30', Outlet Invert= 192.00'

Depth (feet)	End Area (sq-ft)	Perim. (feet)	Storage (cubic-feet)	Discharge (cfs)
0.00	0.0	0.0	0	0.00
2.00	12.0	12.0	2,016	119.87

Summary for Reach R-10a: R-10a

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 1.90" for 25-yr Storm event
Inflow = 23.94 cfs @ 12.07 hrs, Volume= 2.071 af
Outflow = 23.39 cfs @ 12.13 hrs, Volume= 2.071 af, Atten= 2%, Lag= 3.6 min
Routed to Pond DP-10 : DETENTION POND 10

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.16 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.80 fps, Avg. Travel Time= 5.9 min

Peak Storage= 2,938 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.74' , Surface Width= 8.43'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 437.98 cfs

4.00' x 3.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 641.0' Slope= 0.0137 '/'
Inlet Invert= 194.00', Outlet Invert= 185.25'

‡

Summary for Reach R-1B: LF TOE DITCH

Inflow Area = 19.514 ac, 4.11% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 54.70 cfs @ 12.07 hrs, Volume= 3.449 af
Outflow = 52.68 cfs @ 12.12 hrs, Volume= 3.449 af, Atten= 4%, Lag= 2.7 min
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.97 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.94 fps, Avg. Travel Time= 4.6 min

Peak Storage= 4,876 cf @ 12.09 hrs
Average Depth at Peak Storage= 1.68' , Surface Width= 8.73'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 79.00 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 540.0' Slope= 0.0278 '/'
Inlet Invert= 181.00', Outlet Invert= 166.00'

Summary for Reach R-1B1: LF TOE DITCH

Inflow Area = 8.511 ac, 4.70% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 24.87 cfs @ 12.05 hrs, Volume= 1.504 af
Outflow = 23.83 cfs @ 12.09 hrs, Volume= 1.504 af, Atten= 4%, Lag= 2.6 min
Routed to Reach R-1B : LF TOE DITCH

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.64 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.81 fps, Avg. Travel Time= 4.4 min

Peak Storage= 2,063 cf @ 12.07 hrs
Average Depth at Peak Storage= 1.05' , Surface Width= 6.21'
Defined Flood Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 96.96 cfs

2.00' x 2.00' deep channel, n= 0.040 Winding stream, pools & shoals
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 478.0' Slope= 0.0418 '/'
Inlet Invert= 204.00', Outlet Invert= 184.00'

Summary for Reach R-1D: Reach R-1D

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth > 2.03" for 25-yr Storm event
Inflow = 38.56 cfs @ 12.29 hrs, Volume= 6.990 af
Outflow = 38.48 cfs @ 12.36 hrs, Volume= 6.990 af, Atten= 0%, Lag= 4.0 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.91 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 11.6 min

Peak Storage= 4,902 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.75' , Surface Width= 25.10'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 67.93 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 370.0' Slope= 0.0324 '/'
Inlet Invert= 159.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1E: Plastic Lined Ditch

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 28.86 cfs @ 12.04 hrs, Volume= 1.693 af
Outflow = 28.64 cfs @ 12.05 hrs, Volume= 1.693 af, Atten= 1%, Lag= 0.3 min
Routed to Pond DP-1a : DP-1a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.66 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.16 fps, Avg. Travel Time= 0.8 min

Peak Storage= 394 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.41' , Surface Width= 5.63'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 1,302.19 cfs

4.00' x 3.00' deep channel, n= 0.011
Side Slope Z-value= 2.0 '/' Top Width= 16.00'
Length= 200.0' Slope= 0.0500 '/'
Inlet Invert= 176.00', Outlet Invert= 166.00'

Summary for Reach R-1F: Reach R-1F

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 2.06" for 25-yr Storm event
Inflow = 13.32 cfs @ 12.08 hrs, Volume= 1.693 af
Outflow = 12.89 cfs @ 12.14 hrs, Volume= 1.693 af, Atten= 3%, Lag= 3.7 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.20 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 7.6 min

Peak Storage= 1,292 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 25.42'
Bank-Full Depth= 1.00' Flow Area= 30.0 sf, Capacity= 140.14 cfs

20.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 40.00'
Length= 210.0' Slope= 0.0524 '/'
Inlet Invert= 158.00', Outlet Invert= 147.00'

‡

Summary for Reach R-1G: RipRap Downspout

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 2.00" for 25-yr Storm event
Inflow = 3.63 cfs @ 12.06 hrs, Volume= 0.296 af
Outflow = 3.52 cfs @ 12.12 hrs, Volume= 0.296 af, Atten= 3%, Lag= 3.5 min
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.02 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.28 fps, Avg. Travel Time= 6.4 min

Peak Storage= 436 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.20' , Surface Width= 4.80'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 368.81 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 493.0' Slope= 0.3428 '/'
Inlet Invert= 333.00', Outlet Invert= 164.00'

Summary for Reach R-1I: Final Cover Access Road Ditch

Inflow = 1.79 cfs @ 12.06 hrs, Volume= 0.030 af
Outflow = 1.49 cfs @ 12.17 hrs, Volume= 0.030 af, Atten= 17%, Lag= 6.7 min
Routed to Pond P-1I : Culvert Crossing 6c

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.25 fps, Min. Travel Time= 3.9 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 12.9 min

Peak Storage= 361 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.27' , Surface Width= 3.08'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 80.08 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 524.0' Slope= 0.0849 '/'
Inlet Invert= 335.00', Outlet Invert= 290.50'

Summary for Reach R-1J: RipRap Downspout

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 2.07" for 25-yr Storm event
Inflow = 12.70 cfs @ 11.96 hrs, Volume= 0.740 af
Outflow = 12.52 cfs @ 11.98 hrs, Volume= 0.740 af, Atten= 1%, Lag= 0.8 min
Routed to Pond P-1J-1 : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.37 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.82 fps, Avg. Travel Time= 1.5 min

Peak Storage= 322 cf @ 11.97 hrs
Average Depth at Peak Storage= 0.41' , Surface Width= 5.63'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 387.31 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 164.0' Slope= 0.3780 '/'
Inlet Invert= 252.00', Outlet Invert= 190.00'

Summary for Reach R-1L: Final Cover Access Road Ditch

Inflow = 6.72 cfs @ 11.96 hrs, Volume= 0.085 af
Outflow = 6.00 cfs @ 12.04 hrs, Volume= 0.085 af, Atten= 11%, Lag= 4.8 min
Routed to Pond 1P : (2) 24" CULVERTS

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.30 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 12.9 min

Peak Storage= 1,034 cf @ 12.00 hrs
Average Depth at Peak Storage= 0.58' , Surface Width= 4.33'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 77.46 cfs

2.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 560.0' Slope= 0.0795 '/'
Inlet Invert= 254.50', Outlet Invert= 210.00'

Summary for Reach R-1N: R-1N

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth > 2.05" for 25-yr Storm event
Inflow = 1.45 cfs @ 20.00 hrs, Volume= 4.663 af
Outflow = 1.45 cfs @ 20.52 hrs, Volume= 4.663 af, Atten= 0%, Lag= 31.4 min
Routed to Reach R-1O : R-1O

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.85 fps, Min. Travel Time= 18.4 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 34.0 min

Peak Storage= 1,608 cf @ 20.21 hrs
Average Depth at Peak Storage= 0.15' , Surface Width= 12.98'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.97 cfs

10.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 30.00'
Length= 940.0' Slope= 0.0176 '/'
Inlet Invert= 168.00', Outlet Invert= 151.50'

‡

Summary for Reach R-1O: R-1O

Inflow Area = 58.266 ac, 5.06% Impervious, Inflow Depth = 2.31" for 25-yr Storm event
Inflow = 56.24 cfs @ 12.37 hrs, Volume= 11.230 af
Outflow = 53.78 cfs @ 12.56 hrs, Volume= 11.230 af, Atten= 4%, Lag= 11.4 min
Routed to Reach R2 : Reach 2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.93 fps, Min. Travel Time= 6.4 min
Avg. Velocity = 0.42 fps, Avg. Travel Time= 29.0 min

Peak Storage= 20,558 cf @ 12.45 hrs
Average Depth at Peak Storage= 1.25' , Surface Width= 34.91'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 151.21 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 735.0' Slope= 0.0020 '/'
Inlet Invert= 151.50', Outlet Invert= 150.00'

‡

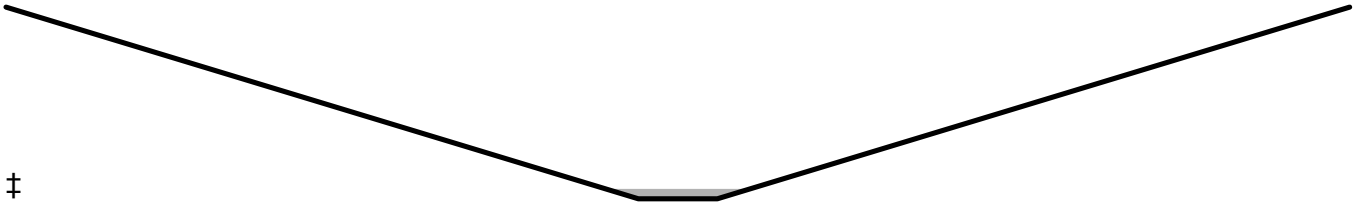
Summary for Reach R-2A: Reach 2A

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 2.17" for 25-yr Storm event
Inflow = 1.99 cfs @ 18.63 hrs, Volume= 5.698 af
Outflow = 1.99 cfs @ 20.06 hrs, Volume= 5.698 af, Atten= 0%, Lag= 86.2 min
Routed to Reach AP2 : ANALYSIS POINT #2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.53 fps, Min. Travel Time= 50.8 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 70.6 min

Peak Storage= 6,062 cf @ 19.22 hrs
Average Depth at Peak Storage= 0.10' , Surface Width= 45.93'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,332.75 cfs

25.00' x 2.00' deep channel, n= 0.050 Scattered brush, heavy weeds
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,630.0' Slope= 0.0092 '/'
Inlet Invert= 166.00', Outlet Invert= 151.00'



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Summary for Reach R-2C: LF TOE DITCH

Inflow Area = 9.740 ac, 3.67% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 27.58 cfs @ 12.06 hrs, Volume= 1.722 af
Outflow = 26.18 cfs @ 12.13 hrs, Volume= 1.722 af, Atten= 5%, Lag= 4.0 min
Routed to Pond CB-2E : LF TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.03 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 0.63 fps, Avg. Travel Time= 7.0 min

Peak Storage= 3,482 cf @ 12.09 hrs
Average Depth at Peak Storage= 1.92' , Surface Width= 10.68'
Defined Flood Depth= 2.00' Flow Area= 14.0 sf, Capacity= 29.12 cfs
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 70.39 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 265.0' Slope= 0.0075 '/'
Inlet Invert= 181.00', Outlet Invert= 179.00'

Summary for Reach R-2D: DITCH

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 26.51 cfs @ 12.06 hrs, Volume= 1.640 af
Outflow = 25.66 cfs @ 12.09 hrs, Volume= 1.640 af, Atten= 3%, Lag= 1.8 min
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.07 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.35 fps, Avg. Travel Time= 2.8 min

Peak Storage= 1,442 cf @ 12.07 hrs
Average Depth at Peak Storage= 1.19' , Surface Width= 7.77'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 183.17 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 225.0' Slope= 0.0511 '/'
Inlet Invert= 191.50', Outlet Invert= 180.00'

Summary for Reach R-4B: R-4B

Inflow Area = 4.602 ac, 9.82% Impervious, Inflow Depth = 2.28" for 25-yr Storm event
Inflow = 14.68 cfs @ 12.05 hrs, Volume= 0.876 af
Outflow = 10.48 cfs @ 12.32 hrs, Volume= 0.876 af, Atten= 29%, Lag= 16.2 min
Routed to Pond CB-4C : LT TOE DITCH - CATCH BASIN

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 10.6 min
Avg. Velocity = 0.40 fps, Avg. Travel Time= 41.8 min

Peak Storage= 6,724 cf @ 12.14 hrs
Average Depth at Peak Storage= 1.23' , Surface Width= 7.90'
Bank-Full Depth= 3.00' Flow Area= 27.0 sf, Capacity= 69.96 cfs

3.00' x 3.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 15.00'
Length= 1,006.0' Slope= 0.0075 '/'
Inlet Invert= 178.50', Outlet Invert= 171.00'

Summary for Reach R-IH: RipRap Downspout

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 2.06" for 25-yr Storm event
Inflow = 9.43 cfs @ 12.01 hrs, Volume= 0.672 af
Outflow = 9.32 cfs @ 12.03 hrs, Volume= 0.672 af, Atten= 1%, Lag= 1.1 min
Routed to Pond P-1H : Modified Plunge Pool w/(2)24" Culverts P-6a

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.81 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.64 fps, Avg. Travel Time= 2.6 min

Peak Storage= 417 cf @ 12.02 hrs
Average Depth at Peak Storage= 0.35' , Surface Width= 5.39'
Bank-Full Depth= 2.50' Flow Area= 22.5 sf, Capacity= 385.75 cfs

4.00' x 2.50' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 256.0' Slope= 0.3750 '/'
Inlet Invert= 286.00', Outlet Invert= 190.00'

Summary for Reach R2: Reach 2

Inflow Area = 122.225 ac, 3.55% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 109.28 cfs @ 12.56 hrs, Volume= 22.526 af
Outflow = 107.85 cfs @ 12.69 hrs, Volume= 22.525 af, Atten= 1%, Lag= 7.6 min
Routed to Reach 1 : Analysis Point 1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.66 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 20.6 min

Peak Storage= 28,389 cf @ 12.61 hrs
Average Depth at Peak Storage= 1.57' , Surface Width= 41.50'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 183.33 cfs

10.00' x 2.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 50.00'
Length= 700.0' Slope= 0.0030 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'

‡

Summary for Reach R4B4:

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 6.22 cfs @ 21.54 hrs, Volume= 10.010 af
Outflow = 6.22 cfs @ 22.08 hrs, Volume= 10.010 af, Atten= 0%, Lag= 32.0 min
Routed to Reach AP4 : AP4

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.88 fps, Min. Travel Time= 18.2 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 49.3 min

Peak Storage= 6,810 cf @ 21.77 hrs
Average Depth at Peak Storage= 0.43' , Surface Width= 20.66'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 131.94 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 963.0' Slope= 0.0094 '/'
Inlet Invert= 142.00', Outlet Invert= 132.96'

‡

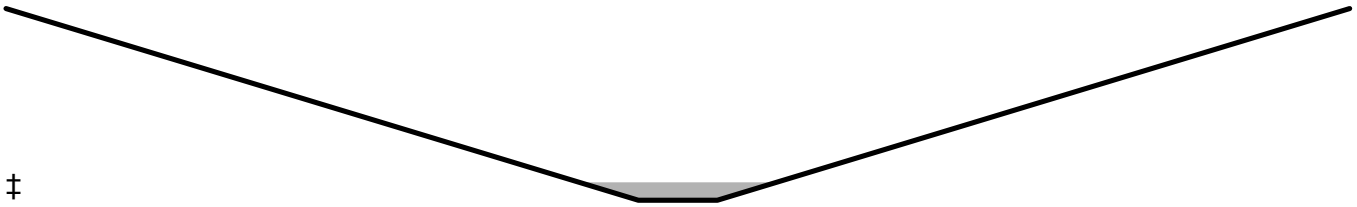
Summary for Reach R4C: Reach 4C

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 2.26" for 25-yr Storm event
Inflow = 3.15 cfs @ 13.11 hrs, Volume= 2.158 af
Outflow = 2.97 cfs @ 14.85 hrs, Volume= 2.158 af, Atten= 6%, Lag= 104.1 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.37 fps, Min. Travel Time= 43.9 min
Avg. Velocity = 0.18 fps, Avg. Travel Time= 91.8 min

Peak Storage= 7,838 cf @ 14.11 hrs
Average Depth at Peak Storage= 0.19' , Surface Width= 62.08'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 669.12 cfs

25.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 970.0' Slope= 0.0093 '/'
Inlet Invert= 159.00', Outlet Invert= 150.00'



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Summary for Reach R4C1: Reach 4C1

Inflow Area = 24.911 ac, 5.27% Impervious, Inflow Depth = 2.18" for 25-yr Storm event
Inflow = 4.44 cfs @ 14.95 hrs, Volume= 4.527 af
Outflow = 3.42 cfs @ 21.64 hrs, Volume= 4.527 af, Atten= 23%, Lag= 401.2 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.21 fps, Min. Travel Time= 177.8 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 429.7 min

Peak Storage= 36,520 cf @ 18.67 hrs
Average Depth at Peak Storage= 0.14' , Surface Width= 128.53'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 562.82 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 2,240.0' Slope= 0.0031 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Reach R4C2: Reach 4C2

Inflow Area = 54.320 ac, 3.83% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 6.24 cfs @ 20.57 hrs, Volume= 10.011 af
Outflow = 6.22 cfs @ 21.54 hrs, Volume= 10.010 af, Atten= 0%, Lag= 58.4 min
Routed to Reach R4B4 :

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.23 fps, Min. Travel Time= 32.2 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 79.5 min

Peak Storage= 12,014 cf @ 21.01 hrs
Average Depth at Peak Storage= 0.22' , Surface Width= 144.22'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 477.27 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 445.0' Slope= 0.0022 '/'
Inlet Invert= 143.00', Outlet Invert= 142.00'

‡

Summary for Reach R4D: Reach 4D

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 2.11" for 25-yr Storm event
Inflow = 1.50 cfs @ 14.89 hrs, Volume= 2.369 af
Outflow = 1.50 cfs @ 16.21 hrs, Volume= 2.369 af, Atten= 0%, Lag= 79.1 min
Routed to Reach R4C1 : Reach 4C1

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.23 fps, Min. Travel Time= 44.7 min
Avg. Velocity = 0.16 fps, Avg. Travel Time= 61.6 min

Peak Storage= 4,015 cf @ 15.46 hrs
Average Depth at Peak Storage= 0.06' , Surface Width= 112.48'
Bank-Full Depth= 2.00' Flow Area= 600.0 sf, Capacity= 1,002.64 cfs

100.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 100.0 '/' Top Width= 500.00'
Length= 605.0' Slope= 0.0099 '/'
Inlet Invert= 156.00', Outlet Invert= 150.00'

‡

Summary for Reach R4G: Reach 4G

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 3.26 cfs @ 15.01 hrs, Volume= 5.483 af
Outflow = 3.25 cfs @ 15.25 hrs, Volume= 5.483 af, Atten= 0%, Lag= 14.4 min
Routed to Reach R4C2 : Reach 4C2

Routing by Stor-Ind+Trans method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.69 fps, Min. Travel Time= 8.7 min
Avg. Velocity = 0.46 fps, Avg. Travel Time= 13.1 min

Peak Storage= 1,708 cf @ 15.11 hrs
Average Depth at Peak Storage= 0.21' , Surface Width= 24.25'
Bank-Full Depth= 2.00' Flow Area= 80.0 sf, Capacity= 199.54 cfs

20.00' x 2.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 10.0 '/' Top Width= 60.00'
Length= 363.0' Slope= 0.0193 '/'
Inlet Invert= 150.00', Outlet Invert= 143.00'

‡

Summary for Pond 1P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 2.30" for 25-yr Storm event
Inflow = 22.61 cfs @ 12.05 hrs, Volume= 1.084 af
Outflow = 21.68 cfs @ 12.07 hrs, Volume= 1.084 af, Atten= 4%, Lag= 1.4 min
Primary = 21.68 cfs @ 12.07 hrs, Volume= 1.084 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach 7R : SOUTH ACCESS RD DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 207.66' @ 12.07 hrs Surf.Area= 1,649 sf Storage= 2,122 cf
Flood Elev= 210.00' Surf.Area= 3,240 sf Storage= 7,740 cf

Plug-Flow detention time= 4.2 min calculated for 1.084 af (100% of inflow)
Center-of-Mass det. time= 4.2 min (841.0 - 836.7)

Volume	Invert	Avail.Storage	Storage Description
#1	206.00'	7,740 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
206.00	900	0	0
208.00	1,800	2,700	2,700
210.00	3,240	5,040	7,740

Device	Routing	Invert	Outlet Devices
#1	Primary	206.00'	**24.0" Round 24"Culvert (X2) X 2.00** L= 76.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 206.00' / 205.00' S= 0.0132 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	209.60'	**30.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=21.09 cfs @ 12.07 hrs HW=207.63' (Free Discharge)
↑—**1=24"Culvert (X2)** (Inlet Controls 21.09 cfs @ 3.84 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=206.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 12P: (2) 24" CULVERTS

Inflow Area = 5.651 ac, 2.50% Impervious, Inflow Depth = 2.30" for 25-yr Storm event
Inflow = 21.20 cfs @ 12.09 hrs, Volume= 1.084 af
Outflow = 20.53 cfs @ 12.11 hrs, Volume= 1.084 af, Atten= 3%, Lag= 1.4 min
Primary = 20.53 cfs @ 12.11 hrs, Volume= 1.084 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond 15P : EXISTING 12" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 199.50' @ 12.11 hrs Surf.Area= 1,777 sf Storage= 1,684 cf
Flood Elev= 200.50' Surf.Area= 2,548 sf Storage= 3,866 cf

Plug-Flow detention time= 1.6 min calculated for 1.084 af (100% of inflow)
Center-of-Mass det. time= 1.6 min (844.7 - 843.1)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	3,866 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676
200.50	2,548	1,190	3,866

Device	Routing	Invert	Outlet Devices
#1	Primary	197.90'	**24.0" Round 24"Culvert (X2) X 2.00** L= 98.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 197.90' / 195.47' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Secondary	200.00'	**14.0' long x 11.0' breadth Broad-Crested Rectangular Weir-Overflow** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.53 2.59 2.70 2.68 2.67 2.68 2.66 2.64

Primary OutFlow Max=20.17 cfs @ 12.11 hrs HW=199.48' (Free Discharge)
1=24"Culvert (X2) (Inlet Controls 20.17 cfs @ 3.78 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
2=Broad-Crested Rectangular Weir-Overflow(Controls 0.00 cfs)

Summary for Pond 15P: EXISTING 12" CULVERT

Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 198.00' @ 0.00 hrs Surf.Area= 464 sf Storage= 0 cf
Flood Elev= 200.50' Surf.Area= 2,212 sf Storage= 2,676 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	198.00'	2,676 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
198.00	464	0	0
200.00	2,212	2,676	2,676

Device	Routing	Invert	Outlet Devices
#1	Primary	197.40'	**12.0" Round 24"Culvert (X2)** L= 121.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 197.40' / 189.90' S= 0.0620 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	198.00'	**10.0' long x 50.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**1=24"Culvert (X2)** (Passes 0.00 cfs of 1.02 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=198.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area = 14.437 ac, 3.03% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 38.63 cfs @ 12.08 hrs, Volume= 2.552 af
Outflow = 38.65 cfs @ 12.08 hrs, Volume= 2.551 af, Atten= 0%, Lag= 0.0 min
Primary = 29.87 cfs @ 12.08 hrs, Volume= 2.446 af
Routed to Reach 12R : Ditch 4B1
Secondary = 8.79 cfs @ 12.08 hrs, Volume= 0.105 af
Routed to Pond C-4L : Catch Basin - 4L

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 221.40' @ 12.08 hrs Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 0.4 min calculated for 2.551 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (849.0 - 848.9)

Volume	Invert	Avail.Storage	Storage Description
#1	214.50'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	216.50'	**24.0" Round Culvert - 4K** L= 51.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 216.50' / 214.50' S= 0.0392 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	218.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=29.64 cfs @ 12.08 hrs HW=221.34' (Free Discharge)
└**1=Culvert - 4K** (Inlet Controls 29.64 cfs @ 9.43 fps)
└**2=Orifice/Grate** (Passes 29.64 cfs of 43.19 cfs potential flow)

Secondary OutFlow Max=8.30 cfs @ 12.08 hrs HW=221.34' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 8.30 cfs @ 3.10 fps)

Summary for Pond C-4L: Catch Basin - 4L

Inflow Area = 0.679 ac, 6.77% Impervious, Inflow Depth = 4.06" for 25-yr Storm event
Inflow = 9.22 cfs @ 12.08 hrs, Volume= 0.229 af
Outflow = 9.22 cfs @ 12.08 hrs, Volume= 0.226 af, Atten= 0%, Lag= 0.0 min
Primary = 8.74 cfs @ 12.08 hrs, Volume= 0.223 af
Routed to Reach 13R : Ex Ditch
Secondary = 0.49 cfs @ 12.09 hrs, Volume= 0.003 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 215.07' @ 12.08 hrs Surf.Area= 13 sf Storage= 43 cf

Plug-Flow detention time= 7.4 min calculated for 0.226 af (98% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	210.50'	43 cf	**4.00'D x 3.40'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.50'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 212.50' / 210.50' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	214.50'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads
#3	Secondary	215.00'	**15.0' long x 2.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=8.31 cfs @ 12.08 hrs HW=215.05' (Free Discharge)
└**1=Culvert 4L** (Passes 8.31 cfs of 11.41 cfs potential flow)
└**2=Orifice-Top of catch basin** (Weir Controls 8.31 cfs @ 2.42 fps)

Secondary OutFlow Max=0.41 cfs @ 12.09 hrs HW=215.05' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 0.41 cfs @ 0.56 fps)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area = 3.101 ac, 10.32% Impervious, Inflow Depth = 2.98" for 25-yr Storm event
Inflow = 16.44 cfs @ 12.09 hrs, Volume= 0.771 af
Outflow = 16.05 cfs @ 12.10 hrs, Volume= 0.771 af, Atten= 2%, Lag= 1.0 min
Primary = 16.05 cfs @ 12.10 hrs, Volume= 0.771 af
Routed to Reach O4 : Overland Flow

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 205.87' @ 12.10 hrs Surf.Area= 1,191 sf Storage= 872 cf

Plug-Flow detention time= 0.8 min calculated for 0.771 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (817.3 - 816.6)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,690 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
204.40	0	0	0
206.00	1,300	1,040	1,040
208.00	4,200	5,500	6,540
209.00	6,100	5,150	11,690

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 46.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0152 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=15.91 cfs @ 12.10 hrs HW=205.86' (Free Discharge)
└**1=Culvert - 4B** (Inlet Controls 15.91 cfs @ 3.24 fps)

Summary for Pond CB-2B: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.308 ac, 2.34% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 25.70 cfs @ 12.07 hrs, Volume= 1.645 af
Outflow = 25.75 cfs @ 12.07 hrs, Volume= 1.643 af, Atten= 0%, Lag= 0.0 min
Primary = 25.75 cfs @ 12.07 hrs, Volume= 1.643 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 180.18' @ 12.07 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 1.2 min calculated for 1.642 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (848.5 - 848.1)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	173.00'	**24.0" Round Culvert** L= 90.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0111 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=25.20 cfs @ 12.07 hrs HW=180.14' (Free Discharge)
└**2=Culvert** (Passes 25.20 cfs of 37.47 cfs potential flow)
└**1=Orifice/Grate** (Orifice Controls 25.20 cfs @ 5.13 fps)

Summary for Pond CB-2D: LF TOE DITCH - CATCH BASIN

Inflow Area = 9.297 ac, 3.94% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 26.42 cfs @ 12.06 hrs, Volume= 1.643 af
Outflow = 26.51 cfs @ 12.06 hrs, Volume= 1.640 af, Atten= 0%, Lag= 0.0 min
Primary = 26.51 cfs @ 12.06 hrs, Volume= 1.640 af
Routed to Reach R-2D : DITCH

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 202.25' @ 12.06 hrs Surf.Area= 13 sf Storage= 138 cf
Flood Elev= 200.65' Surf.Area= 13 sf Storage= 134 cf

Plug-Flow detention time= 1.6 min calculated for 1.640 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (847.8 - 847.3)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	138 cf	**4.00'D x 11.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	201.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	192.00'	**24.0" Round Culvert** L= 30.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 192.00' / 191.50' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=26.10 cfs @ 12.06 hrs HW=202.22' (Free Discharge)
↑**2=Culvert** (Passes 26.10 cfs of 36.26 cfs potential flow)
↑**1=Orifice/Grate** (Orifice Controls 26.10 cfs @ 5.32 fps)

Summary for Pond CB-2E: LF TOE DITCH - CATCH BASIN

Inflow Area = 10.279 ac, 4.18% Impervious, Inflow Depth = 2.13" for 25-yr Storm event
Inflow = 26.52 cfs @ 12.13 hrs, Volume= 1.828 af
Outflow = 26.55 cfs @ 12.13 hrs, Volume= 1.826 af, Atten= 0%, Lag= 0.1 min
Primary = 26.55 cfs @ 12.13 hrs, Volume= 1.826 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 180.26' @ 12.13 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 1.1 min calculated for 1.825 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (852.8 - 852.4)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

#2	Primary	173.00'	**24.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=26.04 cfs @ 12.13 hrs HW=180.21' (Free Discharge)
↑—**2=Culvert** (Passes 26.04 cfs of 37.71 cfs potential flow)
↑—**1=Orifice/Grate** (Orifice Controls 26.04 cfs @ 5.31 fps)

Summary for Pond CB-4C: LT TOE DITCH - CATCH BASIN

Inflow Area = 10.458 ac, 9.73% Impervious, Inflow Depth = 2.28" for 25-yr Storm event
Inflow = 22.47 cfs @ 12.02 hrs, Volume= 1.991 af
Outflow = 22.48 cfs @ 12.02 hrs, Volume= 1.989 af, Atten= 0%, Lag= 0.0 min
Primary = 22.48 cfs @ 12.02 hrs, Volume= 1.989 af
Routed to Pond DP-13 : DETENTION POND 13

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.92' @ 12.02 hrs Surf.Area= 13 sf Storage= 87 cf
Flood Elev= 174.00' Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 0.9 min calculated for 1.989 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (853.5 - 853.3)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	171.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	167.00'	**24.0" Round Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 167.00' / 166.50' S= 0.0096 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=22.04 cfs @ 12.02 hrs HW=171.90' (Free Discharge)
↑—**2=Culvert** (Passes 22.04 cfs of 29.88 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 22.04 cfs @ 3.11 fps)

Summary for Pond CB-4D: LF TOE DITCH - CATCH BASINS

Inflow Area = 12.095 ac, 2.44% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 40.38 cfs @ 12.01 hrs, Volume= 2.138 af
Outflow = 40.40 cfs @ 12.01 hrs, Volume= 2.137 af, Atten= 0%, Lag= 0.0 min
Primary = 40.40 cfs @ 12.01 hrs, Volume= 2.137 af
Routed to Pond DP-14 : DETENTION POND 14

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 161.35' @ 12.01 hrs Surf.Area= 13 sf Storage= 57 cf
Flood Elev= 162.00' Surf.Area= 13 sf Storage= 57 cf

Plug-Flow detention time= 0.5 min calculated for 2.136 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (843.2 - 843.1)

Volume	Invert	Avail.Storage	Storage Description
#1	156.00'	57 cf	**4.00'D x 4.50'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	160.50'	**30.0" Horiz. Orifice/Grate X 2.00** C= 0.600 Limited to weir flow at low heads
#2	Primary	158.00'	**24.0" Round Culvert X 2.00** L= 54.5' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.50' S= 0.0092 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=39.65 cfs @ 12.01 hrs HW=161.34' (Free Discharge)
└**2=Culvert** (Passes 39.65 cfs of 46.29 cfs potential flow)
└**1=Orifice/Grate** (Weir Controls 39.65 cfs @ 3.00 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area = 11.260 ac, 1.95% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 42.04 cfs @ 12.06 hrs, Volume= 2.099 af
Outflow = 42.30 cfs @ 12.06 hrs, Volume= 2.098 af, Atten= 0%, Lag= 0.0 min
Primary = 42.30 cfs @ 12.06 hrs, Volume= 2.098 af
Routed to Pond DP-11R : DETENTION POND 11R

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 167.44' @ 12.06 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 170.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 0.3 min calculated for 2.098 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (841.1 - 841.0)

Volume	Invert	Avail.Storage	Storage Description
#1	159.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	161.00'	**24.0" Round Culvert** L= 115.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 161.00' / 160.00' S= 0.0087 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Primary	167.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=41.29 cfs @ 12.06 hrs HW=167.39' (Free Discharge)
└**1=Culvert** (Inlet Controls 35.11 cfs @ 11.18 fps)
└**2=Orifice/Grate** (Weir Controls 6.18 cfs @ 2.03 fps)

Summary for Pond CB-4H: Catch Basin - 4H

Inflow Area = 15.096 ac, 1.13% Impervious, Inflow Depth = 2.23" for 25-yr Storm event
Inflow = 47.70 cfs @ 12.06 hrs, Volume= 2.805 af
Outflow = 47.76 cfs @ 12.06 hrs, Volume= 2.803 af, Atten= 0%, Lag= 0.0 min
Primary = 37.59 cfs @ 12.06 hrs, Volume= 2.694 af
Routed to Pond DP-11R : DETENTION POND 11R
Secondary = 10.17 cfs @ 12.06 hrs, Volume= 0.108 af
Routed to Pond CB-4G : Catch Basin - 4G

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 183.53' @ 12.06 hrs Surf.Area= 13 sf Storage= 113 cf
Flood Elev= 183.00' Surf.Area= 13 sf Storage= 113 cf

Plug-Flow detention time= 0.8 min calculated for 2.803 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (838.5 - 838.2)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	113 cf	**4.00'D x 9.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	174.00'	**24.0" Round Culvert** L= 65.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 174.00' / 172.00' S= 0.0308 '/' Cc= 0.900 n= 0.011 PVC, smooth interior, Flow Area= 3.14 sf
#2	Device 1	181.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	183.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=37.50 cfs @ 12.06 hrs HW=183.52' (Free Discharge)
└**1=Culvert** (Passes 37.50 cfs of 44.15 cfs potential flow)
└**2=Orifice/Grate** (Orifice Controls 37.50 cfs @ 7.64 fps)

Secondary OutFlow Max=9.77 cfs @ 12.06 hrs HW=183.52' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 9.77 cfs @ 1.89 fps)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 13.052 ac, 3.54% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 36.42 cfs @ 12.07 hrs, Volume= 2.311 af
Outflow = 36.45 cfs @ 12.07 hrs, Volume= 2.309 af, Atten= 0%, Lag= 0.0 min
Primary = 23.94 cfs @ 12.07 hrs, Volume= 2.071 af
Routed to Reach R-10a : R-10a
Secondary = 12.52 cfs @ 12.06 hrs, Volume= 0.237 af
Routed to Pond CB-4H : Catch Basin - 4H

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 208.60' @ 12.06 hrs Surf.Area= 13 sf Storage= 108 cf
Flood Elev= 209.90' Surf.Area= 13 sf Storage= 121 cf

Plug-Flow detention time= 0.8 min calculated for 2.309 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (847.9 - 847.6)

Volume	Invert	Avail.Storage	Storage Description
#1	200.00'	121 cf	**4.00'D x 9.60'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	200.00'	**24.0" Round NEW 24-INCH** L= 67.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 200.00' / 194.00' S= 0.0896 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	207.58'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	208.00'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=23.69 cfs @ 12.07 hrs HW=208.58' (Free Discharge)
↑└**1=NEW 24-INCH** (Passes 23.69 cfs of 41.66 cfs potential flow)
↑└**2=Orifice/Grate** (Orifice Controls 23.69 cfs @ 4.83 fps)

Secondary OutFlow Max=12.06 cfs @ 12.06 hrs HW=208.59' (Free Discharge)
↑└**3=Broad-Crested Rectangular Weir** (Weir Controls 12.06 cfs @ 2.06 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area = 11.663 ac, 3.68% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 24.96 cfs @ 12.17 hrs, Volume= 2.062 af
Outflow = 24.96 cfs @ 12.17 hrs, Volume= 2.060 af, Atten= 0%, Lag= 0.0 min
Primary = 22.32 cfs @ 12.17 hrs, Volume= 2.034 af
Routed to Pond DP-10 : DETENTION POND 10
Secondary = 2.64 cfs @ 12.17 hrs, Volume= 0.026 af
Routed to Pond CB-4JA3 : (4JA3) New Catch Basin

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 220.63' @ 12.17 hrs Surf.Area= 13 sf Storage= 88 cf

Plug-Flow detention time= 0.9 min calculated for 2.060 af (100% of inflow)
Center-of-Mass det. time= 0.3 min (856.2 - 856.0)

Volume	Invert	Avail.Storage	Storage Description
#1	211.00'	88 cf	**4.00'D x 7.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert - 4JA** L= 56.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 212.20' S= 0.0143 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	220.00'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=22.25 cfs @ 12.17 hrs HW=220.59' (Free Discharge)
└**1=Culvert - 4JA** (Inlet Controls 22.25 cfs @ 12.59 fps)
└**2=Orifice/Grate** (Passes 22.25 cfs of 32.50 cfs potential flow)

Secondary OutFlow Max=2.43 cfs @ 12.17 hrs HW=220.59' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 2.43 cfs @ 2.06 fps)

Summary for Pond CB-4JA3: (4JA3) New Catch Basin

Inflow	=	2.64 cfs @	12.17 hrs, Volume=	0.026 af
Outflow	=	3.10 cfs @	12.16 hrs, Volume=	0.024 af, Atten= 0%, Lag= 0.0 min
Primary	=	2.60 cfs @	12.16 hrs, Volume=	0.020 af
Routed to Pond DP-10 : DETENTION POND 10				
Secondary	=	0.50 cfs @	12.16 hrs, Volume=	0.004 af
Routed to Pond PS11 : Culvert - 4IA(C11 PS)				

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 213.11' @ 12.15 hrs Surf.Area= 0.000 ac Storage= 0.003 af
Flood Elev= 215.00' Surf.Area= 0.000 ac Storage= 0.003 af

Plug-Flow detention time= 1.2 min calculated for 0.024 af (93% of inflow)
Center-of-Mass det. time= 0.8 min (731.0 - 730.2)

Volume	Invert	Avail.Storage	Storage Description
#1	202.90'	0.003 af	**4.00'D x 10.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Primary	204.90'	**18.0" Round NEW 24-INCH** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 204.90' / 204.00' S= 0.0150 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	212.90'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Secondary	212.90'	**2.0' long x 3.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=2.23 cfs @ 12.16 hrs HW=213.10' (Free Discharge)
↑—**1=NEW 24-INCH** (Passes 2.23 cfs of 23.22 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 2.23 cfs @ 1.45 fps)

Secondary OutFlow Max=0.42 cfs @ 12.16 hrs HW=213.10' (Free Discharge)
↑—**3=Broad-Crested Rectangular Weir** (Weir Controls 0.42 cfs @ 1.08 fps)

Summary for Pond DP-1: DETENTION POND 1

Inflow Area = 41.304 ac, 3.35% Impervious, Inflow Depth = 2.08" for 25-yr Storm event
Inflow = 85.57 cfs @ 12.09 hrs, Volume= 7.174 af
Outflow = 38.56 cfs @ 12.29 hrs, Volume= 6.990 af, Atten= 55%, Lag= 12.1 min
Primary = 38.56 cfs @ 12.29 hrs, Volume= 6.990 af
Routed to Reach R-1D : Reach R-1D
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1D : Reach R-1D

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 165.32' @ 12.29 hrs Surf.Area= 19,943 sf Storage= 79,584 cf
Flood Elev= 166.00' Surf.Area= 21,310 sf Storage= 93,390 cf

Plug-Flow detention time= 397.4 min calculated for 6.990 af (97% of inflow)
Center-of-Mass det. time= 340.9 min (1,285.5 - 944.6)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	115,245 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	10,750	0	0
162.00	13,540	24,290	24,290
164.00	17,070	30,610	54,900
165.00	19,300	18,185	73,085
166.00	21,310	20,305	93,390
167.00	22,400	21,855	115,245

Device	Routing	Invert	Outlet Devices
#1	Primary	159.80'	**30.0" Round Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 159.80' / 159.35' S= 0.0060 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	160.60'	**3.0" Vert. Orifice on side** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.70'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#4	Secondary	166.30'	**40.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=38.53 cfs @ 12.29 hrs HW=165.31' (Free Discharge)
└**1=Culvert** (Inlet Controls 38.53 cfs @ 7.85 fps)
  └**2=Orifice on side** (Passes < 0.51 cfs potential flow)
  └**3=Orifice-Top of drop inlet** (Passes < 126.40 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 34.949 ac, 6.10% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 76.39 cfs @ 12.01 hrs, Volume= 6.441 af
Outflow = 15.90 cfs @ 12.62 hrs, Volume= 5.911 af, Atten= 79%, Lag= 36.7 min
Primary = 14.61 cfs @ 12.62 hrs, Volume= 3.278 af
Routed to Reach E1R6 : DP-10 DISCHARGE
Secondary = 1.29 cfs @ 12.62 hrs, Volume= 2.633 af
Routed to Reach E1R6 : DP-10 DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach E1R6 : DP-10 DISCHARGE

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.48' @ 12.62 hrs Surf.Area= 61,319 sf Storage= 130,989 cf
Flood Elev= 189.00' Surf.Area= 77,500 sf Storage= 239,860 cf

Plug-Flow detention time= 779.9 min calculated for 5.911 af (92% of inflow)
Center-of-Mass det. time= 736.2 min (1,584.5 - 848.3)

Volume	Invert	Avail.Storage	Storage Description
#1	180.00'	320,610 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
180.00	10	0	0
182.00	2,300	2,310	2,310
184.00	11,000	13,300	15,610
186.00	34,000	45,000	60,610
188.00	71,000	105,000	165,610
190.00	84,000	155,000	320,610

Device	Routing	Invert	Outlet Devices
#1	Device 3	187.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.00'	**6.0" Vert. 6-in Orifice** C= 0.600 Limited to weir flow at low heads
#3	Primary	181.00'	**24.0" Round 18-in Primary Culvert** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 181.00' / 180.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#4	Secondary	177.50'	**5.8" Round 6-in Culvert** L= 220.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 177.50' / 174.00' S= 0.0159 '/' Cc= 0.900

n= 0.011, Flow Area= 0.18 sf

#5	Device 4	186.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	184.00'	**1.5" Vert. Orifice Side** X 2 rows with 0.5" cc spacing C= 0.600 Limited to weir flow at low heads
#7	Tertiary	188.00'	**10.0' long x 26.0' breadth E-Spillway Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=14.54 cfs @ 12.62 hrs HW=187.48' (Free Discharge)
└**3=18-in Primary Culvert** (Passes 14.54 cfs of 35.40 cfs potential flow)
  ├**1=Orifice/Grate** (Weir Controls 13.49 cfs @ 2.26 fps)
  └**2=6-in Orifice** (Orifice Controls 1.05 cfs @ 5.33 fps)

Secondary OutFlow Max=1.29 cfs @ 12.62 hrs HW=187.48' (Free Discharge)
└**4=6-in Culvert** (Passes 1.29 cfs of 1.37 cfs potential flow)
  ├**5=Orifice Top** (Orifice Controls 1.07 cfs @ 5.85 fps)
  └**6=Orifice Side** (Orifice Controls 0.22 cfs @ 8.87 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=180.00' (Free Discharge)
└**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 91.57 cfs @ 12.05 hrs, Volume= 5.483 af
Outflow = 3.26 cfs @ 15.01 hrs, Volume= 5.483 af, Atten= 96%, Lag= 177.6 min
Primary = 1.91 cfs @ 15.01 hrs, Volume= 2.139 af
  Routed to Reach R4G : Reach 4G
Secondary = 1.35 cfs @ 15.01 hrs, Volume= 3.345 af
  Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 160.52' @ 15.01 hrs Surf.Area= 34,204 sf Storage= 142,499 cf

Plug-Flow detention time= 644.3 min calculated for 5.481 af (100% of inflow)
Center-of-Mass det. time= 644.6 min (1,485.0 - 840.4)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.91 cfs @ 15.01 hrs HW=160.52' (Free Discharge)
└─**1=Culvert** (Passes 1.91 cfs of 31.07 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.84 cfs @ 9.65 fps)
  ├─**3=Orifice** (Orifice Controls 1.07 cfs @ 5.43 fps)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.35 cfs @ 15.01 hrs HW=160.52' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.35 cfs @ 6.86 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 2.17" for 25-yr Storm event
Inflow = 78.37 cfs @ 12.09 hrs, Volume= 5.698 af
Outflow = 1.99 cfs @ 18.63 hrs, Volume= 5.698 af, Atten= 97%, Lag= 392.2 min
Primary = 0.52 cfs @ 18.63 hrs, Volume= 0.713 af
  Routed to Reach R-2A : Reach 2A
Secondary = 1.47 cfs @ 18.63 hrs, Volume= 4.985 af
  Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
  Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 173.19' @ 18.63 hrs Surf.Area= 43,913 sf Storage= 167,588 cf

Plug-Flow detention time= 1,058.3 min calculated for 5.696 af (100% of inflow)
Center-of-Mass det. time= 1,058.7 min (1,906.2 - 847.5)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.52 cfs @ 18.63 hrs HW=173.19' (Free Discharge)
└─**1=Culvert** (Passes 0.52 cfs of 27.42 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.52 cfs @ 5.94 fps)
  ├─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.47 cfs @ 18.63 hrs HW=173.19' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.47 cfs @ 7.50 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 2.26" for 25-yr Storm event
Inflow = 24.69 cfs @ 12.00 hrs, Volume= 2.158 af
Outflow = 3.15 cfs @ 13.11 hrs, Volume= 2.158 af, Atten= 87%, Lag= 66.4 min
Primary = 1.62 cfs @ 13.11 hrs, Volume= 0.698 af
Routed to Reach R4C : Reach 4C
Secondary = 1.53 cfs @ 13.11 hrs, Volume= 1.460 af
Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 164.06' @ 13.11 hrs Surf.Area= 13,728 sf Storage= 41,613 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 174.2 min calculated for 2.157 af (100% of inflow)
Center-of-Mass det. time= 174.1 min (1,026.6 - 852.5)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	164.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.62 cfs @ 13.11 hrs HW=164.06' (Free Discharge)
└**1=Culvert** (Passes 1.62 cfs of 25.11 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.77 cfs @ 8.86 fps)
  ├**3=Orifice** (Orifice Controls 0.85 cfs @ 4.32 fps)
  └**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.53 cfs @ 13.11 hrs HW=164.06' (Free Discharge)
└**5=Culvert** (Barrel Controls 1.53 cfs @ 7.77 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 2.11" for 25-yr Storm event
Inflow = 42.95 cfs @ 12.00 hrs, Volume= 2.369 af
Outflow = 1.50 cfs @ 14.89 hrs, Volume= 2.369 af, Atten= 97%, Lag= 173.3 min
Primary = 0.40 cfs @ 14.89 hrs, Volume= 0.386 af
Routed to Reach R4D : Reach 4D
Secondary = 1.10 cfs @ 14.89 hrs, Volume= 1.983 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 159.04' @ 14.89 hrs Surf.Area= 36,650 sf Storage= 57,194 cf

Plug-Flow detention time= 465.9 min calculated for 2.368 af (100% of inflow)
Center-of-Mass det. time= 465.9 min (1,308.8 - 842.8)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.40 cfs @ 14.89 hrs HW=159.04' (Free Discharge)
└**1=Culvert** (Passes 0.40 cfs of 15.46 cfs potential flow)
├**2=Orifice** (Orifice Controls 0.01 cfs @ 0.71 fps)
├**3=Grate** (Controls 0.00 cfs)
└**5=Orifice/Grate** (Orifice Controls 0.39 cfs @ 4.51 fps)

Secondary OutFlow Max=1.10 cfs @ 14.89 hrs HW=159.04' (Free Discharge)
└**4=Culvert** (Barrel Controls 1.10 cfs @ 5.59 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-1a: DP-1a

Inflow Area = 9.580 ac, 2.92% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 28.64 cfs @ 12.05 hrs, Volume= 1.693 af
Outflow = 2.83 cfs @ 12.72 hrs, Volume= 1.566 af, Atten= 90%, Lag= 40.4 min
Primary = 2.83 cfs @ 12.72 hrs, Volume= 1.566 af
Routed to Pond DP-1 : DETENTION POND 1
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-1 : DETENTION POND 1

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 163.00' Surf.Area= 34,985 sf Storage= 146,410 cf
Peak Elev= 163.99' @ 12.72 hrs Surf.Area= 37,410 sf Storage= 182,319 cf (35,910 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (116,636 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= 435.3 min (1,281.8 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	263,046 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
158.00	24,139	0	0
160.00	27,981	52,120	52,120
162.00	32,544	60,525	112,645
163.00	34,985	33,765	146,410
164.00	37,429	36,207	182,617
166.00	43,000	80,429	263,046

Device	Routing	Invert	Outlet Devices
#1	Primary	163.10'	**113.0 deg Sharp-Crested Vee/Trap Weir** Cv= 2.49 (C= 3.11)
#2	Secondary	165.60'	**18.0' long x 12.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Primary OutFlow Max=2.83 cfs @ 12.72 hrs HW=163.99' (Free Discharge)
└**1=Sharp-Crested Vee/Trap Weir** (Weir Controls 2.83 cfs @ 2.35 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 9.875 ac, 0.07% Impervious, Inflow Depth = 2.10" for 25-yr Storm event
Inflow = 33.38 cfs @ 11.96 hrs, Volume= 1.728 af
Outflow = 13.32 cfs @ 12.08 hrs, Volume= 1.693 af, Atten= 60%, Lag= 7.4 min
Primary = 13.32 cfs @ 12.08 hrs, Volume= 1.693 af
Routed to Reach R-1F : Reach R-1F

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2

Starting Elev= 162.30' Surf.Area= 1,330 sf Storage= 630 cf
Peak Elev= 166.85' @ 12.08 hrs Surf.Area= 11,842 sf Storage= 23,305 cf (22,675 cf above start)
Flood Elev= 167.80' Surf.Area= 17,700 sf Storage= 36,993 cf (36,363 cf above start)

Plug-Flow detention time= 65.1 min calculated for 1.678 af (97% of inflow)
Center-of-Mass det. time= 45.7 min (889.7 - 844.0)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	36,993 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,000	0	0
164.00	3,200	4,200	4,200
165.00	4,940	4,070	8,270
166.00	7,860	6,400	14,670
167.00	12,570	10,215	24,885
167.80	17,700	12,108	36,993

Device	Routing	Invert	Outlet Devices
#1	Primary	162.80'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.80' / 162.20' S= 0.0150 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	164.20'	**8.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	165.40'	**2.4' long x 0.30' rise Sharp-Crested Rectangular Weir** 1 End Contraction(s)
#5	Device 1	166.60'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=13.09 cfs @ 12.08 hrs HW=166.84' (Free Discharge)
↑└**1=Culvert** (Passes 13.09 cfs of 26.37 cfs potential flow)
↑ ├**2=Orifice** (Orifice Controls 1.79 cfs @ 9.12 fps)
 ├**3=Orifice** (Orifice Controls 2.55 cfs @ 7.31 fps)
 ├**4=Sharp-Crested Rectangular Weir** (Orifice Controls 3.96 cfs @ 5.56 fps)
 └**5=Grate** (Weir Controls 4.79 cfs @ 1.60 fps)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 27.235 ac, 7.11% Impervious, Inflow Depth = 2.35" for 25-yr Storm event
Inflow = 54.55 cfs @ 12.01 hrs, Volume= 5.342 af
Outflow = 1.45 cfs @ 20.00 hrs, Volume= 4.663 af, Atten= 97%, Lag= 479.1 min
Primary = 1.45 cfs @ 20.00 hrs, Volume= 4.663 af
Routed to Reach R-1N : R-1N
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-1N : R-1N

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 176.71' @ 20.00 hrs Surf.Area= 73,177 sf Storage= 172,607 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf

Plug-Flow detention time= 1,277.0 min calculated for 4.663 af (87% of inflow)
Center-of-Mass det. time= 1,215.0 min (2,060.1 - 845.1)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.45 cfs @ 20.00 hrs HW=176.71' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Orifice Controls 1.45 cfs @ 7.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=172.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-6 ES: DETENTION POND 6 - EMERGENCY SPILLWAY

Inflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Outflow	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af, Atten= 0%, Lag= 0.0 min
Primary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af
Secondary	=	0.00 cfs @	0.00 hrs,	Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 178.00' Surf.Area= 93,326 sf Storage= 273,159 cf
Peak Elev= 178.00' @ 0.00 hrs Surf.Area= 93,326 sf Storage= 273,159 cf
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (223,485 cf above start)

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**24.0" Round Outlet Culvert X 0.00** L= 70.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 178.00' / 168.00' S= 0.1429 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Primary	174.00'	**5.8" Horiz. Orifice X 0.00** C= 0.600 Limited to weir flow at low heads
#3	Secondary	179.00'	**20.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**1=Outlet Culvert** (Controls 0.00 cfs)
└**2=Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=178.00' (Free Discharge)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 30.022 ac, 9.91% Impervious, Inflow Depth = 2.60" for 25-yr Storm event
Inflow = 77.99 cfs @ 12.13 hrs, Volume= 6.497 af
Outflow = 1.83 cfs @ 19.49 hrs, Volume= 4.089 af, Atten= 98%, Lag= 441.5 min
Primary = 0.68 cfs @ 19.49 hrs, Volume= 0.589 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Secondary = 1.15 cfs @ 19.49 hrs, Volume= 3.501 af
Routed to Reach 9R : LEVEL SPREADER DISCHARGE
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 189.98' @ 19.49 hrs Surf.Area= 86,597 sf Storage= 219,623 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,376.3 min calculated for 4.089 af (63% of inflow)
Center-of-Mass det. time= 1,264.4 min (2,102.4 - 837.9)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Primary	189.50'	**12.0" Round 12-In Outlet Culvert** L= 48.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.50' / 180.50' S= 0.1875 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	184.21'	**5.8" Round 6-In Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.21' / 180.50' S= 0.0618 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#3	Device 2	188.70'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 2	188.30'	**1.5" Vert. Orifice X 2.00** C= 0.600 Limited to weir flow at low heads
#5	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.68 cfs @ 19.49 hrs HW=189.98' (Free Discharge)
└**1=12-In Outlet Culvert** (Inlet Controls 0.68 cfs @ 1.85 fps)

Secondary OutFlow Max=1.15 cfs @ 19.49 hrs HW=189.98' (Free Discharge)
└**2=6-In Culvert** (Passes 1.15 cfs of 1.64 cfs potential flow)
  ├**3=Orifice** (Orifice Controls 1.00 cfs @ 5.44 fps)
  └**4=Orifice** (Orifice Controls 0.15 cfs @ 6.12 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9(E): DP 9 (EMERGENCY OUTLET)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	404,050 cf	**Detention Pond (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	35,200	0	0
188.00	78,220	56,710	56,710
190.00	86,700	164,920	221,630
192.00	95,720	182,420	404,050

Device	Routing	Invert	Outlet Devices
#1	Tertiary	190.50'	**10.0' long x 22.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond P-1G: Culvert Crossing 1G

Inflow Area = 1.772 ac, 0.00% Impervious, Inflow Depth = 2.20" for 25-yr Storm event
Inflow = 5.44 cfs @ 12.05 hrs, Volume= 0.325 af
Outflow = 5.42 cfs @ 12.06 hrs, Volume= 0.325 af, Atten= 0%, Lag= 0.5 min
Primary = 3.63 cfs @ 12.06 hrs, Volume= 0.296 af
Routed to Reach R-1G : RipRap Downspout
Secondary = 1.79 cfs @ 12.06 hrs, Volume= 0.030 af
Routed to Reach R-1I : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 336.36' @ 12.06 hrs Surf.Area= 573 sf Storage= 420 cf

Plug-Flow detention time= 4.7 min calculated for 0.325 af (100% of inflow)
Center-of-Mass det. time= 4.8 min (848.5 - 843.8)

Volume	Invert	Avail.Storage	Storage Description
#1	335.50'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
335.50	400	0	0
337.50	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	335.50'	**24.0" Round 24" Culvert** L= 36.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 335.50' / 331.00' S= 0.1250 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	336.00'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=3.60 cfs @ 12.06 hrs HW=336.36' (Free Discharge)
1=24" Culvert (Inlet Controls 3.60 cfs @ 2.79 fps)

Secondary OutFlow Max=1.75 cfs @ 12.06 hrs HW=336.36' (Free Discharge)
2=Stone Check Dam Weir (Weir Controls 1.75 cfs @ 1.60 fps)

Summary for Pond P-1H: Modified Plunge Pool w/(2)24" Culverts P-6a

Inflow Area = 6.697 ac, 1.15% Impervious, Inflow Depth = 2.05" for 25-yr Storm event
Inflow = 18.71 cfs @ 11.95 hrs, Volume= 1.147 af
Outflow = 18.27 cfs @ 11.96 hrs, Volume= 1.144 af, Atten= 2%, Lag= 0.3 min
Primary = 18.27 cfs @ 11.96 hrs, Volume= 1.144 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Pond DP-2 : DETENTION POND 2

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 184.60' @ 11.96 hrs Surf.Area= 491 sf Storage= 606 cf
Flood Elev= 186.00' Surf.Area= 869 sf Storage= 1,551 cf

Plug-Flow detention time= 3.0 min calculated for 1.144 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (848.9 - 847.5)

Volume	Invert	Avail.Storage	Storage Description
#1	182.00'	5,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	37	0	0
183.00	163	100	100
184.00	348	256	356
185.00	587	468	823
186.00	869	728	1,551
188.00	1,067	1,936	3,487
190.00	1,160	2,227	5,714

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**24.0" Round (2)24"-Culvert X 2.00** L= 56.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 183.00' / 182.00' S= 0.0179 '/' Cc= 0.900 n= 0.025 Corrugated metal, Flow Area= 3.14 sf
#2	Secondary	185.00'	**10.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=17.99 cfs @ 11.96 hrs HW=184.58' (Free Discharge)
↑—**1=(2)24"-Culvert** (Inlet Controls 17.99 cfs @ 3.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond P-1I: Culvert Crossing 6c

Inflow Area = 3.906 ac, 1.97% Impervious, Inflow Depth = 2.21" for 25-yr Storm event
Inflow = 13.36 cfs @ 12.01 hrs, Volume= 0.720 af
Outflow = 13.17 cfs @ 12.01 hrs, Volume= 0.720 af, Atten= 1%, Lag= 0.1 min
Primary = 9.43 cfs @ 12.01 hrs, Volume= 0.672 af
Routed to Reach R-IH : RipRap Downspout
Secondary = 3.75 cfs @ 12.01 hrs, Volume= 0.048 af
Routed to Pond P-1K : Culvert Crossing 1K

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs

Peak Elev= 292.01' @ 12.01 hrs Surf.Area= 800 sf Storage= 300 cf

Plug-Flow detention time= 3.4 min calculated for 0.720 af (100% of inflow)
Center-of-Mass det. time= 3.5 min (841.7 - 838.3)

Volume	Invert	Avail.Storage	Storage Description
#1	290.50'	300 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
290.50	400	0	0
291.00	800	300	300

Device	Routing	Invert	Outlet Devices
#1	Primary	290.50'	**24.0" Round 24" Culvert** L= 38.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 290.50' / 286.00' S= 0.1184 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	291.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=9.33 cfs @ 12.01 hrs HW=292.00' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 9.33 cfs @ 3.68 fps)

Secondary OutFlow Max=3.62 cfs @ 12.01 hrs HW=292.00' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Orifice Controls 3.62 cfs @ 1.89 fps)

Summary for Pond P-1J-1: (2) 24" CULVERTS

Inflow Area = 6.104 ac, 1.82% Impervious, Inflow Depth = 2.08" for 25-yr Storm event
Inflow = 19.41 cfs @ 11.96 hrs, Volume= 1.060 af
Outflow = 19.32 cfs @ 11.96 hrs, Volume= 1.060 af, Atten= 0%, Lag= 0.2 min
Primary = 17.08 cfs @ 11.96 hrs, Volume= 1.042 af
Routed to Pond DP-6 : DETENTION POND 6
Secondary = 2.25 cfs @ 11.96 hrs, Volume= 0.018 af
Routed to Pond P-1J-2 : 18" CULVERT

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 191.53' @ 11.96 hrs Surf.Area= 308 sf Storage= 242 cf

Plug-Flow detention time= 0.2 min calculated for 1.059 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (842.6 - 842.4)

Volume	Invert	Avail.Storage	Storage Description
#1	190.00'	410 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
190.00	10	0	0
192.00	400	410	410

Device	Routing	Invert	Outlet Devices
#1	Primary	190.00'	**24.0" Round Culvert X 2.00** L= 37.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 190.00' / 189.60' S= 0.0108 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	191.20'	**170.0 deg x 1.0' long Sharp-Crested Vee/Trap Weir** Cv= 2.46 (C= 3.08)

Primary OutFlow Max=16.82 cfs @ 11.96 hrs HW=191.51' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 16.82 cfs @ 3.30 fps)

Secondary OutFlow Max=2.07 cfs @ 11.96 hrs HW=191.51' (Free Discharge)
↑—**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 2.07 cfs @ 1.45 fps)

Summary for Pond P-1J-2: 18" CULVERT

Inflow	=	2.25 cfs @	11.96 hrs, Volume=	0.018 af
Outflow	=	1.76 cfs @	11.99 hrs, Volume=	0.019 af, Atten= 22%, Lag= 1.9 min
Primary	=	1.76 cfs @	11.99 hrs, Volume=	0.019 af

Routed to Pond DP-6 : DETENTION POND 6

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 187.49' @ 11.99 hrs Surf.Area= 672 sf Storage= 166 cf

Plug-Flow detention time= 1.3 min calculated for 0.018 af (100% of inflow)
Center-of-Mass det. time= 1.5 min (719.0 - 717.5)

Volume	Invert	Avail.Storage	Storage Description
#1	187.00'	32,056 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
187.00	10	0	0
188.00	1,367	689	689
190.00	3,000	4,367	5,056
192.00	6,000	9,000	14,056
194.00	12,000	18,000	32,056

Device	Routing	Invert	Outlet Devices
#1	Primary	186.80'	**18.0" Round 18" Culvert** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 186.80' / 185.97' S= 0.0208 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.66 cfs @ 11.99 hrs HW=187.47' (Free Discharge)
↑—**1=18" Culvert** (Inlet Controls 1.66 cfs @ 2.19 fps)

Summary for Pond P-1K: Culvert Crossing 1K

Inflow Area = 4.295 ac, 2.58% Impervious, Inflow Depth = 2.31" for 25-yr Storm event
Inflow = 20.38 cfs @ 11.95 hrs, Volume= 0.825 af
Outflow = 19.42 cfs @ 11.96 hrs, Volume= 0.825 af, Atten= 5%, Lag= 0.7 min
Primary = 12.70 cfs @ 11.96 hrs, Volume= 0.740 af
Routed to Reach R-1J : RipRap Downspout
Secondary = 6.72 cfs @ 11.96 hrs, Volume= 0.085 af
Routed to Reach R-1L : Final Cover Access Road Ditch

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 256.39' @ 11.96 hrs Surf.Area= 677 sf Storage= 747 cf

Plug-Flow detention time= 0.4 min calculated for 0.825 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (829.9 - 829.5)

Volume	Invert	Avail.Storage	Storage Description
#1	255.00'	1,200 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
255.00	400	0	0
257.00	800	1,200	1,200

Device	Routing	Invert	Outlet Devices
#1	Primary	254.50'	**24.0" Round 24" Culvert** L= 33.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 254.50' / 252.00' S= 0.0758 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Secondary	255.50'	**160.0 deg x 1.0' long x 0.50' rise Stone Check Dam Weir** Cv= 2.47 (C= 3.09)

Primary OutFlow Max=12.40 cfs @ 11.96 hrs HW=256.35' (Free Discharge)
↑—**1=24" Culvert** (Inlet Controls 12.40 cfs @ 4.09 fps)

Secondary OutFlow Max=6.46 cfs @ 11.96 hrs HW=256.35' (Free Discharge)
↑—**2=Stone Check Dam Weir** (Orifice Controls 6.46 cfs @ 3.37 fps)

Summary for Pond PS11: Culvert - 4IA(C11 PS)

Inflow = 0.50 cfs @ 12.16 hrs, Volume= 0.004 af
Outflow = 0.39 cfs @ 12.20 hrs, Volume= 0.004 af, Atten= 22%, Lag= 2.5 min
Primary = 0.39 cfs @ 12.20 hrs, Volume= 0.004 af
Routed to Pond CB-4I : Catch Basin - 4I

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 213.33' @ 12.20 hrs Surf.Area= 216 sf Storage= 46 cf
Flood Elev= 215.10' Surf.Area= 1,133 sf Storage= 1,237 cf

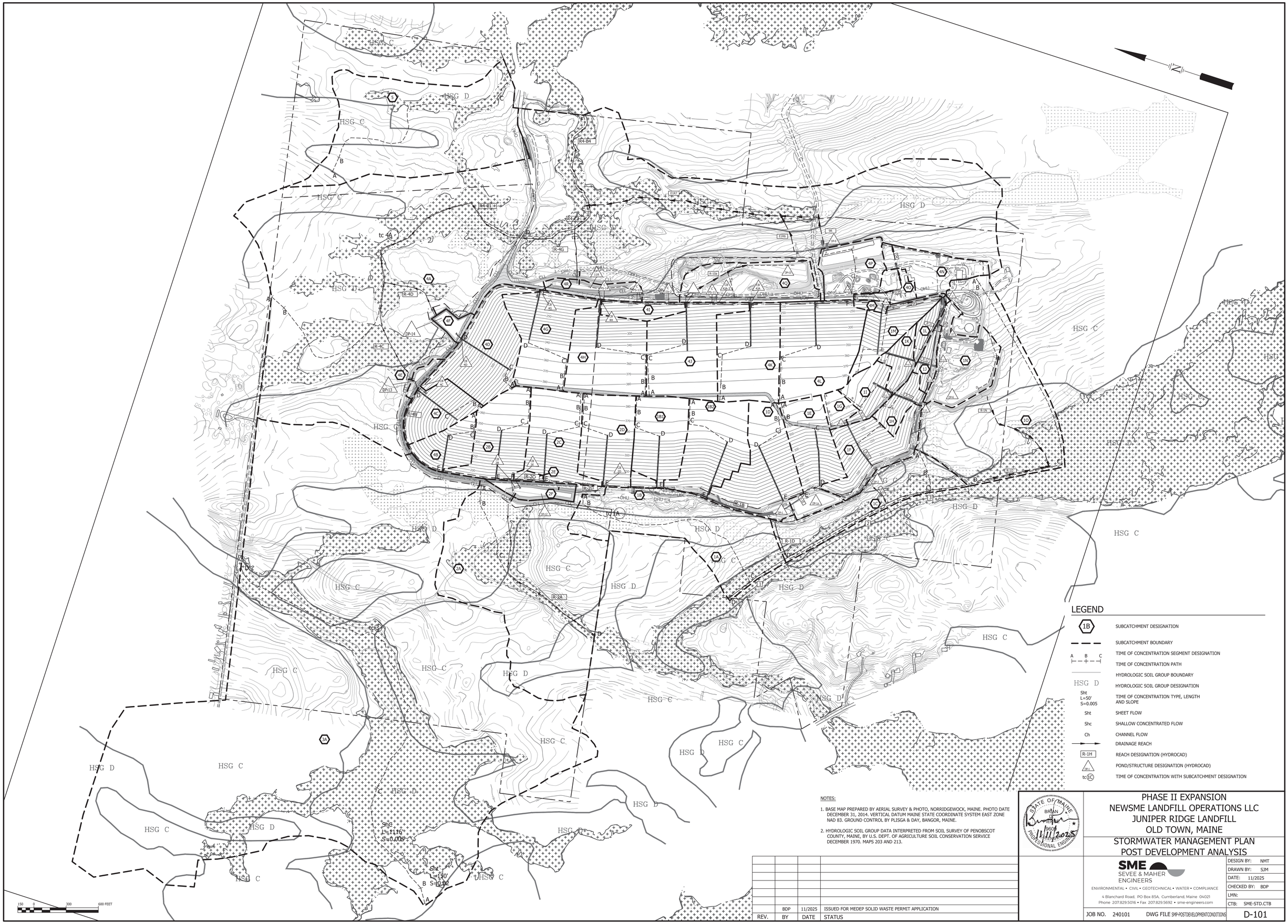
Plug-Flow detention time= 2.4 min calculated for 0.004 af (97% of inflow)
Center-of-Mass det. time= 2.3 min (733.3 - 731.0)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,353 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
212.90	5	0	0
213.04	63	5	5
215.20	1,185	1,348	1,353

Device	Routing	Invert	Outlet Devices
#1	Primary	213.05'	**24.0" Round Culvert - 4IA(C11 PS)** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 213.05' / 212.15' S= 0.0225 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=0.38 cfs @ 12.20 hrs HW=213.33' (Free Discharge)
↑—**1=Culvert - 4IA(C11 PS)** (Inlet Controls 0.38 cfs @ 1.42 fps)



LEGEND

1B	SUBCATCHMENT DESIGNATION
	SUBCATCHMENT BOUNDARY
A B C	TIME OF CONCENTRATION SEGMENT DESIGNATION
	TIME OF CONCENTRATION PATH
	HYDROLOGIC SOIL GROUP BOUNDARY
HSG D	HYDROLOGIC SOIL GROUP DESIGNATION
Sht L=50' S=0.005	TIME OF CONCENTRATION TYPE, LENGTH AND SLOPE
Sht	SHEET FLOW
Shc	SHALLOW CONCENTRATED FLOW
Ch	CHANNEL FLOW
	DRAINAGE REACH
R-1H	REACH DESIGNATION (HYDROCAD)
DP-1	POND/STRUCTURE DESIGNATION (HYDROCAD)
tc 1C	TIME OF CONCENTRATION WITH SUBCATCHMENT DESIGNATION

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO, NORRIDGEWOCK, MAINE. PHOTO DATE DECEMBER 31, 2014. VERTICAL DATUM MAINE STATE COORDINATE SYSTEM EAST ZONE NAD 83. GROUND CONTROL BY PLISGA & DAY, BANGOR, MAINE.
2. HYDROLOGIC SOIL GROUP DATA INTERPRETED FROM SOIL SURVEY OF PENOBSCOT COUNTY, MAINE, BY U.S. DEPT. OF AGRICULTURE SOIL CONSERVATION SERVICE DECEMBER 1970. MAPS 203 AND 213.

REV.	BY	DATE	STATUS
	BDP	11/2025	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

STATE OF MAINE — BRIAN D. PERRY — 9601 — REGISTERED PROFESSIONAL ENGINEER — 11/11/2025

PHASE II EXPANSION
NEWSME LANDFILL OPERATIONS LLC
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE
STORMWATER MANAGEMENT PLAN
POST DEVELOPMENT ANALYSIS

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	NMT
DRAWN BY:	SJM
DATE:	11/2025
CHECKED BY:	BDP
LMN:	
CTB:	SME-STD.CTB

JOB NO. 240101 DWG FILE SMP-POSTDEVELOPMENTCONDITIONS D-101

\\server\SCDatabase\SMP\Current\SMP\Current Phase 1 Expansion\Acad\Plans\SMP Post Development Conditions.dwg, SMP-D-101, 11/11/2025 8:39:48 AM, sjm

DETENTION POND 10
OUTLET CONTROL
STRUCTURES TO REMAIN

DETENTION POND 10

EMERGENCY SPILLWAY (TYP)
SEE DWG C-309

CB 4G AND SD 4G
SEE DWG C-309

TOE DITCH
SEE DWG C-309

OUTLET CONTROL
STRUCTURE DP-11R
SEE DWG C-309

PLUNGE POOL
SEE DWG C-309

LEVEL SPREADER DP-11R
SEE DWG C-308

DETENTION POND 11R

CB 4H AND SD 4H
SEE DWG C-309

EXISTING
CULVERT PS-14

EXISTING
CULVERT PS-11B-2

EXISTING
CULVERT PS-13

EXISTING CB 4I
AND CULVERT 4I

EXISTING
CULVERT PS-11

EXISTING
CULVERT 4IA

EXISTING CB 4JA-3
AND SD 4JA-3

EXISTTING CULVERTS
4JB AND 4JC

EXISTING CB 4JA
AND SD 4JA

LEVEL SPREADER DP-14
SEE DWG C-309

EMERGENCY
SPILLWAY (TYP)
SEE DWG C-309

PLUNGE POOL
SEE DWG C-309

OUTLET CONTROL
STRUCTURE DP-14
SEE DWG C-309

DETENTION POND 14

CB 4D AND SD 4D
SEE DWG C-309

EMERGENCY
SPILLWAY (TYP)
SEE DWG C-309

DETENTION
POND 13

OUTLET CONTROL
STRUCTURE DP-13
SEE DWG C-309

LEVEL SPREADER
DP-13
SEE DWG C-308

PLUNGE POOL
SEE DWG C-309

CB 4C AND SD 4C
SEE DWG C-309

TOE DITCH
SEE DWG C-309

FINAL COVER RIPRAP
DOWNSPOUT (TYP)
SEE DWG C-309

FINAL COVER SURFACE
TERRACE (TYP)
SEE DWG C-309

FINAL LANDFILL
ACCESS ROAD (TYP)

7.5% MIN (TYP)

10H:1V (TYP)

3H:1V (TYP)

FINAL WASTE GRADES (TYP)

CB 2B AND SD 2B
SEE DWG C-309

CB 2E AND SD 2E
SEE DWG C-309

OUTLET CONTROL
STRUCTURE DP-12
SEE DWG C-309

LEVEL SPREADER DP-12
SEE DWG C-308

EMERGENCY SPILLWAY (TYP)
SEE DWG C-309

PLUNGE POOL
SEE DWG C-309

DETENTION POND 12

CB 2D AND SD 2D
SEE DWG C-309

EXISTING DITCH 2D
SEE DWG C-309

FINAL COVER SYSTEM
SEE DWG C-309

60 0 120 240 FEET

NOTE:
1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC, NORRIDGEWOCK, MAINE. PHOTO DATE 5/21/2024. CONTROL POINTS BASED ON SURVEY BY PLISGA & DAY LAND SURVEYORS OF BANGOR, MAINE, ON APRIL 24, 2025. VERTICAL DATUM: ASSUMED. SUBTRACT 0.34 FEET FROM ELEVATIONS LISTED TO CONVERT ELEVATIONS TO NAVD 88. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY SEVEE & MAHER ENGINEERS, INC., OF CUMBERLAND, MAINE. SEE NOTE 1 ON DWG C-100.

2. WETLAND BOUNDARIES DELINEATED BY BRI ENVIRONMENTAL IN 2024.

3. BORINGS AND TEST PIT LOCATIONS FIELD SURVEYED BY SEVEE & MAHER ENGINEERS, INC. OF CUMBERLAND, MAINE.

REV.	BY	DATE	STATUS
	BDP	11/2025	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

STATE OF MAINE
BRIAN D. PIERCE
9608
11/11/2025
PROFESSIONAL ENGINEER

PHASE II EXPANSION
NEWSME LANDFILL OPERATIONS LLC
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

FINAL GRADES AND SITE DRAINAGE PLAN

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	DPW/NMT
DRAWN BY:	SJM
DATE:	11/2025
CHECKED BY:	BDP
LMN:	FINAL-DRAIN
CTB:	SME-STD.CTB
JOB NO.	240101.00
DWG FILE	BASE
	C-109

\\Newnet\Clients\CMP\Twin Landfill\Expansion\Phase II Expansion\Acad\Plans\BASE.dwg C-109, 11/11/2025 10:07:24 AM, sjm

APPENDIX B

EROSION CONTROL DESIGN

B-1 GRASS DITCH LINING DESIGN
B-2 RIPRAP DITCH LINING DESIGN
B-3 CULVERT INLET/OUTLET DESIGN
B-4 LEVEL SPREADER DESIGN
B-5 PLUNGE POOL DESIGN
B-6 EMERGENCY SPILLWAY DESIGN

SME
SEVEE & MAHER
ENGINEERS

B-1

GRASS DITCH LINING DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

FINAL COVER SURFACE TERRACE

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 11/7//2025
Checked By: BDP
Date: 11/7/2025

OBJECTIVE

Design channel with adequate lining to convey stormwater flows from 25-year, 24-hour storm event assuming full grass cover and 2-year, 24-hour storm event assuming bare ditch condition.

REFERENCES

1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, October 2016.
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System, Version 10.10-4a, Chocorua, New Hampshire.
3. North American Green Erosion Control Material Design Software.

ANALYSIS

1. Evaluate temporary channel lining using peak stormwater flows from 2-year and 25-year, 24-hour storm event using TR-20.
2. Use ditch subcatchment from Top, Middle, and Bottom terrace dtiches with the largest peak flow as basis of design (conservative).
3. All terrace ditch grass line channels assumed to be grass lined and have a longitudinal slope of 7%.

CONCLUSION

(in)

Grassed Ditch	Flow From	Slope (Max.) (ft/ft)	Q_2 (cfs)	Q_{25} (cfs)	Bottom Width (feet)	Side Slopes (H:1V)	Temp. Lining	Permanent Lining
Top	4J	0.07	3.3	12.6	0	10:1,2:1	C125BN	GRASS
Middle	4L	0.07	1.5	5.4	0	3:1,2:1	C125BN	GRASS
Bottom	1D	0.07	1.1	4.8	0	3:1,2:1	C125BN	GRASS

North American Green
5401 St. Wendel-Cynthiana Rd.
Poseyville, Indiana 47633
Tel. 800.772.2040
>Fax 812.867.0247
www.nagreen.com
ECMDS v7.0

CHANNEL ANALYSIS

> > > 4J TOP

Name	4J TOP
Discharge	12.64
Channel Slope	0.07
Channel Bottom Width	0
Left Side Slope	10
Right Side Slope	2
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	Mix (Sod and Bunch)
Vegetation Density	Good 65-79%
Soil Type	Silt Loam (SM)

C125BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
C125BN Unvegetated	Straight	12.64 cfs	6.43 ft/s	0.57 ft	0.026	2.8 lbs/ft2	2.5 lbs/ft2	1.12	STABLE	D
Underlying Substrate	Straight	12.64 cfs	6.43 ft/s	0.57 ft	0.026	2.05 lbs/ft2	1.22 lbs/ft2	1.68	STABLE	D

S150BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S150BN Unvegetated	Straight	12.64 cfs	5.56 ft/s	0.62 ft	0.032	1.9 lbs/ft2	2.69 lbs/ft2	0.71	UNSTABLE	D
Underlying Substrate	Straight	12.64 cfs	5.56 ft/s	0.62 ft	0.032	1.39 lbs/ft2	1.31 lbs/ft2	1.06	STABLE	D

SC150BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150BN Unvegetated	Straight	12.64 cfs	5.56 ft/s	0.62 ft	0.032	2 lbs/ft2	2.69 lbs/ft2	0.74	UNSTABLE	D
Underlying Substrate	Straight	12.64 cfs	5.56 ft/s	0.62 ft	0.032	1.47 lbs/ft2	1.31 lbs/ft2	1.12	STABLE	D

Unreinforced Vegetation

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	12.64 cfs	4.62 ft/s	0.67 ft	0.041	4 lbs/ft2	2.94 lbs/ft2	1.36	STABLE	--
Underlying Substrate	Straight	12.64 cfs	4.62 ft/s	0.67 ft	0.041	1.8 lbs/ft2	1.44 lbs/ft2	1.25	STABLE	--

S75BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S75BN Unvegetated	Straight	12.64 cfs	5.93 ft/s	0.6 ft	0.029	1.6 lbs/ft2	2.6 lbs/ft2	0.62	UNSTABLE	D

Underlying Substrate	Straight	12.64 cfs	5.93 ft/s	0.6 ft	0.029	1.17 lbs/ft2	1.27 lbs/ft2	0.92	UNSTABLE	D

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>Fax 812.867.0247
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CHANNEL ANALYSIS

> > > 4L Middle

Name	4L Middle
Discharge	5.4
Channel Slope	0.07
Channel Bottom Width	0
Left Side Slope	3
Right Side Slope	2
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	Mix (Sod and Bunch)
Vegetation Density	Good 65-79%
Soil Type	Silt Loam (SM)

C125BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
C125BN Unvegetated	Straight	5.4 cfs	6.28 ft/s	0.59 ft	0.026	2.8 lbs/ft2	2.56 lbs/ft2	1.09	STABLE	D
Underlying Substrate	Straight	5.4 cfs	6.28 ft/s	0.59 ft	0.026	2.05 lbs/ft2	1.19 lbs/ft2	1.73	STABLE	D

S150BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S150BN Unvegetated	Straight	5.4 cfs	5.42 ft/s	0.63 ft	0.032	1.9 lbs/ft2	2.76 lbs/ft2	0.69	UNSTABLE	D
Underlying Substrate	Straight	5.4 cfs	5.42 ft/s	0.63 ft	0.032	1.39 lbs/ft2	1.28 lbs/ft2	1.09	STABLE	D

SC150BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150BN Unvegetated	Straight	5.4 cfs	5.42 ft/s	0.63 ft	0.032	2 lbs/ft2	2.76 lbs/ft2	0.73	UNSTABLE	D
Underlying Substrate	Straight	5.4 cfs	5.42 ft/s	0.63 ft	0.032	1.47 lbs/ft2	1.28 lbs/ft2	1.15	STABLE	D

Unreinforced Vegetation

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	5.4 cfs	4.5 ft/s	0.69 ft	0.041	4 lbs/ft2	3.03 lbs/ft2	1.32	STABLE	--
Underlying Substrate	Straight	5.4 cfs	4.5 ft/s	0.69 ft	0.041	1.83 lbs/ft2	1.4 lbs/ft2	1.31	STABLE	--

S75BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S75BN Unvegetated	Straight	5.4 cfs	5.8 ft/s	0.61 ft	0.029	1.6 lbs/ft2	2.67 lbs/ft2	0.6	UNSTABLE	D

Underlying Substrate	Straight	5.4 cfs	5.8 ft/s	0.61 ft	0.029	1.17 lbs/ft2	1.23 lbs/ft2	0.95	UNSTABLE	D

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CHANNEL ANALYSIS

> > > 1D Bottom Terrace

Name	1D Bottom Terrace
Discharge	4.79
Channel Slope	0.07
Channel Bottom Width	0
Left Side Slope	3
Right Side Slope	2
Low Flow Liner	
Retardence Class	C 6-12 in
Vegetation Type	Mix (Sod and Bunch)
Vegetation Density	Good 65-79%
Soil Type	Silt Loam (SM)

C125BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
C125BN Unvegetated	Straight	4.79 cfs	6.04 ft/s	0.56 ft	0.026	2.8 lbs/ft2	2.45 lbs/ft2	1.14	STABLE	D
Underlying Substrate	Straight	4.79 cfs	6.04 ft/s	0.56 ft	0.026	2.05 lbs/ft2	1.13 lbs/ft2	1.81	STABLE	D

S150BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S150BN Unvegetated	Straight	4.79 cfs	5.22 ft/s	0.61 ft	0.032	1.9 lbs/ft2	2.65 lbs/ft2	0.72	UNSTABLE	D
Underlying Substrate	Straight	4.79 cfs	5.22 ft/s	0.61 ft	0.032	1.39 lbs/ft2	1.23 lbs/ft2	1.14	STABLE	D

SC150BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
SC150BN Unvegetated	Straight	4.79 cfs	5.22 ft/s	0.61 ft	0.032	2 lbs/ft2	2.65 lbs/ft2	0.76	UNSTABLE	D
Underlying Substrate	Straight	4.79 cfs	5.22 ft/s	0.61 ft	0.032	1.47 lbs/ft2	1.23 lbs/ft2	1.2	STABLE	D

Unreinforced Vegetation

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	4.79 cfs	4.31 ft/s	0.67 ft	0.042	4 lbs/ft2	2.91 lbs/ft2	1.38	STABLE	--
Underlying Substrate	Straight	4.79 cfs	4.31 ft/s	0.67 ft	0.042	1.89 lbs/ft2	1.35 lbs/ft2	1.41	STABLE	--

S75BN

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S75BN Unvegetated	Straight	4.79 cfs	5.6 ft/s	0.58 ft	0.029	1.6 lbs/ft2	2.55 lbs/ft2	0.63	UNSTABLE	D

Underlying Substrate	Straight	4.79 cfs	5.6 ft/s	0.58 ft	0.029	1.17 lbs/ft2	1.18 lbs/ft2	0.99	UNSTABLE	D

Summary for Subcatchment 1-D: Bottom Terrace

Runoff = 1.34 cfs @ 11.94 hrs, Volume= 0.059 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	1.200	71	Landfill Cover
	1.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, A-B**

Summary for Subcatchment 4-J: Top Terrace

Runoff = 3.26 cfs @ 12.07 hrs, Volume= 0.229 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
*	4.620	71	Landfill Cover
	4.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.3	241	0.2000	3.13		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.9	476	0.0700	9.08	81.69	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.50' Z= 5.0 & 3.0 '/' Top.W=12.00' n= 0.035 Earth, dense weeds
13.5	867	Total			

Summary for Subcatchment 4-L: Middle Terrace

Runoff = 1.47 cfs @ 11.99 hrs, Volume= 0.076 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-yr Storm Rainfall=2.70"

	Area (sf)	CN	Description
*	66,530	71	Landfill Cover
	66,530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	100	0.3300	0.33		**Sheet Flow, A-B**
					Grass: Dense n= 0.240 P2= 2.70"
0.4	103	0.3300	4.02		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.7	376	0.0700	8.95	60.43	**Trap/Vee/Rect Channel Flow, C-D**
					Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00'
					n= 0.035 Earth, dense weeds
6.2	579	Total			

Summary for Subcatchment 1-D: Bottom Terrace

Runoff = 4.79 cfs @ 11.93 hrs, Volume= 0.204 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	1.200	71	Landfill Cover
	1.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.0					**Direct Entry, A-B**

Summary for Subcatchment 4-J: Top Terrace

Runoff = 12.64 cfs @ 12.06 hrs, Volume= 0.786 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	4.620	71	Landfill Cover
	4.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.3	241	0.2000	3.13		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.9	476	0.0700	9.08	81.69	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.50' Z= 5.0 & 3.0 '/' Top.W=12.00' n= 0.035 Earth, dense weeds
13.5	867	Total			

Summary for Subcatchment 4-L: Middle Terrace

Runoff = 5.40 cfs @ 11.98 hrs, Volume= 0.260 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (sf)	CN	Description
*	66,530	71	Landfill Cover
	66,530		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	100	0.3300	0.33		**Sheet Flow, A-B**
					Grass: Dense n= 0.240 P2= 2.70"
0.4	103	0.3300	4.02		**Shallow Concentrated Flow, B-C**
					Short Grass Pasture Kv= 7.0 fps
0.7	376	0.0700	8.95	60.43	**Trap/Vee/Rect Channel Flow, C-D**
					Bot.W=0.00' D=1.50' Z= 3.0 '/' Top.W=9.00'
					n= 0.035 Earth, dense weeds
6.2	579	Total			

B-2

RIPRAP DITCH LINING DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

WEST DITCH RIPRAP CHANNEL DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 11/7//2025
Checked By: BDP
Date: 11/7/2025

OBJECTIVE

Design riprap channel with adequate lining to convey stormwater flows from 25-year, 24-hour storm event assuming stable cover conditions

REFERENCES

1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, October 2016
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001
3. Channel Design Program HYCHL Version 6.1

ANALYSIS

1.Determine peak stormwater flows for 25-year, 24-hour storm events using TR-20. (See Attached Hydrocad Printouts). Evaluate permanent channel lining using maximum flow rate.
2. Use peak stormwater inflow for CB-2E which represents the channel with greatest slope and greatest flow.

CONCLUSION

						Riprap	
Riprap Ditch	Flow From	Slope (Max.) (ft/ft)	Q_{25} (cfs)	Bottom Width (feet)	Side Slopes (H:1V)	D_{50} (in)	Thickness (in)
West Ditch Between CB 2D and CB 2E	2C and 2E	0.05	26.6	3	2	10	20

```
          ******  HYCHL  ****** (Version 6.1) ******          Date 11-
07-2025
 Commands Read From File: C:\WESTDITCH.CHL

       JOB WESTDITCH
       UNI 0
 ** UNITS PARAMETER = 0 (ENGLISH)
       CHL .05    26.6
       TRP 3      2      2
 ** LEFT SIDE SLOPE    2.0 AND RIGHT SIDE SLOPE    2.0
 ** THE BASE WIDTH OF THE TRAPEZOID (ft)    3.00
       LRR .83    2 42     2.65   0.047
 ** D50 (ft)    .83
 ** ANGLE OF REPOSE (DEGREES)   42.00
 ** SPECIFIC GRAVITY    2.65
 ** SHIELDS PARAMETER    .047
       END
***************END OF COMMAND FILE************

 WESTDITCH
 ------------
 INPUT REVIEW
 ------------
   DESIGN PARAMETERS:
       DESIGN DISCHARGE (ft^3/s):           26.60
       CHANNEL SHAPE:                  TRAPEZOIDAL
       CHANNEL SLOPE (ft/ft):               .050
 -------------------------------------
 HYDRAULIC CALCULATIONS USING BATHURST
 -------------------------------------

 FLOW (cfs)                26.60
 MAX DEPTH (ft)             1.09
 AREA (ft^2)                5.67
 WETTED PERIMETER (ft)      7.89
 HYDRAULIC RADIUS (ft)       .72
 AVG VELOCITY (ft/s)        4.69
 MANNINGS EQUIVALENT        .060
 Davg / D50                  .93
 FROUDE NUMBER               .79
 REYNOLDS NUMBER (10^5)      .97
 ------------------
 STABILITY ANALYSIS
 ------------------

                      LINING    PERMIS SHR   CALC. SHR  STAB.
     CONDITION        TYPE      (LB/FT^2)    (LB/FT^2)  FACTOR   REMARKS
     ---------         ------    ----------   ---------  ------   ------
-
   BOTTOM; STRAIGHT   RIPRAP          4.02      3.41      1.18   STABLE
   SIDE; STRAIGHT     RIPRAP          2.99      2.60      1.15   STABLE

 *** NORMAL END OF HYCHL ***
```

Summary for Pond CB-2E: LF TOE DITCH - CATCH BASIN

Inflow Area = 10.279 ac, 4.18% Impervious, Inflow Depth = 2.13" for 25-yr Storm event
Inflow = 26.52 cfs @ 12.13 hrs, Volume= 1.828 af
Outflow = 26.55 cfs @ 12.13 hrs, Volume= 1.826 af, Atten= 0%, Lag= 0.1 min
Primary = 26.55 cfs @ 12.13 hrs, Volume= 1.826 af
Routed to Pond DP-12 : DETENTION POND 12

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 180.26' @ 12.13 hrs Surf.Area= 13 sf Storage= 101 cf
Flood Elev= 182.00' Surf.Area= 13 sf Storage= 101 cf

Plug-Flow detention time= 1.1 min calculated for 1.825 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (852.8 - 852.4)

Volume	Invert	Avail.Storage	Storage Description
#1	171.00'	101 cf	**4.00'D x 8.00'H Vertical Cone/Cylinder**

Device	Routing	Invert	Outlet Devices
#1	Device 2	179.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	173.00'	**24.0" Round Culvert** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 173.00' / 172.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=26.04 cfs @ 12.13 hrs HW=180.21' (Free Discharge)
└**2=Culvert** (Passes 26.04 cfs of 37.71 cfs potential flow)
└**1=Orifice/Grate** (Orifice Controls 26.04 cfs @ 5.31 fps)

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

RIPRAP DOWNSPOUT DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 11/7/2025
Checked By: BDP
Date: 11/7/2025

OBJECTIVE

Design riprap channel with adequate freeboard and lining to convey stormwater flows from 25-year, 24-hour storm event assuming full grass cover.

REFERENCES

1. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System, Version 10.10.
2. Channel Design Program HYCHL Version 6.1.
3. USDOT, FHA, Design of Roadside Channels with Flexible Linings, HEC 15, September 2005.

ASSUMPTIONS

1. This evaluation includes anticipated stormwater flows from landfill final cover.
2. This evaluation is worst case.

ANALYSIS

Determine peak stormwater flows for the 25-year, 24-hour storm event (assuming full grass growth) using TR-20. (See Attached HydroCAD Printouts). Evaluate channel stability based on peak flows.

CONCLUSION

Note: Riprap sizing for downspouts for final cover conditions.

Downspout	R-4H Final Cover Downspout
Q25 Vegetated (ft3/sec)	33.16
Qdesign	33.16
Downspout Geometry	
Maximum Slope (ft/ft)	0.37
Bottom Width (ft)	4
Side slope left (H:1V)	2
Side slope right (H:1V)	2
Depth (ft) =	2.5
D50 (in) =	12
Minimum Thickness (in) =	24
Mannings n =	0.045
Velocity (ft/sec) =	12.65
Flow Depth (ft) =	0.52

D50 riprap size checked using HYCHL Program. (See Attachment)

```
          ******  HYCHL  ****** (Version 6.1) ******          Date 11-
07-2025
 Commands Read From File: C:\4H.CHL

       JOB 4H
       UNI 0
 ** UNITS PARAMETER = 0 (ENGLISH)
       CHL .37    33.16
       TRP 4      2      2
 ** LEFT SIDE SLOPE    2.0 AND RIGHT SIDE SLOPE    2.0
 ** THE BASE WIDTH OF THE TRAPEZOID (ft)    4.00
       LRR 1      2 42     2.65   .1500
 ** D50 (ft)   1.00
 ** ANGLE OF REPOSE (DEGREES)   42.00
 ** SPECIFIC GRAVITY    2.65
 ** SHIELDS PARAMETER    .150
       END
***************END OF COMMAND FILE************

 4H
 ------------
 INPUT REVIEW
 ------------
   DESIGN PARAMETERS:
       DESIGN DISCHARGE (ft^3/s):           33.16
       CHANNEL SHAPE:                  TRAPEZOIDAL
       CHANNEL SLOPE (ft/ft):               .370
 -------------------------------------
 HYDRAULIC CALCULATIONS USING BATHURST
 -------------------------------------

 FLOW (cfs)                33.16
 MAX DEPTH (ft)              .53
 AREA (ft^2)                2.72
 WETTED PERIMETER (ft)      6.40
 HYDRAULIC RADIUS (ft)       .43
 AVG VELOCITY (ft/s)       12.19
 MANNINGS EQUIVALENT        .043
 Davg / D50                  .44
 FROUDE NUMBER              2.94
 REYNOLDS NUMBER (10^5)     2.28
 ------------------
 STABILITY ANALYSIS
 ------------------

                      LINING    PERMIS SHR   CALC. SHR  STAB.
     CONDITION        TYPE      (LB/FT^2)    (LB/FT^2)  FACTOR   REMARKS
     ---------         ------    ----------   ---------  ------   ------
-
   BOTTOM; STRAIGHT   RIPRAP          15.44     12.33      1.25   STABLE
   SIDE; STRAIGHT     RIPRAP          11.49      9.53      1.21   STABLE

 *** NORMAL END OF HYCHL ***
```

Summary for Subcatchment 4-H: SC-4H

Runoff = 33.16 cfs @ 12.07 hrs, Volume= 2.120 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-yr Storm Rainfall=4.90"

	Area (ac)	CN	Description
*	12.330	71	Landfill Final Cover
*	0.135	98	Riprap
	12.465	71	Weighted Average
	12.330		98.92% Pervious Area
	0.135		1.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.3	150	0.1000	0.22		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
1.7	232	0.1000	2.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
0.8	464	0.0700	9.13	123.23	**Trap/Vee/Rect Channel Flow, Segment C-D** Bot.W=0.00' D=1.50' Z= 2.0 & 10.0 '/' Top.W=18.00' n= 0.035 High grass
0.5	440	0.3300	14.25	227.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=4.00' D=2.00' Z= 2.0 '/' Top.W=12.00' n= 0.069 Riprap, 6-inch
14.3	1,286	Total			

B-3

CULVERT INLET/OUTLET DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

RIPRAP APRON DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 3/24/2025
Checked By: TJM
Date: 4/3/2025

OBJECTIVE

Design culvert outlet protection to protect the outlet of culverts from scour and deterioration.

REFERENCES

Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, October 2016.

ANALYSIS

Evaluate required riprap apron dimensions for full pipe with low tail water.

CONCLUSION

Riprap Apron Designation	Flow From	Culvert Dia. (in)	D_{50} (in)	Thickness (in)	Min. Length (ft)	Min. Width (ft)
11R	Pond DP-11R	24	10	20	20	8
12	Pond DP-12	24	10	20	20	8
13	Pond DP-13	24	10	20	20	8
14	Pond DP-14	24	10	20	20	8

B-4

LEVEL SPREADER DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

STANDARD LEVEL SPREADER DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 3/24/2025
Checked By: TJM
Date: 4/3/2025

OBJECTIVE

Design level spreaders in accordance with Erosion and Sediment Control Standards.

REFERENCES

1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, October 2016.
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001.

ANALYSIS

1. Level Spreader Length shall be such that flow from the spreader during the 10-year storm event does not exceed 0.25 cfs per linear foot of spreader. (Minimum Length= 15')

CONCLUSION

Level Spreader Designation	Discharge From	Q_{10} (cfs)	Rqd Rate (cfs/ft)	Min. Rqd. Length (ft)	Specified Length (ft)
11R	Pond DP-11R	1.9	0.25	7.6	15
12	Pond DP-12	1.4	0.25	5.6	15
13	Pond DP-13	1.8	0.25	7.2	15
14	Pond DP-14	1.3	0.25	5.2	15

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 1.45" for 10-yr Storm event
Inflow = 56.32 cfs @ 12.06 hrs, Volume= 3.543 af
Outflow = 1.86 cfs @ 15.94 hrs, Volume= 3.543 af, Atten= 97%, Lag= 233.0 min
Primary = 0.65 cfs @ 15.94 hrs, Volume= 0.853 af
Routed to Reach R4G : Reach 4G
Secondary = 1.21 cfs @ 15.94 hrs, Volume= 2.690 af
Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 158.89' @ 15.94 hrs Surf.Area= 28,727 sf Storage= 91,332 cf

Plug-Flow detention time= 621.8 min calculated for 3.542 af (100% of inflow)
Center-of-Mass det. time= 622.0 min (1,476.4 - 854.4)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.65 cfs @ 15.94 hrs HW=158.89' (Free Discharge)
└─**1=Culvert** (Passes 0.65 cfs of 24.35 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.65 cfs @ 7.45 fps)
  ├─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.21 cfs @ 15.94 hrs HW=158.89' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.21 cfs @ 6.15 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 1.43" for 10-yr Storm event
Inflow = 50.07 cfs @ 12.10 hrs, Volume= 3.756 af
Outflow = 1.43 cfs @ 18.64 hrs, Volume= 3.756 af, Atten= 97%, Lag= 392.2 min
Primary = 0.11 cfs @ 18.64 hrs, Volume= 0.061 af
Routed to Reach R-2A : Reach 2A
Secondary = 1.32 cfs @ 18.64 hrs, Volume= 3.696 af
Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 171.74' @ 18.64 hrs Surf.Area= 39,716 sf Storage= 107,124 cf

Plug-Flow detention time= 897.1 min calculated for 3.755 af (100% of inflow)
Center-of-Mass det. time= 897.4 min (1,757.4 - 860.1)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.11 cfs @ 18.64 hrs HW=171.74' (Free Discharge)
└─**1=Culvert** (Passes 0.11 cfs of 18.93 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.11 cfs @ 1.67 fps)
  ├─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.32 cfs @ 18.64 hrs HW=171.74' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.32 cfs @ 6.70 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 1.50" for 10-yr Storm event
Inflow = 15.85 cfs @ 12.00 hrs, Volume= 1.435 af
Outflow = 1.97 cfs @ 13.29 hrs, Volume= 1.435 af, Atten= 88%, Lag= 76.9 min
Primary = 0.62 cfs @ 13.29 hrs, Volume= 0.314 af
Routed to Reach R4C : Reach 4C
Secondary = 1.36 cfs @ 13.29 hrs, Volume= 1.121 af
Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 162.83' @ 13.29 hrs Surf.Area= 11,800 sf Storage= 25,985 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 139.9 min calculated for 1.435 af (100% of inflow)
Center-of-Mass det. time= 139.9 min (1,006.1 - 866.2)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	164.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.62 cfs @ 13.29 hrs HW=162.83' (Free Discharge)
└─**1=Culvert** (Passes 0.62 cfs of 18.72 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.62 cfs @ 7.08 fps)
  ├─**3=Orifice** (Controls 0.00 cfs)
  └─**4=Grate** (Controls 0.00 cfs)

Secondary OutFlow Max=1.36 cfs @ 13.29 hrs HW=162.83' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.36 cfs @ 6.91 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 1.38" for 10-yr Storm event
Inflow = 27.78 cfs @ 12.00 hrs, Volume= 1.551 af
Outflow = 1.21 cfs @ 14.17 hrs, Volume= 1.551 af, Atten= 96%, Lag= 130.2 min
Primary = 0.21 cfs @ 14.17 hrs, Volume= 0.110 af
Routed to Reach R4D : Reach 4D
Secondary = 1.00 cfs @ 14.17 hrs, Volume= 1.441 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 158.41' @ 14.17 hrs Surf.Area= 35,143 sf Storage= 34,295 cf

Plug-Flow detention time= 350.6 min calculated for 1.550 af (100% of inflow)
Center-of-Mass det. time= 350.6 min (1,206.1 - 855.4)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.21 cfs @ 14.17 hrs HW=158.41' (Free Discharge)
└─**1=Culvert** (Passes 0.21 cfs of 9.53 cfs potential flow)
  ├─**2=Orifice** (Controls 0.00 cfs)
  ├─**3=Grate** (Controls 0.00 cfs)
  └─**5=Orifice/Grate** (Orifice Controls 0.21 cfs @ 2.36 fps)

Secondary OutFlow Max=1.00 cfs @ 14.17 hrs HW=158.41' (Free Discharge)
└─**4=Culvert** (Barrel Controls 1.00 cfs @ 5.11 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

B-5

PLUNGE POOL DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER ENGINEERS

4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

PLUNGE POOL DESIGN

Project Name: Juniper Ridge
Project Location: Old Town, ME
240101
NMT
4/4/2025
TJM

OBJECTIVE: Design plunge pool to protect the outlet of culverts from scour and deterioration.

REFERENCES:

1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, March 2003
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System, Version 7.0, Chocorua, New Hampshire, 2001

DESIGN PROCEDURE:

1. Use design flows for 25-year, 24-hour storm event and attached Outlet Plunge Pool table to determine plunge pool dimensions and riprap size.

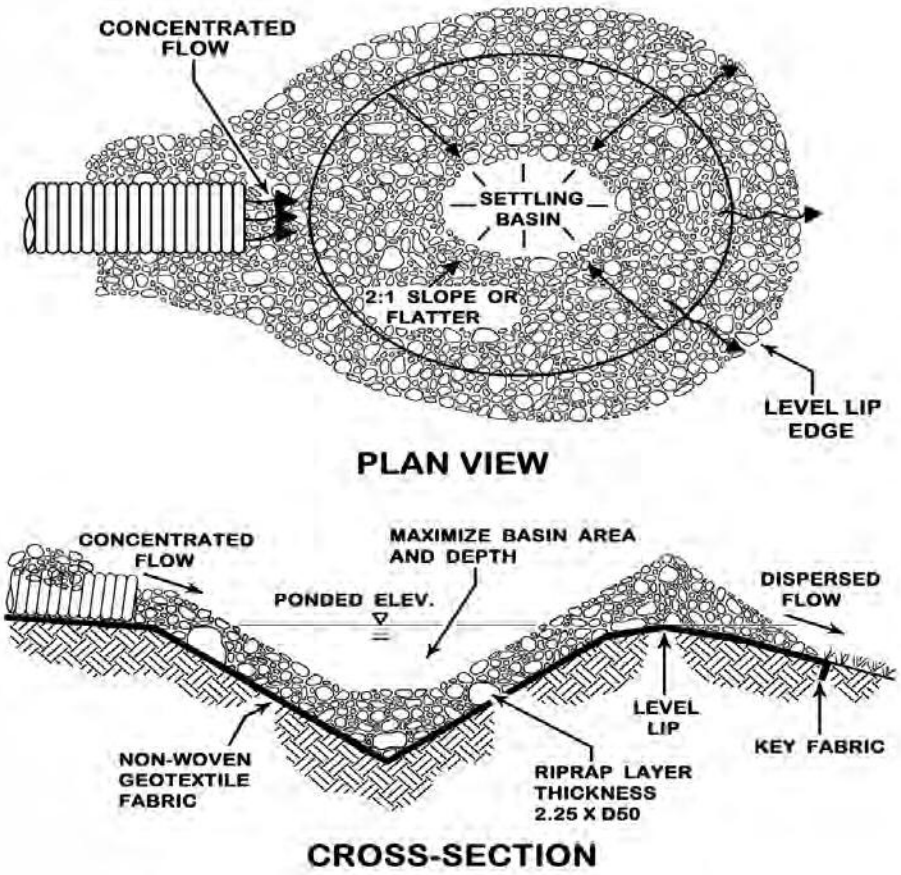
SUMMARY OF RESULTS:

				Riprap			
Plunge Pool Designation	Flow From	Q_{25} (cfs)	Culvert Dia. (in)	D_{50} (in)	Thickness (in)	Length (ft)	Width (ft)
11R	Pond DP-11R	3.3	24	6	14	8	8
12	Pond DP-12	2.0	24	4	9	8	8
13	Pond DP-13	3.3	24	6	14	8	8
14	Pond DP-14	1.5	24	4	9	8	8

PLUNGE POOL SIZING (minimum)				
SIZE	***RIPRAP SIZING (D_{50})***	***WIDTH At the narrow end of pipe***	***LENGTH For slow flows (no pressure head)***	***LENGTH For high flows (with pressure head)***
12”	5”	3-4’	4-6’	8-10’
18”	8”	4-6’	6-8’	12-18’
24”	10”	6-8’	8-10’	18-22’
30”	12”	8-10’	12-14’	22-28’
36”	14”	10-12’	14-16’	28-32’
The diameter of the largest stone size in the mix should be about 1.5 times the D_{50} and the smallest one about one half the size. The thickness of riprap should never be less than 2 times the rock D_{50}.				

CONSTRUCTION SPECIFICATIONS

- If the pipe discharges onto a flat area, the apron should have a width that is three times the outlet pipe’s diameter. If the pipe flows have the potential of causing a gully, a level spreader should be provided.
- The channel side slopes should be no steeper than 2:1. Riprap on the sides of the plunge pool should extend to the top of the channel.
- The plunge pool sizing and the median sized riprap can be determined from the following table. The thickness of riprap should not be less than 2 times the rock D_{50}.
- A geotextile or appropriate gravel filter should be used to protect against piping of soil fines from beneath the rock.
- In a channel that can be revegetated, seed and mulch should be applied within 7 days from final construction.



B-6

EMERGENCY SPILLWAY DESIGN

SME
SEVEE & MAHER
ENGINEERS

SME
SEVEE & MAHER
ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com

RIPRAP CHANNEL DESIGN

Project Name: Juniper Ridge Landfill Phase II Expansion
Project Location: Old Town, Maine
Project No.: 240101
By: NMT
Date: 3/24/2025
Checked By: BDP
Date: 5/29/2025

OBJECTIVE

Design riprap channel with adequate lining to convey stormwater flows from 25-year or 100-year, 24-hour storm event assuming vegetative conditions.

REFERENCES

1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, October 2016
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System,Version 7.0, Chocorua, New Hampshire, 2001.
3. Channel Design Program HYCHL Version 6.1

ANALYSIS

Determine peak stormwater flows for 25-year and 100-year, 24-hour storm events using TR-20. (See Attached Hydrocad Printouts). Evaluate permanent channel lining using maximum flow rate. Assume normal outlets are clogged for 25-year storm and all outlets working during 100-year event.

CONCLUSION

							Riprap	
Riprap Ditch	Flow From	Slope (Max.) (ft/ft)	Q_{25} (cfs)	Q_{100} (cfs)	Bottom Width (feet)	Side Slopes (H:1V)	D_{50} (in)	Thickness (in)
DP-11R Emergency Spillway	DP-11R	0.33	NA	NA	10	2	4	9
DP-12 Emergency Spillway	DP-12	0.33	NA	NA	10	2	4	9
DP-13 Emergency Spillway	DP-13	0.33	0.94	NA	10	2	4	9
DP-14 Emergency Spillway	DP-14	0.33	0.57	NA	10	2	4	9

Note: No discharge during 100-year storm event.

****** HYCHL ****** (Version 6.1) ****** Date 05-29-2025

Commands Read From File: C:\DP13ES.CHL

```
      JOB DP13 ES
      UNI 0
** UNITS PARAMETER = 0 (ENGLISH)
      CHL .40    .94
** LEFT SIDE SLOPE    2.0 AND RIGHT SIDE SLOPE    2.0
** THE BASE WIDTH OF THE TRAPEZOID (ft)   10.00
      LRR .33    2 42     2.65   .15
** D50 (ft)    .33
** ANGLE OF REPOSE (DEGREES)   42.00
** SPECIFIC GRAVITY    2.65
** SHIELDS PARAMETER    .150
      END
***************END OF COMMAND FILE************
```

DP13 ES

INPUT REVIEW

DESIGN PARAMETERS:

DESIGN DISCHARGE (ft^3/s):	.94
CHANNEL SHAPE:	TRAPEZOIDAL
CHANNEL SLOPE (ft/ft):	.400

*** WARNING: DEPTH DID NOT CONVERGE. PROGRAM WILL CONTINUE WITH MOST RECENT VALUE

HYDRAULIC CALCULATIONS USING BATHURST

FLOW (cfs)	.94
MAX DEPTH (ft)	.04
AREA (ft^2)	.56
WETTED PERIMETER (ft)	10.25
HYDRAULIC RADIUS (ft)	.06
AVG VELOCITY (ft/s)	1.66
MANNINGS EQUIVALENT	.446
Davg / D50	.17
FROUDE NUMBER	1.49
REYNOLDS NUMBER (10^5)	.43

STABILITY ANALYSIS

CONDITION	LINING TYPE	PERMIS SHR (LB/FT^2)	CALC. SHR (LB/FT^2)	STAB. FACTOR	REMARKS
BOTTOM; STRAIGHT	RIPRAP	5.10	.97	5.27	STABLE
SIDE; STRAIGHT	RIPRAP	3.79	.75	5.03	STABLE

*** NORMAL END OF HYCHL ***

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 2.24" for 25-yr Storm event
Inflow = 91.57 cfs @ 12.05 hrs, Volume= 5.483 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4G : Reach 4G

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 163.02' @ 24.90 hrs Surf.Area= 43,058 sf Storage= 238,848 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP-11R: DETENTION POND 11R

Inflow Area = 29.409 ac, 2.62% Impervious, Inflow Depth = 3.89" for 100-yr Storm event
Inflow = 166.60 cfs @ 12.05 hrs, Volume= 9.537 af
Outflow = 37.67 cfs @ 12.34 hrs, Volume= 9.537 af, Atten= 77%, Lag= 17.5 min
Primary = 36.21 cfs @ 12.34 hrs, Volume= 5.725 af
Routed to Reach R4G : Reach 4G
Secondary = 1.47 cfs @ 12.34 hrs, Volume= 3.812 af
Routed to Reach R4G : Reach 4G
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 162.03' @ 12.34 hrs Surf.Area= 39,466 sf Storage= 198,102 cf

Plug-Flow detention time= 472.9 min calculated for 9.533 af (100% of inflow)
Center-of-Mass det. time= 473.4 min (1,296.2 - 822.8)

Volume	Invert	Avail.Storage	Storage Description
#1	154.00'	499,354 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
154.00	2,440	0	0
156.00	19,408	21,848	21,848
158.00	25,775	45,183	67,031
160.00	32,395	58,170	125,201
162.00	39,360	71,755	196,956
164.00	46,635	85,995	282,951
166.00	54,090	100,725	383,676
168.00	61,588	115,678	499,354

Device	Routing	Invert	Outlet Devices
#1	Primary	155.30'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 155.30' / 154.00' S= 0.0236 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	156.50'	**4.0" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	161.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	152.20'	**6.0" Round Culvert** L= 118.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 152.20' / 151.80' S= 0.0034 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=36.20 cfs @ 12.34 hrs HW=162.03' (Free Discharge)
└─**1=Culvert** (Inlet Controls 36.20 cfs @ 11.52 fps)
  ├─**2=Orifice** (Passes < 0.99 cfs potential flow)
  ├─**3=Orifice** (Passes < 1.58 cfs potential flow)
  └─**4=Grate** (Passes < 42.77 cfs potential flow)

Secondary OutFlow Max=1.47 cfs @ 12.34 hrs HW=162.03' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.47 cfs @ 7.47 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=154.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 2.17" for 25-yr Storm event
Inflow = 78.37 cfs @ 12.09 hrs, Volume= 5.698 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 174.92' @ 34.65 hrs Surf.Area= 49,069 sf Storage= 248,202 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 31.486 ac, 4.26% Impervious, Inflow Depth = 3.64" for 100-yr Storm event
Inflow = 133.74 cfs @ 12.08 hrs, Volume= 9.546 af
Outflow = 6.57 cfs @ 14.18 hrs, Volume= 9.546 af, Atten= 95%, Lag= 125.6 min
Primary = 4.90 cfs @ 14.18 hrs, Volume= 3.046 af
Secondary = 1.66 cfs @ 14.18 hrs, Volume= 6.499 af
Routed to Reach R-2A : Reach 2A
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R-2A : Reach 2A

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 175.18' @ 14.18 hrs Surf.Area= 49,848 sf Storage= 260,943 cf

Plug-Flow detention time= 1,062.2 min calculated for 9.542 af (100% of inflow)
Center-of-Mass det. time= 1,062.9 min (1,895.2 - 832.4)

Volume	Invert	Avail.Storage	Storage Description
#1	168.00'	537,379 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
168.00	7,544	0	0
170.00	34,762	42,306	42,306
172.00	40,454	75,216	117,522
174.00	46,283	86,737	204,259
176.00	52,328	98,611	302,870
178.00	58,583	110,911	413,781
180.00	65,015	123,598	537,379

Device	Routing	Invert	Outlet Devices
#1	Primary	168.90'	**24.0" Round Culvert** L= 66.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 168.90' / 168.50' S= 0.0061 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	171.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	174.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	175.00'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**6.0" Round Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 166.00' / 165.50' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	178.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.82 cfs @ 14.18 hrs HW=175.18' (Free Discharge)
└─**1=Culvert** (Passes 4.82 cfs of 34.76 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.79 cfs @ 9.02 fps)
  ├─**3=Orifice** (Orifice Controls 0.91 cfs @ 4.64 fps)
  └─**4=Grate** (Weir Controls 3.12 cfs @ 1.38 fps)

Secondary OutFlow Max=1.66 cfs @ 14.18 hrs HW=175.18' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.66 cfs @ 8.48 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=168.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 2.26" for 25-yr Storm event
Inflow = 24.69 cfs @ 12.00 hrs, Volume= 2.158 af
Outflow = 0.94 cfs @ 16.81 hrs, Volume= 0.516 af, Atten= 96%, Lag= 288.2 min
Primary = 0.94 cfs @ 16.81 hrs, Volume= 0.516 af
Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 166.10' @ 16.81 hrs Surf.Area= 17,264 sf Storage= 73,336 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 486.8 min calculated for 0.515 af (24% of inflow)
Center-of-Mass det. time= 343.0 min (1,195.4 - 852.5)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.90 cfs @ 16.81 hrs HW=166.10' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.90 cfs @ 0.87 fps)

Summary for Pond DP-13: DETENTION POND 13

Inflow Area = 11.450 ac, 8.89% Impervious, Inflow Depth = 3.75" for 100-yr Storm event
Inflow = 42.15 cfs @ 12.00 hrs, Volume= 3.581 af
Outflow = 23.86 cfs @ 12.32 hrs, Volume= 3.581 af, Atten= 43%, Lag= 19.3 min
Primary = 22.29 cfs @ 12.32 hrs, Volume= 1.848 af
Routed to Reach R4C : Reach 4C
Secondary = 1.57 cfs @ 12.32 hrs, Volume= 1.733 af
Routed to Reach R4C : Reach 4C
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Reach R4C : Reach 4C

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 164.43' @ 12.32 hrs Surf.Area= 14,366 sf Storage= 46,837 cf
Flood Elev= 166.00' Surf.Area= 17,062 sf Storage= 71,548 cf

Plug-Flow detention time= 131.7 min calculated for 3.580 af (100% of inflow)
Center-of-Mass det. time= 131.7 min (967.8 - 836.1)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	109,546 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	6,224	0	0
162.00	10,498	16,722	16,722
164.00	13,633	24,131	40,853
166.00	17,062	30,695	71,548
168.00	20,936	37,998	109,546

Device	Routing	Invert	Outlet Devices
#1	Primary	160.30'	**24.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 160.30' / 159.00' S= 0.0433 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	160.50'	**4.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	163.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#4	Device 1	163.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#5	Secondary	158.00'	**6.0" Round Culvert** L= 55.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0055 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#6	Tertiary	166.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=22.07 cfs @ 12.32 hrs HW=164.42' (Free Discharge)
└─**1=Culvert** (Passes 22.07 cfs of 26.73 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.81 cfs @ 9.33 fps)
  ├─**3=Orifice** (Orifice Controls 1.02 cfs @ 5.22 fps)
  └─**4=Grate** (Weir Controls 20.23 cfs @ 2.58 fps)

Secondary OutFlow Max=1.57 cfs @ 12.32 hrs HW=164.42' (Free Discharge)
└─**5=Culvert** (Barrel Controls 1.57 cfs @ 8.01 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└─**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 2.11" for 25-yr Storm event
Inflow = 42.95 cfs @ 12.00 hrs, Volume= 2.369 af
Outflow = 0.57 cfs @ 23.49 hrs, Volume= 0.227 af, Atten= 99%, Lag= 689.8 min
Primary = 0.57 cfs @ 23.49 hrs, Volume= 0.227 af
Routed to Reach R4D : Reach 4D

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 160.07' @ 23.49 hrs Surf.Area= 39,113 sf Storage= 96,233 cf

Plug-Flow detention time= 713.1 min calculated for 0.227 af (10% of inflow)
Center-of-Mass det. time= 559.9 min (1,402.8 - 842.8)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.55 cfs @ 23.49 hrs HW=160.07' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.55 cfs @ 0.73 fps)

Summary for Pond DP-14: DETENTION POND 14

Inflow Area = 13.461 ac, 2.19% Impervious, Inflow Depth = 3.56" for 100-yr Storm event
Inflow = 72.37 cfs @ 11.99 hrs, Volume= 3.997 af
Outflow = 4.97 cfs @ 12.95 hrs, Volume= 3.997 af, Atten= 93%, Lag= 57.1 min
Primary = 3.74 cfs @ 12.95 hrs, Volume= 1.453 af
Routed to Reach R4D : Reach 4D
Secondary = 1.22 cfs @ 12.95 hrs, Volume= 2.544 af
Routed to Reach R4D : Reach 4D
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-120.00 hrs, dt= 0.05 hrs
Peak Elev= 159.95' @ 12.95 hrs Surf.Area= 38,791 sf Storage= 91,376 cf

Plug-Flow detention time= 463.0 min calculated for 3.995 af (100% of inflow)
Center-of-Mass det. time= 463.2 min (1,290.9 - 827.7)

Volume	Invert	Avail.Storage	Storage Description
#1	157.00'	176,567 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
157.00	6,253	0	0
158.00	34,183	20,218	20,218
160.00	38,909	73,092	93,310
162.00	44,348	83,257	176,567

Device	Routing	Invert	Outlet Devices
#1	Primary	157.00'	**24.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 157.00' / 156.00' S= 0.0182 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Device 1	159.00'	**6.0" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	159.80'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads
#4	Secondary	155.00'	**6.0" Round Culvert** L= 76.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 155.00' / 154.70' S= 0.0039 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#5	Device 1	158.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Tertiary	160.00'	**10.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.74 cfs @ 12.95 hrs HW=159.95' (Free Discharge)
└**1=Culvert** (Passes 3.74 cfs of 21.12 cfs potential flow)
  ├**2=Orifice** (Orifice Controls 0.79 cfs @ 4.03 fps)
  ├**3=Grate** (Weir Controls 2.39 cfs @ 1.27 fps)
  └**5=Orifice/Grate** (Orifice Controls 0.56 cfs @ 6.43 fps)

Secondary OutFlow Max=1.22 cfs @ 12.95 hrs HW=159.95' (Free Discharge)
└**4=Culvert** (Barrel Controls 1.22 cfs @ 6.22 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=157.00' (Free Discharge)
└**6=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

APPENDIX C

TYPICAL CONSTRUCTION EROSION AND SEDIMENTATION CONTROL SPECIFICATIONS AND DRAWINGS C-308 AND C-309

SME
SEVEE & MAHER
ENGINEERS

SECTION 02220

EROSION CONTROL

PART 1 GENERAL

1.01 RELATED DOCUMENTS:

A. The general provisions of the Contract, including General and Supplementary Conditions and General Requirements (if any) apply to the work specified in this Section.

B. Requirements set forth by the Quality Assurance/Quality Control Plan shall apply to the work specified in this Section.

C. The Project Site-Specific Maine Construction General Permit.

D. All work performed under this specification shall be performed in general accordance with the most recent edition of the Maine Department of Environmental Protection (MEDEP) Maine Erosion and Sediment Control Practices Best Management Practices.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Measurement and Payment: Section 01025

B. Project Coordination: Section 01041

C. Site Preparation: Section 02100

D. Earthwork: Section 02200

E. Riprap: Section 02261

F. Seeding and Mulching: Section 02800

1.03 DESCRIPTION OF WORK:

A. Prevention: Take every reasonable precaution and do whatever is necessary to avoid any erosion and to prevent sedimentation of rivers, streams, lakes, reservoirs, impoundments, and drainage ditches and swales.

B. Exposure: The exposure of uncompleted cut slopes, embankments, trench excavations, and site-graded areas shall be kept as short as possible. Initiate seeding and other erosion control measures on each segment as soon as reasonably possible.

C. Temporary Protection: Should it become necessary to suspend construction for seven days, shape all excavated and graded areas in such a manner that runoff will be intercepted and diverted to points where sediment control structures have been installed. Provide and maintain temporary erosion and sediment control measures, such as berms, dikes, slope drains, silt stops, sedimentation basins, sediment traps, mulching, temporary seeding, stone check dams, and filter berms until permanent drainage facilities or erosion control features have been completed and are operative. The Contractor shall provide temporary seeding, mulching, or other protective coverings to exposed earth surfaces and stockpiles outside of the landfill cell that are susceptible to erosion and which will be exposed to rain or wind elements for a period of greater than seven days.

D. Handling of Erodible Soils: Erodible soils placed or exposed during the work shall be so handled and treated as to minimize the possibility of its reaching any surface waters. Use diversion channels, dikes, sediment traps, or any other effective control measures.

E. Off-site Erosion Control: The requirements of this Section also apply to Project-related construction activities away from the Project site, such as at borrow pits, off-site storage areas, and haul and work roads.

F. Remedial Action: Should any protective measures employed indicate any deficiencies or erosion taking place, immediately repair erosion control measures or employ different techniques to correct the situation and to prevent subsequent erosion and sedimentation.

G. Discontinuation: Continue temporary erosion and sedimentation control measures until the permanent measures have been sufficiently established and are capable of controlling erosion and sedimentation on their own.

H. Permanent Seeding: At the completion of landfill construction activities, the Contractor shall provide permanent seeding, mulching, or other protective landscape coverings to exposed earth surfaces affected by construction activities, and as shown on the Contact Drawings, and as specified in Section 02800.

I. Inspection: The Contractor shall perform all inspections and documentation required by the project's MEDEP Maine General Construction Permit.

J. Maintenance and Repair: The Contractor shall be responsible for maintenance, and/or repair of all temporary and permanent erosion and sedimentation control measures during construction, including temporary or permanent erosion and sedimentation control measures installed by other subcontractors and used during this project. Inspections will be undertaken by the Contractor's qualified personnel to ensure that controls are correctly functioning, and that additional erosion control measures are installed if needed. Such inspections will occur bi-weekly and after each significant rainfall event (1 inch or more within a 24-hour period) during construction and until permanent erosion and sediment control measures have been properly installed and the site is stabilized. Sediment within sediment control structures shall be removed when the height of the sediment is greater than one-half the depth of the erosion control measure.

1.04 SEDIMENT CONTROL GUIDELINES:

A. Maine Erosion and Sediment Control BMPs (most recent version).

B. Maine Erosion and Sediment Control Practices Field Guide for Contractors (most recent version).

C. MEDEP Natural Resources Protection Act Permit by Rule Standards, Chapter 305.

D. MEDEP – Maine Construction General Permit requirements.

1.05 SUBMITTALS:

A. The Contractor shall furnish to the Engineer, in writing, his plan for dewatering excavations and diverting surface water before beginning the construction work for which the dewatering or diversion is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

B. Manufacturer's product data sheets, material certifications, and standard manufacturing quality control test data for products listed in Part 2 of this specification.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis, and name of manufacturer. Handle material in accordance with manufacturer's recommendations. Protect materials from deterioration during delivery, and while stored at the site.

1.07 JOB CONDITIONS: Contractor must examine the subgrade, verify the elevations, observe the conditions under which work is to be performed and notify the Engineer of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

Proceed with and complete the erosion and sedimentation work as rapidly as portions of the site become available, working within the required seasonal limitations.

A. Seeding Seasons: Unless variance is requested in writing and approved by the Engineer, seeding shall be done within the following dates:

Permanent Seeding: April 26 – September 15

Temporary Seeding: September 16 until April 25

Dormant Seeding: At the Contractor's risk, from September 16 until April 25

1.08 QUALITY CONTROL:

A. Source Quality Control:
   1. General: Ship erosion control materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.
   2. Analysis and Standards: Package standard products with the manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemist, wherever applicable or as further specified.
   3. Inspection: The Engineer reserves the right to request manufacturers materials (bags, tags, etc.) of any and all materials to confirm material quality and quantity.

B. Installation Quality Control:
   1. Provide at least one person who shall be present at all times during erosion control installation and who shall be thoroughly familiar with the types of materials being installed and the best methods for their installation and who shall direct all work performed under this Section.
   2. Material manufacturers and vendors shall be reputable, qualified firms regularly engaged in producing the required types of materials.
   3. Protect and maintain all areas disturbed by the work, such that erosion is controlled and sediments are not allowed to flow into any watercourse, onto adjacent properties, or into storm drains.

PART 2 - MATERIALS AND PRODUCTS

2.01 GENERAL:

A. Materials incorporated in erosion control shall be specified in other sections or included herein.

2.02 GRUBBINGS:

A. The top 14 inches of soil removed from areas shown on the Drawings shall be segregated into piles, cleaned sufficiently, and reused in accordance with Section 02200, Earthwork. Any of this soil that is used as vegetative soil shall be tested by a qualified laboratory for the requirements listed for vegetative soil. If the quantity of stockpiled vegetative soil is insufficient, or quality is not in accordance with the requirements for vegetative soil, the Contractor shall provide additional new vegetative soil from an Engineer-approved off-site source as required to complete the work.

2.03 VEGETATIVE SOIL:

A. Vegetative Soil shall be as specified in Seeding and Mulching Specification Section 02800.

2.04 SILTATION FENCE:

A. Siltation fence shall be preassembled fence consisting of synthetic filter fabric reinforced with a supporting mesh and mounted on wood or metal stakes.

B. The fence shall be Envirofence as manufactured by Mirafi, Spun Bond as manufactured by Trevira, or Propex Silt Stop as manufactured by Amoco or approved equal.

2.05 RIPRAP STONE:

A. Riprap shall be as shown on the Drawings.

B. Bedding Stone: Material for bedding shall be drainage stone conforming to Specification 02200, Earthwork.

C. Riprap Geotextile: The nonwoven geotextile used in the construction of riprap-lined swales, the final cover downspout, plunge pool, and the gas collection trench shall meet Specification 02272.

2.06 STONE CHECK DAMS:

A. Stone for check dams shall consist of a mixture of angular stones having a particle size of between 2 and 6 inches and faced with 6 inches of drainage stone. The check dams shall be installed at locations as indicated on the Drawings and shall be constructed as detailed on the Drawings.

B. Exposed Stone: The exposed stones for the check dams shall be angular and as nearly rectangular in cross-section as practicable. Rounded stone will not be permitted. The stone shall consist of durable stones that will not disintegrate by exposure to the action of water or weather.

2.07 EROSION CONTROL MATTING:

A. Shall be placed on newly loamed and seeded areas as indicated on the Contract Drawings.

B. During fall and winter (see Section 1.07.A) use heavy-grade mats or as recommended by the Engineer on all channel bottoms and slopes greater than 4H:1V. Install mats according to manufacturer's recommendation.

2.08 MULCH:

A. Mulch shall be in accordance with Seeding and Mulching Specification Section 02800.

2.09 HAY BALES:

A. Rectangular-shaped bales of hay or straw weighing at least 40 lbs. free from primary noxious weed seeds and rough or woody materials.

2.10 EROSION CONTROL MIX:

A. Erosion Control Mix shall contain a well-graded mixture of particle-sizes and may contain rocks smaller than 4” diameter. Erosion control mix shall be free of refuse, physical contaminants, and material toxic to plant growth such as ash and yard scrapings. Large portions of silts, clays, or fine sands are not acceptable in the mix. The mix composition should meet the following standards:
   1. The organic matter content should be between 80% and 100% on a dry weight basis;

2. Particle size by weight should be 100% passing a 4-inch screen and 70% to 85% passing a 0.75” screen;
3. The organic portion needs to be fibrous and elongated;
4. Soluble salt content shall be < 4.0 mmhos/cm; and
5. The pH shall be between 5.0 and 8.0.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall provide for the diversion of clean surface water from the construction areas and install siltation and erosion control structures as shown on the Contract Drawings or as directed by the Engineer or QARE.

B. The Contractor shall provide all materials, equipment, and labor necessary (for the duration of the Contract) for the dewatering of excavations and the removal and/or diversion of surface water from the construction area, and installation of erosion and sedimentation control structures as shown on the Contract Drawings and according to these Specifications, and in accordance with the MEDEP BMPs. The Contractor shall maintain a dewatering and stormwater control system so that no sediment-impacted waters are discharged from the site.

C. The Contractor shall build all drains, dikes, and sediment basins, install all siltation fencing, mulches, grasses, seeding, ditches, channels, riprap, grading, and all other work necessary to control water pollution, surface runoff, and soil erosion.

D. The Contractor shall provide temporary seeding, mulching, or other protective coverings to exposed earth surfaces or stockpiles which will be exposed to rain or wind elements through the fall and winter seasons.

E. The Contractor shall maintain all facilities necessary to control water pollution, surface runoff, and soil erosion until permission is given by the Engineer to discontinue the use of the facilities.

F. It shall be the Contractor’s responsibility to restore any eroded or damaged surfaces to the design grade with approved material and to keep topsoiled areas in acceptable condition until a sufficient vegetated surface is established and accepted by the Engineer.

3.02 EROSION CONTROL PROVISIONS:

A. The discharge from pumping operations during dewatering operations shall be contained by a dike so constructed as to prevent siltation, and the area at the outlet pipe shall be protected against erosion by the construction of a riprap apron.

B. Prior to removal of sediment control dikes, all retained silt or other materials shall be removed and placed in areas not susceptible to erosion as directed by the Engineer, at no additional cost to the Owner.

3.03 REMOVAL OF TEMPORARY WORKS:

A. After the temporary works have served their purposes, the Contractor shall remove them or level and grade them to the extent required to present a sightly appearance and to prevent any obstruction of the flow of water or any other interference with the operation of or access to the permanent works.

3.04 PLACEMENT OF EROSION CONTROL BLANKET: Erosion control blanket shall be placed at locations indicated on Contract Drawings. The anchoring of the blanket shall be in accordance with manufacturer’s recommendations, as shown on the Contract Drawings, or as directed by the Engineer or QARE.

3.05 PLACEMENT OF RIPRAP: Placement of riprap shall be in accordance with Riprap Specification Section 02261.

3.06 MAINTENANCE AND ACCEPTANCE:

A. The Contractor shall be responsible for inspection and maintenance of all temporary erosion and sedimentation control measures during construction. Inspections will be undertaken by qualified personnel to ensure that controls are correctly functioning, and that additional erosion control measures are installed if needed. Such inspections will occur bi-weekly and after each significant rainfall event (1 inch or more within a 24-hour period) during construction until permanent erosion control measures have been properly installed and the site is stabilized. Trapped sediment shall be removed when the height of the sediment is greater than one-half the depth of the erosion control measure.

B. The Contractor shall continue to maintain erosion and sedimentation controls until vegetation is suitably established (Seeding and Mulching Specification Section 02800) and the Engineer deems the site stable, at which time all temporary erosion and sediment controls may be removed from the site.

END OF SECTION

A. GENERAL

1. All soil erosion and sediment control will be done in accordance with: (1) the Maine Erosion and Sediment Control Handbook: Best Management Practices, Maine Department of Environmental Protection (MEDEP), October 2016; (2) the project specific stormwater pollution prevention plan.

2. The site contractor (to be determined) will be responsible for the repair/replacement/maintenance of all erosion control measures until all disturbed areas are stabilized.

3. Disturbed areas will be permanently stabilized within 7 days of final grading. Disturbed areas not to be worked upon within 14 days of disturbance will be temporarily stabilized within 7 days of the disturbance.

4. In all areas, removal of trees, bushes and other vegetation, as well as disturbance of topsoil will be kept to a minimum while allowing proper site operations.

5. Any suitable topsoil will be stripped and stockpiled for reuse as directed by the owner. Topsoil will be stockpiled in a manner such that natural drainage is not obstructed and no off-site sediment damage will result. In any event, stockpiles will not be located within 100 feet of wetlands and will be at least 50 feet upgradient of the stockpile's perimeter silt fence. The sideslopes of the topsoil stockpile will not exceed 2:1. Silt fence will be installed around the perimeter of all topsoil stockpiles. Topsoil stockpiles will be surrounded with siltation fencing and will be temporarily seeded with Aroostook rye, annual or perennial ryegrass within 7 days of formation, or temporarily mulched.

B. TEMPORARY MEASURES

1. STABILIZED CONSTRUCTION ENTRANCE/EXIT

A crushed stone stabilized construction entrance/exit will be placed at any point of vehicular access to the site.

2. SILT FENCE

a. Silt fence will be installed prior to all construction activity, where soil disturbance may result in erosion. Silt fence will be erected at locations shown on the plans and/or downgradient of all construction activity.

b. Silt fences will be removed when they have served their useful purpose, but not before the upgradient areas have been permanently stabilized.

c. Silt fences will be inspected immediately after each rainfall and at least daily during prolonged rainfall. They will be inspected if there are any signs of erosion or sedimentation below them. Any required repairs will be made immediately. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water behind them, they will be replaced with a temporary crushed stone check dam.

d. Sediment deposits will be removed after each storm event if significant build-up has occurred or if deposits exceed half the height of the barrier.

3. STONE CHECK DAMS

Stone check dams will be installed in grass-lined swales and ditches during construction.

4. BARK MULCH SEDIMENT BARRIER

a. Where approved, bark mulch sediment barriers may be used as a substitute for silt fence. See the details in this drawing set for specifications.

b. Rock Filter Berms: To provide more filtering capacity or to act as a velocity check dam, a berm's center can be composed of clean crushed rock ranging in size from the french drain stone to riprap.

5. TEMPORARY SEEDING

Stabilize disturbed areas that will not be brought to final grade for a year or less and reduce problems associated with mud and dust production from exposed soil surface during construction with temporary vegetation.

6. TEMPORARY MULCHING

Use temporary mulch in the following locations and/or circumstances:

- In sensitive areas (within 100 feet of streams, wetlands and in lake watersheds) temporary mulch will be applied within 7 days of exposing spill or prior to any storm event.
- Apply temporary mulch within 14 days of disturbance or prior to any storm event in all other areas.
- Areas which have been temporarily or permanently seeded will be mulched immediately following seeding.
- Areas which cannot be seeded within the growing season will be mulched for over-winter protection and the area will be seeded at the beginning of the growing season.
- Mulch can be used in conjunction with tree, shrub, vine, and ground cover plantings.
- Mulch anchoring will be used on slopes greater than 5 percent in late fall (past September 1), and over-winter (September 1 - April 25).

The following materials may be used for temporary mulch:

a. Hay or Straw material shall be air-dried, free of seeds and coarse material. Apply 2-3 tons/acre or 3 bales (90-130 lbs per 1,000 sf).

b. Erosion Control Mix: It can be used as a stand-alone reinforcement:
- on slopes 2 horizontal to 1 vertical or less;
- on frozen ground or forested areas; and
- at the edge of gravel parking areas and areas under construction.

c. Erosion control mix alone is not suitable:
- on slopes with groundwater seepage;
- at low points with concentrated flows and in gullies;
- at the bottom of steep perimeter slopes exceeding 100 feet in length;
- below culvert outlet aprons; and around catch basins and closed storm systems.

d. Chemical Mulches and Soil Binders: Wide ranges of synthetic spray-on materials are marketed to protect the soil surface. These are emulsions that are mixed with water and applied to the soil. They may be used alone, but most often are used to hold wood fiber, hydro-mulches or straw to the soil surface.

e. Erosion Control Blankets and Mats: Mats are manufactured combinations of mulch and netting designed to retain soil moisture and modify soil temperature. During the growing season (April 25 to August 31) use mats indicated on drawings or North American Green (NAG) C125 BN (or mulch and netting) on:
- the base of grassed waterways;
- steep slopes (15 percent or greater); and
- any disturbed soil within 100 feet of lakes, streams, or wetlands.

During the late fall and winter (September 1 to April 25) use heavy grade mats indicated on drawings for NAG SC250 on all areas noted above plus use lighter grade mats NAG C125BN (or mulch and netting) on:
- sideslopes of grassed waterways; and
- moderate slopes (between 8 and 15 percent).

7. TEMPORARY DUST CONTROL

To prevent the blowing and movement of dust from exposed soil surfaces, and reduce the presence of dust, use water to control dusting by preserving the moisture level in the road surface materials. The use of calcium chloride or any other chemicals for dust control is prohibited

8. CONSTRUCTION DE-WATERING

a. Water from construction de-watering operations shall be cleaned of sediment before reaching wetlands, water bodies, streams or site boundaries. Utilize temporary sediment basins, erosion control soil filter berms backed by staked hay bales, or other approved Best Management Practices (BMP's).

b. In sensitive areas near streams or ponds, discharge the water from the de-watering operation into a temporary sediment basin created by a surrounding filter berm of uncompacted erosion control mix immediately backed by staked hay bales (see the site details). Locate the temporary sediment basin at lease 100 feet from the nearest water body, such that the filtered water will flow through undisturbed vegetated soil areas prior to reaching the water body or property line.

A. PERMANENT MEASURES

1. Riprapped Aprons: All storm drain pipe outlets and the inlet and outlet of culverts will have riprap aprons to protect against scour and deterioration.

2. Topsoil, Seed, and Mulch: All areas disturbed during construction, but not subject to other restoration (paving, riprap, etc.) will be loamed, limed, fertilized, seeded, and mulched.

a. Seeded Preparation: Use stockpiled materials spread to the depths shown on the plans, if available. Approved topsoil substitutes may be used. Grade the site as needed.

b. Seeding will be completed by August 31 of each year. Late season seeding may be done between September 1 and April 25. Areas not seeded or which do not obtain satisfactory growth by August 31, will be seeded with Aroostook Rye or mulched. After November 1, or the first killing frost, disturbed areas will be seeded at double the specified application rates, mulched, and anchored.

PERMANENT SEEDING SPECIFICATIONS

Mixture:	Grassed areas (lbs/acre)
Tall Fescue	54
Creeping Red Fescue	25
Red Top	5
Ladino Clover	13
Annual Ryegrass	8
Birdsfoot Trefoil	5
Timothy	10

c. Mulch in accordance with specifications for temporary mulching.

d. If permanent vegetated stabilization cannot be established due to the season of the year, all exposed and disturbed areas not to undergo further disturbance are to have dormant seeding applied and be temporarily mulched to protect the site.

3. Ditches and Channels: All ditches on-site will be lined with North American Green S75 erosion control mesh (or an approved equal) upon installation of loam and seed.

B. WINTER CONSTRUCTION AND STABILIZATION

1. Winter excavation and earthwork will be completed so as to minimize exposed areas while satisfactorily completing the project. Limit exposed areas to those areas in which work is to occur during the following 15 days and that can be mulched in one day prior to any snow event. All areas will be considered denuded until the subbase gravel is installed in roadway areas or the areas of future loam and seed have been loamed, seeded, and mulched.

Install any added measures necessary to control erosion/sedimentation. The particular measure used will be dependent upon site conditions, the size of the area to be protected, and weather conditions.

To minimize areas without erosion control protection, continuation of earthwork operations on additional areas will not begin until the exposed soil surface on the area being worked has been stabilized.

2. Natural Resource Protection: During winter construction, or within 100-feet of a natural resource (i.e., wetland) a double-row of sediment barriers (i.e., silt fence backed with hay bales or erosion control mix) will be placed between any natural resource and the disturbed area. Projects crossing the natural resource will be protected a minimum distance of 100 feet on either side from the resource.

3. Sediment Barriers: During frozen conditions, sediment barriers may consist of erosion control mix berms or any other recognized sediment barriers as frozen soil prevents the proper installation of hay bales or silt fences.

4. Mulching: All areas will be considered to be denuded until seeded and mulched. Hay and straw mulch will be applied at a rate of twice the normal accepted rate.

Mulch will not be spread on top of snow.

After each day of final grading, the area will be properly stabilized with anchored hay or straw or erosion control matting.

Between the dates of September 1 and April 25, all mulch will be anchored by either mulch netting, emulsion chemical, tracking or wood cellulose fiber.

5. Soil Stockpiling: Stockpiles of soil or subsoil will be mulched for over-winter protection with hay or straw at twice the normal rate or with a 4-inch layer of erosion control mix. This will be done within 24 hours of stocking and re-established prior to any rainfall or snowfall. Any soil stockpiles shall not be placed (even covered with mulch) within 100 feet from any natural resources.

6. Seeding: Dormant seeding may be placed prior to the placement of mulch or erosion control blankets. If dormant seeding is used for the site, all disturbed areas will receive 4 inches of loam and seed at an application rate of three times the rate for permanent seeding. All areas seeded during the winter will be inspected in the spring for adequate catch. All areas insufficiently vegetated (less than 85 percent catch) will be revegetated by replacing loam, seed, and mulch.

If dormant seeding is not used for the site, all disturbed areas will be revegetated in the spring.

7. Maintenance: Maintenance measures will be applied as needed during the entire construction season. After each rainfall, snow storm, or period of thawing and runoff, the site contractor will perform a visual inspection of all installed erosion control measures and perform repairs as needed to ensure their continuous function.

Following the temporary and/or final seeding and mulching, the contractor will, in the spring, inspect and repair any damages and/or bare spots. An established vegetative cover means a minimum of 90 percent of areas vegetated with vigorous growth.

A. OVER-WINTER CONSTRUCTION EROSION CONTROL MEASURES

1. Stabilization of Disturbed Soil: By August 31, all disturbed soils on areas having a slope less than 15 percent will be seeded and mulched. If the contractor fails to stabilize these soils by this date, then the contractor shall stabilize the soil for late fall and winter, by using either temporary seeding or mulching.

2. Stabilization of Disturbed Slopes: All slopes to be vegetated will be completed by August 31. The owner will consider any area having a grade greater than 15 percent (6.5H:1V) to be a slope. Slopes not vegetated by August 31 will receive one of the following actions to stabilize the slope for late fall and winter:

a. Stabilize the soil with temporary vegetation and erosion control mesh.
b. Stabilize the slope with erosion control mix.
c. Stabilize the slope with stone riprap.

3. Stabilization of Ditches and Channels: All stone-lined ditches and channels to be used to convey runoff through the winter will be constructed and stabilized by November 15. Grass-lined ditches and channels will be complete by September 15. Grass-lined ditches not stabilized by September 15 shall be lined with either sod or riprap.

E. MAINTENANCE PLAN

1. Routine Maintenance: Inspection will be performed as outlined in the project's Erosion Control Plan. Inspection will be by a qualified person during wet weather to ensure that the facility performs as intended. Inspection priorities will include checking erosion controls for accumulation of sediments.

A. Housekeeping

1. Spill prevention. Controls must be used to prevent pollutants from being discharged from materials on site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

2. Groundwater protection. During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

3. Fugitive sediment and dust. Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

4. Debris and other materials. Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

5. Trench or foundation de-watering. Trench de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the department.

6. Non-stormwater discharges. Identify and prevent contamination by non-stormwater discharges.

7. Additional requirements. Additional requirements may be applied on a site-specific basis.

B. CONSTRUCTION SEQUENCE

It is anticipated that construction will commence upon receipt of all necessary permits and approvals. The following outlines the preliminary construction sequence:

a. Install silt fence and other temporary erosion control measures for the construction of Cell and accessory facilities such as berms, and service roads;

b. Construct upslope stormwater diversion berms, ditches, culvert outlets, and control structures:

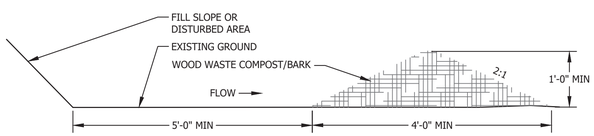
c. Perform stormwater upgrades;

d. Construct service road;

e. Construct Cell base grade;

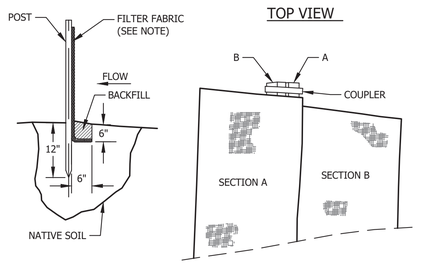
f. Construct Cell liner system;

g. As permanent erosion control measures become stabilized, remove temporary measures (e.g., silt fence, stone check dams).



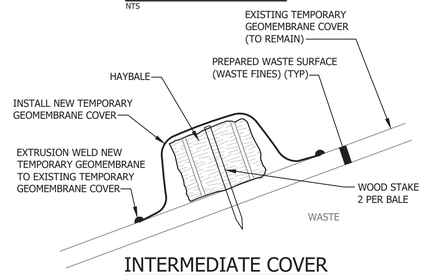
NOTE:
BARK MULCH SEDIMENT BARRIERS MAY BE USED AS AN ALTERNATE TO SILT FENCE WHEN APPROVED BY THE ENGINEER.

EROSION CONTROL MIX BERM
NTS

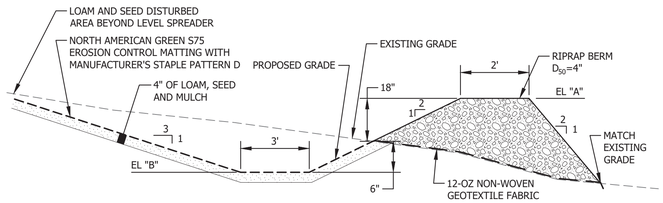


TOE-IN DETAIL — JOINING SECTIONS

SILTATION FENCE
NTS



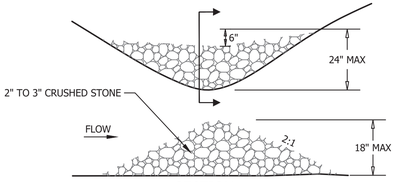
INTERMEDIATE COVER STORMWATER DIVERSION BERM
NTS



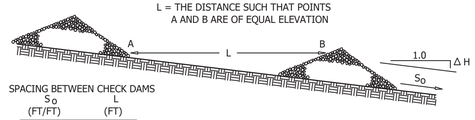
NOTES:
1. CONSTRUCT LEVEL LIP AND SPREADER ON ZERO PERCENT GRADE.
2. STORM RUNOFF CONVERTED TO SHEET FLOW SHALL OUTLET ONTO STABILIZED AREA. WATER SHALL NOT BE CHANNELIZED IMMEDIATELY BELOW POINT OF DISCHARGE.

LEVEL SPREADER NO.	EL "A"	EL "B"	LENGTH (FT)
DP-11R	151.5	150.0	15.0
DP-12	165.8	164.3	15.0
DP-13	158.0	156.5	15.0
DP-14	154.0	152.5	25.0

LEVEL SPREADER
NTS



SECTION

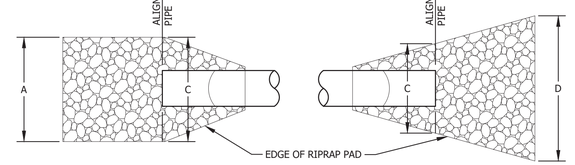


SPACING BETWEEN CHECK DAMS

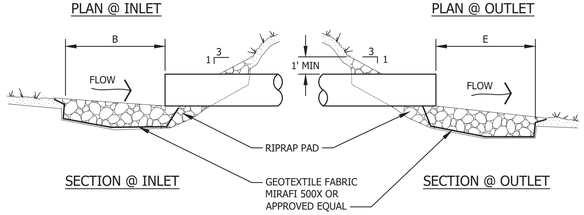
So (FT/FT)	L (FT)
0.020	75
0.030	50
0.040	40
0.050	30
0.080	20
0.100	10

STONE CHECK DAM
NTS

CROSS SECTION



PLAN @ INLET — PLAN @ OUTLET



SECTION @ INLET — SECTION @ OUTLET

RIPRAP PAD MUST BE INSTALLED WITHIN 48 HOURS OF INSTALLING NEW PIPE OR CULVERT.

PIPE	PIPE DIA (IN)	C (FT)	D (FT)	E (FT)	PAD DEPTH (IN)	D50 (IN)
DP-11R	24	6	15	20	20	10
DP-12	24	6	15	20	20	10
DP-13	24	6	15	20	20	10
DP-14	24	6	15	20	20	10
SC-2D	24	6	15	20	20	10
UNDERDRAIN DISCHARGE STRUCTURE	4	4	4	4	8	4

PIPE INLET/OUTLET DETAILS
NTS

REV.	BY	DATE	STATUS
	BDP	11/2025	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

STATE OF MAINE — BRIAN D. EMERSON — 9601 — LICENSED PROFESSIONAL ENGINEER — 11/11/2025

PHASE II EXPANSION
NEWSME LANDFILL OPERATIONS LLC
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SECTIONS AND DETAILS

SME SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	DPW/NMT
DRAWN BY:	SJM
DATE:	11/10/2025
CHECKED BY:	BDP
LMN:	LMN
CTB:	SME-STD.CTB

JOB NO. 240101.00 DWG FILE DETAILS

C-308

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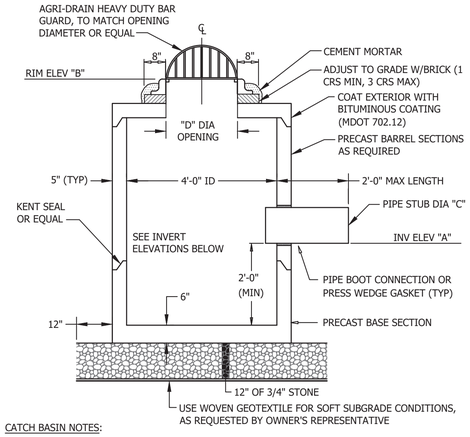


CATCH BASIN NOTES:

THE CONTRACTOR SHALL PROVIDE SUBMITTALS TO THE ENGINEER FOR APPROVAL. SUBMITTALS SHALL INCLUDE BUT NOT LIMITED TO THE FOLLOWING:

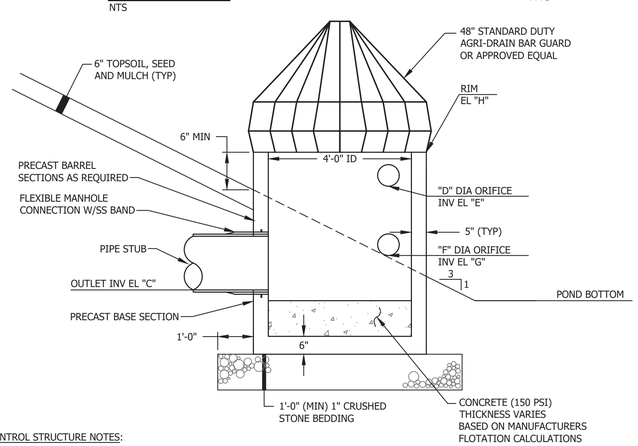
PRODUCT DATA: SUBMIT PRODUCT DATA FOR ALL MATERIALS USED ON THE JOB FOR REVIEW FOR LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH INFORMATION GIVEN AND DESIGN CONCEPT EXPRESSED IN CONTRACT DOCUMENTS.

SHOP DRAWINGS: SUBMIT FOR REVIEW SHOP DRAWINGS OF ALL PRECAST UNITS. MANUFACTURER'S INFORMATION SHALL BE SUBMITTED FOR JOINT SEALANTS AND WATERPROOFING. MANUFACTURER SHALL PROVIDE ANTI-FLOTATION DESIGN SHOP DRAWINGS AND CALCULATIONS, INCLUDING ANY EXTENDED BASE SLABS AS NECESSARY, FOR PROPOSED MANHOLES. MANUFACTURER SHALL ASSUME GROUNDWATER LEVELS EQUAL TOP OF GROUND ELEVATIONS AND PROVIDE FOR A 1.2 FACTOR OF SAFETY AGAINST FLOTATION.

CATCH BASIN SCHEDULE A

CATCH BASIN DESIGNATION	PIPE INV EL	RIM EL	PIPE DIA	TOP OPENING
	"A" (FT)	"B" (FT)	"C" (IN)	DIA "D" (IN)
CB-2B	173.0	179.0	24	30
CB-2G	173.0	179.0	24	30
CB-2D	192.0	201.0	24	30
CB-4C	167.0	171.0	24	30
CB-4D	158.00	160.5	24	30
CB-4G	161.00	167.0	24	30
CB-4H	174.0	181.0	24	30

CATCH BASIN
NTS



OUTLET CONTROL STRUCTURE NOTES:

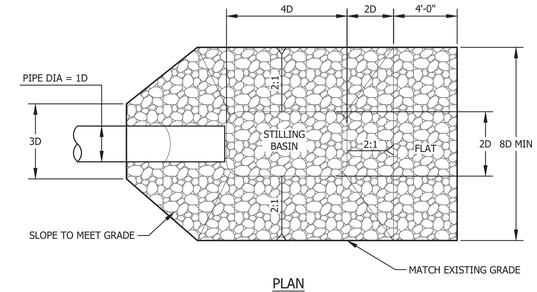
THE CONTRACTOR SHALL PROVIDE SUBMITTALS TO THE ENGINEER FOR APPROVAL. SUBMITTALS SHALL INCLUDE BUT NOT LIMITED TO THE FOLLOWING:

PRODUCT DATA: SUBMIT PRODUCT DATA FOR ALL MATERIALS USED ON THE JOB FOR REVIEW FOR LIMITED PURPOSE OF CHECKING FOR CONFORMANCE WITH INFORMATION GIVEN AND DESIGN CONCEPT EXPRESSED IN CONTRACT DOCUMENTS.

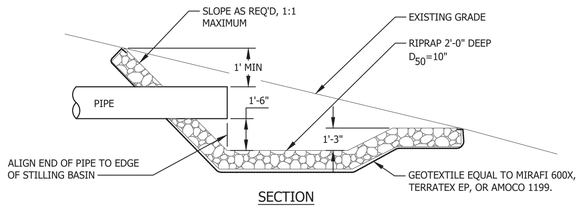
SHOP DRAWINGS: SUBMIT FOR REVIEW SHOP DRAWINGS OF ALL PRECAST UNITS. MANUFACTURER'S INFORMATION SHALL BE SUBMITTED FOR JOINT SEALANTS AND WATERPROOFING. MANUFACTURER SHALL PROVIDE ANTI-FLOTATION DESIGN SHOP DRAWINGS AND CALCULATIONS, INCLUDING ANY EXTENDED BASE SLABS AS NECESSARY, FOR PROPOSED MANHOLES. MANUFACTURER SHALL ASSUME GROUNDWATER LEVELS EQUAL TOP OF BERM ELEVATION AND PROVIDE FOR A 1.2 FACTOR OF SAFETY AGAINST FLOTATION.

STRUCTURE DESIGNATION	OUTLET INV EL	ORIFICE DIA	ORIFICE INV EL	ORIFICE DIA	ORIFICE INV EL	RIM EL	OUTLET (C) CULVERT	CULVERT	CULVERT SLOPE
	"C" (FT)	"D" (IN)	"E" (FT)	"F" (IN)	"G" (FT)	"H" (FT)	DIAMETER (IN)	LENGTH (FT)	(FT/FT)
DP-11R	155.3	6.0	159.0	4.0	156.50	161.00	24 (CORR PE)	55.00	0.02
DP-12	168.9	6.0	174.0	4.0	171.50	175.00	24 (CORR PE)	66.00	0.01
DP-13	160.3	6.0	163.0	4.0	160.50	163.80	24 (CORR PE)	30.00	0.04
DP-14	157.0	6.0	159.0	4.0	158.00	159.80	24 (CORR PE)	55.00	0.02

OUTLET CONTROL STRUCTURE
NTS



PLAN

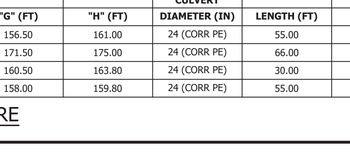


SECTION

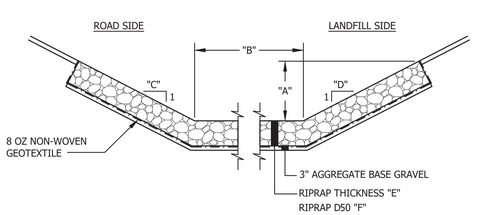
NOTES:

1. INSTALL SILT FENCE DOWNSTREAM PRIOR TO EXCAVATION.
2. LOAM AND SEED ALL AREAS DISTURBED BY CONSTRUCTION OF PLUNGE POOL.

STANDARD PLUNGE POOL
NTS



POND UNDERDRAIN
NTS

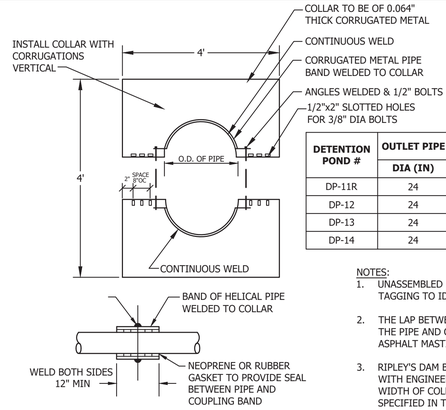


DITCH	A	B	C	D	E	F
	(FT)	(FT)			(IN)	(IN)
TOE DITCH	3	3	2	2	22	10
DITCH 2D	3	3	2	2	22	10

RIPRAP DITCH
NTS

STORM DRAIN	DIAMETER	MATERIAL	LENGTH	SLOPE	INV IN	INV OUT
	(in.)		(ft.)	(%)		
SD-2B	24	CORR PE	90.0	0.010	173.00	172.00
SD-2E	24	CORR PE	80.0	0.010	173.00	172.00
SD-2D	24	CORR PE	30.0	0.020	192.00	191.50
SD-4C	24	CORR PE	52.0	0.009	167.00	166.50
SD-4D	24	CORR PE	54.5	0.009	158.00	157.50
SD-4G	24	CORR PE	115.0	0.008	161.00	160.00
SD-4H	24	CORR PE	65.0	0.030	174.00	172.00

STORM DRAIN PIPES
NTS

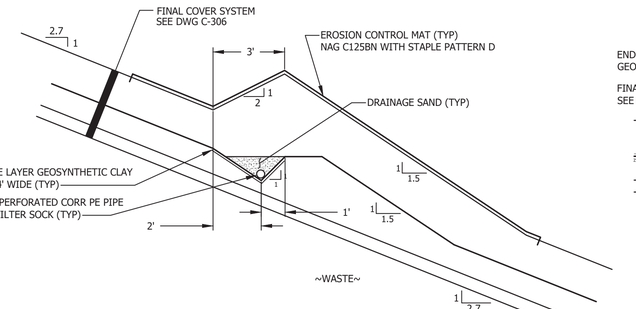


DETENTION POND #	OUTLET PIPE	PIPE LENGTH	SATURATED LENGTH	# OF	SPACING
	DIA (IN)	(FT)	(FT)	COLLARS	(FT)
DP-11R	24	55	46.2	2	15
DP-12	24	66	35.2	2	12
DP-13	24	30	42.5	2	14
DP-14	24	55	22.8	2	8

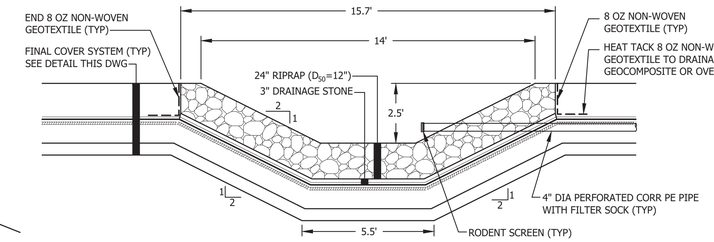
NOTES:

1. UNASSEMBLED COLLAR SHALL BE MARKED BY PAINTING OR TAGGING TO IDENTIFY MATCHING PARTS.
2. THE LAP BETWEEN THE TWO HALF SECTIONS AND BETWEEN THE PIPE AND CONNECTING BAND SHALL BE CAULKED WITH ASPHALT MASTIC AT TIME OF INSTALLATION.
3. RIPLEY'S DAM BY MCRIP MANUFACTURING MAY BE USED WITH ENGINEERS APPROVAL PROVIDING THAT LENGTH AND WIDTH OF COLLAR IS EQUAL TO OR GREATER THAN THAT SPECIFIED IN THE DETAIL.

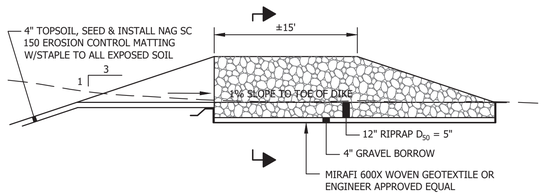
ANTI-SEEP COLLAR
NTS



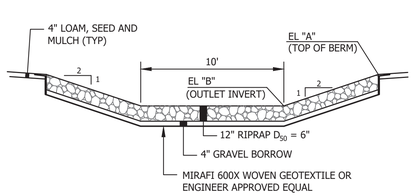
FINAL COVER SURFACE TERRACE
NTS



FINAL COVER RIPRAP DOWNSPOUT
NTS



ELEVATION



SECTION

STRUCTURE DESIGNATION	BOTTOM WIDTH (FT)	LENGTH (FT)	EL "A" (FT)	D_{50} (IN)	THICKNESS (IN)	EL "B" (FT)
DP-11R	10	±15	168.0	6	12	166.5
DP-12	10	±15	180.0	6	12	178.5
DP-13	10	±15	168.0	6	12	166.5
DP-14	10	±15	162.0	6	12	160.5

EMERGENCY SPILLWAY
NTS

REV.	BY	DATE	STATUS
	BDP	11/2025	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

STATE OF MAINE — BRIAN D. PIERCE — 9600 — 11/11/2025 — PROFESSIONAL ENGINEER

PHASE II EXPANSION
NEWSME LANDFILL OPERATIONS LLC
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SECTIONS AND DETAILS

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DESIGN BY:	DPW/NMT
DRAWN BY:	SJM
DATE:	11/10/2025
CHECKED BY:	BDP
LMN:	LMN
CTB:	SME-STD.CTB

JOB NO. 240101.00 DWG FILE DETAILS

C-309

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APPENDIX M

LEACHATE DISPOSAL CONTRACTS

SME
SEVEE & MAHER
ENGINEERS

LEACHATE DISPOSAL AGREEMENT

THIS LEACHATE DISPOSAL AGREEMENT (this **"Agreement"**) is made and entered into this 27th day of October, 2023 by and between ND OTM LLC, a Delaware limited liability company having an office located at Suite 500, 2001 Spring Road, Oak Brook, IL 60523 ("ND") and NEWSME Landfill Operations, LLC **("NEWSMELOC")**, a Maine limited liability company with a place of business in Westbrook, Maine.

WITNESSETH:

WHEREAS, ND owns and operates a certain Wastewater Treatment Plant located at 24 Portland Street, Old Town, Maine (the **"WTP"**) that provides for the treatment and disposal of wastewater pursuant to duly issued and valid licenses and permits; and

WHEREAS, NEWSMELOC operates a secure, Subtitle D landfill located in Old Town (the **"Landfill"**) in accordance with a certain Operating Services Agreement dated February 5, 2004 between the State of Maine and Casella Waste Systems, Inc., an affiliate of NEWSMELOC, as amended (the "Operating Services Agreement"); and

WHEREAS, the operation of the Landfill generates, and will in the future generate, leachate, and NEWSMELOC wishes to obtain from ND leachate disposal services as more fully provided in this Agreement.

NOW, THEREFORE, in consideration of the terms and conditions of this Agreement and the mutual benefits to be derived, the parties hereto agree as follows:

ARTICLE 1. GENERAL

1.1 Upon execution hereof, the Leachate Disposal Agreement and the Commercial Agreement for Disposal Services dated June 11, 2019 shall have no further force and effect.

1.2 During the term of and subject to the terms of this Agreement, NEWSMELOC shall be entitled to dispose of leachate produced at the Landfill at the WTP, and ND or its successors or assigns holding title to the WTP shall provide treatment of any and all leachate produced at the Landfill and delivered by NEWSMELOC to the WTP, through processing at the WTP subject to the conditions specified herein. NEWSMELOC agrees to provide the leachate to ND on an exclusive basis with the following exceptions: i) If during the term of the Agreement ND cannot receive leachate for any reason for a period of fifteen (15) days or longer, or for five (5) occurrences in a twelve (12) month rolling period, exclusivity shall no longer apply to the Agreement, and ii) if NEWSMELOC must provide leachate to a secondary disposal location to maintain an additional outlet or outlets, it may re-direct up to ten percent (10%) of its annual leachate capacity in its sole discretion. ND shall comply with all applicable laws, regulations, permits and licenses applicable to the operation of the WTP, and shall operate the WTP in accordance with good operating practices as generally applied in the industry. The failure of ND to do so, to the extent resulting in NEWSMELOC potentially incurring liability or other adverse consequences or being unable to dispose of Landfill leachate at the WTP, shall

entitle NEWSMELOC to dispose of its Landfill leachate at other locations and to exercise its remedies specified in Articles 11 and 12. Without limitation of the foregoing, ND represents and warrants to NEWSMELOC that ND holds all permits and licenses necessary in order to perform its obligations hereunder.

1.3 ND shall only be required to receive and treat leachate from the Landfill at the WTP in accordance with all applicable laws, regulations, permits, approvals and the provisions set forth herein during the term of this Agreement, subject, however, to the provisions of Articles 3 and 10 hereof.

1.4 NEWSMELOC or its authorized contractor(s) shall transport the leachate to the WTP for disposal in accordance with all applicable laws, regulations, permits, approvals and the terms and conditions specified in this Agreement.

1.5 Except as set forth in Article 4, NEWSMELOC shall not be required to pretreat its leachate to meet any permit limits, conditions, or standards.

ARTICLE 2. CONTRACT TERM

The term of this Agreement shall commence on the date of this Agreement and shall continue for a period of three (3) years, unless this Agreement is earlier terminated as hereinafter provided.

ARTICLE 3. FINANCIAL TERMS

Fees for treatment and disposal of landfill leachate shall be as follows:

3.1 First 25 million gallons of leachate in each twelve (12) month year of the Term= [redacted]

3.2 Gallons in excess of 25 million in each twelve (12) month year of the Term = [redacted]

3.3 Fees will increase on an annual basis on each anniversary of the term, based on the consumer price index for garbage and trash collection, but in no event more than 3.0% in any year.

3.4 Pricing for any partial year shall be prorated.

ARTICLE 4. LEACHATE DISPOSAL PROCEDURES

4.1 NEWSMELOC shall provide leachate chemical conditioning, such as the addition of lime, as may be necessary to maintain pH in compliance with the standards set forth in Article 6 of this Agreement.

4.2 The hours of operation at the WTP shall be twenty-four (24) hours per day, seven (7) days per week. ND has extended facility outages from time to time; during these periods the WTP may not be available for the disposal of leachate. ND shall provide NEWSMELOC with reasonable prior notice of the WTP's unavailability (or, in the case of an unplanned outage, as prompt notice as is reasonably practicable) and will exercise commercially reasonable efforts to minimize such outages that may affect the operation of the WTP.

4.3 NEWSMELOC shall transport leachate hereunder to the WTP at its sole expense and in accordance with applicable Town, State and Federal requirements.

4.4 Truck operations shall comply with ND's mill policies and rules, including the following safety and maintenance procedures or such other reasonable written procedures as may be determined by ND.

4.4.1 Drivers will wear appropriate personal protective equipment including hard hat, safety glasses, and gloves at all times while on site.

4.4.2 Speed limit of 10 miles per hour while on WTP property.

4.4.3 Enter and exit by side gate only.

4.4.4 Back-up alarms and other vehicle safety devices shall be fully operational.

4.4.5 Drivers shall comply with reasonable operational personnel instructions while on property.

4.4.6 Any and all spilled leachate shall be promptly cleaned up by NEWSMELOC or its agents or contractors whether on the WTP property or elsewhere.

4.4.7 Drivers shall clean/hose the leachate discharge area immediately after the discharge or leachate has been completed.

4.4.8 Hose opening, discharge piping, etc., shall be covered or plugged when no longer in use to minimize leakage and malodorous conditions.

4.5 NEWSMELOC drivers and WTP personnel shall observe the procedures outlined below prior to leachate discharge.

4.5.1 The driver may only discharge leachate after receiving permission from WTP personnel and may only discharge leachate at the location specified by WTP personnel.

4.5.2 The driver shall complete a leachate receiving form for each shipment and submit it to the WTP operational personnel.

4.5.3 The driver shall provide a sample of the tanker contents to WTP operational personnel upon request.

4.5.4 The pH range of the sample shall be between 5.0 and 9.0, or such other standard necessary for the WTP to comply with its permit(s) then in effect, and the sample shall have the general visual characteristics of leachate.

4.5.5 WTP personnel will have the right to visually inspect for the volume of leachate discharged. NEWSMELOC will demonstrate delivered volume by net weight of each tanker load and document such measurement in writing. WTP may periodically require driver to verify weight on WTP's truck scales.

4.5.6 WTP personnel shall, after verification of the items listed in sections 4.5.1 through 4.5.4, complete and sign the leachate receiving form. Copies of the same shall be submitted to the WTP's Chief Operator. A copy shall be retained by the driver.

4.5.7 At all times, NEWSMELOC will adhere to and strictly follow and abide by all laws related to the proper care and possession of all leachate related to this agreement.

ARTICLE 5. LIMITATIONS OF LEACHATE

5.1 NEWSMELOC shall comply with the sampling and monitoring program specified in Article 6 to ensure quality control of the leachate.

5.2 NEWSMELOC shall pay the costs of the sampling and monitoring program set forth in Article 6.

5.3 NEWSMELOC shall not add any materials to the leachate after it is collected at the Landfill and shall not add any other solid, liquid, or gaseous materials or substance to the collected leachate without the express written consent of ND, not to be unreasonably withheld, delayed or conditioned; provided, however, that NEWSMELOC, at its sole discretion, may add substances utilized for the purposes of maintaining pH and/or reducing odors to the leachate collection tanks, to transport vehicles or to the Landfill; and provided further that ND may require NEWSMELOC to undertake such additional odor control measures which are reasonable and in accordance with accepted industry practice.

ARTICLE 6. SAMPLING AND MONITORING REQUIREMENTS

6.1 A sample of leachate may be taken from each truckload which is transported to the WTP from the Landfill. The sample shall be visually inspected and checked for pH by WTP operational personnel.

6.2 NEWSMELOC or a qualified third party shall collect two random samples of leachate twice per year and provide analytical results to ND for the following parameters, as such parameters may be modified by local, state or federal authorities:

6.2.1 Volatile Organics (VOC's)

EPA Method 624.1

VOC's Limit (PPM)

Total VOC's 350

6.2.2 Chemical and Indicator Parameters

Parameter Limits

pH 5.0-9.0 (ND may request a pH range of 6.0-9.0 if reasonably necessary to maintain compliance with permit limitations. ND will provide notice of such request to NEWMELOC as promptly as is reasonably practicable. NEWSMELOC will exercise commercially reasonable efforts to accommodate any such request.)

6.2.3 Hazardous Waste

The leachate shall not meet the definition of a hazardous waste per 40 CFR Part 261 or Maine Chapter 850. Leachate will be analyzed for the contaminants listed in 40 CFR

Part 261.24 (Toxicity characteristic) and Maine Chapter 850 using approved EPA test method.

6.2.4 BOD and TSS to be analyzed once per quarter

BOD5 mg/L

Total Suspended Solids (TSS) mg/L

6.2.5 Priority Pollutant and Analytical Chemistry

Leachate shall be tested for contaminants listed in Maine Chapter 530 Section C(3) Priority pollutants, C(4) Analytical chemistry, and C(5) Other at a frequency consistent with the WTP permit.

6.3 Leachate analyses shall be performed by an EPA certified and DEP approved laboratory and paid for by NEWSMELOC The analyses shall be conducted in accordance with the methods prescribed in the latest edition of "Standard Methods for the Examination of Water and Wastewater", "Methods for Chemical Analysis of Water and Waste", U.S. Environmental Protection Agency, or in accordance with any other generally accepted analytical method.

6.4 The parties acknowledge and agree that these sampling and monitoring requirements are based on local and state environmental rules and regulations, and may be revised from time to time, as changes in the laws governing the transmission and processing of leachate so dictate. The parties agree that the sampling and monitoring requirements of this section will be revised as needed from time to time to comply with local and state laws and regulations. The parties shall cooperate as necessary to promptly provide to one another a copy of each leachate analysis result. The parties shall cooperate as necessary to promptly provide to one another a copy of each leachate analysis result.

ARTICLE 7. INSURANCE

7.1 NEWSMELOC shall maintain (a) worker's compensation insurance at statutorily required levels, and (b) general liability insurance in an amount not less than $5 million during the term of this Agreement for claims arising out of NEWSMELOC's use of the WTP. NEWSMELOC shall require any company transporting NEWSMELOC's leachate to maintain statutory worker's compensation insurance and auto liability insurance, during the term of this Agreement with a combined single limit of not less than $1 million for claims arising out of the transport of NEWSMELOC's leachate under this Agreement. NEWSMELOC shall provide ND upon execution of this Agreement and annually thereafter, and whenever changed, certificates attesting to the existence of such insurance and naming ND as an additional insured. Each certificate shall contain a statement of the insurer's undertaking to notify the party to whom the certificate is addressed at least ten (10) days prior to the cancellation of any policy covered thereunder.

7.2 All insurance is to be with companies authorized to do business in Maine. All such insurance shall be obtained and maintained at the sole cost and expense of NEWSMELOC, its agents or contractors.

7.3 Notwithstanding any other provisions of this Agreement, in the event that NEWSMELOC does not have in full force and affect the required insurance, ND may

refuse to accept and treat leachate from NEWSMELOC until such time as the required insurance is obtained by giving prompt notice of same to NEWSMELOC. Nothing contained herein shall prevent ND from terminating this Agreement because of failure of NEWSMELOC to obtain and maintain the required insurance; provided, however, that ND and NEWSMELOC shall, in such circumstances, confer with each other in an attempt to resolve the insurance issues to the reasonable satisfaction of ND.

ARTICLE 8. NOTICES

8.1 Any notice from NEWSMELOC to ND or from ND to NEWSMELOC relating to or required under this Agreement shall be deemed to have been given when posted by certified mail, return receipt requested to the following address:

ND OTM LLC:
Old Town Division
24 Portland St
Old Town, ME 04468
Attention: Elisha Cram, Environmental Manager
elisha.cram@us.ndpaper.com

With copy to:
ND Paper Inc.
2001 Spring Road, Suite 500
Oak Brook, IL 60523
Attn: Legal

NEWSMELOC:
Shelley Sayward, SVP & General Counsel
Casella Waste Systems, Inc.
25 Greens Hill Lane
Rutland, VT 05701
shelley.sayward@casella.com

8.2 Either party may change its address for purposes of this Article by so notifying the other party in the manner provided in this Article 8.

ARTICLE 9. AUTHORITY TO CONTRACT

Each party expressly represents and warrants that it: (i) has been duly authorized to enter into this Agreement in accordance with applicable federal, state and local laws, bylaws and regulations as a legally binding agreement enforceable in accordance with the terms set forth herein; and (ii) holds (or will hold, when required) all necessary permits and licenses to perform its respective obligations contemplated by this Agreement.

ARTICLE 10. DEFAULT

The failure of either party to perform any of its obligations hereunder shall be a default by that

party and a breach of this Agreement. No waiver of any default shall constitute a waiver of any other breach or default whether of the same or any other term or condition. Either party may provide prompt written notice to the other party of any breach of this Agreement. The party receiving such notice shall have thirty (30) days after receipt of such notice to cure the breach or otherwise resolve the issues in a manner agreeable, in writing, to the other party.

ARTICLE 11. INDEMNIFICATION

Each party agrees to defend, indemnify and hold harmless the other party, its officers, employees and agents from and against any and all suits, actions, claims and demands of any kind whatsoever, including without limitation, for personal injury, death, property damage, and environmental liability occurring to any person or entity, reasonable attorneys' fees, arising by reason of any breach of this Agreement or any negligent act or omission by the indemnifying party, its agents, servants, employees or subcontractors in the performance of this Agreement. Notice of any such claim must be given to the indemnifying party within twelve (12) months of the event giving rise to such claim.

ARTICLE 12. TERMINATION; RENEGOTIATION; SUSPENSION

12.1 Either party may terminate this Agreement upon thirty (30) days written notice to the other party in the event that:

12.1.1 The other party has materially defaulted in its obligations hereunder and has not cured said material default pursuant to the provisions of Article 10 of this Agreement; or

12.1.2 Changes in the law occur regarding PFAS that have a material effect on the cost of treatment of the leachate; or

12.1.3 Treatment of the leachate presents a material risk to the health or safety of either party's employees or the public at large.

12.2 In the case that ND commences operations of the mill, the parties agree to renegotiate the financial terms described herein and to enter into a disposal agreement for waste from ND to be delivered to the Landfill. If the parties cannot reach mutual agreement on terms and conditions after ninety (90) days, either party may terminate this Agreement.

12.3 ND may suspend its obligation to accept and treat leachate under this Agreement upon seven (7) days' written notice to NEWSMELOC, or any period of time required under any applicable permit or order, whichever is longer, in the event that (i) public health and safety so require; (ii) any regulatory authority or court having jurisdiction over the WTP requires cessation of transporting NEWSMELOC's leachate to or treating NEWSMELOC's leachate at the WTP for disposal; or (iii) changes to the laws and regulations concerning the processing or treatment of leachate that have a material adverse affect on the cost of treatment of NEWSMELOC's leachate for PFAS . In the event that ND receives notices of any alleged violation or other matter or proceeding which relates to NEWSMELOC's transportation of leachate to or disposal of leachate at the WTP that is cause for suspension as provided in this section, ND shall promptly notify NEWSMELOC of same in writing, indicating the reason and the expected duration of the suspension of services. NEWSMELOC and ND shall forthwith confer and cooperate in good faith to attempt to timely resolve matters which are the subject of said notice of violation or order at minimal

cost to ND and NEWSMELOC.

ARTICLE 13. FORCE MAJEURE

Neither party shall be liable to the other, or be deemed to be in breach of this Agreement, for any failure or delay in rendering performance arising out of causes beyond its reasonable control and not due to its fault or negligence. Such causes include but are not limited to act of God, acts of war or military authority, fires, explosions, floods, epidemics, quarantine restrictions, riots, labor strikes, unusually severe weather or change of law. Such causes shall not include economic or market conditions, financial hardship or adverse business developments not related to the events or circumstances described in the preceding sentence. In the event the provisions of this Article are believed to apply, the party relying thereon shall give prompt written notice to the other party of the circumstances, the basis for the applicability of this Article and the anticipated time required to cure such failure or delay in performance, and such party shall exercise diligent, commercially reasonable efforts to end or mitigate such condition or circumstance.

ARTICLE 14. ADDITIONAL PROVISIONS

14.1 If any provision of this Agreement or its application to any person or circumstance is invalid or unenforceable, then the remainder of this Agreement, or the application of said provision to other persons or circumstances, shall not be affected thereby; provided, however, that if any provision of its application is invalid or unenforceable, then a suitable and equitable provision, mutually agreed to, shall be substituted therefore in order to carry out so far as may be valid and enforceable the intended purpose of the invalid or unenforceable provisions.

14.2 This Agreement is delivered, and is intended to be performed, in the State of Maine, and it shall be construed and enforced in accordance with its laws, rules and regulations, other than conflict of laws provisions.

14.3 Any provision of this Agreement which refers to a federal, state, or local law, rule, regulation, standard, or guideline, shall be considered to refer to the most current applicable version of such law, rule, regulations, standard, or guideline so as to ensure that the requirements of this Agreement are consistent at all times with currently applicable requirements enacted or adopted by federal, state and local authorities with jurisdiction over the matters which are the subject of this Agreement.

14.4 Sections and subsections used in this Agreement are for convenience or reference only and shall not be deemed to alter or affect any provision thereof.

14.5 All remedies provided in this Agreement are distinct and cumulative to any other right or remedy under this Agreement or afforded by law or equity, and may be exercised concurrently, independently, or successively. The failure on the part of either party to enforce any of its rights as to any provision of this Agreement shall not be construed as a waiver of its rights to enforce such provision in the future. Without limitation of the foregoing, either party shall be entitled to set off against any of its obligations under this Agreement (or any other agreement between the parties hereto) any amounts due and payable to it under any other agreement between the parties hereto (or their respective

affiliates, assignees or successors), which right of offset shall remain in effect irrespective of the assignment of any such agreement.

14.6 This Agreement contains the entire agreement between NEWSMELOC and ND with respect to the subject matter hereof and supersedes all previous or contemporaneous communications, representations or agreements with respect thereto. This Agreement may be modified only by written amendment signed by both parties.

14.7 This Agreement shall not be assigned by either party without the written consent of the other party, which consent shall not be unreasonably withheld, conditioned or delayed; provided, further, that NEWSMELOC or ND may withhold or condition such consent only on the basis of demonstrable and material deficiencies on the creditworthiness or technical ability of the proposed assignee to operate the WTP. ND covenants and agrees that it may not convey, directly or indirectly, its interest in the WTP without this Agreement being assigned to and assumed in writing by such transferee by a writing reasonably satisfactory to NEWSMELOC and complying with this Section 14.7.

[Signature page follows]

IN WITNESS WHEREOF, the parties hereto have set their hands and seals, by their respective duly authorized representatives who, however, incur no personal liability by reason of the execution hereof or of anything herein contained, as of the day and year first above written.

Witness:

_____

NEWSME Landfill Operations, LLC:

_____
Brian Oliver, Vice President

Witness

_____

ND OTM LLC:

By: Bruce Hogan 10/30/2023
Name: Bruce Hogan
Title: GM and VP, ND Paper OTM

APPENDIX N

SITE AND SURROUNDINGS MAP AND TAX MAP WITH LIST OF ABUTTERS

SME
SEVEE & MAHER
ENGINEERS

ROUTE 16
I-95
EXISTING SITE ACCESS ROAD (SEE RECORDED RIGHT-OF-WAY NOTE 4)
100' BUFFER
UNNAMED TRIBUTARY TO PUSHAW STREAM
ENVIRONMENTAL REVIEW POLYGONS MAINE INLAND FISHERIES & WILDLIFE (SEE NOTE 8)
RARE ANIMAL MAINE INLAND FISHERIES & WILDLIFE (SEE NOTE 8)
WOOD TURTLE
SIGNIFICANT SAND AND GRAVEL AQUIFER (SEE LEGEND)
UNNAMED TRIBUTARY TO JUDKINS BROOK
100-YEAR FLOOD ZONE
EXISTING APPROXIMATE WATERSHED BOUNDARY
PERMITTED WOOD WASTE STORAGE AREA
DETENTION POND 9
ZONING R-3A (SEE NOTE 6)
FACILITY WATER SUPPLY WELL
LANDFILL GAS TO ENERGY FACILITY
LANDFILL GAS TREATMENT FACILITY
LEACHATE STORAGE TANK
MAINTENANCE BUILDINGS
DETENTION POND 10
PERMITTED SOLID WASTE BOUNDARY EXISTING LANDFILL (122 ACRES)
ZONING L-1 (SEE NOTE 6)
PERMITTED TILL BORROW PIT
PROPERTY LINE
ALTON/OLD TOWN TOWN LINE
EXISTING SCALE AND SCALE HOUSE
LIMIT OF DEED RESTRICTION/ CONSERVATION AREA (SEE NOTE 7)
RESIDENTIAL DWELLING (TYPICAL)
SIGNIFICANT VERNAL POOL
PROPOSED LANDFILL EXPANSION DETENTION POND 11R
PROPOSED OVERHEAD ELECTRIC LINE
EXISTING PERIMETER FENCE
PROPOSED DETENTION POND 14
SIGNIFICANT VERNAL POOL
PROPOSED DETENTION POND 13
PROPOSED PERIMETER ROAD
DETENTION POND 1A
CONSERVATION AREA (SEE NOTE 7)
UNNAMED STREAM
RESOURCE PROTECTION ZONE P SEE NOTE 6
DETENTION POND 1
ROUTE 43
JUDKINS BROOK
PROPOSED EXPANSION SOLID WASTE BOUNDARY (57 ACRES)
2000' PERIMETER FROM PROPOSED FACILITY SITE BOUNDARY
PROPOSED DETENTION POND 12
100' BUFFER
SIGNIFICANT WATERFOWL-WADING BIRD HABITAT (SEE NOTE 8)
STAGE COACH ROAD
CONSERVATION AREA (SEE NOTE 7)
RARE ANIMAL MAINE INLAND FISHERIES & WILDLIFE (SEE NOTE 8)
BLUE HERON
ZONING R-3A (SEE NOTE 5)
UNNAMED TRIBUTARY TO PUSHAW STREAM
205434
205294
12445
12447

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC, NORRIDGEWOCK, MAINE. PHOTO DATE 5/21/2024. VERTICAL DATUM: BRASS PLUG AT PUMP STATION AT THE ADMINISTRATION BUILDING. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY SEVEE & MAHER ENGINEERS, INC., OF CUMBERLAND, MAINE.
2. LANDFILL EXPANSION 57+ ACRE FOOTPRINT BASED UPON CURRENT GRADING PLAN FOR THE JUNIPER RIDGE LANDFILL EXPANSION.
3. PROPERTY LINE LOCATIONS ARE A RESULT OF FIELD SURVEY PERFORMED BY HERRICK AND SALSBURY, INC. LAND SURVEYORS, ELLSWORTH, MAINE FOR TRYTON TREE FARM PROJECT, PATTEN CORPORATION-DOWNEAST, OLD TOWN, MAINE, FEBRUARY 23, 1988, REVISED APRIL 7, 1988.
4. RIGHT OF WAY FOR ALL PURPOSES OVER THE ACCESS ROAD (50) FOOT WIDE, AS DESCRIBED IN EXHIBIT A TO QUITCLAIM DEED WITH COVENANT (BOOK 9188, PAGE 154, #3751 - PENOBSCOT REGISTRY OF DEEDS).
5. THERE ARE NO HISTORICAL OR ARCHAEOLOGICAL PROPERTIES AFFECTED BY THE PROPOSED DEVELOPMENT OF THE JRL PHASE II EXPANSION. PER MAINE HISTORIC PRESERVATION COMMISSION (JUNE 5, 2024).
6. ZONING, AS DESCRIBED BY THE CITY OF OLD TOWN CODE OF ORDINANCES, FOR PROPERTY OWNED BY THE STATE OF MAINE IS L-1 (LANDFILL ZONE). ALL OTHER PROPERTY SURROUNDING THE SITE IS R-3A (RESIDENCE AND FARMING) AND RESOURCE PROTECTION. REFERENCE IS ZONING MAP OF CITY OF OLD TOWN (2010).
7. CONSERVATION AREAS SHOWN ARE WETLAND AREAS PREVIOUSLY PRESERVED AS DESCRIBED IN DECLARATIONS OF COVENANTS AND RESTRICTIONS BY JAMES RIVER PAPER COMPANY (REVISED PLAN AUGUST 10, 1995) AND STATE OF MAINE DEPARTMENT OF ADMINISTRATIVE AND FINANCIAL SERVICES (MARCH 2, 2018). LOCATIONS ARE APPROXIMATE.
8. THERE ARE NO RARE BOTANICAL FEATURES DOCUMENTED WITHIN THE PROJECT AREA BASED UPON A REVIEW OF THE NATURAL AREAS PROGRAM'S BIOLOGICAL AND CONSERVATION DATA SYSTEMS FILES BY THE MAINE DEPARTMENT OF AGRICULTURE CONSERVATION AND FORESTRY (DECEMBER 12, 2022 CORRESPONDENCE).
   THE MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE, WILDLIFE DIVISION, IDENTIFIED WOOD TURTLE, BAT SPECIES, AND SIGNIFICANT VERNAL POOLS, AND FISHERIES HABITAT NEAR THE SITE (DECEMBER 15, 2022 CORRESPONDENCE). THERE HAVE BEEN NO OTHER UNIQUE AREAS IDENTIFIED WITHIN THE GENERAL VICINITY OF THE SITE.
9. THERE ARE NO INDUSTRIAL OR PUBLIC WATER SUPPLY WELLS, PUBLIC WATER SUPPLY WATERSHED AREAS, WELLHEAD PROTECTION AREAS OR SIGNIFICANT SAND AND GRAVEL AQUIFERS LOCATED WITHIN 2000 FEET OF THE PROPOSED EXPANSION. ALL RESIDENTIAL DWELLINGS SHOWN ARE ASSUMED TO HAVE A DOMESTIC WATER SUPPLY WELL.

LEGEND

- MAINE INLAND FISHERIES AND WILDLIFE SIGNIFICANT WILDLIFE HABITAT SOURCE: NOVEMBER 5, 2014 CORRESPONDENCE WITH THE MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE
- 100 YEAR FLOOD ZONE (FEMA OLD TOWN QUAD PANEL NUMBER 23019C1926D AND 23019C1927D (EFFECTIVE 7/19/2023)
- WETLANDS DELINEATIONS AS PROVIDED IN NATURAL RESOURCES REPORT FOR JUNIPER RIDGE LANDFILL PROJECT BY BIODIVERSITY RESEARCH INSTITUTE (BRI) DATED, SEPTEMBER 2024.
- WETLANDS DELINEATED BY STANTEC/WOODLOT ALTERNATIVES (2004, 2008, 2104, AND 2015)
- GROUNDWATER YIELDS GREATER THAN 10 GPM SIGNIFICANT SAND & GRAVEL AQUIFER MGS SURVEY OPEN FILE NO. 01-188 DATED 2001.
- CONSERVATION AREAS
- CITY OF OLD TOWN RESOURCE PROTECTION ZONE P (SEE NOTE 6)
- DIRECTION OF FLOW
- YIELD BETWEEN 5 AND 10 GALLONS PER MINUTE
- YIELD BETWEEN 10 AND 15 GALLONS PER MINUTE

} REFERENCE DRAWING: MAINE GEOLOGICAL SURVEY OPEN FILE NO. 02-25 2002 BANGOR 30x60 MINUTE QUADRANGLE

250 0 500 1000 FEET

SITE SURROUNDINGS MAP
JUNIPER RIDGE LANDFILL
PHASE II EXPANSION
OLD TOWN, MAINE

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DWG: BUFFERPLAN LMN: SITE SURROUNDINGS CTB: SME-STD.CTB JOB#: 240102.05 REV: 8/6/2025

\\Server-cb\Civil\2d\Land\JRE\Expansion\Phase II Expansion\Autof\Figures\BUFFERPLAN1.dwg, SITE SURROUNDINGS, 8/5/2025 7:54:58 AM, sjm

OLD TOWN

MAP NO.	LOT NO.	NAME
2	40	Laurent J. & Barbara Beauregard
2	41	Laurent J. & Barbara Beauregard
2	44	Robert W. & Wendy Hall
2	46	Thomas Dunn & Karen Bertolino
2	47	City of Old Town
2	51	New England Waste Services
2	52	Raymond A. Perkins
2	53	Cassandra Goodspeed
2	54	Gregg & Evlynn Wallace
2	55	Robyn Emmons
3	1A	University of Maine System
3	1B	SSR, LLC
3	6B	Scott E. Bergquist
3	7	Kevin H. Daniel
3	7A	Angela D. Cyr
3	15	NEWSME Landfill Operations LLC
3	41C	Herbert A. Robertson, Jr
3	45B	SSR, LLC
3	50A	SSR, LLC
3	53	SSR, LLC
3	54B	SSR, LLC
3	58B	SSR, LLC

ALTON

MAP NO.	LOT NO.	NAME
8	97	Harry & Laura Sanborn
8	98	Second Chance Holdings LLC
8	99	NEWSME Landfill Operations LLC
8	99.01	NEWSME Landfill Operations LLC
8	100	State of Maine
8	101	NEWSME Landfill Operations LLC
8	102	NEWSME Landfill Operations LLC
8	103	ABS Transport
8	104	Tasanee Lolonga
8	106	Karl Held
8	107	Harry & Tammy Feero
8	108	Win & Nancy Chaiyabhat
8	109	Win & Nancy Chaiyabhat
8	111	Win & Nancy Chaiyabhat
8	112	Win & Nancy Chaiyabhat
8	113	Jesse Pekkala
8	114	Charles Tringale III
8	116	Anthony Madden
8	117	Challis Randall
8	117.1	Town of Alton
8	118	Kenneth Gray
8	119	Kathryn Pelletier
8	119.1	Ruth Dalton
8	119.2	Shana McLaughlin
8	121	Anthony & Cynthia Brown
8	121.1	Mary & Vincent St. Louis
8	122	NEWSME Landfill Operations LLC
8	122.1	NEWSME Landfill Operations LLC
8	123	Dennis & Mary Theriault
8	124	Samuel Diaz

NOTE:

1. THIS IS AN INFORMATIONAL FIGURE ONLY AND IS NOT INTENDED TO SERVE AS A BOUNDARY SURVEY MAP. DIMENSIONS, NORTHING AND EASTING INFORMATION PRESENTED ON THIS FIGURE ARE APPROXIMATE AND ARE BASED UPON AVAILABLE SITE INFORMATION FOR THE JUNIPER RIDGE LANDFILL. NO FIELD SURVEY HAS BEEN PERFORMED BY SEVEE AND MAHER ENGINEERS REGARDING THE INFORMATION PRESENTED ON THIS DRAWING.

LEGEND

PROPERTY LINE LOCATIONS ARE ARE APPROXIMATE AND ARE BASED UPON A RESULT OF FIELD SURVEY PERFORMED BY HERRICK AND SALSBURY, INC. LAND SURVEYORS, ELLSWORTH, MAINE FOR TRYTON TREE FARM PROJECT, PATTEN CORPORATION-DOWNEAST, OLD TOWN, MAINE, FEBRUARY 23, 1988, REVISED APRIL 7, 1988

50A — LOT LOCATIONS ARE APPROXIMATE AND ARE BASED UPON AVAILABLE TAX MAP INFORMATION FOR THE TOWN OF ALTON AND OLD TOWN, MAINE, (2024).

TAX MAP OF PROPERTY ABUTTERS NEWSME LANDFILL OPS LLC JUNIPER RIDGE LANDFILL

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

DWG: AREAMAP LMN: TAX MAP CTB: SME-STD REV: 8/27/2025

\\fileserver\SME\Data\Old Town Landfill\Drawings\Arcadis\Figures\AREAMAP.dwg, TAX MAP, 8/27/2025 12:01:46 PM, sjm

LIST OF ABUTTERS – JUNIPER RIDGE LANDFILL

Map/Lot	Name & Address	Location
002/040/000	Laurent & Barbara Beauregard 273 Washington Street Brewer, ME 04412	West Old Town Road Old Town, ME 04468
002/041/000	Laurent & Barbara Beauregard 273 Washington Street Brewer, ME 04412	West Old Town Road Old Town, ME 04468
002/044/000	Robert Hall 631 West Old Town Road Old Town, ME 04468	631 West Old Town Road Old Town, ME 04468
002/046/000	Karen Bertolino & Thomas Dunn 579 West Old Town Road Old Town, ME 04468	579 West Old Town Road Old Town, ME 04468
002/047/000	City of Old Town 265 Main Street Old Town, ME 04468	West Old Town Road Old Town, ME 04468
002/052/000	Raymond Perkins 55 Old Brooklyn Turnpike Windham, CT 06280	549 West Old Town Road Old Town, ME 04468
002/053/000	Cassandra Goodspeed 519 West Old Town Road Old Town, ME 04468	519 West Old Town Road Old Town, ME 04468
002/054	Greg & Evlynn Wallace 526 West Old Town Road Old Town, ME 04468	526 West Old Town Road Old Town, ME 04468
002/055	Robyn Emmons 488 West Old Town Road Old Town, ME 04468	488 West Old Town Road Old Town, ME 04468
003/001/00A	University of Maine System 107 Maine Avenue Bangor, ME 04401	Bennoch Road Old Town, ME 04468
003/001/00B	SSR LLC PO Box 435 Stillwater, ME 04489-0435	Bennoch Road Old Town, ME 04468
003/006/00B	Scott Bergquist 497 West Old Town Road Old Town, ME 04468	497 West Old Town Road Old Town, ME 04468
003/007	Kevin & Sandilynn Daniel 439 West Old Town Road Old Town, ME 04468	439 West Old Town Road Old Town, ME 04468
003/007/00A	Angela Cyr 449 West Old Town Road Old Town, ME 04468	449 West Old Town Road Old Town, ME 04468
003/041/00C	Herbert Robertson Jr 163 Clewleyville Road Eddington, ME 04428	Bennoch Road Old Town, ME 04468

003/045/00B	SSR LLC PO Box 435 Stillwater, ME 04489-0435	Bennoch Road Old Town, ME 04468
003/050/00A	SSR LLC PO Box 435 Stillwater, ME 04489-0435	Bennoch Road Old Town, ME 04468
003/054/00B	SSR LLC PO Box 435 Stillwater, ME 04489-0435	Bennoch Road Old Town, ME 04468
003/058/00B	SSR LLC PO Box 435 Stillwater, ME 04489-0435	Bennoch Road Old Town, ME 04468
08/97	Harry and Laura Sanborn 2845 Bennoch Road Alton, ME 04468	2845 Bennoch Road Alton, ME 04468
08/98	Second Chance Holdings, LLC 74 Upper Dedham Road Holden, ME 04429	Unknown
08/100	State of Maine South Main St Old Town, ME 04468	Unknown
08/103	ABS Transport LLC 2894 Bennoch Road Alton, ME 04468	Unknown
08/104	Tasanee Lolonga 157 Massapaug Avenue N. Easton, MA 02356	Unknown
08/106	Karl Held 2351 Cochran Road Dallas, GA 30132	Unknown
08/107	Harry & Tammy Feero 1118 Southgate Road Argyle, ME 04468	Unknown
08/108 08/109 08/111 08/112	Win & Nancy Chaiyabhat PO Box 1046 Scarborough, ME 04070	Old Stage Coach Road Alton, ME 04468
08/113	Jesse Pekkala PO Box 471 Telluride, CO 81435	Unknown
08/114	Charles Tringale 268 Park Street Medford, MA 02155	250 Old Stage Coach Road Alton, ME 04468

08/116	Anthony & Cindy Madden PO Box 499 Milford, ME 04461	240 Old Stage Coach Road Alton, ME 04468
08/117	Estate of Challis Randall 220 Old Stagecoach Road Alton, ME 04468	220 Old Stagecoach Road Alton, Me 04468
08/117/01	Town of Alton 3352 Bennoch Road Alton, ME 04468	Unknown
08/118	Kenneth Gray PO Box 357 Old Town, ME 04468	214 Old Stagecoach Road Alton, ME 04468
08/119/00	Kathryn Pelletier 198 Old Stagecoach Road Alton, ME 04468	198 Old Stagecoach Road Alton, ME 04468
08/119/01	Ruth Dalton 206 Old Stagecoach Road Alton, ME 04468	206 Old Stagecoach Road Alton, ME 04468
08/119/02	Shana McLaughlin 181 Moondance Lane Summerville, SC 29483	204 Old Stagecoach Road Alton, ME 04468
08/121	Anthony & Cynthia Brown 1 Chamberlain Road, Seymour, CT 06483	194 Old Stagecoach Road Alton, ME 04468
08/121/01	Vincent and Mary St. Louis 10 Crosby Ct, Apt 10 Orono, ME 04473	196 Old Stagecoach Road Alton, ME 04468
08/123	Dennis & Mary Theriault 1047 Southgate Road Argyle TWP, ME 04468	158 Stagecoach Road Alton, ME 04468
08/124	Samuel Diaz 156 Old Stagecoach Road Alton, ME 04468	156 Old Stagecoach Road Alton, ME 04468

APPENDIX O

CURRENT SWPP PLAN

SME
SEVEE & MAHER
ENGINEERS

STORMWATER POLLUTION PREVENTION PLAN

Maine Department of Environmental Protection

Multi-Sector General Permit
Stormwater Discharges
Associated with Industrial Activity

Facility:
Juniper Ridge Landfill
2828 Bennoch Road
Alton, Maine

Prepared for:
NEWSME Landfill Operations, LLC
207 Larrabee Road, Suite 1
Westbrook, Maine

Prepared by:
St.Germain
846 Main Street
Westbrook, Maine

April 2025

St.Germain File No.: 2137-0009

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Appendix J: Routine Inspection Form
Appendix K: Weekly/Monthly Inspection Form
Appendix L: Corrective Action Report

SITE INFORMATION	
Site Name	Juniper Ridge Landfill
Street Address	2828 Bennoch Road
City/Town	Alton
County	Penobscot
Site Operator	NEWSME Landfill Operations, LLC
Site Contact	Jeffrey Pelletier
Telephone	(207) 249-8025
Permit Owner	NEWSME Landfill Operations, LLC
Permit Owner Address	207 Larrabee Road, Suite 1, Westbrook, Maine
Hours of Operation	6:00am to 5:00pm Monday-Friday, 7:00am to 12:00pm Saturday
Type of Site	Landfill
New Sub-Sector/Activity Code	L1/LF
Applicable Industrial Sector	L - Landfills and Land Application Sites
Multi-Sector General Permit Number	MER05B477
Permit Issued/Effective Date	December 8, 2016/March 8, 2017
Permit Expiration	March 8, 2022*

*The Maine Department of Environmental Protection has not introduced an updated MSGP beyond the one that expired on March 8, 2022; therefore Juniper Ridge Landfill continues to operate under the current permit.

EMERGENCY CONTACT INFORMATION	
Fire Department	911
Medical Emergency	911
MEDEP Oil Spill Response Hotline	1-800-482-0777

PLAN REVISION LOG		
REVISION #	**DATE**	**REVISION DETAIL**
1	October 2018	Revised to reflect comments received from a MEDEP inspection at another facility.
2	April 2021	Updated based on site expansion which included additional outfalls.
3	April 2023	Updated based on site expansion and construction of RNG facility.
4	April 2024	Updated based on completed construction of the RNG facility.
5	April 2025	Updated based on site expansion, additions of sand/salt storage, the RNG stormwater pond, and the foam production system for daily cover.

1.0 INTRODUCTION AND PURPOSE

NEWSME Landfill Operations, LLC (NEWSME) operates the Juniper Ridge Landfill located at 2828 Bennoch Road, in Alton, Maine (see **Figure 1, Site Location Map).** The landfill is owned by the Maine Bureau of General Services (BGS) but operated under an operating services agreement which began in 2004. Industrial activities and point source discharges of stormwater to waters of the State of Maine occur at this site, therefore, a Multi-Sector General Permit (MSGP) is required by the Maine Department of Environmental Protection (MEDEP). The site must develop a Stormwater Pollution Prevention Plan (SWPPP) under the MSGP. The purpose of the SWPPP is to identify potential pollutant sources (PPSs) that may contaminate stormwater as well as non-structural and structural control measures needed to reduce pollutants in stormwater.

NEWSME submitted a Notice of Intent (NOI) for coverage under the MSGP. Copies of the NOI submitted by NEWSME, the MEDEP NOI Approval Letter, and the MSGP are provided in **Appendices A, B**, and **C**, respectively.

2.0 POLLUTION PREVENTION TEAM

The Stormwater Pollution Prevention Team is responsible for the following:

- Coordinating and implementing all stages of SWPPP development;
- Coordinating employee training programs;
- Keeping all records and ensuring that reports are submitted;
- Reviewing changes to site operations and updating the SWPPP, as necessary;
- Implementing the control measures and preventive maintenance program;
- Overseeing good housekeeping activities; and
- Conducting monitoring and inspections.

Table 1 – Juniper Ridge Landfill – Alton, ME	
Pollution Prevention Team	
Name	**Responsibilities**
Wayne Boyd/ Jeffrey Pelletier	Coordinating and implementing all stages of SWPPP development.
Jeffrey Pelletier	Coordinating employee training programs, keeping all records, and ensuring that reports are submitted.
Jeffrey Pelletier	Reviewing changes to site operations and updating the SWPPP when necessary.
Steve Emerson Jeffrey Pelletier Kurtis Brown Mike Abbotte Lou Pizzuti	Implementing the control measures and preventive maintenance program, overseeing good housekeeping activities, and conducting monitoring and inspections.

3.0 SITE DESCRIPTION AND EVALUATION

3.1 Site Description

NEWSME operates a solid waste landfill located south of Route 16 in Alton, Maine, immediately west of Interstate 95. The facility comprises a scale house and two scales, vehicle/equipment parking area, a maintenance building with an attached office/operators breakroom, a landfill gas (LFG) treatment facility, a Renewable Natural Gas (RNG) facility (owned and operated by Archaea Energy, Inc.), a foam production system for daily cover, a wood waste transfer station (grinding operated by a third party), a leachate storage tank, a leachate hauler truck loading station, the Rubb Building, several soil stockpile areas, sand and salt storage, groundwater and surface water monitoring locations, a landfill perimeter access road and security fencing. Operations at the facility include:

- Landfilling of solid waste;
- Leachate and methane gas collection;
- LFG treatment;
- RNG processing;
- Foam production system for daily cover;
- Wood waste grinding;
- Limited equipment repair and maintenance; and
- Administration.

Figure 2 and 3, Site Plan, and **Outfall Drainage Boundaries** shows the following details as applicable:

- Boundaries of the property and the size of the property in acres (see **Figure 3**);
- Location and extent of significant structures and impervious surfaces;
- Directions of stormwater flows;
- Locations of all stormwater control measures;
- Locations of all receiving waters, including wetlands, in the immediate vicinity of the site;
- Locations of all stormwater conveyances including catch basins, ditches, pipes, and swales;
- Locations of potential pollutant sources;
- The location of all wastewater or process water containment tanks;
- Locations where significant spills or leaks identified have occurred within the past three years (areas of frequent spills with >3 spills/year or areas with large spills of > 10 gallons);
- Locations of all stormwater monitoring points;
- Locations of stormwater inlets and outfalls (with a unique identification code for each) and an approximate outline of the areas draining to each outfall: and

- Locations of the following activities where such activities are exposed to precipitation:
  - fueling stations;
  - vehicle and equipment maintenance and/or cleaning areas;
  - loading/unloading areas;
  - locations used for the treatment, storage, or disposal of wastes;
  - liquid storage tanks;
  - processing and storage areas;
  - immediate access roads used or traveled by carriers of raw materials;
  - transfer areas for substances in bulk;
  - machinery;
  - active and closed landfill cells or trenches;
  - active and closed land application areas;
  - locations where open dumping is occurring or has occurred;
  - locations of leachate springs or areas where uncontrolled leachate may commingle with runoff; and
  - leachate collection and handling systems.

3.2 Sector-Specific Requirements

NEWSME is subject to additional requirements set forth in Appendix L of the MSGP for Industry Sector L - Landfills and Land Application Sites (see **Appendix D MSGP Sector Specific Requirements**). A list of the specific requirements for this sector is provided below. Each is addressed in the appropriate sections of this plan.

- Covered Stormwater Discharges
- Industrial Activities Covered by Sector L
- Limitations on Coverage
- Definitions
- Additional Technology-Based Effluent Limits
- Additional SWPPP Requirements
- Additional Inspection Requirements
- Additional Post-Authorization Documentation Requirements
- Sector-Specific Benchmarks
- Effluent Limitations Based on Effluent Limitations Guidelines

This MSGP authorizes stormwater discharges from landfills that receive or have received industrial waste including sites subject to Subtitle D of the Resource Conservation Recovery Act (RCRA).

The following sites and discharges are not authorized under this permit:

- Landfills that receive only municipal wastes;

- Any leachate, gas collection condensate, drained free liquids, contaminated groundwater, laboratory wastewater, and contact wash water from washing truck and railcar exteriors and surface areas that have come in direct contact with solid waste at the landfill; and
- Discharges from open dumps as defined under RCRA.

3.3 Direction of Stormwater Runoff and Receiving Waters

There are nine point source discharges of stormwater identified at the site (Nos. 1, 2, 3, 4, 5, 6, 7, 8 and 9) all of which discharge from onsite drainage features to an unnamed tributary of Pushaw Stream.

On the west side of the facility, the majority of runoff is directed to detention ponds allowing for sediment to settle prior to controlled discharge to offsite receiving waters. On the east side of the facility, runoff is either directed through a detention pond, east of the maintenance building area, or through a series of drainage ditches and culverts, then discharged to offsite receiving waters. On the northern side of the facility, runoff is directed through a series of check damns and through a detention pond prior to flowing through an outlet structure and discharging to offsite receiving waters. Precipitation falling onto the active landfill cell is collected in the leachate collection system.

Detention Pond 1 outlet is designated as Outfall No. 1. Detention Pond 2 outlet is designated as Outfall No. 2. Outfall No. 3 has been made active again and is described below. Stormwater falling in the area of the former outlet now sheetflows offsite. Detention Pond 6 outlet is designated as Outfall No. 4. Stormwater from these ponds ultimately flows to an unnamed tributary of Pushaw Stream.

Stormwater that falls in the area of the maintenance building, the gravel laydown areas, the permitted wood waste handling area, the landfill gas treatment area and the drainage ditch that runs along the access road northeast of Cell 11 Stage 2 of the landfill flow to Detention Pond 9, which has an outlet designated as Outfall No. 5. Stormwater falling in the area of the RNG facility flows into the RNG facility stormwater pond, which drains into Detention Pond 9, discharging through Outfall No. 5.

Stormwater that falls north of Cell 11 Stage 2 of the landfill flows into Detention Pond 10, which has an outfall designated as Outfall No. 6.

Stormwater that falls in the northwest portion of the facility flows through a series of check dams to Detention Pond 11, which discharges through an outfall designated as Outfall No. 7.

Stormwater from portions of the landfill cover systems flow to a geomembrane-lined storage pond, which is adjacent to Detention Pond 1. This storage pond was used for storage of landfill leachate before the construction of the leachate storage tank. Stormwater collected within the geomembrane-lined storage pond is pumped via forced main to a clean water

loading rack adjacent to Detention Pond 1. Water trucks used for site dust control are filled at this loading rack.

Stormwater falling between the Cell 4 pump station and Cell 5 pump station and a portion of lower landfill Cell 4 is directed to a culvert, designated as Outfall No. 8. Outfall No. 8 also receives flow from the access road.

Stormwater falling on the outside edge of Cell 16 is directed to a perimeter ditch which contains a catch basin. This catch basin discharges to a culvert designated as Outfall No. 9.

Stormwater falling to the west of Cell 16 and along the temporary maintenance road is directed to a culvert which discharges to a riprap level spreader, designated as Outfall No. 3. Outfall No. 3 was previously designated as the outlet to Detention Pond 5, which was removed for the construction of Cell 16.

Stormwater falling within the leachate storage tank containment berm is contained, then discharged (as appropriate) to a riprap apron southwest of the leachate storage tank area. This stormwater eventually flows to Detention Pond 6 and discharges out of Outfall No. 4.

A summary description of stormwater runoff by industrial area or activity is provided in Section 4.1.

3.4 Representative Outfalls

The site does not have any representative outfalls. Representative outfalls are defined as two or more outfalls within a single drainage area that receive a discharge from a substantially similar industrial activity.

4.0 POTENTIAL POLLUTANT SOURCES

4.1 Potential Pollutant Sources by Industrial Area/Activity

A description of industrial areas/activities that have the potential to be exposed to stormwater are described in the table below and depicted on **Figure 2, Site Plan**.

Table 2 – Juniper Ridge Landfill – Alton, ME			
Potential Pollutant Sources			
Industrial Area/Activity	**Description**	**Pollutants**	**Direction of Stormwater Runoff**
Scale House and Scale	Trucks coming in and leaving the facility are weighed on the scale.	Diesel, Gasoline, Antifreeze, Sediment and Suspended Solids	Stormwater runoff in this area sheetflows to the east and west into wooded areas.
Soil Stockpile Areas	This area is where soil that will be used through the facility either as cover for the landfill, or for erosion control purposes, is stored prior to use.	Sediment and Suspended Solids	Stormwater runoff in this area sheetflows to the northeast toward a natural drainage channel located to the northeast.
Borrow Pit	This is a permitted area where material (soil, gravel or sand) is excavated for use at other locations.	Sediment and Suspended Solids	Stormwater runoff in this area sheetflows to the northeast toward a natural drainage channel located to the northeast.
Wood Waste Handling Area	Wood waste is stored in this permitted area prior to being used as cover material for the active landfill cells, road-base, or being shipped offsite.	Particulate Matter, Sediment and Suspended Solids	Stormwater runoff in this area is directed to Detention Pond 9 and discharges out of Outfall No. 5.

Table 2 – Juniper Ridge Landfill – Alton, ME			
Potential Pollutant Sources			
Industrial Area/Activity	**Description**	**Pollutants**	**Direction of Stormwater Runoff**
Maintenance Building with attached office/operator's breakroom	Limited equipment repair and maintenance is done within the maintenance building. Parts and tires are stored in the building. There is a parts washer within the building as well. Various chemicals are stored in the maintenance building: truck batteries, oxygen cylinders, one 500-gallon hydraulic oil AST, one 500-gallon motor oil AST, one 275-gallon used oil tote, five to ten 55-gallon drums, five to ten 5-gallon buckets with various oils, lubricants, windshield wash fluid, and antifreeze/coolants. There is also one flammable cabinet with various paints, parts cleaners and varnishes. There are floor drains within the maintenance building that flow to a 2,000-gallon underground storage tank (UST).	Gasoline, Hydraulic Oil, Transmission Oil, Grease, Solvents, Metals, Acid, Maintenance Chemicals and Antifreeze	Stormwater runoff in this area is directed to Detention Pond 9 and discharges out of Outfall No. 5.

Table 2 – Juniper Ridge Landfill – Alton, ME			
Potential Pollutant Sources			
Industrial Area/Activity	**Description**	**Pollutants**	**Direction of Stormwater Runoff**
Rubb Building	The Rubb Building is located next to the maintenance building and is used to store parts and tires. It is also used to convert pre-manufactured plastic piping to landfill gas transport piping. Various chemicals are stored in the Rubb building. Truck batteries, one 275-gallon tote of odor control liquid, five to ten 55-gallon drums with various oils, lubricants, windshield wash fluid, and antifreeze/coolants. There are also two flammable cabinets with various paints, parts cleaners and varnishes.	Batteries, Oil, Grease, Solvents, Metals, Odor Control Liquid, Maintenance Chemicals and Antifreeze	Stormwater runoff in this area is directed to Detention Pond 9 and discharges out of Outfall No. 5.
LFG Treatment Facility	The LFG treatment facility takes the LFG that is captured via extraction wells throughout the landfill, cleans it, and then sends LFG to the RNG facility. When the RNG facility is down, LFG is burned through the flare.	Caustic, Anti-Foam, Odor Control Spray, Solvents, Oil and Grease	

Table 2 – Juniper Ridge Landfill – Alton, ME			
Potential Pollutant Sources			
Industrial Area/Activity	**Description**	**Pollutants**	**Direction of Stormwater Runoff**
RNG Facility	This site is owned and operated by Archaea Energy, Inc. This site is approximately 2-acres and was constructed within the existing boundaries of the landfill. The facility consists of equipment skids used to process landfill gas into RNG. There are two vegetable oil-filled transformers, a diesel fuel AST to fuel onsite generators, and other ancillary equipment located at the facility on concrete pads. There is a 550-gallon oil/water separator onsite.	Sediment and Suspended Solids, Vegetable Oil, Dielectric Fluid, Compressor Oil, Used Oil, and Diesel Fuel	Stormwater runoff in this area flows to the RNG Facility Stormwater Pond, which flows into Detention Pond 9 and discharges out of Outfall No. 5. Archaea Energy, Inc. has the ability to close off the outlets from the RNG Facility Stormwater Pond in the event of a significant release.
Leachate Storage Tank	Leachate that is collected from the landfill is stored in a 900,000-gallon tank.	Leachate	Stormwater falling within the leachate storage tank containment berm is contained, then discharged (as appropriate) to a riprap apron southwest of the leachate storage tank area. This stormwater eventually flows to Detention Pond 6, and discharges out of Outfall No. 4.

Table 2 – Juniper Ridge Landfill – Alton, ME			
Potential Pollutant Sources			
Industrial Area/Activity	**Description**	**Pollutants**	**Direction of Stormwater Runoff**
Leachate Loading Rack	Leachate is pumped from the leachate storage tank to tanker trucks at the leachate loading rack for offsite disposal. Overflow or spillage of leachate at the loading rack flows by gravity to a catch basin, and then through piping to a pump station that pumps leachate back to the leachate storage tank.	Leachate, Diesel, Antifreeze, Sediment and Suspended Solids	Stormwater falling in this area would flow into the containment berm for the leachate storage tank, which discharges to a riprap apron southwest of the leachate storage tank area. This stormwater eventually flows to Detention Pond 6 and discharges out of Outfall No. 4.
Leachate Collection System	Leachate collected within the landfill's leachate collection system is conveyed by gravity to pumping areas (sumps) within the landfill. The leachate is pumped from the sumps through force mains to the leachate-storage tank.	Leachate	Stormwater collected within the completely enclosed leachate collection system is pumped into the 900,000-gallon leachate storage tank.
Access Roads	Access roads run throughout the site.	Diesel, Gasoline, Antifreeze, Litter, Sediment and Suspended Solids	Runoff flows into various drainage channels discharging at all outfalls.
Gravel Laydown Area	Facility equipment is parked in this area when not in use.	Diesel, Gasoline, Antifreeze, Sediment and Suspended Solids	Stormwater runoff in this area is directed to Detention Pond 9 and discharges out of Outfall No. 5.

Table 2 – Juniper Ridge Landfill – Alton, ME			
Potential Pollutant Sources			
Industrial Area/Activity	**Description**	**Pollutants**	**Direction of Stormwater Runoff**
Employee Parking Area	Multiple employee vehicles are parked in this area during operating hours.	Diesel, Gasoline, Antifreeze, Sediment and Suspended Solids	Stormwater runoff in this area sheetflows to the northeast toward a natural drainage channel located to the northeast.
1,500-Gallon Gasoline Tank	This tank may be used to fuel onsite vehicles.	Gasoline	Stormwater runoff in this area is directed to Detention Pond 9 and discharges out of Outfall No. 5.
2,500-Gallon Diesel Delivery Truck	This truck is used to fuel onsite equipment and is parked to the south of the Maintenance Building when not in use. The fuel storage tank on the truck is filled onsite by an oil delivery company.	Diesel	Stormwater in this area goes to the leachate collection system which is pumped into the 900,000-gallon leachate storage tank.
Salt and Sand Storage Area	Salt and sand storage beneath a tarp next to the landfill scales, utilized for road treatment in the winter season.	Salt, Sediment, and Suspended Solids	Stormwater falling in this area would flow to the southwest to the wetland located between the scales and the landfill.

Table 3 – Juniper Ridge Landfill – Alton, ME Sector-Specific Potential Pollutant Sources			
Industrial Area/Activity	**Description**	**Pollutants**	**Direction of Stormwater Runoff**
Fertilizer, Herbicide, and Pesticide Application Areas	None applied	Not applicable	Not applicable
Earth and Soil Moving Areas	There are multiple soil stockpile areas used for landfill cover and erosion control, a permitted borrow pit where material (soil, gravel, or sand) is excavated for use at other locations.	Sediment and Suspended Solids	Stormwater runoff in this area sheetflows to the northeast toward a natural drainage channel located to the northeast.
Waste Hauling and Loading/Unloading Areas	Waste brought into the facility is directed to active portions of the landfill. Salt used during winter conditions is also stored in this area.	Leachate, Sediment, Suspended Solids and Salt	Stormwater in this area goes to the leachate collection system which is pumped into the 900,000-gallon leachate-storage tank.
Outdoor Storage of Significant Materials (Includes daily, interim, and final cover material stockpiles as well as temporary waste storage areas.)	There are multiple soil stockpile areas used for landfill cover and erosion control, a permitted borrow pit where material (soil, gravel, or sand) has been excavated for use at other locations, and a wood-waste handling area, all located on the northeast side of the facility.	Sediment and Suspended Solids	Stormwater runoff in this area sheetflows to the northeast toward a natural drainage channel located to the northeast.

Table 3 – Juniper Ridge Landfill – Alton, ME Sector-Specific Potential Pollutant Sources			
Industrial Area/Activity	**Description**	**Pollutants**	**Direction of Stormwater Runoff**
Exposure of Active and Inactive Landfill and Land Application Areas	There are portions of the landfill where final cover has been applied and is inactive, while there are other portions that are active.	Leachate, Sediment and Suspended Solids	Stormwater in this area goes to the leachate collection system which is pumped into the 900,000-gallon leachate storage tank.
Uncontrolled Leachate Flows	Uncontrolled leachate flows are unlikely, due to the design of the site's leachate collection system, the secondary containment provided at the leachate loading rack, and leachate-storage tank.	Leachate	
Failure or Leaks from Leachate Collection and Treatment Systems	Leachate collected within the landfill's leachate collection system is conveyed by gravity to pumping areas (sumps) within the landfill. The leachate is pumped from the sumps through force mains to the leachate-storage tank. A failure of the system is unlikely.	Leachate	
Foam Utilized for Daily Cover	An Atmos Bulk Storage and Dilution System located north of the landfill produces Atmos Alternative Daily Cover foam which is applied by a pneumatic foam unit.	Surfactants	Stormwater in this area sheet flows north to a wooded area and eventually to the adjacent wetlands.

Note: Includes significant materials handled, treated, stored, and exposed in prior three years.

4.2 Wastewater/Process Water Containment

The following wastewater and/or process water storage tanks are present at the site.

Table 4 – Juniper Ridge Landfill – Alton, ME		
Wastewater/Process Water Containment Tanks		
Tank	**Description**	**Pollutants**
900,000-Gallon Leachate Tank	This tank is used for the storage of leachate collected from the landfill and to supply tank trucks for offsite disposal of leachate. The tank is equipped with a level transducer that constantly monitors the level in the tank.	Leachate
2,000-Gallon Underground Holding Tank	The maintenance building has floor drains that flow to a 2,000-gallon holding tank.	Gasoline, Hydraulic Oil, Transmission Oil, Grease, Solvents, Metals, Acid, Maintenance Chemicals and Antifreeze

The 900,000-gallon leachate tank is equipped with a level sensor and alarm to signal an overflow or leak.

4.3 Spills and Leaks

In April 2025, approximately 2 gallons of diesel fuel dripped along the east side paved access road to the scales. The spill was caused by a ruptured fuel line.

In June 2024, approximately 4 gallons of hydraulic oil was spilled due to a hydraulic hose burst on a skid steer in front of the wood waste handling area.

Later in June 2024, approximately 5 gallons of hydraulic oil was dripped/spilled on the east side paved access road from the JRL shop to the east/west access road intersection. The spill was caused by a ruptured hydraulic line.

In May 2024, approximately 20 gallons of diesel fuel was spilled while Archaea was refueling onsite generators. The spill was located on a gravel pad in the Archaea RNG Area.

In April 2024, approximately 1 gallon of antifreeze was spilled by a third-party hauling truck. This spill occurred on the access road in front of Detention Pond 11.

Also in April 2024, approximately 20 gallons of oily water misted out of the top of the Archaea LFG flare during the plant commissioning process. The oil source was blowby from

a leaking seal in process equipment. The spill was located on a gravel pad near the Archaea RNG Flare.

In November 2023, approximately 4 gallons of hydraulic oil was spilled along the Cell 15 access road due to a ball valve release by a third party hauling truck.

In September 2023, approximately 5 gallons of diesel was spilled into Cell 15 due to a fuel tank release by a third-party hauling truck.

In May 2023, approximately 3 gallons of hydraulic oil was spilled by the scale due to a hydraulic line break in a third-party hauling truck.

In October 2022, heavy precipitation (3.8 inches in two days) caused roughly 500 gallons of leachate to trickle into a stormwater ditch along the west road. The spill was caused when a stormwater culvert plugged, overwhelming the area with water.

In each instance, the spill was promptly cleaned up and the Maine DEP was notified within 2 hours of the spill occurring.

All spills or leaks are documented using the **Spill Reporting Form** in **Appendix E**. These records will be kept onsite with the SWPPP. Locations where significant spills and leaks have occurred are also shown on **Figure 2, Site Plan**. Spill prevention and response procedures are discussed further in Section 5.5.

4.4 Non-Stormwater Discharges

The site has been evaluated for unauthorized non-stormwater discharges. The site must conduct an initial inspection for new non-stormwater discharges. Documentation for this inspection is provided in **Appendix F Initial Evaluation of Non-Stormwater Discharges**, which includes:

- The date of the evaluation;
- A description of the evaluation criteria used;
- A list of the outfalls or onsite drainage points that were directly observed during the evaluation; and
- The action(s) taken, or list of control measures used to eliminate unauthorized discharge(s), or documentation that a separate MEPDES permit was obtained.

A list of potential and authorized non-stormwater discharges at the site is provided in the table below.

Table 5 – Juniper Ridge Landfill – Alton, ME		
Non-Stormwater Discharges		
Allowable/Potential Non-Stormwater Discharges	**Status**	**Best Management Practices**
Firefighting activities	Not Applicable	Not Applicable
*Fire hydrant flushings	Not Applicable	Not Applicable
*Potable water, including water line flushings	Not Applicable	Not Applicable
Uncontaminated condensate from air conditioners, coolers, other compressors, and outside storage of refrigerated gases or liquids	Not Applicable	Not Applicable
Irrigation drainage	Not Applicable	Not Applicable
**Landscape watering	Not Applicable	Not Applicable
Routine external building wash-down/power wash water not contaminated with detergents or hazardous cleaning products	Not Applicable	Not Applicable
Uncontaminated groundwater and springs	Not Applicable	Not Applicable
Uncontaminated utility vault dewatering	Not Applicable	Not Applicable
Water from building foundations or footings not contaminated by contact with process materials	Not Applicable	Not Applicable
Incidental mist from cooling towers that collects on roofs or adjacent portions of the site	Not Applicable	Not Applicable
Incidental water that does not contain detergents from onsite rinse stations	Not Applicable	Not Applicable
Incidental condensed steam that does not contribute to violations of water quality standards	Not Applicable	Not Applicable
Wash water from cleaning roads, parking lots, sidewalks or other paved surfaces that does not contain detergents, hazardous cleaning products, oil & grease, or toxic pollutants	Not Applicable	Not Applicable

Table 5 – Juniper Ridge Landfill – Alton, ME		
Non-Stormwater Discharges		
Allowable/Potential Non-Stormwater Discharges	**Status**	**Best Management Practices**
***Wash water from vehicles and equipment cleaning	Not Applicable	Not Applicable
Non-stormwater discharges explicitly authorized in Sectors A through AD	Not Applicable	Not Applicable

*Must not contribute to a violation of MEDEP water quality standards and be documented in the SWPPP.
**provided any pesticides, herbicides, and fertilizers have been applied in accordance with MEDEP regulations.
***Wash water from the cleaning of engines, undercarriages, and transmissions is prohibited. All wash water from the interior of truck trailers or other large commodity carrying containers must be collected and discharged to the POTW.

5.0 STORMWATER CONTROL MEASURES

This section describes stormwater controls that are in place or that will be implemented to control pollutants having the potential to impact stormwater quality. In accordance with Section L of the MSGP, the following criteria were taken into consideration in the selection of Best Management Practices intended for compliance with applicable Non-Numeric and Numeric Technology-Based Effluent Limitations.

5.1 Best Management Practices (BMPs)

When selecting and designing BMPs for the site, the following parameters must be considered:

1. Preventing stormwater from coming into contact with significant materials;
2. Using control measures in combination to minimize pollutants in stormwater discharges;
3. The quantity and nature of potential pollutant sources, and potential to impact the water quality of the receiving waters;
4. Opportunities to offset stormwater and temperature impacts from impervious areas on dry weather flows and low flow situations to streams;
5. Minimizing impervious areas at the site and infiltrating runoff onsite;
6. Conserving and/or restoring riparian buffers;
7. Attenuating flow using open vegetated swales and natural depressions; and
8. Use of treatment interceptors (e.g., swirl separators and sand filters) to minimize the discharge of pollutants.

5.2 Non-Structural BMPs

Descriptions of non-structural control measures are provided in the table below.

Table 6 – Juniper Ridge Landfill – Alton, ME	
Non-Structural Best Management Practices	
Non-Structural BMPs	**Description**
Minimizing Exposure There are operations in place to minimize the exposure of industrial activities and materials at the site to stormwater.	• Grading, berming, and/or curbing is used to prevent runoff of contaminated flows and divert run-on away from these areas; • Materials, equipment, and activities are located such that potential leaks and spills are contained or able to be contained or diverted before discharge; • Spills or leaks are cleaned up promptly upon discovery using dry methods (e.g., absorbents) and disposed of properly; • In the event of leaky vehicles or equipment, indoor storage may be provided, or drip pans and absorbents are used; • Fluids must be drained from vehicles and equipment that are to be decommissioned, and quarterly inspections are performed on any that will remain unused for extended periods of time; and • Industrial materials and activities are performed inside or are protected with storm-resistant coverings, if feasible. • An Atmos Bulk Storage and Dilution System located north of the landfill produces Atmos Alternative Daily Cover foam which is applied by a Morooka-based pneumatic foam unit.

Table 6 – Juniper Ridge Landfill – Alton, ME Non-Structural Best Management Practices	
Non-Structural BMPs	**Description**
Good Housekeeping Good housekeeping measures are performed to avoid or minimize pollutant exposure to stormwater.	• Routine sweeping is performed; • Containers that could be susceptible to spillage or leakage are clearly labeled; • Materials are properly placed, stored, and contained; • Onsite sources of dust are identified and controlled to minimize stormwater contamination with stormwater collected within the geomembrane-lined storage pond adjacent to Detention Pond 1. This stormwater is pumped via forced main to a clean water loading rack adjacent to Detention Pond 1. Water trucks used for site dust control are filled at this loading rack; • Soils are stabilized to prevent erosion; • Dumpsters are covered and kept closed when not in use or for those containers without lids, adequate secondary containment is provided, as practicable; • Snow storage and disposal areas are operated to minimize pollutant runoff; and • Exposed areas are kept free of waste, garbage, and floatable debris to prevent their discharge to receiving waters.
Preventive Maintenance A preventive maintenance program is implemented to maintain all control measures at the site.	• Inspections and maintenance of stormwater management devices are performed in a timely matter; • Proper spill equipment supplies are maintained near where spills could occur; and • Site equipment and systems are inspected, tested, maintained, and repaired to avoid breakdowns or failure that may result in releases of potential pollutants to surface waters.
Spill Prevention Spill prevention and cleanup procedures have been established and are available to employees who may cause or encounter a spill or leak.	• Containers 55 gallons or greater that are susceptible to leaking or spillage are labelled; • Procedures have been implemented for material storage and handling; • Procedures for quick response to stop leaks, spills, and other releases have been implemented; • Training for employees for detecting and responding to a spill is provided; • Notification procedures for emergency response and regulatory agencies are in place; and • Documentation is included in the SWPPP files.

Table 6 – Juniper Ridge Landfill – Alton, ME	
Non-Structural Best Management Practices	
Non-Structural BMPs	**Description**
Employee Training Annual employee training is provided for employees who work in areas where industrial materials or activities are exposed to stormwater and those responsible for implementing activities identified in the SWPPP.	• An overview of the SWPPP contents; • Spill response procedures, good housekeeping, maintenance requirements, and material management practices; • The location of all controls required by the MSGP, and how they are maintained; • Proper procedures to meet pollution prevention requirements; and • When and how to conduct inspections, record findings, and take corrective actions.
Sector-Specific Requirements	
The requirements in Sector L apply to stormwater discharges associated with industrial activity from Landfills, Land Application Sites, and Open Dump facilities as identified by the SIC/NAICS Codes specified in Attachment A of the MSGP. Technology-based effluent limits for this Sector are addressed below when applicable.	
Preventative Maintenance Program Sector-specific requirements are included in the preventative maintenance program.	• All elements of leachate collection and treatment systems to prevent the commingling of leachate with stormwater; and • The integrity and effectiveness of any intermediate or final cover, including any repairs, to minimize the effects of settlement, sinking, and erosion.

5.3 Structural BMPs

Descriptions of structural control measures are provided in the table below. See **Figure 2**, **Site Plan** for locations of structural BMPs.

Table 7 – Juniper Ridge Landfill – Alton, ME	
Structural Best Management Practices	
Structural BMPs	**Description**
Sediment and Erosion Control For areas at the site having a potential for significant or persistent soil erosion, dust generation or vehicle tracking (if applicable).	Structural BMPs include: • Hay bales • Silt fence • Rip rap • Swales • Buffers • Bark mulch sediment berms • Stone
Stormwater Structural Devices Permanent structural BMPs other than those which control the generation or source(s) of pollutant(s.)	Structural BMPs include: • Drainage channels/check dams • Rip-rap and level spreaders • Bark mulch sediment berms • Silt fence • Hay bales • Sedimentation/detention ponds • Litter fencing • Intermediate or final cover • Liner and leachate collection system
Sector-Specific Requirements	
Structural BMPs	**Description**
Sediment and Erosion Control Minimize erosion from the site by utilizing temporary stabilization practices*.	Structural BMPs include: • Seeding • Mulching • Geotextiles • Stone

*Ensure that sediment and erosion control are utilized in the following areas:

1. Materials stockpiled for daily, intermediate, and final cover;
2. Inactive areas of the landfill or open dump;
3. Landfills or open dump areas that have final covers but where vegetation has yet to be established; and
4. Land application sites where waste application has been completed, but final vegetation has not been established.

Employees are trained on the following when hired, and annually thereafter:

1. An overview of the SWPPP;
2. Spill response procedures, maintenance requirements, and material management practices;
3. The location of all controls on the site required by the MSGP, and how they are to be maintained;
4. The proper procedures to follow with respect to the MSGP's pollution prevention requirements;
5. When and how to conduct inspections, record applicable findings, and take corrective actions;
6. Used and spent oil solvent management;
7. Fueling procedures;
8. General good housekeeping practices; and
9. Used battery management.

Training is documented on the SWPPP Training Log, copies of which are kept in the SWPPP files. A copy of a blank **SWPPP Training Log** is provided in **Appendix G**.

5.4 Spill Prevention and Response

Spills or leaks are recorded on the **Spill Reporting Form** (**Appendix E**); copies of which are kept in the SWPPP files. Materials used to address spills such as absorbent pads are shown on **Figure 2, Site Plan**. When a petroleum or hazardous substance spill event takes place, the following actions should be taken in the sequence indicated:

When a spill event takes place, the following actions should be taken in the sequence indicated:

1. For a <u>minor spill</u> that can be immediately contained by site personnel using onsite spill control equipment and materials, the following spill containment and countermeasure procedures should be implemented:

    a. Immediately upon observing an oil spill, find the source and take any corrective action required to stop the flow, including, as necessary, shutting down any operations that are contributing to the spill or may increase the hazard potential.
    b. Notify nearby employees (if any) of the spill and the possible hazards.
    c. Contain the spill using containment devices such as absorbent booms or remove the discharge via use of absorbent pads and/or granular absorbent material.
    d. Notify the Pollution Prevention Team, who will notify local, state and federal agency representatives as appropriate.
    e. Proceed quickly with recovery and clean-up measures using absorbent pads and/or granular absorbent material. Take measures to prevent the spill from entering the drainage system.

f. Use the **Spill Reporting Information Form** in **Appendix E** to record the spill information.

2. For a major spill that cannot be immediately contained by site personnel using onsite spill control equipment and materials:

   a. Follow the steps a through c and e above to the extent that these actions can be performed safely.
   b. Immediately notify the Pollution Prevention Team or facility emergency contact who will notify the offsite response contractor, and the appropriate local, state and federal agency representatives.
   c. Containment and clean-up activities must continue until the facility emergency contact, and the local, federal and/or state agency representatives agree that such activities may be discontinued.

Contaminated cleanup materials must be handled and disposed of in accordance with applicable state and federal requirements. Petroleum impacted pads or booms containing free liquids must be disposed of by a licensed response contractor. The management of cleanup materials contaminated by hazardous substances other than petroleum-impacted materials depends on the type of hazardous substance.

6.0 MONITORING REQUIREMENTS

6.1 Monitoring

Stormwater samples must be collected during a "Qualifying Storm Event" as defined in the MSGP as precipitation or ice/snow melt waters that produce a measurable discharge of 0.1 inch or more within a 24-hour period at an outfall at least 72 hours from a previous qualifying storm event.

In the event that a Qualifying Storm Event does not occur during an entire calendar quarter, it must be documented that there was no discharge to sample.

6.2 Summary of Monitoring Data from Previous Permit Term

Available Quarterly Visual Monitoring Reports from the previous MSGP permit term (2011-2016) were reviewed and results indicate normal stormwater quality at the site. Sediment was occasionally observed in samples collected from Outfall Nos. 1-2 and 4-5 which prompted periodic cleanup of the facility swales throughout the permit period.

Visual monitoring must be performed once per calendar quarter.

Samples must be collected as follows:

- During a storm event that produces a discharge at the outfall, or in the case of snowmelt, during a period with a measurable discharge from the outfall;
- Sample(s) must be taken within the first 60 minutes, and no more than 2.25 hours following the beginning of the discharge. If a sample cannot be collected within the first 60 minutes, the reason must be documented;
- Samples must be representative of the discharge;
- Samples must be collected in a clean, colorless glass or plastic container and examined in a well-lit area;
- Samples must be collected during normal business hours; and
- The samples must be visually inspected for:
    - Color;
    - Odor;
    - Clarity;
    - Floating solids;
    - Settled solids;
    - Suspended solids;
    - Foam;
    - Oil sheen; and
    - Other obvious indicators of stormwater pollution.

Visual assessments must be performed and documented in accordance with standard operating procedures outlined in MEDEP document **DEPLW0768, Visual Monitoring of Stormwater Discharges Associated with Industrial Activity**, provided in **Appendix H**, copies of which are kept in the SWPPP files.

The visual monitoring is documented on a blank **Quarterly Visual Monitoring Form** provided in **Appendix I**. The Quarterly Visual Monitoring Form will be signed and certified by a "Responsible Corporate Officer." A copy of each completed form will be maintained with the SWPPP files.

If no qualifying stormwater discharge event occurs during a calendar quarter, then the site must document that there was no discharge to sample. The record must be maintained with the SWPPP.

6.3 Sector-Specific Benchmark Monitoring

Benchmark monitoring is required for certain industry sectors. The site is not regulated under these sectors, therefore benchmark monitoring is not required.

6.4 Numeric Technology-Based Effluent Limitation Monitoring

Numeric effluent limitation monitoring is required for Sections A, C, D, E, H, J, K, L, O and S (MSGP Section I). The site is regulated under sector L, however per 40 CFR 455 Subpart B there are no contaminated stormwater discharges, therefore numeric effluent limitation monitoring is not required at this site.

6.5 Impaired Waters Monitoring

The MEDEP will determine whether a facility discharges to an impaired water based on receiving water information provided by the applicant on the NOI form. If the receiving water is determined to be impaired, the MEDEP may require additional monitoring to ensure stormwater discharges comply with applicable water quality laws and this MSGP.

6.6 Routine Site Inspections

Routine inspections must be performed on a quarterly basis with at least one inspection per year completed during a period when a stormwater discharge is occurring. The inspections cover:

- Areas where industrial materials or activities are exposed to stormwater;
- Areas identified in the SWPPP and those that are PPSs;
- Areas where spills and leaks have occurred in the past three years;
- Discharge points; and
- Control measures used to comply with the requirements of the MSGP.

The results of the inspection are documented in a report that includes the date and time of inspection, the name and signature of the inspector(s), weather information (precipitation in the previous 72-hour time period), observations, assessment of structural control measures, corrective actions taken, and any incidents of noncompliance. A blank **Routine Inspection Form** is provided in **Appendix J**.

If any deficiencies are noted during the routine inspection or a visual assessment shows evidence of stormwater pollution, all reasonable steps must be taken during that same day to minimize any adverse effects.

If additional actions are necessary, the corrective actions must be completed prior to the next storm event if possible, and within 14 calendar days from the time of discovery of the corrective action condition. If this is not feasible, the reason for the delay must be documented and the improvement completed within 45 days of discovery. The MEDEP must be notified if completion will exceed the 45-day timeframe. The rationale for an extension and completion date must be included in the notification. If changes in the SWPPP are required, the plan must be modified with 14 calendar days of completing corrective action work.

6.7 Additional Sector-Specific Inspections

Sector L requires inspections to be conducted at the site at least once every seven days. These inspections should focus on the following areas, ensuring that sediment and erosion control measures are functioning properly:

- Areas of landfill that have not yet been finally stabilized;
- Land application and storage of material and wastes areas that are exposed to precipitation, stabilization, and structural control measures; and
- Locations where equipment and waste trucks enter and exit the site.

For stabilized sites and areas where land application has been completed, this inspection must be completed at least once every month (see **Appendix K, Weekly/Monthly Inspection Form**).

7.0 SWPPP REVIEW AND CORRECTIVE ACTIONS

7.1 SWPPP Review

The SWPPP must be reviewed and revised as necessary under any of the following conditions:

- An unauthorized release or discharge occurs;
- Control measures are not stringent enough for the discharge to meet applicable water quality standards or the non-numeric effluent limits (i.e., BMPs) in this permit;
- A required control measure was never installed, was installed incorrectly, or is not being properly operated or maintained;
- Whenever a visual assessment shows evidence of stormwater pollution;
- Monitoring, inspections, or investigations by local, state, or federal officials determine that the SWPPP in ineffective or that there is a discharge that could contribute to violation of a water quality standard; or
- There is a change in site design or construction or maintenance that significantly changes the nature or quantity of pollutants discharged.

All other amendments to the SWPPP must be completed within 30 days of discovery of the condition.

7.2 Corrective Actions

If any of the conditions in Section 7.1 are identified, then the following procedures must be implemented:

1. Immediate Actions**:** Immediately (on the same day), all reasonable steps necessary should be taken to minimize or prevent the discharge of pollutants until a permanent

solution is installed and made operational. If a problem is identified too late in the workday to initiate a corrective action, then the action must be initiated no later than the following workday.

2. Subsequent Actions: If it is determined that additional actions are necessary then they must be completed prior to the next storm event if possible, and within 14 calendar days from the time of discovery. If this is not feasible, the reason for the delay must be documented and the improvement completed within 45 days of discovery. The MEDEP must be notified if completion will exceed the 45-day timeframe. The rationale for an extension and completion date must be included in the notification.

If changes in the SWPPP are required, the plan must be modified with 14 calendar days of completing corrective action work.

7.3 Corrective Action Report (CAR)

A Corrective Action Report (CAR) must be a signed, certified report to document actions taken in response to triggering the need for corrective action review due to an exceedance of a water quality-based limitation, ambient water quality criterion, or a deficiency identified in a MEDEP inspection report.

The CAR must include the following information:

1. The existence of any of the conditions listed in Section 7.1 and a description of the condition triggering the need for corrective action review;
2. A description of any incident causing a spill or leak including: the material, date/time, amount, location, and reason that it resulted in a discharge of pollutants to waters of the state through stormwater or otherwise;
3. The date the condition was identified;
4. Description of immediate actions completed and measures to prevent recurrence;
5. A description of corrective actions to be taken as a result of the identified conditions;
6. The dates when each corrective action was initiated and completed, or expected to be completed; and
7. If the event occurred at a "substantially identical outfall" (e.g. representative) documentation that the need for corrective actions at the others was assessed must be included.

A blank **CAR** is provided in **Appendix L**. The CAR must be signed and certified. Maintain the CAR with the SWPPP. RECORDS AND RETENTION

The following documents must be kept onsite in accordance with Section M of the MSGP.

- A copy of the NOI submitted to the MEDEP (**Appendix A**);
- A copy of the NOI Approval issued by the MEDEP (**Appendix B**);

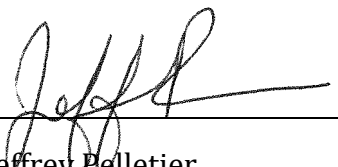
- A paper copy of the MSGP and any Sectors applicable to the site (**Appendix C & D**);
- Documentation of maintenance and repairs of control measures;
- All inspection reports and monitoring data required by the MSGP;
- Documentation of monitoring exceedances and response;
- A description of any deviations from the schedule for or timing of sampling and visual assessments and/or monitoring;
- Dates and descriptions of all spills and leaks;
- CARs and summary of completed actions;
- Impaired waters documentation of any determination that pollutants of concern are not expected to be above natural background levels;
- Documentation to support any determination that pollutants of concern are not expected to be present above natural background levels if discharging directly to Impaired Waters, and that these pollutants were not detected in the discharge or were solely attributable to natural background sources;
- Employee training records;
- Types of wastes disposed of in each cell or trench of a landfill or open dump; and
- For land application sites, records on a log of the types and quantities of wastes applied to specific areas.

Copies of the SWPPP, all reports, certifications and monitoring results, and records of all data used to complete the NOI must be retained from the beginning date of MSGP coverage through the date of renewed coverage under a subsequent permit or until a Notice of Termination is submitted to the MEDEP. These records will be made available to state or federal inspectors upon request.

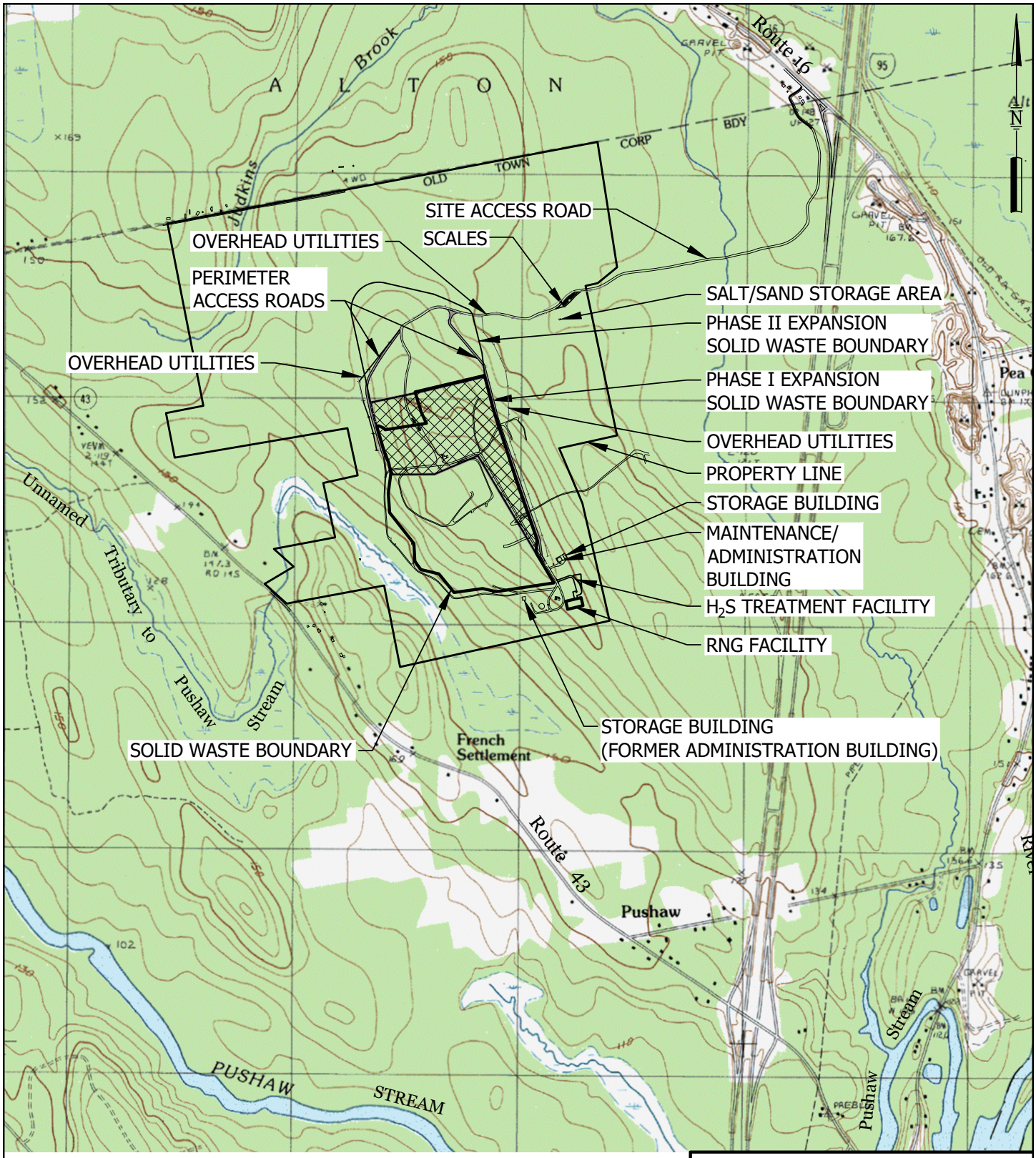
8.0 CERTIFICATION

It is the intention of NEWSME to conduct operations at the Juniper Ridge Landfill, 2828 Bennoch Road in Alton, Maine, in an environmentally safe and responsible manner. The goal of this SWPPP is to minimize the potential for pollution from stormwater discharges from entering waters of the State by minimizing the pollutants contained in stormwater discharges.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Signature:	
Name:	Jeffrey Pelletier
Title:	Environmental Manager
Date:	4/18/2025

FIGURES



NOTE:

BASE MAP ADAPTED FROM 7.5 MIN USGS TOPOGRAPHIC QUADRANGLE OLD TOWN, MAINE-1988

1000 0 2000 4000 FEET

DWG: SITELOC LMN: SITELOC CTB: SME-STD REV: 2/11/2025

SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
SEVEE & MAHER ENGINEERS

\\Nserver\cfs\Casella\OldTownLandfill\GeneralSiteInfo\OM\2024\ACAD\Figures\SITELOC.dwg, FIGURE, 2/11/2025 2:16:46 PM, sjm

MAY 2023 HYDRAULIC OIL SPILL
LANDFILL SCALES
SALT/SAND STORAGE AREA
APRIL 2025 DIESEL FUEL SPILL
2000 GALLON UNDERGROUND STORAGE TANK FOR FLOOR DRAINS
55 GALLON DRUMS ON SPILL PALLETS
PROPANE TANK
RUBB BUILDING
MAINTENANCE BUILDING 500 GALLON MOTOR OIL, 500 GALLON HYDRAULIC OIL, 275 GALLON WASTE OIL TANK, 55 GALLON DRUMS AND 5 GALLON PAILS ON SPILL PALLET
OUTFALL NO.5 (SEE FIGURE 3) (MONITORING LOCATION)
LEVEL LIP SPREADER OUTFALL NO. 6 (MONITORING LOCATION)
PERMITTED BORROW PIT
RNG FACILITY STORMWATER POND
270 GALLON MINERAL OIL TANK
PROCESS WATER SUPPLY WELL
RNG FACILITY SEE NOTE 8
MAY 2024 DIESEL FUEL SPILL
MAINTENANCE BLDG SEPTIC SYSTEM AND LEACHFIELD
GRAVEL LAYDOWN AREA
LFG TREATMENT FACILITY
CONDENSATE SETTLEMENT BASIN
CONDENSATE PUMP STATION
TEMPORARY LOCATION OF DIESEL FUEL TANK SEE NOTE 7
OUTFALL NO. 7 (MONITORING LOCATION)
LEVEL LIP SPREADER
BORROW PIT ACCESS ROAD
VEGETATIVE SOIL STOCKPILE
CELL 14 PUMP STATION
APPROXIMATE LANDFILL WASTE LIMIT
WOOD WASTE HANDLING AREA
APRIL 2024 OILY WATER SPILL
EXISTING GAS FLARE
DIESEL GENERATOR (366 GALLON DIESEL TANK)
ENERGY DISSIPATER
FUEL TRUCK
SPILL KIT
MAINTENANCE BLDG WELL
LEACHATE LOADING RACK
SPILL KIT
LEACHATE STORAGE TANK AND CONTAINMENT AREA
CATCH BASIN
VALVE
RIPRAP OUTLET
DUAL 24-INCH CULVERTS (TYP)
APRIL 2024 ANTIFREEZE SPILL
2ND JUNE 2024 HYDRAULIC OIL SPILL
1ST JUNE 2024 HYDRAULIC OIL SPILL
IN-PLACE GEOMEMBRANE COVER
ACTIVE CELL ACCESS ROAD
IN-PLACE SOIL COVER
STAGE 1 FINAL COVER
500 GALLON DIESEL TANK
275 GALLON HYDRAULIC OIL TANK
2500 GALLON DIESEL TANK (TRUCK)
NOVEMBER 2023 HYDRAULIC OIL SPILL
SEPTEMBER 2023 DIESEL SPILL
MAROOKA WELL
LIQUID STORAGE FOR FOAM PRODUCTION
SPILL KIT
CELL 8 PUMP STATION
DETENTION POND 6 OUTLET STRUCTURE
OUTFALL NO.4 (MONITORING LOCATION)
CHAIN LINK FENCE
LEACHATE FORCEMAIN
WETLAND LIMIT (TYP)
ACTIVE DISPOSAL AREA (SUMMER 2025)
STAGE 2 FINAL COVER
TEMPORARY MAINTENANCE ROAD
LITTER FENCE INSTALLED AS PART OF CELL 15 CONSTRUCTION
TEMPORARY CULVERT
OUTFALL NO.2 (MONITORING LOCATION)
DETENTION POND 2
CELL 5 PUMP STATION
OUTFALL NO. 3
NEW OUTFALL NO. 9 (MONITORING LOCATION)
CELL 15 PUMP STATION
NEW OUTFALL NO. 8 (MONITORING LOCATION)
CELL 4 PUMP STATION
GEOMEMBRANE LINED STORAGE POND
GEOMEMBRANE LINED STORAGE POND PUMP STATION
CELL 16 PUMP STATION
LANDFILL WASTE LIMIT (APPROXIMATE)
LEACHATE LOADING RACK
DETENTION POND 1 OUTFALL NO.1 (MONITORING LOCATION)
OCTOBER 2022 WATER/ LEACHATE SPILL

LEGEND

EXISTING CONTOUR

WETLAND DELINEATED

SITE ACREAGE 780

100 0 200 400 FEET

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC, NORRIDGEWOCK, MAINE. PHOTO DATE 5/21/2024. VERTICAL DATUM: BRASS PLUG AT PUMP STATION AT THE ADMINISTRATION BUILDING. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY SEVEE & MAHER ENGINEERS, INC., OF CUMBERLAND, MAINE. SEE NOTE 1 ON DWG C-100.
2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004, STANTEC CONSULTING SERVICES 2008, 2014, 2015, AND BRI ENVIRONMENTAL IN 2024.
3. DRAWINGS ARE FOR SITE OPERATIONS USE ONLY. DRAWINGS SHALL NOT BE USED FOR CONSTRUCTION.
4. LOCATION OF ALL UTILITIES, POWER & COMMUNICATIONS, WATER, SEWER ETC NOT SHOWN ON THIS PLAN.
5. PLAN UPDATED ON FEBRUARY 2025, BASED ON INFORMATION SUPPLIED BY CASELLA WASTE SYSTEMS, INC.
6. DRAINAGE BOUNDARIES AND STORMWATER CONTROL FLOW PATTERNS SHOWN ON THIS FIGURE REPRESENT ANTICIPATED CONDITIONS AT THE COMPLETION OF CELL 16 STAGE 1 CELL DEVELOPMENT.
7. GRADES SHOWN IN CELL 15 REPRESENT FINISH WASTE GRADES PRIOR TO INSTALLATION OF INTERMEDIATE COVER. GRADES SHOWN IN THE CELL 16 AREA REPRESENT WASTE GRADES AT THE COMPLETION OF STAGE 1 CELL DEVELOPMENT.
8. THE RNG FACILITY INCLUDES SEVERAL LIQUID STORAGE DEVICES. REFER TO ACHAEA ENERGY PREPAREDNESS, PREVENTION, CONTINGENCY (PPC) PLAN, EMERGENCY ACTION PLAN (EAP) AND SPILL PREVENTION, CONTROL, AND COUNTERMEASURES (SPCC) PLAN DATED JANUARY 31, 2024.

FIGURE 2
SITE PLAN
JUNIPER RIDGE LANDFILL
SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN

UPDATED FEBRUARY 2025

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

DWG: SITEPLAN-2024 LMN: SITE PLAN CTB: SME-STD.CTB REV: 2/12/2025

\\Server\d\Casella\Old Town Land\2024\PPP\Acad\Figures\TEST\FIG-2_2025.dwg, FIG-2, 2/12/2025 2:40:58 PM, sm

LANDFILL SCALES

SALT/SAND STORAGE AREA

OUTFALL NO. 6 (MONITORING LOCATION)

LEVEL LIP SPREADER

OUTFALL NO.5 (MONITORING LOCATION)

RNG FACILITY STORMWATER POND

DETENTION POND 9

DETENTION POND 10

LEVEL LIP SPREADER

RNG FACILITY SEE NOTE 8

ENERGY DISSIPATER

OUTFALL NO. 7 (MONITORING LOCATION)

DETENTION POND 11

4 AND 5

STAGE 1 FINAL COVER

DETENTION POND 6

OKA WELL

CELL 16 ACTIVE DISPOSAL AREA (SUMMER 2025)

STAGE 2 FINAL COVER

OUTFALL NO.4 (MONITORING LOCATION)

DETENTION POND 6 OUTLET STRUCTURE

TEMPORARY MAINTENANCE ACCESS ROAD

OUTFALL NO.2 (MONITORING LOCATION)

DETENTION POND 2

OUTFALL NO. 3

NEW OUTFALL NO. 9 (MONITORING LOCATION)

CELL 16 PUMP STATION

CELL 15 PUMP STATION

NEW CULVERT OUTFALL NO. 8

CLEAN WATER LOADING RACK

DETENTION POND 1

OUTFALL NO.1 (MONITORING LOCATION)

GEOMEMBRANE LINED STORAGE POND (DETENTION POND 1A)

PROPERTY LINE (APPROXIMATE)

N

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC, NORRIDGEWOCK, MAINE. PHOTO DATE 5/21/2024. VERTICAL DATUM: BRASS PLUG AT PUMP STATION AT THE ADMINISTRATION BUILDING. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY SEVEE & MAHER ENGINEERS, INC., OF CUMBERLAND, MAINE. SEE NOTE 1 ON DWG C-100.
2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004, STANTEC CONSULTING SERVICES 2008, 2014, 2015, AND BRI ENVIRONMENTAL IN 2024.
3. DRAWINGS ARE FOR SITE OPERATIONS USE ONLY. DRAWINGS SHALL NOT BE USED FOR CONSTRUCTION.
4. LOCATION OF ALL UTILITIES, POWER & COMMUNICATIONS, WATER, SEWER ETC NOT SHOWN ON THIS PLAN.
5. PLAN UPDATED ON FEBRUARY 2025, BASED ON INFORMATION SUPPLIED BY CASELLA WASTE SYSTEMS, INC.
6. DRAINAGE BOUNDARIES AND STORMWATER CONTROL FLOW PATTERNS SHOWN ON THIS FIGURE REPRESENT ANTICIPATED CONDITIONS AT THE COMPLETION OF CELL 16 STAGE 1 CELL DEVELOPMENT.
7. GRADES SHOWN IN CELL 15 REPRESENT FINISH WASTE GRADES PRIOR TO INSTALLATION OF INTERMEDIATE COVER. GRADES SHOWN IN THE CELL 16 AREA REPRESENT WASTE GRADES AT THE COMPLETION OF STAGE 1 CELL DEVELOPMENT.
8. THE RNG FACILITY INCLUDES SEVERAL LIQUID STORAGE DEVICES. REFER TO ACHAEA ENERGY PREPAREDNESS, PREVENTION, CONTINGENCY (PPC) PLAN, EMERGENCY ACTION PLAN (EAP) AND SPILL PREVENTION, CONTROL, AND COUNTERMEASURES (SPCC) PLAN DATED JANUARY 31, 2024.

LEGEND

- EXISTING CONTOUR
- WETLAND DELINEATED
- DRAINAGE SUBCATCHMENT BOUNDARY
- OUTFALL THAT SUBCATCHMENT DRAINS TO

100 0 200 400 FEET

FIGURE 3
OUTFALL DRAINAGE BOUNDARIES
JUNIPER RIDGE LANDFILL
STORMWATER POLLUTION PREVENTION PLAN

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • smemaine.com

DWG: SITEPLAN-2024 LMN: DRAINAGE PLAN CTB: SME-STD.CTB REV: 2/12/2025

UPDATED FEBRUARY 2025

\\Narwhal\Civil\Casella\2025\Twin Lane\BSW\PPP\Autof\Figures\SITEPLAN-2025.dwg, FIG-3, 2/12/2025 2:40:52 PM, sjm

APPENDIX A

NOTICE OF INTENT

NOTICE OF INTENT TO COMPLY WITH THE MAINE MULTI-SECTOR GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Notice of Intent (NOI) submission constitutes the express intent of the entity in Section A (of this form) to discharge stormwater associated with an industrial activity to waters of the State (excluding groundwater), from the facility/site identified in Section C (of this form), under Maine's Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP). Submission of this NOI also certifies that the responsible official understands and meets the eligibility conditions of Special Condition C, *Applicability And Eligibility*, of the MSGP, agrees to comply with all applicable terms and conditions of the MSGP, and understands that continued authorization under the MSGP is contingent on maintaining eligibility for coverage. Please send the completed form to the Maine Department of Environmental Protection, 17 State House Station, Augusta, ME 04333-0017. A check for the appropriate permit fee made payable to: Treasurer, State of Maine may need to be submitted with the NOI. Please read the instructions on the back prior to completing the NOI form.

A. Applicant Information – Legal Name & Mailing Address					
MSGP Permit :	MER05 B477				
Maine State Charter Number (if applicable):	20040538DC				
Legal Name of Applicant	NEWSME Landfill Operations, LLC				
Mailing Address	110 Main St., Suite 1308				
City/Town	Saco	State	ME	Zip Code:	04072
Daytime Phone: (with area code)	(207) 653-4421				
E-mail	toni.king@casella.com				

B. Contact Person for this NOI					
Permit Contact Person	Toni King				
Title	Region Engineer				
Contact Address	110 Main St., Suite 1308				
City/Town	Saco	State	ME	Zip Code	04072
Daytime Phone:	(207) 653-4421				
Email:	toni.king@casella.com				

C. Facility/Site Physical Location					
Physical Address	2828 Bennoch Road				
City/Town	Alton	State	ME	Zip Code	04468

NOTICE OF INTENT TO COMPLY WITH THE MAINE MULTI-SECTOR GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Daytime Phone:	(207) 394-4372
Basis for Applicant's Title, Right, or Interest:	□ Deed □ Lease ■ Operating Agreement □ Other Attach a copy of the documentation demonstrating Title, Right or Interest

D. Receiving Water Information		
Name of the receiving water(s):	Pushaw Stream	
Does the facility discharge stormwater to a municipal separate stormwater sewer system (MS4)?		□ Yes ■ No
If yes, name of the MS4:		

E. Industrial Activity Information

The 4-digit Standard Industrial Classification (SIC) Code(s) or the 2 or 3 alpha-numeric Sub-Sector Code that best represents the industrial activity at the facility or any multiple sector-specific industrial activities.

SIC# or Sub-Sector Code	L1	Additional SIC# or Sub-Sector Code	

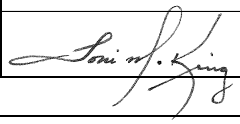
Applicable Sector(s) of industrial activity, as designated in Attachment A of the MSGP, that include associated discharges that you seek to have covered under this permit (check all that apply):

□ Sector A	□ Sector B	□ Sector C	□ Sector D	□ Sector E	□ Sector F	□ Sector G	□ Sector H
□ Sector I	□ Sector J	□ Sector K	■ Sector L	□ Sector M	□ Sector N	□ Sector O	□ Sector P
□ Sector Q	□ Sector R	□ Sector S	□ Sector T	□ Sector U	□ Sector V	□ Sector W	□ Sector X
□ Sector Y	□ Sector Z	□ Sector AA	□ Sector AB	□ Sector AC	□ Sector AD		

Does the facility have a complete and up-to-date Stormwater Pollution Prevention Plan (SWPPP)?	□ Yes □ No
What date was the SWPPP last revised to bring it up-to-date?	January 2017

F. Certification of Responsible Official

I certify under penalty of law that I have personally examined the information submitted in this document and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the information is true, accurate, and complete. I authorize the Department to enter the property that is the subject of this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein. I am aware there are significant civil and criminal penalties for submitting false information, including the possibility of fine and imprisonment. By my signature as a responsible official for the entity or individual identified in Section A of this NOI, I certify under penalty of law that that I am the operator of the facility, and have Title, Right or Interest, as indicated in Section C of this form.

Printed Name:	Toni King		
Title:	Region Engineer		
Signature:		**Date:**	2/3/17

DEP OFFICE USE ONLY		
Permit ID		

NOTICE OF INTENT TO COMPLY WITH THE MAINE MULTI-SECTOR GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Instructions for Completing the NOI Form

Type or print, in the appropriate white areas only. Answer all applicable questions, keep a copy for your records, and mail the original, signed, completed form. If you were previously licensed under a MSGP and you have not yet paid your Fall 2016 invoice include a check for $317. If this is the first time you are requesting coverage under the MSGP, include a check for $340. Make checks payable to "Treasurer, State of Maine". Send this form, attachments and any payment to: **Gregg Wood**, **Maine Department of Environmental Protection, 17 State House Station, Augusta, ME 04333-0017 or e-mail the form and attachments to gregg.wood@maine.gov.**

Section A: Applicant Information – Legal Name & Mailing Address

1. If you were permitted under the previous MSGP, enter the MSGP permit number assigned to the facility. The number will start as follows: MER05____. It can be found in a letter sent to you in calendar year 2011 formally notifying you were granted coverage under the previous MSGP.

2. Enter the business' Maine State Charter Number. The number can be obtained from the State of Maine's Department of the Secretary of State, Bureau of Corporations, Elections and Commissions website. The hyperlink is https://icrs.informe.org/nei-sos-icrs/ICRS?MainPage=x.

3. Enter the applicant's full legal name. The applicant must be the person, partnership, co-partnership, firm, company, corporation, association, trust, estate, governmental entity or other legal entity that owns or operates the facility or site. Legal entities registered to conduct business in Maine or other state, whether for profit or not for profit, typically have a Charter Number issued by the respective state of incorporation or organization. The Charter Number, along with a *Certificate of Good Standing*, obtained from the Maine Secretary of State, Bureau of Corporations, Elections and Commisions, must be submitted with the NOI. If an individual is conducting a business under an unregistered assumed name, the NOI must be filed in the name of the individual.

4. The mailing address of the identified facility or operator will be the street address or P.O. Box, city/town, state, and zip code to which annual bills and other correspodnece will be sent. All correspondence regarding the permit will be sent to this address, not the facility address in Section B of the NOI form.

5. The telephone number listed for the facility operator must be a number at which calls are regularly received during normal business hours (8:00 AM to 5:00 PM).

Section B: Contact Person for this NOI

Enter the name of the **Contact Person** for this facility/site, their title, mailing address (street or P.O. Box, city, state, zip code), telephone number with the area code, and an e-mail address. If this contact is your consultant please supply an e-mail address as well. If your contact for this permit uses the same address as the company, parent company or facility/site, please enter "same as company", etc.

NOTICE OF INTENT TO COMPLY WITH THE MAINE MULTI-SECTOR GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Section C. Facility/Site Physical Location

1. Enter the **physical address** or location of the site (city/town, state and zip code). Include telephone number associated with the physical loation, including area code. If the physical name and address of the site is the same as the Applicant Information, write “same as applicant" in the Facility/Site section. Submit a map showing the location of the facility.

2. The applicant in **Section A** must provide evidence (submitted with the NOI) of “**Title, Right or Interest”** (TRI) in the facility conducting the industrial activity covered by this NOI. TRI means the applicant has a legal right to conduct the regulated activity at the facility or site. Title, Right, or Interest is typically established by way of ownership through a deed, or by way of a lease or operating agreement. Please submit a copy of the documentation demonstrating Title, Right or Interest as an attachment to the NOI at the time of submission.

E. Industrial Activity Information

1. Enter your company’s Standard Industrial Classification (SIC) Code(s) which best describes the industrial activity conducted or products/services provided. See Attachment A of the MSGP for a list of SIC Codes.

2. Check all of the boxes that apply to the sectors of industrial activity that you seek to have covered by this permit. See Attachment A of the MSGP for a list of sectors.

F. Certification Statement

Legibly print the name and title of the responsible official. Have the official sign and date the application.

A **Responsible Official** must be one of the following:

- ✓ For a corporation: a responsible corporate officer
- ✓ For sole proprietorship or a partnership: the proprietor or general partner
- ✓ For a municipal, State, Federal, or other public facility: either a principal executive or ranking elected official.

Before submitting the NOI form, please ensure you have;

a. Answered all the questions on the form
b. Signed the form.
c. Attached documentation demonstrating proof of Title, Right or Interest.
d. For corporations, attach a Certification of Good Standing or a statement signed by a corporate officer affirming that the corporation is in good standing.
e. Attached a location map and or coordinates showing the physical location of the facility.
f. Enclosed a check for any required fees.

If you have questions concerning this form, please contact your regional stormwater inspector.

Portland: Alison Moody 207-615-8936, Laura Crossley 207-615-6711.

Augusta: David Ladd 207-215-7168 Bangor: Jana Wood 207-215-7869.

OPERATING SERVICES AGREEMENT

This OPERATING SERVICES AGREEMENT (this "Agreement") is made as of this 5th day of February, 2004, by and between CASELLA WASTE SYSTEMS, INC., a Delaware corporation with a place of business at 25 Greens Hill Lane, Rutland, Vermont 05702 ("Casella"), and the STATE OF MAINE, acting by and through its Executive Department, State Planning Office (the "State").

WITNESSETH:

WHEREAS, the State has contemporaneously with the execution and delivery hereof and payment of the amounts due hereunder acquired the solid waste landfill located in Old Town, Maine and more fully described below, previously owned by Fort James Operating Company, a Delaware corporation ("FJ"); and

WHEREAS, the State desires that Casella operate and develop the Landfill pursuant to the terms and conditions contained herein;

NOW, THEREFORE, in consideration of the mutual promises and agreements hereinafter contained, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Casella and the State agree as follows:

SECTION 1 DEFINITIONS

Capitalized words and phrases used but not otherwise defined herein shall have the following meanings:

1.1 "Affiliates" shall mean any corporation or other business entity controlling, controlled by, or under common control with the subject corporation, business enterprise or person.

1.2 "Acceptable Waste" shall mean such material as may from time to time be legally

accepted at the Landfill in accordance with applicable MDEP permits and other applicable laws and regulations, excluding, however, all Excluded Waste.

1.3 "Biomass Ash" shall mean the ash resulting from the operation of the Biomass Generating Facility to the extent the same is disposable at the Landfill under the Existing Permit and meets the definition of "special waste" as defined under Maine Environmental Law.

1.4 "Biomass Generating Facility" shall mean the electric generating facility fueled principally with biomass fuel, to be installed at the Old Town Mill.

1.5 "Capacity Credit" is defined in Section 2.8(d).

1.6 "Cash Application" is defined in Section 2.8(d).

1.7 "CERCLA" means the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. §§ 9602 et seq.

1.8 "Closure" shall mean those acts and activities required by applicable law and regulations which result in a permanent cessation of use of a solid waste landfill or portion thereof, as those requirements and regulations may be amended or modified from time to time, and which result in a stabilized solid waste Landfill which is not in active use, excluding those acts and activities which are required for Post-Closure Care.

1.9 "Damages" shall mean liability, loss, costs and expenses of every nature and type and howsoever arising that a Person may incur (including, without limitation, costs of investigation and defense and reasonable attorneys', paralegals and other professionals' fees and expenses).

1.10 "Disposal Application" is defined in Section 2.8(d).

1.11 "Effective Date" shall mean the date hereof.

1.12 "Environmental Law" shall mean any federal, state or local law, statute, rule,

order, directive, judgment, Governmental Approval or regulation or the common law relating to the environment (including the ambient air, surface water, groundwater, land surface or subsurface strata), or exposure of persons or property to Materials of Environmental Concern, including any statute, regulation, administrative decision or order pertaining to: (i) the presence of or the treatment, storage, disposal, generation, transportation, handling, distribution, manufacture, processing, use, or recycling, of Materials of Environmental Concern or documentation related to the foregoing; (ii) air, water and noise pollution; (iii) groundwater and soil contamination; (iv) the release, threatened release, or accidental release into the environment, or other areas of Materials of Environmental Concern, including emissions, discharges, injections, spills, escapes or dumping of Materials of Environmental Concern; (v) transfer of interests in or control of real property; (vi) land use, subdivision and zoning; (vii) community or worker right-to-know disclosures with respect to Materials of Environmental Concern; (viii) the protection of wild life, aquatic and marine life and wetlands, and endangered and threatened species; and (ix) storage tanks, vessels, containers, abandoned or discarded barrels and other open or closed receptacles. As used above, the term "release" shall have the meaning set forth in CERCLA, and to the extent it is more extensive or comprehensive, as defined in Maine Environmental Law. Without limiting the foregoing, the term "Environmental Law" shall include the Maine Forest Practices Act, 12 M.R.S.A. §§8867-A et seq.

1.13 "Environmental Matters" shall mean any liability or obligation arising under Environmental Law, whether arising under theories of contract, tort, negligence, successor or enterprise liability, strict liability or other legal or equitable theory, including (i) any failure to comply with an applicable Environmental Law and (ii) any liability or obligation arising from the presence of, release or threatened release of, or exposure of persons or property to, Materials

of Environmental Concern at the Premises or associated with the Premises. As used above, the term "release" shall have the meaning set forth in CERCLA, and to the extent it is more extensive or comprehensive, as defined in Maine Environmental Law.

1.14 "Escrow Agent" means Lawyers Title Insurance Corporation, appointed as escrow agent to hold and administer the Improvement Fund under Section 2.2(b) of the Acquisition Agreement pursuant to a separate Escrow Agreement between FJ and the State.

1.15 "Existing Permit" means Maine Department of Environmental Protection Permit # S 020700 7A-A-N, issued July 28, 1993, as amended or revised.

1.16 "Expansion Permit" shall mean any and all federal, state, local and other governmental permits, permit modifications, operation plan modifications, other modifications, statutory amendments and legislation, licenses, approvals, authorizations or amendments necessary for the expansion of the Landfill beyond the licensed footprint as of the date hereof.

1.17 "Excluded Waste" shall mean (a) any Acceptable Waste or any other waste of any nature generated outside of the State of Maine, (b) any waste as of the date of Casella's response to the RFP under contract for delivery to another disposal facility or processing facility unless agreed to in writing by such facility's waste generator or responsible party, and (c) any other waste or material excluded from disposal in the Landfill by applicable laws or regulations, or excluded by any of the terms and conditions of any permits, licenses, authorizations or approvals obtained with respect to the construction or operation of the Landfill, provided that Excluded Waste shall not include any waste that would otherwise constitute Excluded Waste hereunder if such category of waste is accepted at another disposal facility in the State of Maine owned or operated by the State, subject in all instances to the prior receipt of any and all required licenses or permits for such category of waste. Notwithstanding the foregoing, the parties acknowledge

and agree that, subject to applicable laws and regulations and such certifications as the State may reasonably require, Casella may bring construction and demolition waste generated outside the State of Maine for processing within the State of Maine solely for purposes of allowing Casella to generate biomass fuel required in connection with the provision of biomass fuel to FJ or its successor or assigns under the C&D Fuel Agreement in the form attached hereto as Exhibit B. Casella agrees to use its best efforts to ensure that any such construction and demolition waste generated outside the State of Maine and processed in the State of Maine is free of putrescible waste. This term shall also include such other wastes and materials as Casella determines, in the reasonable exercise of its commercial judgment, pose a risk or danger to the operation or safety of the Landfill or to the human or natural environment or are otherwise reasonably unacceptable to Casella provided, however, that in no event may FJ Waste be excluded or otherwise deemed Excluded Waste unless such exclusion is required by applicable law, regulation, permit, license, authorization or approval.

1.18 Intentionally omitted.

1.19 Intentionally omitted.

1.20 "FJ Waste" is defined in Section 2.8(a).

1.21 "Force Majeure" shall mean any act, event or condition affecting the Landfill or to the extent that it materially and adversely affects the ability of either party to perform or comply with any obligation, duty or agreement required of the party under this Agreement, provided such act, event or condition is beyond the reasonable control of the party or its agents relying thereon and is not the result of the willful or negligent act or omission of the party relying thereon. Force Majeure includes, without limitation but by way of illustrating the actions, events and conditions constituting a Force Majeure hereunder: (a) an act of God, epidemic, landslide,

lightning, earthquake, fire, explosion, storm, flood or similar occurrence; (b) an act of the public enemy, war, blockage, insurrection, riot, general arrest or restraint of government and people, civil disturbance or disobedience, sabotage or similar occurrence; or (c) a strike, work slowdown, or similar industrial or labor action.

1.22 "Governmental Approval" means any and all approvals, licenses, permits, authorizations (or the transfer thereof) required by any Governmental Authority for the design, construction, improvement, alteration, ownership or operation of the Landfill and all related projects, improvements or land use or the transfer thereof.

1.23 "Governmental Authority" means any federal, state or local governmental subdivision, board, body or regulatory authority.

1.24 "Hazardous Waste" shall mean any pollutant, contaminant, chemical, industrial, toxic or other waste or material that constitutes hazardous waste or material as defined pursuant to the Resource Conservation and Recovery Act, 42 U.S.C. §9601, et seq., or similar Maine laws, or the regulations adopted thereunder, or any successor laws regulating the same or similar substances, and Materials of Environmental Concern.

1.25 "Landfill" shall mean the solid waste landfill located in Old Town, Maine, that the State proposes to acquire from FJ pursuant to the Acquisition Agreement and all of the assets and properties acquired by the State from FJ in connection with said landfill, including any expansion of the solid waste landfill located at the Premises, whether such expansion is effected under the Existing Permit or under a new, amended or additional Governmental Approval, and any associated land, buildings, appurtenances, equipment and fixtures, the full benefit of all utility arrangements, licenses, approvals and permits to the extent transferable, including rights of assignment to the extent any such licenses and permits are assignable (but subject to any third

party consents, when required).

1.26 "Letter of Credit" means an irrevocable, unconditional, direct pay letter of credit in the form of Exhibit E attached to the Acquisition Agreement issued by a financial institution acceptable to FJ, in its discretion, (i) issued to FJ in the face amount of $12,500,000 under Section 2.2(a)(ii) of the Acquisition Agreement, and (ii) issued to the Escrow Agent in the face amount of $1,000,000 under Section 2.2(a)(iii) of the Acquisition Agreement.

1.27 "License Amendment" shall mean any and all federal, state, local and other governmental permits, permit modifications, operation plan modifications, other modifications, statutory amendments and legislation, licenses, approvals, authorizations or amendments necessary for the development of the Landfill within the currently permitted footprint for an additional 7 million cubic yards.

1.28 "License Application" shall mean the application for License Amendment submitted to the MDEP on October 30, 2003.

1.29 "Lincoln" shall mean Lincoln Pulp & Paper Co., Inc.

1.30 "Lincoln Agreement" means the Biomass Ash Disposal Agreement between FJ and Lincoln Pulp and Paper, Co., Inc. dated September 30, 2003.

1.31 "Lincoln's Biomass Ash" means the ash resulting from the operation of the Lincoln biomass boiler located in Lincoln, Maine.

1.32 "Leachate" shall mean the liquid or semi-solid residue from waste deposited at the Landfill and either collected within a liner system to be installed at the Landfill, or otherwise collected for disposal.

1.33 "Materials of Environmental Concern" shall mean any: pollutants, contaminants or hazardous substances (as such terms are defined under CERCLA, the Maine Protection and

Improvement of Waters Act, 38 M.R.S.A. § 361-A, or the Maine Uncontrolled Hazardous Substances Sites Law, 38 M.R.S.A. § 1362.1), pesticides (as such term is defined under the Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. §§ 136 et seq.), solid wastes and hazardous wastes (as such terms are defined under the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901 et seq., and Maine's Hazardous Waste, Septage and Solid Waste Management Act, 38 M.R.S.A. §§ 1301 et seq.), chemicals, other hazardous, radioactive or toxic materials, oil, petroleum and petroleum products (and fractions thereof), asbestos and asbestos-containing materials, polychlorinated biphenyls ("PCBs") or PCB-containing materials, or any other material (or article containing such material) listed or subject to regulation under any law, statute, rule, regulation, order, Governmental Approval, or directive due to its potential, directly or indirectly, to harm the environment or the health of humans or other living beings.

1.34 "MDEP" shall mean the Maine Department of Environmental Protection, and any successor agency or department of the State of Maine.

1.35 "Mill Waste" shall mean waste from the Old Town Mill of a composition consistent with the waste FJ (or its successors or assigns) is permitted to dispose of at the Landfill under the Existing Permit, provided it meets the definition of "special waste" as currently defined by Maine Environmental Law.

1.36 "Old Town Mill" shall mean the pulp and paper mill owned and operated by FJ located in Old Town, Maine, and all related facilities and improvements.

1.37 "Post-Closure Care" shall include those acts and activities which are required under applicable laws, regulations and permits for post-closure care of a solid waste landfill or portion thereof, including monitoring, reporting and maintenance for the time set forth in the relevant laws, regulations and permits.

1.38 "Premises" means the real estate, together with all buildings and improvements thereon, situated in Alton and Old Town, Maine and more particularly described in Exhibit A attached hereto and incorporated herein by reference, including the Landfill.

1.39 "Prime Rate" means the fluctuating interest rate per annum equal to the rate of interest published in The Wall Street Journal as the Prime Rate or the base rate on corporate loans posted by at least 75% of the nation's thirty (30) largest banks, as it may vary. In the event The Wall Street Journal ceases to publish the Prime Rate, the parties shall select a comparable substitute interest rate index.

1.40 "RFP" means the 'Request For Proposals: Contract for Landfill Operations', as issued on June 13, 2003, by the Maine State Planning Office, Waste Management & Recycling Program.

1.41 "Special Waste" shall mean any discarded waste and solid material, other than those which are typically found in household, commercial or municipal refuse, including, without limitation, materials such as industrial waste (but not including Mill Waste or Biomass Ash), institutional waste, animal manure, petroleum contaminated soil of a nonhazardous nature, ash, residue from incineration, waste treatment plant sludge, food processing wastes, dredging wastes, asbestos, or waste which requires special or exceptional handling or approval from MDEP, but only to the extent the foregoing is permitted for disposal in the Landfill under applicable MDEP permits, and shall not include any Excluded Waste, any solid waste generated by sources other than household and typical commercial establishments that exists in such an unusual quantity or in such a chemical or physical state, or any combination thereof, that may disrupt or impair effective waste management or threaten the public health, human safety or the environment and requires special handling, transportation and disposal procedures. Special

Waste includes, but is not limited to: (a) ash; (b) industrial and industrial process waste; (c) sludge and dewatered septage; (d) debris from nonhazardous chemical spills and cleanup of those spills; (e) contaminated soils and dredge materials; (f) asbestos and asbestos-containing waste; (g) sand blast grit and non-liquid paint waste; (h) high and low pH waste; (i) spent filter media residue; and (j) shredder residue.

1.42 "Shut-Down Period" is defined in Section 2.8(d).

1.43 "SPO" means the State Planning Office, an Executive Department of the State.

1.44 "State/FJ Agreement" or the "Acquisition Agreement" means the Agreement Regarding Solid Waste Disposal Facility Acquisition and Operation between the State and FJ pursuant to which the State has acquired the Landfill.

1.45 "Term" shall mean that period of time commencing on the Effective Date and ending on the earlier to occur of (i) thirty (30) years after the Effective Date, or (ii) the date this Agreement is terminated by one or more of the parties as provided for herein.

1.46 "Tipping Fees" shall mean the aggregate of all fees, charges, levies and assessments charged by Casella for the disposal of waste at the Landfill, including any contractors, subcontractors or other service providers employed by Casella, excluding any transportation costs associated with delivery of waste to the Landfill.

SECTION 2 LANDFILL OPERATION AND MANAGEMENT

2.1 Operation, Management and Exclusive Use—General. The State grants to Casella during the Term and subject to the terms and conditions hereof and all applicable laws, regulations and permits, the exclusive right, license and privilege to occupy, operate, maintain, repair, design, redesign, construct and utilize the Landfill, including, without limitation, the right to take possession of, occupy and have the exclusive use of the Landfill, subject to the terms and conditions of this Agreement. Without limiting the generality of the foregoing and subject in all

instances to the terms and conditions hereof, these rights include the following:

2.1.1 The right to take possession of and use all of the Landfill. Casella shall prominently post the hours of operation and other limitations and conditions of access at the entrance to the Landfill. Casella shall have the right to post additional signage at the Landfill indicating its operation of the Landfill and any other information it deems necessary or desirable, subject in all instances to applicable laws and regulations.

2.1.2 The exclusive right to operate and dispose of Acceptable Waste at the Landfill and, subject to the terms hereof, to create and implement rules and policies pertaining to disposal at, and operation of, the Landfill, provided that in no event shall such rules and policies cause a default by the State of its obligations under the State/FJ Agreement or otherwise violate or restrict Casella's obligations under Section 2.8.

2.1.3 To the extent permitted by applicable law, the right to use the permits, licenses, approvals and authorizations issued in the State's name and the right, with the consent of the State (which consent will not be unreasonably withheld), to seek any modifications, transfers or renewals of the same, consistent with this Agreement.

2.1.4 The right to take and use any landfill gas generated at the Landfill, all in accordance with applicable laws and regulations.

2.2 Construction.

(a) Subject to the terms of all applicable laws, regulations and permits, Casella shall have the right to design, locate, permit, construct and remove at the Landfill such buildings and fixed resources as it deems necessary for the operation of the Landfill, including, without limitation, garages, office

buildings, recycling facilities and other structures, fixtures, appurtenances, and improvements, provided that Casella's actions shall in no event impair or limit Casella's obligation to satisfy the capacity commitment to FJ under Section 2.8. The use of the Landfill shall be restricted to development and operation of a solid waste landfill, or other facilities providing for the disposal or recycling of solid waste or other management of solid waste or, with the prior written consent of the State which may be granted or withheld in the State's sole discretion, other uses that do not prohibit or impair the operation of a solid waste landfill of sufficient size, nature, scope and limitation as is required to satisfy Casella's capacity commitment to FJ under Section 2.8 during the term hereof. Casella shall be prohibited from constructing any facility or improvement at the Landfill that would prohibit or impair the construction and operation of a solid waste landfill of sufficient size, nature, scope and location as is required to satisfy Casella's capacity commitment to FJ under Section 2.8. Any capital improvements to or at the Landfill shall be and remain the property of the State upon termination of this Agreement without any compensation to Casella.

(b) Subject to the issuance of all necessary State and local licenses permits and approvals, Casella shall construct a new sewer line to convey leachate to the Old Town Waste Water Treatment Plant on or before five years from the Effective Date.

2.3 Operation.

2.3.1 Casella shall have full control, both physical and managerial, of the

Landfill, subject in all instances to the terms and conditions of this Agreement.

2.3.2 Subject in all instances to the terms and conditions hereof and all applicable laws, regulations, licenses and permits, Casella shall be responsible for, and shall have sole authority over, the day-to-day operation of the Landfill, including weighing of waste pursuant to Section 2.4, testing of waste, preparation of waste for disposal, Landfill construction as provided in Section 2.2, establishment of Tipping Fees pursuant to Section 2.11, acceptance and disposal of Acceptable Waste, preparation and application of daily interim and final cover, construction of temporary roads and other temporary access, and installation and monitoring of groundwater wells. Notwithstanding the foregoing or anything to the contrary herein, Casella agrees to operate the Landfill gate and scale house in such manner, and on such terms so as to provide no price or entry discrimination or benefit (consistent with Section 2.11) in favor of its affiliated haulers or otherwise as to disadvantage haulers that are not Affiliates or who do not have business relations with Casella or its Affiliates.

2.3.3 Subject in all instances to the terms and provisions hereof and all applicable laws, regulations, licenses and permits, Casella shall be responsible for providing at its own cost and expense and shall have sole authority regarding:

(a) all engineering and other services necessary for the design, permitting, construction and operation of the Landfill (with the exception of those construction services for those portions of the Landfill which have already been constructed); and

(b) the employment of all personnel needed to operate the Landfill; and

(c) all services incidental to the business of the Landfill, including security,

accounting, legal, fire prevention and pollution control.

2.3.4 Without limiting the foregoing, Casella shall have the right to detain and inspect the contents of all vehicles delivering waste to the Landfill. Casella shall have the right to refuse or reject any Excluded Waste in its sole discretion or, if not detected prior to entering the Landfill, and Casella becomes aware that Excluded Waste has been disposed of at the Landfill, Casella shall immediately notify MDEP and manage the treatment of such Excluded Waste as MDEP may require. In addition, Casella may proceed against the hauler and/or generator for removal and proper disposal costs and other costs incurred by Casella. Subject in all instances to its obligations under Section 2.8 and Subsection 2.3.2, Casella shall have the right to ban haulers from disposing at the Landfill until such time as the expenses for reimbursement for the removal of any such Excluded Waste are paid to Casella. Subject in all instances to its obligations under Section 2.8 and Subsection 2.3.2, Casella shall have the right to ban any and all haulers which violate any of the rules and policies it establishes for the Landfill. Casella shall not allow members of the general public access to the Landfill for the discharge of solid waste.

2.3.5 Casella shall have the right to operate the Landfill during hours of its selection in accordance with any relevant permits, approvals, licenses, orders or agreements, and shall not discriminate against haulers who do not have business relations with Casella or its Affiliates.

2.3.6 Casella shall not accept any Excluded Waste at the Landfill.

2.4 Weighing. In connection with Casella's operation of the Landfill hereunder, Casella shall weigh all vehicles containing waste to be delivered to the Landfill pursuant to this

Agreement. Casella shall utilize scales approved by the State to weigh all waste delivered to the Landfill. The State or its authorized representative shall have the right at the State's expense to test the accuracy of scales used by Casella in the performance of its obligations hereunder, provided that such tests are conducted at reasonable times and do not unreasonably interfere with Casella's operation of the scales or the Landfill.

2.5 Revenues. Subject in all instances to payment of all governmental taxes, fees and charges and without limiting its payment obligations hereunder, all revenue, income and other financial benefits generated by, at, or related to operation of, the Landfill during the Term, shall be collected by Casella and shall be the property of Casella.

2.6 Inspection. The State shall have the right to inspect the Landfill during reasonable business hours to confirm compliance with the provisions of this Agreement, that policies are in place to provide that only Acceptable Waste will be received at the Landfill, and that the Landfill is being operated in conformity with state and federal environmental laws and regulations and other applicable laws.

2.7 Maintenance Responsibilities. Casella shall be responsible for, and shall have the sole authority regarding, all necessary maintenance of the Landfill.

2.8 FJ Waste Disposal Capacity. Casella agrees to provide FJ with the following waste disposal capacity at the Landfill during the Term:

(a) Casella will provide disposal capacity at the Landfill to FJ for all Mill Waste and all Biomass Ash (excluding for purposes of clarification and the avoidance of doubt, Lincoln's Biomass Ash) (collectively "FJ Waste"). Casella further hereby assumes FJ's and/or the State's responsibilities to provide for the disposal of Lincoln's Biomass Ash at the Facility under and in

accordance with the terms and provisions of the Lincoln Agreement.

(b) The Tipping Fees charged to FJ for disposal of FJ Waste will be fixed at the following levels:

(i) For the first 50,000 tons per year of FJ Waste, Tipping Fees will be fixed at a maximum of $10 per ton for the first five (5) years of the Term. On the sixth anniversary of this Agreement, and thereafter on each anniversary of this Agreement throughout the Term, Tipping Fees shall be adjusted upward or downward annually by a percentage equal to the percentage change in the Consumer Price Index (U.S.-national) ("CPI") from the date of the immediately preceding anniversary of this Agreement through the then current anniversary of this Agreement. In no event shall the CPI adjustment be less than one percent (1%) per year or in excess of five percent (5%) per year.

(ii) For FJ Waste in excess of 50,000 tons per year, but less than 75,000 tons per year, Tipping Fees shall be fixed at a maximum of $40.00 per ton for the first 5 years of the Term. On the sixth anniversary of this Agreement, and thereafter on each anniversary of the Agreement throughout the Term, the Tipping Fees shall be adjusted upward or downward annually by a percentage equal to the percentage change in the CPI from the immediately preceding anniversary of this Agreement through the then current anniversary of this Agreement. In no event shall the CPI adjustment be less than one percent (1%) per year or in excess of five percent (5%) per year.

(iii) Tipping Fees for FJ Waste in excess of 75,000 tons per year will be assessed at the then prevailing market rate.

For purposes of this Section 2.8, reference to a year means the period of twelve (12) months extending from the Effective Date to the first anniversary thereof, or from one anniversary of the Effective Date of this Agreement to another, as applicable.

(c) Casella shall provide for the disposal of up to six thousand (6,000) tons per year of Lincoln's Biomass Ash at the Landfill for four (4) years from the Effective Date at no cost, and thereafter shall provide for the disposal at the Landfill of Lincoln's Biomass Ash at the same pricing and on the same terms as for FJ Waste.

(d) Casella shall provide FJ with a "Capacity Credit" for unused disposal capacity during the Term in the event FJ Waste disposed of at the Landfill is less than 50,000 tons in any year during which the Mill has operated its commercial pulping facility. The Capacity Credit will be at the rate of one (1) ton of future disposal at the Tipping Fee in effect for the first 50,000 tons of FJ Waste for the year in which the Capacity Credit is utilized by FJ. This Capacity Credit will be provided to FJ by allowing FJ to choose, at its option, one of the following alternatives:

(i) During any year when FJ disposes of more than 50,000 tons of FJ Waste, apply any Capacity Credit accumulated during the preceding three (3) years to FJ Waste in excess of the first 50,000 tons disposed of that year ("Disposal Application"); or

(ii) Payment in cash by Casella to FJ of an amount equal to the

monetary value of the Capacity Credit accumulated over the previous three (3) years and not applied to actual disposal under subsection (i) above. In determining the monetary value of the Capacity Credit, each ton of Capacity Credit shall be valued at the Tipping Fee per ton applicable during the year in which the Capacity Credit is cashed out (the "Cash Application"). Cash Application amounts shall be paid to FJ in cash within thirty (30) days following the date of exercise of the Cash Application option.

FJ may exercise its option to apply Capacity Credits through Disposal Application at any time during a year when the volume of FJ Waste disposal exceeds 50,000 tons. FJ may exercise its option to apply Capacity Credits through Cash Application at any time following the end of the year in which the Capacity Credit has been generated. FJ shall exercise its option by written notice to Casella with a copy to the State. In the event FJ has not provided written notice of its choice of option by the end of the third year following the year in which a Capacity Credit is earned, then FJ shall be deemed to have exercised its option to receive the Capacity Credit through Cash Application as of the last day of such year.

For purposes of calculation of the Capacity Credit, the 50,000 ton per year threshold shall be adjusted downward to account for any period in which the Old Town Mill is not operated for a period of fifty-three (53) or more days during any calendar year (a "Shut-Down Period"). The adjustment shall be a reduction in the 50,000 ton threshold by a per diem of 135 tons per day for each day the Old Town Mill is not operated in excess of the initial fifty-three (53) days in a calendar year.

(e) Notwithstanding anything to the contrary herein, if, despite the best efforts of

Casella in preparing, amending, submitting, resubmitting and prosecuting the same, the Expansion Permit does not issue as a direct result of a material change in law, made after the date hereof, that is generally applicable to landfills in the State of Maine and that by its terms prohibits the expansion and/or permitting of landfills for a period of more than two consecutive years, and if as a result thereof disposal capacity at the Landfill is thereby limited to the 10,000,000 cubic yards available under the Existing Permit and, when issued, the License Amendment (a "Capacity Limiting Event"), then (i) Casella's obligation to provide disposal capacity for FJ Waste under subsections (a), (b) and (d) above shall be limited to a period of fifteen (15) years unless and until such law is repealed (in which case, if Casella or any of its Affiliates is still the operator at the Landfill, its disposal capacity obligation shall be reinstated for the balance of this Agreement) ("Reduced Capacity Commitment"); and (ii) FJ shall, subject to the provisions of this Subsection 2.8(e), forfeit its disposal capacity (including any claim for Capacity Credits and Cash Application) in excess of the Reduced Capacity Commitment (that is, disposal capacity otherwise available to FJ hereunder on and after the fifteenth (15th) anniversary hereof) to the extent necessary to allow Casella to operate the Landfill at a level of five hundred thousand (500,000) tons of waste disposal per year through the twentieth (20th) anniversary of the Effective Date hereof.

Casella agrees that regardless of the occurrence of a Capacity Limiting Event,

it shall be obligated to accept the FJ Waste at the Landfill, at the price and on the terms specified herein, for a period of at least fifteen (15) years and thereafter until the disposal capacity at the Landfill is exhausted. Upon exhaustion of the disposal capacity at the Landfill as aforesaid, Casella will make available to FJ disposal capacity for FJ Waste for a price and on the terms specified above at any other landfill in the State of Maine owned and/or operated by Casella or any Affiliate that is licensed to accept FJ Waste for up to an additional fifteen (15) years (for a total commitment of thirty (30) years) or such earlier time as disposal capacity at such landfill(s) is exhausted; provided, however, that FJ shall pay any and all costs of transporting FJ Waste to such site.

In the event of a Capacity Limiting Event and if Casella or any Affiliate is not able to satisfy the thirty (30) year commitment to FJ (or its successors or assigns) as aforesaid at the Landfill or any alternative landfills in the State of Maine, the State will make available to FJ disposal capacity for FJ Waste for the price and on the terms specified above at any other landfill in the State of Maine owned and/or operated by the State that is licensed to accept FJ Waste until the first to occur of the thirtieth (30th) anniversary of the date hereof or when disposal capacity at such landfill(s) for FJ Waste has been exhausted; provided, however, that FJ shall pay any and all costs of transporting FJ Waste to such site.

The parties and FJ intend the provisions of this subsection (e) to be construed

narrowly and to apply only to the specific and generally applicable laws enacted after the Effective Date that by their terms prohibit the expansion of landfills and thereby the issuance of the Expansion Permit and leave Casella only with the disposal capacity at the Landfill provided under the Existing Permit and License Amendment . For purposes of clarification and illustration, a moratorium prohibiting the licensing of an expansion of landfills in the State of Maine for in excess of two (2) years represents the type of change in law triggering the application of this subsection (e), while a change in law that modifies operating requirements for landfills, the qualifications or requirements for operators, the expense of operating landfills or other requirements associated with the operation, management or permitting of landfills would not excuse performance of Casella's obligations under this Agreement.

(f) Casella's commitment to provide disposal capacity described in this Section 2.8 shall apply to FJ, its successors and assigns, including without limiting the generality of the foregoing any subsequent owner, lessor or operator of the Old Town Mill.

(g) The foregoing Tipping Fees are exclusive of any fees, charges, levies or assessments ("Waste Disposal Fees") which may be imposed by the State after the date hereof for the disposal of waste at landfills. The parties acknowledge that Section 5.2 of the Acquisition Agreement exempts FJ from Waste Disposal Fees. However, in the event FJ Waste is subjected to Waste Disposal Fees notwithstanding the Section 5.2 exemption, (i) Casella shall not

be obligated to pay any such Waste Disposal Fees, and (ii) FJ shall have exclusive liability for such Waste Disposal Fees.

2.9 Other Tipping Fees on FJ Waste. Other than as specifically provided in Section 2.8 hereof, Casella will not charge or assess any Tipping Fees on FJ Waste, or Lincoln's Biomass Ash, whether related to disposal in existing built Landfill space or space constructed in the future.

2.10 Maintenance of Capacity for FJ Waste. Casella agrees throughout the Term that it will maintain fully permitted/licensed, fully constructed, unused capacity at the Landfill in the amount sufficient to satisfy the obligation of the State to FJ regarding disposal capacity under the Acquisition Agreement and Casella's obligations to FJ and with respect to Lincoln Biomass Ash under Section 2.8 hereof, including without limitation at all times after October 1, 2004 (which date shall be extended to the final resolution of any appeals with respect to the License Amendment) , one million five hundred thousand (1,500,000) tons of fully constructed available capacity at the Landfill dedicated to and reserved for FJ Waste minus fifty thousand (50,000) tons on each anniversary of the Effective Date This capacity shall be reserved by Casella solely to satisfy its obligations under Section 2.8 with respect to FJ Waste and Lincoln Biomass Ash and the corresponding obligation of the State to FJ under the Acquisition Agreement. Upon request from the State, executive officers of Casella shall periodically certify to the State Casella's compliance with this subsection and the State may inspect the Landfill to confirm the same. Casella's agreement to satisfy the State's obligation to FJ as per Subsection 2.8 and the Acquisition Agreement represent a material condition of the State's agreement to enter into this Agreement.

2.11 Tipping Fees on Non-FJ Waste.

(a) Casella shall charge Tipping Fees for disposal of waste that is not FJ Waste or Lincoln's Biomass Ash according to the following schedule:

- Certain Special Wastes, including without limitation bottom ash / fly from municipal solid waste incinerators and sandblast grit. $48.00 / Ton
- Oversized, bulky waste from municipal solid waste incinerators, that are unacceptable at municipal solid waste incinerators. $58.00 / Ton
- Front-end residue from municipal solid waste incinerators. $48.00 / Ton
- Municipal solid waste, including municipal solid waste designated as "by pass" on an infrequent basis. $58.00 / Ton
- Construction and demolition debris, free of putresible waste. $58.00 / Ton

Subject in all instances to Casella's obligations under Section 2.3.2 hereof, the foregoing Tipping Fees are "not to exceed" fees (it being understood that Casella may, in its sole discretion charge lower fees), are exclusive of any Tipping Fees which may be imposed by the State under laws enacted or regulations promulgated after the Effective Date, and shall be subject to annual adjustment in accordance with changes in the CPI and changes in law which materially affect the cost of landfill design, construction, operations or closure. The fee schedule above is inclusive

of all charges, including the Host Community Benefit Package costs referred to in Casella's response to the RFP.

(b) The State reserves the right to direct solid waste to the Landfill, as may be required by changes in State law or in MDEP rules and regulations. The Tipping Fees established by Casella for the waste stream most closely matching these directed wastes shall apply. Prior to redirection of these wastes, the State shall notify Casella as to the reason for the redirection and an estimate of the expected volume/tonnage of wastes. In no event shall the State's exercise of its rights under this subsection restrict or impair the capacity reserved for FJ under Section 2.8.

2.12 Costs. Casella shall bear all costs, expenses, and liabilities associated with the operation and maintenance of the Landfill and the fulfillment of Casella's other responsibilities hereunder during the term of this Agreement including, without limitation, any liabilities for claims of employees performing activities under this Agreement that arise out of any provision of the workers' compensation law or otherwise.

2.13 Waste Management Hierarchy. Casella agrees to use its best efforts to achieve the following goals:

(a) to operate the Landfill following the State's solid waste management hierarchy (reduce, reuse, recycle, compost, incinerate, landfill);

(b) to implement the Public/Private Partnership agreement with the Municipal Review Committee (MRC);

(c) to draw upon Casella's FCR Division to analyze and develop the best collection, processing and marketing options for all MRC member

communities;

(d) to implement Green Mountain Glass's technology for recovery and recycling of all color glass containers;

(e) to work with the MRC to analyze and help develop organics recycling programs that enhance or expand current practices of MRC communities;

(f) to work with the MRC members in developing program to collect, store and process (where applicable) Universal Wastes and mercury containing products;

(g) to work with MRC members in developing programs to identify, collect and properly dispose of household hazardous wastes;

(h) to work with the MRC and appropriate research facilities to assess the viability of using Maine developed ablation technology as a source of air emission control for biomass boilers combusting up to 50% clean C&D wood as a fuel source, such as being proposed by GP;

(i) to expand C&D processing capability of Casella and its Affiliates to achieve an increase in C&D waste volume requiring disposal with a focus on recovering the clean C&D wood waste that would assist in meeting the biomass fuel commitment to FJ. Other recyclable materials would be separated and utilized in other applications, including aggregate and metals.

2.14 Real and Personal Property Taxes. Casella shall be responsible for the payment of all real and personal property taxes with respect to the Landfill during the Term.

SECTION 3 CONTRACTS WITH THIRD PARTIES

3.1

(a) During the Term hereof, but after the issuance of the License Amendment,

Casella shall, subject to the terms and conditions hereof, have the exclusive right and authority to negotiate and enter into various contracts regarding the Landfill. These contracts may include, among others, (i) long-term contracts for the disposal of waste at the Landfill, (ii) a long-term contract for the disposal of Leachate generated at the Landfill, (iii) long-term contracts for the disposal of local municipal solid waste at the Landfill, and (iv) long-term host community agreement with the City of Old Town, all on terms and conditions reasonably acceptable to Casella. Casella shall provide the State with notice of and adequate time to review and comment on such contracts and agreements prior to their execution. These contracts will not bind State without the State's prior written consent, and shall be expressly subject to the Unwind Provisions described in Section 5.3 (a).

(b) Casella agrees to assume the leachate trucking agreement between FJ and Thornton's Construction and the Landfill operations agreement between FJ and J.A. Buchanan, or, if such contracts cannot be assumed without the consent of the other contract party, to use its best efforts to secure such consents. If Casella is unable to secure such consents, Casella shall use its best efforts to negotiate the termination of such agreements with no impact on FJ or the State. Casella shall further be solely responsible for any liabilities associated with assignment or termination of such contracts, including any contract buyout obligations or termination fees or damages arising from the termination or breach thereof, and hereby indemnifies and holds the State and FJ harmless for any liabilities arising from or relating to the assumption or

termination of such contracts.

SECTION 4 PERMITTING MODIFICATIONS AND COOPERATION

4.1 Cooperation. The State agrees (a) to cooperate reasonably with Casella in obtaining and, where applicable, in maintaining in the State's name (i) the Existing Permit and License Amendment, and (ii) all permits, licenses, statutory amendments and legislation, approvals and authorizations reasonably requested by Casella and agreed to by the State for the operation of the Landfill in accordance with the terms hereof, including without limitation the Expansion Permit, but at no cost or expense to the State and (b) to provide reasonable assistance to Casella but at no cost to the State, in dealing with all federal, state and local agencies to obtain the issuance, modification, transfer or amendment of all permits reasonably requested by Casella and agreed to by the State. The parties shall diligently pursue in good faith the acquisition of all such permits, licenses, approvals and authorizations, and any modifications or amendments thereto, for the Landfill as contemplated by and subject to the terms of this Agreement. The parties, however, recognize that the MDEP is an independent permitting authority before which the State must appear as any other person. Therefore, the parties acknowledge that any commitment of the State to cooperate with and seek a governmental approval is not a guaranty of issuance of such approval or the terms of such approval.

4.2 Permit Responsibility.

(a) Casella shall use its best and most diligent efforts to maintain in full force and effect the Existing Permit and, when issued, License Amendment. Casella shall not take any action or suffer any omission that causes, or provides a basis for, the revocation, suspension or restriction of the Existing Permit and, when issued, License Amendment, or limit or restrict Casella's or the State's ability to operate the Landfill.

(b) Casella shall use its best and most diligent efforts to, at its own cost and expense, apply for, seek and maintain in full force and effect (i) the License Amendment, (ii) the Expansion Permit, and (iii) such other federal, state and local permits, licenses and authorizations as otherwise required in connection with Casella's obligations under this Agreement, including, without limitation, any required zoning, subdivision and site plan approval. Without limiting the generality of the foregoing, Casella shall prepare on or before the third anniversary of the Effective Date an application for the Expansion Permit and shall conduct geologic and engineering studies and bear the cost of any consulting services related to all such permit/license and approval efforts. Subject to the foregoing, Casella shall determine the timing of the submission and the content of any such applications to the appropriate regulatory entities. Casella currently contemplates an application for the Expansion Permit for ten million (10,000,000) cubic yards of additional capacity, but, following exhaustion of all appeals of any approval of the Expansion Permit authorizing a lesser disposal capacity, Casella hereby agrees to accept any such approval so issued in connection with any application for the Expansion Permit, provided that, taken together, the initial application so submitted by Casella for the Expansion Permit shall provide that the Existing Permit, the License Amendment and the Expansion Permit will collectively provide sufficient capacity to dispose of at least 500,000 tons of waste per year over twenty (20) years of operation. If issued, Casella shall not take any action or suffer any omission that causes, or provides a basis for the revocation, suspension or

restriction of the Expansion Permit, or limit or restrict Casella's or the State's ability to operate the Landfill.

SECTION 5 PAYMENT AND BONDS; UNWIND PROVISIONS

5.1 Payments to the State. Contemporaneously with the execution of this Agreement, Casella shall pay to the State, and the State directs Casella to pay FJ, a total of Twenty-six Million Dollars ($26,000,000) as follows: (a) $12,500,000 in cash or by certified or bank cashier's check or by wire transfer to an account designated by the State; (b) $12,500,000 by issuance of a Letter of Credit in such amount; and (c) $1,000,000 by issuance of a Letter of Credit in such amount to the Escrow Agent for deposit into the Improvement Fund (as defined in the Acquisition Agreement). The aforesaid Letters of Credit may be fully drawn by FJ and the Escrow Agent, as applicable, in the event that, within five (5) business days following the receipt of the License Amendment that is materially consistent with the License Application, Casella fails to pay the amounts of the Letters of Credit to FJ and the Escrow Agent, respectively, in cash or by certified or bank cashier's check or by wire transfer. In the event that Casella pays the amounts of the Letters of Credit to the respective beneficiaries as aforesaid, the State shall cause the Letters of Credit to be immediately revoked and returned to Casella. There shall be no requirement that any appeal period expire or that any appeal of the issuance of the License Amendment be resolved prior to drawing under the Letters of Credit.

5.2 Bonds.

(a) Casella's obligation to perform its obligations hereunder shall be secured by a Four Million Dollar ($4,000,000) payment and performance bond in the form attached hereto as Exhibit C, which shall be delivered within five (5) business days from the date hereof.

(b) On the Effective Date Casella shall post, and thereafter shall maintain, closing and post-closing bonds in substitution for those provided by FJ in such amounts and on such terms as MDEP and federal law may require. Copies of the proposed closing and post-closing bonds shall be provided to the State within ten (10) business days of the Effective Date.

5.3 (a) Unwind Provisions. In the event that the License Amendment is (i) not received by June 30, 2004, or (ii) received by June 30, 2004 but is materially inconsistent with the License Application, or (iii) received by June 30, 2004 but successfully challenged on appeal such that a final judgment or court order either invalidates the License Amendment or results in the License Amendment being materially inconsistent with the License Application, Casella shall have the right to terminate this Agreement and rescind the transaction, at a simultaneous closing complying with the terms of Section 2.10 of the Acquisition Agreement. The closing shall occur within thirty (30) days of the exercise by Casella of its right to terminate and rescind hereunder, or such later date when the parties obtain MDEP authority to transfer the Existing Permit. At the closing, FJ shall promptly refund the $12,500,000 paid by Casella pursuant to Section 5.1, and FJ shall return or cause to be returned the cash or the Letters of Credit (as the case may be) described in Section 5.1. Appropriate provision shall be made for the closure and post-closure bonds identified in Section 5.2(b) in accordance with applicable law, and Casella shall undertake any remedial action as a result of its activities hereunder required by applicable regulatory authorities. Casella agrees to cooperate with the State and FJ in connection with the reconveyance of the Landfill described in Section 2.10 of the Acquisition Agreement, including filing necessary applications for transfer of all federal, state and local permits and approvals for operation of the Landfill as a generator-owned landfill (provided that FJ shall have the option to

assume the License Amendment, if any, and to the extent allowable under applicable law and so long as Casella and the State are released from any liability for post-assignment activities), and undertaking all other actions required to unwind the transaction described in the Acquisition Agreement and place the parties as nearly as reasonably possible in the same positions they were in prior to said transaction, with the exception that each party shall be responsible for its own out-of-pocket costs associated with said transaction and effecting the foregoing unwind provisions. Casella's right to terminate this Agreement and rescind the transaction hereunder must by exercised within thirty (30) days after the last to occur of the three events described in the first sentence of this Section 5.3(a). Any dispute regarding rights or obligations under this Section 5.3 shall be resolved by binding arbitration in accordance with the Commercial Arbitration Rules of the American Arbitration Association, provided that the arbitrators shall be directed to make an arbitration award within ninety (90) days, and that Casella shall continue to operate the Landfill pursuant to the terms hereof until the issuance of a final arbitration award.

(b) The State shall have no liability or obligation to Casella with respect to the repayment of the cash or return of the Letters of Credit as described in Section 5.3(a), and Casella agrees to look solely to FJ for the repayment of such cash and return of the Letters of Credit and hereby waives and releases the State of any liability arising thereunder or relating thereto, howsoever arising.

SECTION 6 EQUIPMENT

Casella shall be responsible for all operating, repair and maintenance costs associated with any equipment used in the operation of the Landfill, and shall maintain and replace such equipment as it deems necessary.

SECTION 7 COMPLIANCE WITH LAW

Except as otherwise provided in this Agreement, and subject to Section 8 hereof, Casella shall be responsible for all costs and expenses related to Landfill regulatory compliance. Notwithstanding the foregoing, Casella shall have the right, at its own cost and expense, to contest or review by legal or administrative proceedings the validity or legality of any law, order, ordinance, rule, regulation, direction or certificate of occupancy, and, to the extent permitted by law, during such contest Casella may refrain from complying therewith, subject, however, to the terms and conditions hereof.

SECTION 8 INDEMNIFICATION

8.1 Indemnification.

(a) Casella will indemnify, defend, and hold the State and FJ, their respective Affiliates and their respective officers, directors, employees, agents and Affiliates harmless from and against any and all Damages that arise from or related to any past, current or future design, construction, improvement, ownership or operation of the Landfill or any other activities associated therewith, or any breach of Casella's obligations under this Agreement, including without limiting the generality of the foregoing, any and all Damages resulting from:

(i) groundwater or surface water contamination caused by the Landfill, whether or not such liability results from operation of the

Landfill by FJ or any third parties;

(ii) on-Premises or off-Premises contamination;

(iii) violation of any Environmental Law at or in connection with the Landfill or Premises;

(iv) any fine, penalty, judgment, award, or settlement of any legal or administrative proceeding relating in any way to Environmental Matters relating to the Landfill or the Premises;

(v) any compliance, corrective or remedial measure required under any Environmental Law or other requirement including any clean-up, removal, containment or other remediation or response actions associated with the Landfill or the Premises; and

(vi) any and all Environmental Matters.

8.2 Limitations. Anything in this Section 8 to the contrary notwithstanding, in the event that this Agreement is terminated pursuant to Section 15 below, Casella's indemnity obligations hereunder shall survive termination hereof and the unwind of the transaction described in Section 5.3 (a) but shall be limited to Environmental Matters and other Damages arising from or relating to breaches, conditions, events, transactions or occurrences which occurred at any time prior to the termination of this Agreement or the unwind of the transaction but regardless of when the same shall be discovered or become manifest. Furthermore, Casella's indemnity obligations hereunder shall not extend to Damages arising from breaches of FJ's representations and warranties under Article 3 of the Acquisition Agreement.

SECTION 9 SUBCONTRACTING

In the performance of its obligations hereunder, Casella shall have the unrestricted right to subcontract those services that it deems appropriate in its sole discretion, including, without

limitation, construction, engineering, design, permitting, operation, maintenance, management and administration; provided, that Casella shall remain fully responsible for the performance of any and all obligations subcontracted hereunder.

SECTION 10 RECORDS, AUDITS AND CONFIDENTIALITY

10.1 Annual Report; Inspection Rights. In addition to other reports that Casella may be required to maintain under applicable law, Casella shall prepare and provide to the State an annual report summarizing in reasonable detail the business and technical operation of the Landfill during the preceding calendar year or portion thereof and such other records and information as the State may reasonably require, including certifications regarding the as built and available disposal capacity reserved for FJ (or its successor or assign). Casella shall maintain accurate records, books and data with respect to the amount of all Acceptable Waste disposed of at the Landfill during any period that Casella is the operator of the Landfill. The State shall have the right at reasonable times and upon not less than three (3) business days prior notice to inspect and examine Casella's books and records related to the operation of the Landfill to confirm Casella's compliance with this Agreement and applicable permits and environmental laws and regulations. The State shall further have the right to visit and enter upon the Landfill to confirm, among other matters, satisfaction by Casella of its obligations under Sections 2.8 and 2.10 hereof. The parties shall cooperate in good faith to develop a list of the books, records and data which shall be available for such inspection and examination by the State. Casella shall maintain any such books, records or other data for so long as Casella's indemnity obligations under Section 8 shall continue in effect. Upon termination of this Agreement, the State shall have the right to review and copy, and shall have a permanent, irrevocable, exclusive license to make use of all of Casella's technical information, data, studies, engineering, operational records and other materials and information of any nature related to the Landfill and/or the design,

construction, licensing or operation of the Landfill, including without limitation, all testing results, design materials, engineering studies and other engineering work, all applications for Governmental Approvals related to the Landfill and any and all such other data and materials as relate in any way to the premises and/or the development of the Landfill.

SECTION 11 NO JOINT VENTURE

Without limiting Casella's obligations hereunder (including the obligation to satisfy the State's obligation to FJ under the Acquisition Agreement), the parties acknowledge and agree that nothing contained in this Agreement is intended to nor shall be construed to create a partnership or joint venture between Casella and the State or make Casella and the State partners or joint venturers, or make either party in any way liable or otherwise responsible for the debts, actions, obligations or losses of the other party.

SECTION 12 SPECIAL PROVISIONS CONCERNING THE STATE

12.1 Appropriations. The State's obligations and liabilities hereunder are subject to available budgetary appropriations and shall not create any obligation of payment on behalf of the State in excess of such appropriations and other funds and assets available to the State for the performance of its obligations. Notwithstanding any other provision of this Agreement, if the State does not receive sufficient funds to fund this Agreement and the State's obligations hereunder and other obligations of the State, if funds are deappropriated, or if the State does not receive legal authority to expend funds from the Maine State Legislature or Maine courts, then the State is not obligated to make any payment otherwise due under this Agreement. The SPO hereby represents that it reasonably believes that funds will be made available through appropriation by the Legislature to make all payments required hereunder and to fund all obligations of performance hereunder by the State. Without limiting the foregoing, the SPO hereby covenants and agrees that it will exercise all reasonable efforts to obtain, maintain and

properly request and pursue appropriation of funds and other revenue sources from which all payments to be made hereunder shall be satisfied, and through which all obligations of performance will be funded, including, without limitation, making provisions for such payments in any and all budgets submitted for the purposes of obtaining appropriations and/or funding, using all reasonable efforts to have such portion of the budget approved. Without limiting the foregoing, it is the State's intent to make all payments required hereunder and perform all of its obligations hereunder if funds are legally available therefor.

12.2 No Waiver of Sovereign Immunity. Casella acknowledges and agrees that the Legislative Resolve authorizing this Agreement specifically provides that nothing in this Agreement, or the execution and delivery of this Agreement, or the agreement by the State to perform its obligations hereunder constitutes or is intended to constitute abrogation of the sovereign immunity of the State with respect to each and every term of this Agreement. In this regard, the State expressly reserves its right of sovereign immunity with respect to its obligations hereunder, and the execution and delivery of this Agreement by the State, and its undertakings herein in no way waive, partially waive, imply a waiver, limit or restrict the State's unconditional right to exercise its right of, or to assert sovereign immunity with respect to any matter, term or issue arising under or relating to this Agreement.

SECTION 13 CERTAIN REPRESENTATIONS, WARRANTIES AND COVENANTS OF CASELLA

Casella represents and warrants to the State as follows:

13.1 Casella is a corporation duly organized and existing under the laws of the State of Delaware with the full legal right, power and authority to enter into and fully and timely perform its obligations under this Agreement.

13.2 Casella has duly authorized, executed and delivered this Agreement, and this

Agreement constitutes a legal, valid and binding obligation, enforceable against Casella in accordance with its terms, subject to bankruptcy, insolvency and other laws affecting creditors' rights generally.

13.3 Neither the execution or delivery by Casella of this Agreement nor the performance by Casella of its obligations in connection with the transactions contemplated hereby or Casella's fulfillment of the terms and conditions hereof conflicts with, violates or results in a breach of any law or governmental regulation applicable to Casella or materially conflicts with, violates or results in a breach of, any term or condition of any order, judgment or decree or any agreement or instrument to which Casella is a party or by which Casella or any of its properties or assets is bound, or otherwise constitutes a default thereunder.

13.4 No approval, authorization, order, consent, declaration, registration or filing with any federal, state or local governmental authority or agency is required for the valid execution and delivery by Casella of this Agreement or the performance by Casella of its obligations hereunder.

13.5 Casella covenants and agrees to operate Landfill and otherwise conduct all aspects of its business at the Landfill in compliance with all applicable laws and regulations and permits. Casella further agrees to maintain, and not to take any action or fail to take any action that would cause denial or revocation of the Existing Permit or the License Amendment, or, if issued, the Expansion Permit or any other license or permit issued during the Term relating to the Landfill. Casella further agrees to assume responsibility for all closure and post-closure aspects of the Landfill arising during the Term and to close those portions of the Landfill which reach final grade in accordance with approved plans and specifications.

13.6 Casella agrees to make all contributions to the State of Maine's Solid Waste

Management Fund (or any successor fund) or other payments required under applicable laws and regulations as if the Landfill were a commercial landfill under applicable law.

13.7 Casella shall maintain in full force and effect throughout the Term and for one year following termination, the $4,000,000 payment and performance bond in the form attached hereto as Exhibit C during the term hereof and the closure and post-closure bonds required hereunder upon closure of the Landfill with financially sound and reputable sureties and/or insurers qualified to issue sureties and bonds in the State, reasonably acceptable to the State. The State acknowledges that Evergreen National Indemnity Company is a financially sound and reputable surety as of the date hereof.

13.8 Casella agrees that all improvements to the Landfill of every nature and type shall be the property of and ownership of the same shall vest in the State on termination of this Agreement.

13.9 Throughout the term hereof, Casella agrees to participate in, and support to the best of its ability, the joint citizen advisory committee, comprised of representatives from the City of Old Town and the Town of Alton, as created by the Legislative Resolve permitting the State Planning Office to purchase the Landfill and cause it to be operated, all at no cost or expense to the State.

13.10 Casella shall perform its obligations under the C&D Fuel Agreement and shall not amend the same without the prior written consent of the State, which consent will not be unreasonably withheld

SECTION 14 SURVIVAL OF REPRESENTATIONS, WARRANTIES AND COVENANTS

All representations and warranties and covenants made herein or in any schedules attached hereto, or in any instruments or documents delivered by or on behalf of either party

pursuant to this Agreement, shall remain in effect during the Term and shall survive termination hereof to the extent specifically contemplated herein. The indemnity commitment described in Section 8 hereof shall continue until the expiration of the longest of the statutes of limitations applicable to Environmental Matters subject to the indemnification thereunder.

SECTION 15 TERMINATION

15.1 Events. This Agreement may be terminated at any time:

(a) By mutual written agreement of the parties;

(b) By either party if, prior to the Effective Date, litigation is filed or threatened, or any governmental authority institutes an action or investigation, intended to prohibit or prevent consummation of any of the transactions contemplated hereby or by the Acquisition Agreement, or any governmental authority does anything by the Effective Date which in a party's reasonable commercial judgment renders such consummation imprudent.

(c) By Casella if:

(i) Casella exercises its right to terminate under Section 5.3, subject to the limitations and qualifications set forth in said Section 5.3.

(ii) an Expansion Permit has not issued as a result of a Capacity Limiting Event and the licensed and permitted capacity of the Landfill (in excess of the capacity reserved for FJ Waste pursuant to Section 2.8) has been exhausted, provided that Casella cannot exercise its right to terminate under this clause (i) until on or after the fifteenth (15th) anniversary hereof.

(iii) An Event of Default by the State occurs as set forth in Section 16, which default remains uncured beyond any applicable period for cure

thereof;

Without in any respect limiting the foregoing or affecting other terms and provisions hereof, and solely for purposes of illustration, Casella shall not have the right to terminate this Agreement in the event:

(A) The application for the Expansion Permit is denied under State law in effect as of the date of this Agreement;

(B) The construction, engineering, design, permitting, licensing, operation, maintenance, management and administration of the Landfill is more expensive under the terms of the Expansion Permit as granted than as anticipated by Casella;

(C) The application for the Expansion Permit is granted but restricted such that the new capacity, when added to the then permitted capacity, is insufficient to allow Casella to dispose of 500,000 tons of waste a year for a period of twenty (20) years;

(D) Casella is unable or fails to comply with the terms and conditions under which the Landfill is permitted and licensed;

(E) There is a change in Federal or State law after the Effective Date of this Agreement that increases the cost of the construction, engineering, design, permitting, licensing, operation, maintenance, management and administration of the Landfill; or

(F) The Expansion Permit is revoked or modified.

(d) By the State if:

(i) an Event of Default by Casella occurs as defined in Section 16.1,

which default remains uncured beyond any applicable period for cure thereof; or

(ii) any of the conditions to closing in the Acquisition Agreement for either the State's or FJ's benefit shall not have been satisfied or waived and such Agreement shall have been terminated in accordance with terms thereof; or

(iii) any representation or warranty made by Casella hereunder is not true, accurate and complete in any material respect when made or becomes untrue, inaccurate or incomplete in any material respect during Term; or

(iv) FJ exercises its right of reverter under Article 10 of the Acquisition Agreement and the underlying breach is not cured within the applicable cure period or Casella breaches its obligations under the C&D Fuel Agreement and the underlying breach is not cured within the applicable cure period; or

(v) if the State reasonably determines that the issuer of the payment and performance bond attached hereto as Exhibit C is not financially sound or reputable, notifies Casella of the same and Casella fails to secure an alternative bond in form and content reasonably satisfactory to the State issued by a financially sound and reputable surety reasonably acceptable to the State and licensed to issue surety bonds and/or insurance policies within ninety (90) days.

15.2 Effects of Termination.

(a) If this Agreement is terminated pursuant to Subsections 15.1(a) or (b), this Agreement shall terminate and neither party shall have any further or continuing obligation hereunder.

(b) If the State terminates this Agreement pursuant to subsection 15.1(d), in addition to whatever other rights or remedies it may have (none of which are waived), the State (a) may remove Casella and its agents from, and on demand Casella and its agents shall, vacate the Landfill, and (b) and/or make demand under the payment and performance bond.

(c) Upon termination of this Agreement for any reason, the State shall own all fixed capital improvements to the Landfill and all other buildings, fixtures and other improvements without any obligation to pay Casella.

(d) Termination of this Agreement for any reason shall not relieve a party of its obligations arising prior to the termination date or those obligations that survive termination, including certain of Casella payment obligations under Section 5.2 and Casella's obligations under Section 8.

SECTION 16 DEFAULT AND REMEDIES

16.1 Notice/Cure. If either party fails to perform a material obligation under this Agreement, then the other party shall give notice of such alleged material failure, describing the alleged material failure and the action required to cure such material failure, if any. If the party receiving such notice fails to cure any such material failure to perform pursuant to Section 17 hereof, then an "Event of Default" shall be deemed to have occurred and the other party shall have the rights and remedies set forth in subsection 15.1 above and 16.2 below.

16.2 Remedies. If any Event of Default occurs (as defined in subsection 16.1 above), then (i) this Agreement may be terminated by the non-defaulting party by giving notice of

termination to the defaulting party, and/or (ii) the non-defaulting party shall have the right to take whatever action at law or in equity it deems necessary or desirable to collect any amounts then due or thereafter to become due under this Agreement or to enforce performance of any covenant or obligation of the defaulting party under this Agreement, including as to the State the right to make demand on the payment and performance bond securing Casella's obligations under this Agreement.

SECTION 17 RIGHT TO CURE BREACH

Upon its receipt of a notice of alleged material failure to perform a material obligation under this Agreement issued under subsection 16.1 hereof, the receiving party shall either:

17.1 Cure the material failure to perform within thirty (30) days of receipt of the written notice from the other party, provided that there shall be no cure period for a breach by Casella of its obligations under section 13.7 and 21.2; or

17.2 Continuously demonstrate, for those defaults for which cure periods exist, within such thirty (30) day cure period that it is actively pursuing a course of action which reasonably can be expected to lead to a cure of the material failure to perform (and the cure period shall be extended for so long as the curing party is actively and continuously pursuing such course of action) within a commercially reasonable period of time not to exceed ninety (90) days; provided, however, that with respect to a default by Casella under Section 2.10, the aforesaid period of time shall be extended to one (1) year on the condition that Casella has established and is maintaining a capital improvement plan designed to bring Casella into compliance with and maintain Casella's compliance with the requirements of Section 2.10; alternatively, Casella shall have the right to cure such a default by posting a performance bond in the amount of the insufficient capacity, calculated at the rate of $2.90 per ton; provided further that, in the event of the failure of either party to pay the other party any amount required to be paid hereunder when

due, cure shall consist of payment in full which shall be made within ten (10) business days of written demand from the party entitled to the payment, together with interest accruing from the date the payment was due at a per annum rate equal to the Prime Rate, unless said sums are being contested.

SECTION 18 NON-BINDING MEDIATION

18.1 Non-Binding Mediation. The parties agree that in the event of any dispute, controversy or claim arising under or relating to this Agreement or any alleged breach thereof, other than a breach by Casella of its payment obligations or its obligations under Sections 13.7, 21.1 or 21.2 hereof, the parties shall attempt to come to a reasonable settlement of any dispute (i) by having their authorized representatives attempt to negotiate a resolution of the dispute for a period of thirty (30) days, and, if not resolved by the authorized representatives (ii) by having other more senior members of each party's management, who have no previous involvement in the dispute, but who have the authority to resolve the dispute, attempt to negotiate a resolution of the dispute for an additional fifteen (15) days.

18.2 Waiver of Jury Trial. THE STATE AND CASELLA AGREE THAT NEITHER OF THEM NOR ANY ASSIGNEE OR SUCCESSOR SHALL (A) SEEK A JURY TRIAL IN ANY LAWSUIT, PROCEEDING, COUNTERCLAIM OR ACTION ARISING UNDER OR RELATING TO THIS AGREEMENT, OR (B) SEEK TO CONSOLIDATE ANY SUCH ACTION WITH ANY OTHER ACTION IN WHICH A JURY TRIAL CANNOT BE OR HAS NOT BEEN WAIVED. THE PROVISIONS OF THIS PARAGRAPH HAVE BEEN FULLY DISCUSSED BY THE STATE AND CASELLA, AND THESE PROVISIONS SHALL BE SUBJECT TO NO EXCEPTIONS. NEITHER THE STATE NOR CASELLA HAS AGREED WITH OR REPRESENTED TO THE OTHER THAT THE PROVISIONS OF THIS SECTION WILL NOT BE FULLY ENFORCED IN ALL INSTANCES.

18.3 Consent to Jurisdiction. The parties and their assigns submit to the jurisdiction of any state or federal court located in the State of Maine in connection with any proceeding or action arising from or relating to this Agreement or the agreements referred to herein. The parties consent to the jurisdiction and venue of any such court and waive any argument that venue in such forums is not convenient. In the event a party commences any action in another jurisdiction or venue under any tort or contract theory arising directly or indirectly from the relationship created by this Agreement, the other party at its option shall be entitled to have the case transferred to one of the jurisdictions and venues above-described, or if such transfer cannot be accomplished under applicable law, to have such case dismissed without prejudice.

SECTION 19 FORCE MAJEURE

If either party hereto is rendered unable, in whole or in part, to perform any of its obligations under this Agreement (other than an obligation to pay money when due) as a result of the occurrence of an event of Force Majeure, then the obligations of the affected party shall be suspended and its non-performance thereof excused during the continuation of the event of Force Majeure. At any time that a party intends to rely upon an event of Force Majeure to suspend its obligations or excuse its non-performance as provided in this Section 19, the affected parties shall notify the other party as soon as reasonably practicable (but in no event later than 72 hours following such event) describing in reasonable detail the circumstances of the event of Force Majeure and its ongoing efforts to mitigate the effects of such event of Force Majeure. Notice shall again be given when the effect of the event of Force Majeure has ceased. As a condition of invoking the protection afforded by this Section 19, the party relying upon an event of Force Majeure shall be required to exercise its best and most diligent efforts to eliminate the Force Majeure or devise a means of performance notwithstanding the Force Majeure and re-establish performance hereunder as rapidly as possible

Notwithstanding anything to the contrary herein, upon the occurrence of a force majeure, Casella will make available to FJ disposal capacity for FJ Waste and Lincoln Biomass Ash at the then prevailing market rate at any other landfill in the State of Maine owned and/or operated by Casella or any Affiliate that is licensed to accept FJ Waste and Lincoln Biomass Ash for a total commitment of thirty (30) years or such earlier time as disposal capacity at such landfill(s) is exhausted; provided, however, that FJ or Lincoln, as applicable, shall pay any and all costs of transporting FJ Waste and Lincoln Biomass Ash to such site. Except as aforesaid, Casella's obligations to provide disposal capacity for FJ Waste and Lincoln Biomass Ash shall be suspended during the pendency of any Force Majeure.

SECTION 20 EMINENT DOMAIN

The State agrees to cooperate with Casella in opposing any effort by any governmental authority to exercise its rights of eminent domain. In the event an eminent domain award is made, the amount of the award, after deducting amounts due FJ resulting from any breach of the Acquisition Agreement or Casella's obligations to FJ hereunder shall be apportioned between the State and Casella on the basis of the value of Casella's contractual and other interests under this Agreement, including without limitation, the value of any capital improvements made by Casella hereunder, and the value of lost revenue under any Landfill waste disposal capacity otherwise available to Casella hereunder.

SECTION 21 INSURANCE

21.1 General Insurance Requirements. Casella shall maintain liability, fire and workers' compensation insurance insuring both the State and Casella in the amounts set forth in Schedule 21 attached hereto, issued by financially sound and reputable insurance companies reasonably acceptable to the State that are authorized and licensed to issue such policies in the

State of Maine. Casella shall pay any premiums with respect to such policies as they come due. If Casella fails to pay any such premiums when due, the State shall have the right and option to pay any such premiums, whereupon the amount of any such premiums paid by the State shall be reimbursed by Casella to the State upon demand therefor. Upon request from the State, Casella shall promptly provide copies of such policies to the State.

21.2 Environmental Impairment. During the Term hereof, and annually thereafter for a period equal to the longest applicable statute of limitations (so long as such insurance is commercially available) for claims (including governmental actions) under Environmental Laws, Casella shall cause the Landfill to be insured for third party environmental impairment under a claims made policy carried by Casella. The policy shall provide a limit of not less than the greater of (a) the amount required under applicable laws and regulations from time to time in effect or required in connection with license and permits, or (b) $1,000,000 primary coverage and a $10,000,000 umbrella, increased annually by Two Hundred Twenty-five Thousand Dollars ($225,000) on each anniversary date of the Effective Date. Such policies shall name the State and FJ as additional insureds and shall be reasonably acceptable to the State and FJ.

SECTION 22 COVENANT OF QUIET ENJOYMENT

The State covenants and agrees that Casella, upon its performance of its obligations hereunder, shall lawfully, peacefully and quietly hold, occupy and enjoy the Landfill during the Term without hindrance, objection or disturbance, subject in all instances to the terms and provisions hereof.

SECTION 23 THIRD-PARTY BENEFICIARY

23.1 Third Party Benefit to FJ. FJ is an intended third-party beneficiary of all agreements, commitments and promises of Casella under this Agreement that provide benefit to FJ, including without limiting the generality of the foregoing, the provisions of Sections 2.8, 2.9,

2.10, 3.1, 4.1, 4.2, 8, 13, 14, 19, 20, 21 and 23.2 hereof, including related definitions from Section 1 and Exhibits (collectively, the "FJ Commitments"). The parties acknowledge and agree that FJ has provided consideration for its status as a third-party beneficiary hereunder through the sale of the Landfill to the State contemporaneously herewith, and that FJ's status as a third-party beneficiary under this Agreement was a material inducement to FJ selling the Landfill to the State. FJ's status hereunder shall be fully vested and shall be absolute as of the date hereof and FJ shall be entitled to take whatever action, in law or in equity, as may be available to enforce FJ's rights hereunder against Casella or any Affiliate operating the Landfill. FJ's status hereunder as a direct, intended, fully vested, absolute third-party beneficiary shall not in any way limit, restrict, abrogate or otherwise alter its rights against the State under the Acquisition Agreement.

23.2 Third Party Benefit to Casella. Casella is an intended third party beneficiary of the Unwind Provisions set forth in Section 2.10, the Representations and Warranties of FJ set forth in Article 3, and the Reverter Option set forth in Section 10.1, of the Acquisition Agreement. The parties acknowledge that Casella has provided consideration for its status as a third party beneficiary through its undertakings hereunder, and that such status shall be fully vested and absolute as of the date hereof and that Casella shall be entitled to take whatever action, in law or equity, as may be available to enforce Casella's rights as a third party beneficiary.

23.3 Successors and Assigns. The provisions of this Section 23 shall inure to the benefit of, and be binding upon FJ and its respective successors and assigns. Casella shall not assign or otherwise transfer its obligations under the FJ Commitments without the express written consent of FJ.

SECTION 24 MISCELLANEOUS PROVISIONS

24.1 Assignment. This Agreement may not be assigned by either party without the prior written consent of the other, which consent may be granted or withheld by such party in its sole discretion; notwithstanding the foregoing, Casella shall have the right to assign this Agreement to any Affiliate provided that Casella remains fully liable hereunder and provides reasonable assurances of the same to State in connection with any such assignment; furthermore, until such time as the License Amendment is received and is substantially consistent with the terms and conditions of the License Application, Casella shall have the right to delegate or subcontract the operation of the Landfill to J.A. Construction, Inc., subject to the terms and conditions of this Agreement. Each party further agrees not to unreasonably withhold its consent to a collateral assignment of this Agreement by the other party of such party's rights under this Agreement.

24.2 Cumulative Remedies. The specified remedies available to a party under this Agreement are not exclusive of any other remedies or means of redress to which such party may be lawfully entitled in the event of any breach or threatened breach by the other party of any provision(s) of this Agreement.

24.3 Captions and Headings. Captions and headings contained in this Agreement are inserted for convenience and reference only and the words contained therein shall in no way be held or deemed to define, limit, describe, explain, modify, amplify or add to the interpretation, construction or meaning of any provision or of the scope or intent of this Agreement, nor in any way to affect this Agreement.

24.4 Amendments and Modifications. This Agreement shall not be amended, modified or changed, except pursuant to an agreement in writing signed by or on behalf of the party against whom enforcement of the amendment, modification or change is sought.

24.5 Notices. All notices or other communications required or permitted hereunder shall be in writing and may be given by personal delivery, by overnight express delivery, or by registered or certified U.S. mail, postage prepaid, return receipt requested, properly addressed as follows:

To the State:

Executive Department
State Planning Office
38 State House Station
Augusta, Maine 04333-0038
Attention: Director

With a copy to:

William H. Laubenstein III Esq.
Assistant Attorney General
State of Maine
Office of the Attorney General
6 State House Station
Augusta, ME 04333-0006

To Casella:

c/o Casella Waste Systems, Inc.
25 Greens Hill Lane
Rutland, VT 05702-0866

With a copy to:

Gordon F. Grimes, Esq.
Bernstein, Shur, Sawyer & Nelson, P.A.
100 Middle Street, P.O. Box 9729
Portland, Maine 04104

Either party may change the address to which notices are required to be sent by giving notice of such change in the manner provided in this Section 24.5. All notices shall be deemed to have been received on the date of delivery if service is made in person, on the day after sent by

overnight express delivery service, or on the third (3rd) business day after mailing in accordance with this Section 24.5, except that any notice of a change of address shall be effective only upon actual receipt.

24.6 Strict Performance. The failure of either party to insist on the strict performance of any of the terms, covenants and provisions of this Agreement or to exercise any right, remedy or option herein contained shall not be construed as a waiver or a relinquishment for the future of such term, covenant, condition, provision, right, remedy or option.

24.7 Severability. In the event that any one or more of the terms or provisions of this Agreement shall for any reason he held by a court or other tribunal of competent jurisdiction to be invalid, illegal or unenforceable in any respect, in whole or in part, such invalidity, illegality or unenforceability shall not affect any other terms or provisions of this Agreement, and this Agreement shall be construed as if such invalid, illegal or unenforceable term or provision had never been contained herein, provided that it is the intention of the parties that, in lieu of such term or provision held to be invalid, illegal or unenforceable, there shall be added by mutual agreement as a part of this Agreement a term or provision as similar in terms to such illegal, invalid or unenforceable term or provision as may be possible, valid, legal and enforceable.

24.8 Construction. Words connoting the singular number shall include the plural in each case, and vice versa, and words connoting persons shall include corporations, companies, firms or other entities. The terms "herein", "hereunder", "hereby", "hereof" and any similar terms shall refer to this Agreement; the term "heretofore" shall mean before the date of execution of this Agreement. This Agreement is the result of joint negotiations and drafting and no part of this Agreement shall be construed as the product of any one of the parties hereto.

24.9 Entire Agreement. This Agreement, including covenants in the Acquisition

Agreement incorporated or referred to herein and the other agreements contemplated hereby, the covenants of Casella in the C&D Fuel Agreement and all exhibits and schedules attached hereto and thereto, constitute the entire agreement between the State and Casella with respect to the subject matter hereof, and supersede all prior or contemporaneous negotiations, representations, understandings and agreements, whether written or oral, between the parties with respect to the subject matter hereof.

24.10 Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original for all purposes, but all of which together shall constitute one and the same agreement.

24.11 Governing Law. This Agreement shall be governed by and construed and enforced in accordance with the laws of the State of Maine, without regard to the conflicts of law principles of such State.

24.12 Binding Effect; No Third Party Rights. This Agreement shall be binding upon and shall inure to the benefit of the parties hereto and their respective legal representatives, successors (whether by sale, assignment, transfer, merger, other acquisition, operation of law, or court ruling) and/or permitted assigns without releasing Casella of its obligations herein and shall be binding on any entity or entities that acquire all or substantially all of the assets or business of Casella and/or its Affiliates, in one or more transactions, whether by sale of assets, stock, merger or otherwise. Subject to the foregoing, and except as otherwise expressly provided herein (including Subsections 23.1 and 25), nothing in this Agreement shall be construed to confer any benefit on, or create any obligation, duty or liability to, or create any standard of care with respect to, any person, firm or entity not a party to this Agreement.

24.13 Authority of Parties. Each party hereto represents and warrants that the individual

who has executed this Agreement on its behalf has the full and complete authority to sign on behalf of such party for the purpose of duly binding such party to this Agreement.

24.14 State Special Services Agreement. This Agreement is subject to certain provisions of Rider B to the State's standard form of Agreement for Special Services, which provisions are attached hereto as Exhibit D.

SECTION 25 C&D FUEL COMMITMENT

Contemporaneously with the execution of this Agreement, Casella and FJ shall enter into a C&D Fuel Agreement in the form attached hereto as Exhibit B.

IN WITNESS WHEREOF, the parties have executed and delivered this Agreement as of the date first above written.

CASELLA WASTE SYSTEMS, INC.

Witness

Name: Richard Brennan
V.P. General Counsel

By: _____
Name: James W. Bohlig
Its President

STATE OF MAINE, Acting by and Through its Executive Department, State Planning Office

Witness

Name: George M MacDonald

By: Martha E. Freeman
Name: Martha E. Freeman
Its Director

APPENDIX B

MEDEP NOI APPROVAL LETTER

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION
AUGUSTA, ME 04333

DEPARTMENT ORDER

IN THE MATTER OF		
NEWSME LANDFILL OPERATIONS LLC	)	MULTI-SECTOR GENERAL
OLD TOWN, PENOBSCOT COUNTY, MAINE	)	PERMIT FOR STORMWATER
MER05B477	)	DISCHARGES ASSOCIATED
2828 BENNOCH RD	)	WITH AN INDUSTRIAL ACTIVITY
APPROVAL	)	**GENERAL PERMIT COVERAGE**

The Department of Environmental Protection (Department) has considered the Notice of Intent submitted by the NEWSME LANDFILL OPERATIONS LLC with supportive data, agency review comments and other related materials on file for coverage under the Multi-Sector General Permit For Stormwater Associated With An Industrial Activity (MSGP) #MER050000, issued by the Department on December 7, 2016, and FINDS THE FOLLOWING FACTS.

The permittee has agreed to comply with all terms and conditions of the MSGP. Operated in accordance with MSGP #MER050000, the discharges identified by the permittee will not have a significant adverse effect on water quality or cause or contribute to the violation of the water quality standards of the receiving water.

THEREFORE, the Department GRANTS the NEWSME LANDFILL OPERATIONS LLC , coverage under MSGP #MER050000 subject to the terms and conditions therein.

DONE AND DATED AT AUGUSTA, MAINE, THIS 2ND DAY OF March, 2017.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Michael Kuhn
for Paul Mercer, Commissioner

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

The Original Notice of Intent was received by the Department on February 7, 2017.
The Original Notice of Intent was accepted by the Department on February 7, 2017.

Date filed with Board of Environmental Protection: _____

This Order prepared by GREGG WOOD, BUREAU OF WATER QUALITY
MER05B477 March 1, 2017

Filed
MAR 0 2 2017
State of Maine
Board of Environmental Protection

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PAUL MERCER
COMMISSIONER

March 1, 2017

TONI KING
NEWSME LANDFILL OPERATIONS LLC
2828 BENNOCH RD
OLD TOWN, ME 04468-4214
e-mail: toni.king@casella.com

RE: Multi-Sector General Permit For Stormwater Associated With An Industrial Activity
MER05B477– 2828 BENNOCH RD

Dear Brian G Oliver:

Enclosed, please find a Department Order granting coverage under the Multi-Sector General Permit For Stormwater Associated With An Industrial Activity (MSGP), which was issued by the Department on December 7, 2016, for a five year term.

Please read the MSGP and its attached conditions carefully. Compliance with this permit will protect water quality. If you have any questions regarding the matter, please feel free to call me at 287-7693.

Your Department compliance inspector is also a resource that can assist you with compliance. Please do not hesitate to contact them with any questions.

Thank you for your efforts to protect and improve the waters of the great state of Maine!

Sincerely,

Gregg Wood
Division of Water Quality Management
Bureau of Water Quality

Enc.
cc: David Ladd, DEP
Lori Mitchell, DEP/CMRO
Sandy Mojica, USEPA
Olga Vergara, USEPA
Marelyn Vega, USEPA

AUGUSTA
17 STATE HOUSE STATION
AUGUSTA, MAINE 04333-0017
(207) 287-7688 FAX: (207) 287-7826

BANGOR
106 HOGAN ROAD, SUITE 6
BANGOR, MAINE 04401
(207) 941-4570 FAX: (207) 941-4584

PORTLAND
312 CANCO ROAD
PORTLAND, MAINE 04103
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE
1235 CENTRAL DRIVE, SKYWAY PARK
PRESQUE ISLE, MAINE 04769
(207) 764-0477 FAX: (207) 760-3143

web site: www.maine.gov/dep

NOTICE OF INTENT TO COMPLY WITH THE MAINE MULTI-SECTOR GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Notice of Intent (NOI) submission constitutes the express intent of the entity in Section A (of this form) to discharge stormwater associated with an industrial activity to waters of the State (excluding groundwater), from the facility/site identified in Section C (of this form), under Maine's Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP). Submission of this NOI also certifies that the responsible official understands and meets the eligibility conditions of Special Condition C, *Applicability And Eligibility*, of the MSGP, agrees to comply with all applicable terms and conditions of the MSGP, and understands that continued authorization under the MSGP is contingent on maintaining eligibility for coverage. **Please send the completed form to the Maine Department of Environmental Protection, 17 State House Station, Augusta, ME 04333-0017. A check for the appropriate permit fee made payable to: Treasurer, State of Maine may need to be submitted with the NOI. Please read the instructions on the back prior to completing the NOI form.**

A. Applicant Information – Legal Name & Mailing Address					
MSGP Permit:	MER05 B477				
Maine State Charter Number (if applicable):	20040538DC				
Legal Name of Applicant	NEWSME Landfill Operations, LLC				
Mailing Address	110 Main St., Suite 1308				
City/Town	Saco	State	ME	Zip Code:	04072
Daytime Phone: (with area code)	(207) 653-4421				
E-mail	toni.king@casella.com				

B. Contact Person for this NOI					
Permit Contact Person	Toni King				
Title	Region Engineer				
Contact Address	110 Main St., Suite 1308				
City/Town	Saco	State	ME	Zip Code	04072
Daytime Phone:	(207) 653-4421				
Email:	toni.king@casella.com				

C. Facility/Site Physical Location					
Physical Address	2828 Bennoch Road				
City/Town	Alton	State	ME	Zip Code	04468

Recv'd 2/7/17 Accpt 2/7/17

December 27, 2016

Entered & Permit 3-1-17 SP

NOTICE OF INTENT TO COMPLY WITH THE MAINE MULTI-SECTOR GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Daytime Phone:	(207) 394-4372
Basis for Applicant's Title, Right, or Interest:	☐ Deed ☐ Lease ☒ Operating Agreement ☐ Other Attach a copy of the documentation demonstrating Title, Right or Interest

D. Receiving Water Information

Name of the receiving water(s):	Pushaw Stream
Does the facility discharge stormwater to a municipal separate stormwater sewer system (MS4)?	☐ Yes ☒ No
If yes, name of the MS4:	

E. Industrial Activity Information

The 4-digit Standard Industrial Classification (SIC) Code(s) or the 2 or 3 alpha-numeric Sub-Sector Code that best represents the industrial activity at the facility or any multiple sector-specific industrial activities.

SIC# or Sub-Sector Code	L1	Additional SIC# or Sub-Sector Code	

Applicable Sector(s) of industrial activity, as designated in Attachment A of the MSGP, that include associated discharges that you seek to have covered under this permit (check all that apply):

☐ Sector A	☐ Sector B	☐ Sector C	☐ Sector D	☐ Sector E	☐ Sector F	☐ Sector G	☐ Sector H
☐ Sector I	☐ Sector J	☐ Sector K	☒ Sector L	☐ Sector M	☐ Sector N	☐ Sector O	☐ Sector P
☐ Sector Q	☐ Sector R	☐ Sector S	☐ Sector T	☐ Sector U	☐ Sector V	☐ Sector W	☐ Sector X
☐ Sector Y	☐ Sector Z	☐ Sector AA	☐ Sector AB	☐ Sector AC	☐ Sector AD		

Does the facility have a complete and up-to-date Stormwater Pollution Prevention Plan (SWPPP)?	☒ Yes ☐ No
What date was the SWPPP last revised to bring it up-to-date?	January 2017

F. Certification of Responsible Official

I certify under penalty of law that I have personally examined the information submitted in this document and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the information is true, accurate, and complete. I authorize the Department to enter the property that is the subject of this application, at reasonable hours, including buildings, structures or conveyances on the property, to determine the accuracy of any information provided herein. I am aware there are significant civil and criminal penalties for submitting false information, including the possibility of fine and imprisonment. By my signature as a responsible official for the entity or individual identified in Section A of this NOI, I certify under penalty of law that that I am the operator of the facility, and have Title, Right or Interest, as indicated in Section C of this form.

Printed Name:	Toni King		
Title:	Region Engineer		
Signature:	Toni M. King	**Date:**	2/3/17

DEP OFFICE USE ONLY

Permit ID		

APPENDIX C

2016 MEDEP MULTI-SECTOR GENERAL PERMIT

STATE OF MAINE

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Multi-Sector General Permit – Stormwater Discharge Associated With Industrial Activity

Maine Pollutant Discharge Elimination System Permit
Maine Waste Discharge License

Bureau of Water Quality

Final Permit - December 2016

MEPDES Permit #MER050000
Waste Discharge License #W008227-MN-C-R

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

MULTI-SECTOR GENERAL PERMIT – STORMWATER DISCHARGE ASSOCIATED WITH INDUSTRIAL ACTIVITY

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ATTACHMENT A – SIC/NAICS Codes Covered by the General Permit

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APPENDIX E. Sector E: Glass, Clay, Cement, Concrete, and Gypsum Products
APPENDIX F. Sector F: Primary Metals
APPENDIX G. Sector G: Metal Mining
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APPENDIX V. Sector V: Textile Mills, Apparel, and Other Fabric Products
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APPENDIX AA. Sector AA: Fabricated Metal Products
APPENDIX AB. Sector AB: Transportation Equipment, Industrial or Commercial Machinery
APPENDIX AC. Sector AC: Electronic, Electrical Equipment and Components Photographic and Optical Goods
APPENDIX AD: Sector AD: Stormwater Designated by the Department as Requiring a Permit

STANDARD CONDITIONS

FACT SHEET

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
17 STATE HOUSE STATION AUGUSTA, MAINE 04333-0017

DEPARTMENT ORDER

IN THE MATTER OF

MULTI-SECTOR GENERAL PERMIT FOR		)	MAINE POLLUTANT DISCHARGE
STORMWATER DISCHARGE ASSOCIATED		)	ELIMINATION SYSTEM PERMIT
WITH INDUSTRIAL ACTIVITY		)	
STATE OF MAINE		)	AND
#MER050000		)	WASTE DISCHARGE LICENSE
#W008227-MN-C-R	**APPROVAL**	)	**RENEWAL**

In compliance with applicable provisions of *Pollution Control*, 38 M.R.S. §§ 411 – 424-B, *Water Classification Program*, 38 M.R.S. §§ 464 – 470 and *Federal Water Pollution Control Act*, Title 33 U.S.C. § 1251, and applicable rules of the Maine Department of Environmental Protection (Department hereinafter), the Department has considered the renewal of Maine Pollutant Discharge Elimination System (MEPDES hereinafter) General Permit #MER050000 / Waste Discharge License (WDL) #W008227-5Y-B-R, which was issued on April 26, 2011, for a five-year term, with its supportive data, agency review comments, and other related materials on file and FINDS THE FOLLOWING FACTS:

PROCEDURAL AND REGULATORY SUMMARY

On January 12, 2001, the Department received authorization from the U.S. Environmental Protection Agency (USEPA) to administer the National Pollutant Discharge Elimination System (NPDES) permit program in Maine. From that point forward, the program has been referenced as the MEPDES permit program.

On April 26, 2011, the Department issued *Stormwater Discharge Associated With Industrial Activity Multi-Sector General Permit* (General Permit) #MER050000 / WDL #W008227-5Y-B-R, for a five-year term. The April 26, 2011 General Permit superseded the initial General Permit, #MER050000 / WDL #W008227-5Y-A-N, which was issued on October 11, 2005 for a five-year term.

Beginning March 14, 2016, the Department commenced renewal proceedings and provided public notice of its intent to renew the April 26, 2011 General Permit in the *Bangor Daily, Kennebec Journal, Sun-Journal,* and *Portland Press Herald* newspapers. The notice solicited comments on a draft permit, when available, and provided an opportunity to request a public hearing.

CONCLUSIONS

Based on the findings in the attached permit and incorporated Fact Sheet, dated September 29, 2016, and subject to the special and standard conditions that follow, this Department makes the following **CONCLUSIONS:**

1. The discharge(s) covered under this General Permit, either by itself or in combination with other discharges, will not lower the quality of any classified body of water below such classification.

2. The discharge(s) covered under this General Permit, either by itself or in combination with other discharges, will not lower the quality of any unclassified body of water below the classification which the Department expects to adopt in accordance with State law.

3. The provisions of the State's antidegradation policy, *Classification of Maine waters*, 38 M.R.S. § 464(4)(F), will be met, in that:

   (a) Existing in-stream water uses and the level of water quality necessary to protect and maintain those existing uses will be maintained and protected;

   (b) Where high quality waters of the State constitute an outstanding national resource, that water quality will be maintained and protected;

   (c) Where the standards of classification of the receiving water body are not met, the discharge will not cause or contribute to the failure of the water body to meet the standards of classification;

   (d) Where the actual quality of any classified receiving water body exceeds the minimum standards of the next highest classification that higher water quality will be maintained and protected; and

   (e) Where a discharge will result in lowering the existing water quality of any water body, the Department has made the finding, following opportunity for public participation, that this action is necessary to achieve important economic or social benefits to the State.

4. The discharge(s) covered under this General Permit is subject to effluent limitations that require application of best practicable treatment as defined in *Conditions of licenses*, 38 M.R.S. § 414-A(1)(D).

ACTION

Based on the findings and conclusions as stated above, the Department APPROVES the renewal of *Multi-Sector General Permit for Stormwater Discharge Associated With Industrial Activity*, #MER050000, for the discharge of stormwater associated with industrial activity and certain non-stormwater discharges to surface waters of the State, SUBJECT TO THE ATTACHED CONDITIONS, including:

1. The attached Special Conditions, including any effluent limitations and monitoring requirements.

2. *Maine Pollutant Discharge Elimination System Permit Standard Conditions Applicable To All Permits*, revised July 1, 2002, copy attached.

3. This General Permit and the authorization to discharge become effective **ninety (90) days** following the date of signature below and expire at midnight five (5) years from the effective date. Prior to expiration of this General Permit, the Department must make a determination if it is to be renewed, and, if so, must commence renewal proceedings. If this General Permit is to be renewed, it must remain in force until the Department takes final action on the renewal. [*Maine Administrative Procedure Act*, 5 M.R.S. § 10002, *Rules Concerning the Processing of Applications and Other Administrative Matters*, 06-096 C.M.R. 2(21)(A) (last amended October 19, 2015), and *General Permits for Certain Wastewater Discharges*, 06-096 C.M.R. 529(3)(c) (last amended June 27, 2007)]

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

DONE AND DATED AT AUGUSTA, MAINE, THIS __7th__DAY OF __December___, 2016.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: ___/s/ Michael Kuhns for_____
PAUL MERCER, Commissioner

Date of Public Notice _____March 14, 2016_____.

Date filed with Board of Environmental Protection __December 8, 2016_____

This Order prepared by Bill Hinkel/Gregg Wood, BUREAU OF WATER QUALITY

MER050000 2016 12/5/16

SPECIAL CONDITIONS

A. AUTHORITY

A permit is required for the direct or indirect discharge of pollutants to waters of the State and United States. *Waste discharge licenses*, 38 M.R.S. § 413(1) and *Federal Water Pollution Control Act*, Title 33 U.S.C. § 1251, *et seq*. The Department is authorized by the USEPA to administer the NPDES permit program in Maine. The Department may issue a general permit authorizing the discharge of certain pollutants from multiple individual discharge sources and locations which all have the same type of discharges and which involve situations where the Department determines there is a relatively low risk for significant environmental impact. 06-096 C.M.R. 529. The Department has determined that discharges resulting from stormwater discharge associated with industrial activities located within the geographic area of coverage and that conform to the applicability and coverage standards established herein may be authorized by a general permit.

B. DEFINITIONS

In addition to the definitions found in *Definitions in the Waste Discharge Permitting Program*, 06-096 C.M.R. 520 (effective January 12, 2001) and in the waste discharge program and water classification laws, the following terms have the following meanings when used in this General Permit.

1. **Co-located Industrial Activities** – any industrial activities, excluding your primary industrial activity(ies), located on-site that are defined by the stormwater regulations at 06-096 CMR 521 §9(b)(14)(i) through (x) and 06-096 CMR 521 §9(b)(14)(xi). An activity at a facility is not considered co-located if the activity, when considered separately, does not meet the description of a category of industrial activity covered by the stormwater regulations or identified by the SIC code list in Attachment A of this permit or your primary industrial activity does not meet the description of a category of industrial activity covered by the stormwater regulations or identified by the SIC code list in Attachment A of this permit.

2. **Corrective Action**. "Corrective action" means any action taken, or required to be taken, to (1) repair, modify, or replace any stormwater control used at the site; (2) clean up and dispose of spills, releases, or other deposits found on the site; and (3) remedy a violation of this General Permit.

3. **Discharge Point (Outfall).** – for the purpose of this permit the location where collected and concentrated stormwater flows are discharged from the facility such that the first receiving waterbody into which the discharge flows, either directly or through a separate storm sewer system, is a water of the State.

4. **Impaired Waters.** "Impaired Waters" means waters identified by the Department as not meeting an applicable water quality standard, and require development of a total maximum daily load (TMDL) (pursuant to Section 303(d) of the CWA), or are addressed by a USEPA-approved or established TMDL, or are covered by pollution controls requirements that meet the requirements of 40 CFR 130.7(b)(1). For discharges that enter a separate storm sewer system prior to discharge, the first water of the State to which you discharge is the waterbody that receives the stormwater discharge from the storm sewer system.

SPECIAL CONDITIONS

B. DEFINITIONS (cont'd)

5. **Industrial Activity.** "Industrial Activity" means the 10 categories of industrial activities included in the definition of "stormwater discharges associated with industrial activity" as defined in 06-096 C.M.R. 521(9)(b)(14)(i) through (x) and 06-096 C.M.R. 521(9)(b)(14)(xi).

6. **Municipal Separate Storm Sewer System ("MS4").** "Municipal Separate Storm Sewer System" or "MS4" means conveyances for stormwater, including, but not limited to, roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels or storm drains (other than publicly owned treatment works and combined sewers) owned or operated by any municipality, sewer or sewage district, Maine Department of Transportation, Maine Turnpike Authority, State agency or Federal agency or other public entity that ultimately discharges directly to waters of the State other than ground water.

7. NEG – means National Effluent Guideline.

8. **No Exposure.** "No exposure" means that all industrial materials and activities are protected by a storm resistant shelter to prevent exposure to rain, snow, snowmelt, and/or runoff. See 40 CFR 122.26(g).

9. **Notice of Intent ("NOI").** "Notice of Intent" or "NOI" means a notification of intent to seek coverage under this General Permit made by the applicant to the Department on a form provided by the Department.

11. **Notice of Termination ("NOT").** "Notice of Termination" or "NOT" means a notification to end coverage under this General Permit on a form provided by the Department.

12. **Primary Industrial Activity** – Is the activity in which a facility is primarily engage in that meets the definition of Industrial Activity of these definitions. For a facility where therte is more than one activity or operation covered by a SIC code in Attachment A, it is recommended that the primary industrial determination be based on the value of receipts or revenues related to the operation in question or, if such information is not available for a particular facility, the number of employees or production rate for each operation may be compared. The operation that generates the most revenue or employs the most personnel is the operation in which the facility is primarily engaged. In situations where the vast majority of on-site activity falls within one SIC code, that activity may be the primary industrial activity.]

13. **Process Waste Water**. Means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by product or waste product.

14. **Qualifying Storm Event.** "Qualifying Storm Event" means precipitation or ice/snow melt waters that produce a measurable discharge of 0.1 inch or more in a 24-hour period at an outfall and occurs at least 72 hours from a previous qualifying storm event.

SPECIAL CONDITIONS

B. DEFINITIONS (cont'd)

15. **Representative Outfalls.** "Representative Outfalls" means two or more outfalls within a single drainage area that are anticipated to discharge substantially similar pollutants resulting from substantially similar industrial activities, materials or practices. If the facility contains representative outfalls, the permittee may conduct monitoring of one of the outfalls during a given sampling period provided that subsequent samples are taken from a different outfall within the representative outfalls' drainage area. The permittee will not be required to monitor more than one representative outfall within a designated drainage area per monitoring event. For this to be permissible, the SWPPP must include the permittee's narrative and include the following: locations of the outfalls and associated drainage area; why the outfalls are expected to discharge substantially identical effluents; and, estimates of the size of the drainage area (in square feet) for each outfall(s).

16. **Spill.** "Spill" means the release of a hazardous or toxic substance from its container or containment.

17. **Stormwater.** "Stormwater" means precipitation including runoff from rain, snow melt or ice melt that flows across the surface as sheet flow, shallow concentrated flow or in drainage ways. "Stormwater" means the same as "storm water".

18. **Stormwater Discharge Associated with Industrial Activity.** "Stormwater Discharge Associated with Industrial Activity" means the discharge from any point source which is used for collecting and conveying stormwater and which is directly related to manufacturing, processing, or raw materials storage areas at an industrial facility. The term does not include discharges from facilities or activities excluded from the MEPDES program under 38 M.R.S. § 413. For the categories of industries identified at 06-096 C.M.R. 521(9)(b)(14)(i) through (x) and 06-096 C.M.R. 521(9)(b)(14)(xi), the term includes, but is not limited to, stormwater discharges from industrial facility yards; immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility; material handling sites; refuse sites; sites used for the application or disposal of process waste waters; sites used for the storage and maintenance of material handling equipment; sites used for residual treatment, storage, or disposal; shipping and receiving areas; manufacturing buildings; storage areas (including tank farms) for raw materials, and intermediate and final products; and areas where industrial activity has taken place in the past and significant materials remain and are exposed to stormwater. For the purposes of this paragraph, material handling activities include storage, loading and unloading, transportation, or conveyance of any raw material, intermediate product, final product, by-product or waste product. The term excludes areas located on facility lands separate from the facility's industrial activities, such as office buildings and accompanying parking lots as long as the drainage from the excluded areas is not mixed with stormwater drained from the above described areas. Industrial facilities include those that are federally, State, or municipally owned or operated that meet the description of the facilities listed in 06-096 C.M.R. 521(9)(b)(14). The term also includes those facilities designated under the provisions of 06-096 C.M.R. 521(a)(1)(v).

19. **Watershed Management Plan.** "Watershed Management Plan" means a plan, subject to Department review and approval, to address stormwater discharges to an impaired water body. An acceptable plan capable of providing structural or operational best management practices to prevent discharges of pollutants that would cause or contribute to impairment of the water body.

SPECIAL CONDITIONS

C. APPLICABILITY AND ELIGIBILITY

To be eligible to discharge under this General Permit, an applicant must (1) have an allowable stormwater discharge, 2) an allowable non-stormwater discharge associated with industrial activity from the primary industrial activity, provided the primary industrial activity is included in Attachment A of this General Permit, or (3) be notified by the Department that you are eligible for coverage under Sector AD of this General Permit. Stormwater that is conveyed to a treatment facility regulated by the Department or the USEPA for treatment, is not a discharge for which a waste discharge permit is required pursuant to 38 M.R.S. § 413(1).

1. **Area of coverage.** The geographic area covered by this General Permit is the entire State of Maine. Subject to all terms and conditions specified herein, this General Permit authorizes the discharge of stormwater associated with industrial activity to Class GPA, tributaries to Class GPA, Classes AA, A, B, and C, Classes SA, SB, and SC, and those waters classified as such and having drainage areas of less than ten square miles.

2. **Allowable non-stormwater discharges.** The following allowable non-stormwater discharges may be covered by this General Permit provided that the discharge, either alone or in conjunction with other discharges, do not cause or contribute to a violation of an applicable water quality standard. The use of best management practices to minimize the contribution of pollutants from these discharges and the location(s) to where each source is anticipated to be discharged must be documented in the Storm Water Pollution Prevention Plan (SWPPP).[1]

    a. Discharges from emergency and unplanned fire-fighting activities;
    b. Fire hydrant flushings, provided the discharge does not cause or contribute to a violation of water quality standards as determined by the Department and the activity is documented in the SWPPP;
    c. Potable water, including water line flushings, provided they do not contribute to a violation of water quality standards as determined by the Department and the activity documented in the SWPPP;
    d. Uncontaminated condensate from air conditioners, coolers, and other compressors and from the outside storage of refrigerated gases or liquids;
    e. Irrigation drainage;
    f. Landscape watering, provided any pesticides, herbicides, and fertilizers have been applied in accordance with the approved labeling;
    g. Routine external building washdown / power wash water that does use detergents or hazardous cleaning products (e.g. those containing bleach, hydrofluoric acid, muriatic acid, sodium hydroxide, nonylphenols);
    h. Uncontaminated ground water and springs;
    i. Uncontaminated utility vault dewatering;
    j. Water from building foundations or footings that is not contaminated by contact with process materials;
    k. Incidental mist from cooling towers that collects on rooftops or adjacent portions of a facility, but not intentional discharge from cooling towers (e.g. “piped” cooling tower blowdown; drains.

1 The Department reserves the right to exclude non-stormwater discharges on a case-by-case basis if the permittee cannot objectively demonstrate to the Department’s satisfaction that the discharge will not violate an applicable water quality standard.

SPECIAL CONDITIONS

C. APPLICABILITY AND ELIGIBILITY (cont'd)

l. Incidental water that does not contain detergent draining from vehicles leaving an on-site rinse station, provided the waters from the rinse station itself are properly managed through best management practices addressed in the SWPPP; and

m. Incidental quantities of condensed steam that do not contributing to a violation of water quality standards (e.g. steam trap condensate).

n. Wash waters from cleaning roads, parking lots, sidewalks and other paved surfaces, provided no detergents or hazardous cleaning products are used (e.g. bleach, hydrofluoric acid, muriatic acid, sodium hydroxide, nonlphenols) and the wash waters do not come into contact with oil and grease deposits, sources of pollutants associated with industrial activities or any other toxic or hazardous materials, unless residues are first cleaned up using dry clean up methods (e.g. applying absorbent materials and sweeping, using hydrophobic mops/rags) and one has implemented appropriate control measures to minimize discharges of mobilized solids and other pollutants (e.g. filtration, detention, settlement).

o. The washing of new or used vehicles or equipment is allowed with the following prohibitions and recommended best management practices:

i. Engine, undercarriage and transmission washing is prohibited. Cleaning operations should minimize the detachment of paint residues, heavy metals or any other potentially hazardous materials from surfaces. .

ii .Vehicle and equipment washing should occur, where possible, on an impermeable surface (i.e., concrete, asphalt, plastic or other) and utilize an area that extends to a minimum of four (4) feet on all sides of the vehicle or equipment so that wash water and overspray falls initially on the impermeable surface. From the impermeable surface, wash water should then be directed to a vegetated area.

iii. Vehicles and equipment should not be washed near uncovered repair areas or chemical storage areas such that chemicals can be transported in wash water runoff. All wash water runoff should drain away from a shop repair or chemical storage area.

iv Wash water from cleaning the interior of truck trailers and other large commodity carrying containers must be collected and discharged to a POTW or treated in a closed-loop, wash water recycling system.

p. Non-stormwater discharges authorized in Sectors A through AD of this General Permit.

SPECIAL CONDITIONS

C. APPLICABILITY AND ELIGIBILITY (cont'd)

3. **Exclusions and restrictions.** The following exclusions and restrictions for coverage under this General Permit apply.

   a. Stormwater discharges that are comingled with other sources authorized by another MEPDES permit if the co-mingled waters cannot be separately characterized;
   b. Stormwater discharges which the Department has determined are or would cause or contribute to a violation of an applicable water quality standard. This exclusion does not apply if the applicant demonstrates participation and compliance with a Watershed Management Plan; and
   c. Stormwater discharges associated with construction activity disturbing one (1) acre or more, unless in conjunction with mining activities or certain oil and gas extraction activities as specified in Sectors G, H, I, and J of this General Permit.

4. **Conditional exclusion for no exposure.** Discharges composed entirely of stormwater are not stormwater discharges associated with industrial activity if there is no exposure of industrial materials and activities to rain, snow, snowmelt and/or runoff, and the discharger satisfies the conditions in this section. To qualify for exclusion, the permittee must submit the Department's No Exposure Certification Form DEPLW0968.

   a. Qualification requirements. To qualify for this exclusion, the permittee covered by this General Permit that becomes eligible for a no exposure exclusion must:

      1. Provide a storm resistant shelter to protect industrial materials and activities from exposure to rain, snow, snow melt, and runoff;
      2. Complete and sign a certification that there are no discharges of stormwater contaminated by exposure to industrial materials and activities from the entire facility;

      3. Submit the signed certification to the Department once every five years;
      4. Allow the Department to inspect the facility to determine compliance with the no exposure conditions;
      5. For facilities that discharge through an MS4, upon request, submit a copy of the certification of no exposure to the MS4 operator, as well as allow inspection and public reporting by the MS4 operator; and
      6. Notify the Department of changes in facility ownership in accordance with Special Condition D.7, *Changed conditions*.

   b. Shelter exclusions. To qualify for this exclusion, storm resistant shelter is not required for:

      1. Drums, barrels, tanks, and similar containers that are tightly sealed, provided those containers are not deteriorated, do not leak or do not otherwise contribute pollutants to stormwater;
      2. Adequately maintained vehicles used in material handling; and
      3. Products that would not contribute pollutants to stormwater.

SPECIAL CONDITIONS

C. APPLICABILITY AND ELIGIBILITY (cont'd)

c. Changed circumstances. If circumstances change and industrial materials or activities become exposed to rain, snow, snow melt, and/or runoff, the conditions for this exclusion no longer apply. In such cases, the discharge becomes subject to enforcement for un-permitted discharge. Any conditionally exempt discharger who anticipates changes in circumstances should apply for and obtain permit authorization prior to the change of circumstances.

5. **Co-located facilities.** Where more than one sector of industrial activity applies to a single facility, the permittee must comply with the requirements of all applicable sectors. In the case of a difference between numeric effluent limitations for a facility subject to multiple sectors, compliance is required with the more stringent limitation.

6. **Stormwater discharges to impaired waters.** Coverage under this General Permit for stormwater discharges associated with an industrial activity to impaired waters may only be approved if the Department determines that the discharge(s) does not cause or contribute to the failure of the water body to meet the standards of classification. The Department will determine whether a facility discharges to an impaired water based on receiving water information provided by the applicant on the NOI form. In making this determination, the entity seeking coverage must provide the Department with clear and compelling evidence that the discharge does not contain pollutants in concentrations or quantity that would cause or contribute to the impairment condition. Evidence may consist of, but is not necessarily limited to, effluent analytical data for the pollutants of concern, documentation from the facility's SWPPP that there is no exposure of all sources of the pollutants of concern at the facility and / or that treatment devices are installed to eliminate or sufficiently minimize the pollutants of concern from stormwater runoff. The Department reserves the right to require additional monitoring on a case-by-case basis to ensure stormwater discharges to impaired waters comply with applicable water quality laws and this General Permit.

D. NOTIFICATION, DECISIONS AND EFFECTIVE TERM OF COVERAGE

1. **Notice of Intent (NOI)**. The owner or operator of a facility discharging stormwater associated with industrial activity, as an applicant, and seeking coverage under this General Permit must submit a completed NOI to the Department for review and approval within **sixty (60) days** of the date the permit is signed by the Commissioner of the Department. NOI forms must be mailed or hand-delivered to:

Department of Environmental Protection
Bureau of Water Quality
Division of Water Quality Management
17 State House Station
Augusta, ME 04333-0017

The Department reserves the right to request additional information from the applicant based on review of the NOI. Permitting information, forms, and Augusta office directions may be obtained by contacting the Department's Waste Discharge Permitting Unit at 1-207-287-7688. Additionally, the General Permit, associated fact sheet and other forms are available for review and download at: http://www.maine.gov/dep/water/wd/multisector/index.html.

SPECIAL CONDITIONS

D. NOTIFICATION, DECISIONS AND EFFECTIVE TERM OF COVERAGE (cont'd)

2. **NOI information**. A complete NOI must contain the following information.

   a. The legal name, mailing address, e-mail address and telephone number of the owner and operator (*i.e.*, applicant) of the facility;
   b. The name and street address of the facility;
   c. A topographic or similar type map extending approximately one mile beyond the boundaries of the facility generating stormwater and the geographic coordinates (latitude and longitude) of the facility's main entrance or office, if known;
   d. The name(s) or descriptions of all known water bodies into which the stormwater discharge is conveyed, or the MS4 into which the discharge(s) is connected;
   e. The Standard Industrial Code(s) (SIC) or NAICS Code(s) and identification of the Sectors of the General Permit that apply to the industrial activity conducted at the facility;
   f. A copy of a signed participating landowner agreement associated with a Watershed Management Plan in which the facility is participating , if applicable;
   g. A statement that a complete and up-to-date SWPPP[2] is available;
   h. Evidence of title, right or interest (TRI) in all of the property that is proposed for development or use in accordance with 06-096 C.M.R. 2(11)(D);
   i. For corporations, a *Certificate of Good Standing* or a statement signed by a corporate officer affirming that the corporation is in good standing; and
   j. The signature of an authorized person in accordance with *Applications for Waste Discharge Licenses*, 06-096 C.M.R. 521(5) (effective January 12, 2001).

   Failure to submit all required NOI information may result in finding the NOI incomplete for processing and may delay processing or result in denial of the NOI.

3. **Decisions.**

   a. **Effective date of coverage**. The Department must approve or deny each NOI submitted for coverage under this General Permit: 1) within 31 calendar days of receipt of a complete NOI if discharging to waters not listed as impaired waters; 2) within 61 calendar days of receipt of a complete NOI if discharging to impaired waters; or 3) on the effective date of this General Permit, whichever is later. If the Department does not notify the applicant within the specified timeframe, the NOI is automatically approved and becomes effective as if signed by the Commissioner in accordance with 06-096 C.M.R. 2(19)(E). In the event coverage is denied, the Department must notify the applicant of the reason(s) for denial. Denial of coverage under this General Permit is not appealable to the Board of Environmental Protection and is not final agency action. The approval of coverage under this General Permit is appealable in accordance with 06-096 C.M.R. 2(24)(B).

2 For purposes of this section, complete and up-to-date SWPPP means a SWPPP that contains all of the components required by this General Permit.

SPECIAL CONDITIONS

E. NOTIFICATION, DECISIONS AND EFFECTIVE TERM OF COVERAGE (cont'd)

b. **Individual permit coverage**. The Department may require, or an interested party may request for consideration, that a facility covered under this General Permit obtain an individual MEPDES permit for any of the reasons specified at 06-096 C.M.R. 529(2)(b)(3)(i)(A-G). The owner or operator of a facility eligible for coverage under this General Permit may request to be excluded from this General Permit and instead apply for an individual MEPDES permit as provided at 06-096 C.M.R. 529(2)(b)(3)(iii).

4. **Effective term of coverage.** The term of this General Permit is five years. Coverage under this General Permit will be continued from year to year provided payment of an applicable annual fee pursuant to *Maine Environmental Protection Fund*, 38 M.R.S. § 353-B, and that there are no significant changes in the facility or its operation as described in the NOI.

   Prior to expiration of this General Permit, the Department must make a determination if it is to be renewed, and, if so, will commence renewal proceedings. Not less than 6 months prior to expiration of this General Permit, the Department must provide notice of its intent to renew or not renew the General Permit. If the General Permit is to be renewed, it will remain in force until the Department takes final action on the renewal. Upon reissuance of a renewal General Permit, persons wishing to continue coverage must apply for coverage under the renewal General Permit not later than 30 days following the issuance date of the new General Permit.

5. **Transfer of ownership.** In the event that the ownership of a facility is transferred to a new owner or operator, coverage under this General Permit may be transferred to the new owner or operator notifying the Department in writing within two weeks of the transfer. The notice must include documentation that the new owner or operator has: 1) a *Certificate of Good Standing* or a statement signed by a corporate officer affirming that the corporation is in good standing; 2) title, right or interest in the facility; 3) the technical and financial capacity to comply with this General Permit; and 4) a SWPPP that meets all requirements of this General Permit and that is certified in accordance with the signatory requirements of 06-096 C.M.R. 521(5). If increases or significant changes in the discharge(s) are proposed, a new NOI must be filed.

6. **Changed conditions**. In the event a permittee covered by this General Permit proposes to make significant changes in the nature or scope of the operations of facilities described in a NOI previously approved, the permittee must notify the Department as soon as becoming aware of and before implementing such changes. Based on its evaluation of the proposed changes, the Department may require the submittal of a new NOI or that an individual permit be obtained.

SPECIAL CONDITIONS

D. NOTIFICATION, DECISIONS AND EFFECTIVE TERM OF COVERAGE (cont'd)

7. **Notice of termination.** A permittee covered under this General Permit that has 1) ceased operations and has eliminated the potential for discharges of stormwater associated with industrial activity; or 2) has obtained coverage for the discharge covered under this General Permit through another MEPDES permit must, within 30 days of either condition, submit a request for permit termination to the Department by submitting a complete Department Form DEPLW0967. The Department will notify an entity that requested permit termination of the Department's decision to terminate coverage under this General Permit, including, but not limited to, identification of additional requirements necessary to make the permittee eligible for permit termination. In accordance with Standard Condition A.5, *Permit actions*, the filing of a request for permit termination does not eliminate any General Permit condition, including payment of an annual waste discharge license fee pursuant to Standard Condition A.11, *Other laws*, and *Annual waste discharge license fees*, 38 M.R.S. § 353-B.

E. AUTHORIZED DISCHARGES

A permittee covered under this General Permit is authorized to discharge: 1) only in accordance with the permittee's Notice of Intent; and 2) only in accordance with the terms and conditions of this General Permit. Discharges of pollutants from any other point source are not authorized under this General Permit, and must be reported in accordance with Standard Condition D(1)(f), *Twenty-four hour reporting*, of *Maine Pollutant Discharge Elimination System Permit Standard Conditions Applicable To All Permits*, revised July 1, 2002, attached to this General Permit. Any non-stormwater discharges not explicitly authorized pursuant to Special Condition C.2 of this General Permit are not covered and must be eliminated, or in the alternative, covered by a separate MEPDES permit.

F. NARRATIVE EFFLUENT LIMITATIONS

In addition to compliance with the numeric and non-numeric technology-based effluent established in this General Permit, the permittee must comply with the following narrative effluent limitations.

1. An entity covered under this General Permit must not discharge, at any time, effluent that contains a visible oil sheen, foam or floating solids, which would impair the uses designated for the classification of the receiving waters.

2. An entity covered under this General Permit must not discharge, at any time, effluent that contains materials in concentrations or combinations which are hazardous or toxic to aquatic life, or which would impair the uses designated for the classification of the receiving waters.

3. An entity covered under this General Permit must not discharge, at any time, effluent that imparts color, taste, turbidity, toxicity, radioactivity or other properties which cause those waters to be unsuitable for the designated uses and characteristics ascribed to their classification.

4. An entity covered under this General Permit must not discharge effluent that lowers the quality of any classified body of water below such classification, or lowers the existing quality of any body of water if the existing quality is higher than the classification

SPECIAL CONDIONS

G. CONTROL MEASURES

The permittee must select, design, install and implement control measures, adhering to good engineering practices and manufacturer's specifications, to minimize pollutant discharges from all potential sources. The control measure(s) selected must be capable of meeting 1) the non-numeric technology-based effluent limitations established in Special Condition H of this General Permit; 2) the numeric limitations specified in Special Condition I of this General Permit; and 3) all applicable water quality standards, including the goals of approved total maximum daily load (TMDLs) and water quality-based effluent limitations where established. Where more than one standard exists for a specific pollutant, compliance with this General Permit and the control measure design must be based on the most stringent standard. In selecting control measures, the permittee must address the following design and selection considerations.

1. Preventing stormwater from coming into contact with polluting materials;
2. Using control measures in combination;
3. Assessing the type and quantity of pollutants, including their potential to impact receiving water quality;
4. Minimizing impervious areas at the facility and infiltrating runoff onsite (including bioretention cells, green roofs, and pervious pavement, among other approaches) in accordance with State laws and regulations;
5. Attenuating flow using open vegetated swales and natural depressions;
6. Conserving and/or restoring riparian buffers; and
7. Using treatment interceptors (*e.g.*, swirl separators and sand filters).

H. NON-NUMERIC TECHNOLOGY-BASED EFFLUENT LIMITATIONS

The permittee must comply with the following non-numeric effluent limitations in addition to any non-numeric effluent limitations specified in Sectors A through AD of this General Permit.

1. **Minimize exposure.** The permittee must minimize the exposure of manufacturing, processing, and material storage areas (including, but not limited to, loading and unloading, storage, disposal, cleaning, maintenance, and fueling operations) to rain, snow, snowmelt, and runoff in order to minimize pollutant discharges. Unless impractical, the permittee must also:

    a. Use grading, berming or curbing to prevent runoff of contaminated flows and divert run-on away from these areas;
    b. Locate materials, equipment, and activities so that potential leaks and spills are contained or able to be contained or diverted before discharge;
    c. Clean up spills and leaks promptly using dry methods (*e.g.*, absorbents) to prevent the discharge of pollutants;

SPECIAL CONDITIONS

H. NON-NUMERIC TECHNOLOGY-BASED EFFLUENT LIMITATIONS (cont'd)

d. Properly dispose of materials used for spill or leak clean up to prevent used clean up materials from being a source of pollutants in stormwater;
e. Store leaky vehicles and equipment indoors or, if stored outdoors, use drip pans and absorbents;
f. Use spill/overflow protection equipment;
g. The washing of new or used vehicles or equipment is allowed with the following prohibitions and recommended best management practices:
    1. Engine, undercarriage and transmission washing is prohibited**.** Cleaning operations should minimize the detachment of paint residues, heavy metals or any other potentially hazardous materials from surfaces. Information on temporary berms and magnetic storm drain covers is attached to this guidance.
    2. Vehicle and equipment washing should occur, where possible, on an impermeable surface (i.e., concrete, asphalt, plastic or other) and utilize an area that extends to a minimum of four (4) feet on all sides of the vehicle or equipment so that wash water and overspray falls initially on the impermeable surface. From the impermeable surface, wash water should then be directed to a vegetated area. Information on temporary berms and magnetic storm drain covers and suppliers is attached to this guidance.
    3. Vehicles and equipment should not be washed near uncovered repair areas or chemical storage areas such that chemicals can be transported in wash water runoff. All wash water runoff should drain away from a shop repair or chemical storage area.
    4. Wash water from cleaning the interior of truck trailers and other large commodity carrying containers must be collected and discharged to a POTW or treated in a closed-loop, wash water recycling system.
h. Drain fluids from equipment and vehicles that will be decommissioned, and, for any equipment and vehicles that will remain unused for extended periods of time, inspect at least quarterly for leaks.
i. locate industrial materials and activities inside or protecting them with storm resistant coverings where practical to do so.

2. **Good housekeeping.** The permittee must keep clean all exposed areas that are potential sources of pollutants. The permittee must perform good housekeeping measures in order to minimize pollutant discharges, including but not limited to, the following:

a. Sweep or vacuum at regular intervals as a primary measure or, alternatively, wash down the area as a secondary measure and collect and/or treat, and properly dispose of the washdown water;
b. Store materials in appropriate containers that are labeled to specify contents;
c. Keep all dumpster lids closed when not in use, or provide secondary containment to ensure that discharges have a control. For dumpsters, waste bins and roll-off containers that do not have lids and could leak, ensure that discharges have a control (e.g. secondary containment, treatment). Dumpsters and roll-off containers should only be used to hold solid waste materials and never used to hold liquid wastes. This permit does not authorize any dry weather discharges from dumpsters or roll-off containers;

SPECIAL CONDITIONS

H. NON-NUMERIC TECHNOLOGY-BASED EFFLUENT LIMITATIONS (cont'd)

d. Minimize the potential for waste, garbage and floatable debris to be discharged by keeping exposed areas free of such materials, or by intercepting them before they are discharged;
e. For facilities that handle pre-production plastic, implement best management practices to eliminate discharges of plastic in stormwater; and
f. Site and operate snow storage and disposal areas to prevent or minimize discharges of pollutants from snow maintenance activities.

3. **Maintenance.** The permittee must maintain all control measures that are used to achieve the effluent limits in this General Permit in effective operating condition, as well as all industrial equipment and systems, in order to minimize pollutant discharges. This includes:

a. Performing and documenting inspections and preventive maintenance of stormwater drainage, source controls, treatment systems, and plant equipment and systems that could fail and result in contamination of stormwater;
b. Diligently maintaining non-structural control measures (*e.g.*, keep spill response supplies available, personnel appropriately trained);
c. Inspecting and maintaining baghouses at least quarterly to prevent the escape of dust from the system and immediately removing any accumulated dust at the base of the exterior baghouse; and
d. Cleaning catch basins when the depth of sediment or debris reaches 2/3rds of the sump depth and keeping the sediment and debris surface at least six inches below the lowest outlet pipe or alternatively, establish a routine maintenance schedule such each catch basin is cleaned oat least nce per year.

4. **Spill prevention and response.** The permittee must minimize the potential for leaks, spills and other releases that may be exposed to stormwater and develop plans for effective response to such spills if or when they occur in order to minimize pollutant discharges. The permittee must conduct spill prevention and response measures, including but not limited to, the following:

a. Plainly label containers 55 gallons or greater *(e.g.*, "Used Oil," "Spent Solvents," "Fertilizers and Pesticides") that could be susceptible to spillage or leakage to encourage proper handling and facilitate rapid response if spills or leaks occur;
b. Implement procedures for material storage and handling, including the use of secondary containment and barriers between material storage and traffic areas, or a similarly effective means designed to prevent the discharge of pollutants from these areas;
c. Develop training on spill response procedures for expeditiously stopping, containing, and cleaning up leaks, spills, and other releases. As appropriate, execute such procedures as soon as possible;
d. Keep adequate and accessible spill kits on-site, located near areas where spills may occur or where a rapid response can be made; and
e. Notify appropriate facility personnel when a leak, spill, or other release occurs.

5. **Erosion and sediment controls.** The permittee must minimize erosion by stabilizing exposed soils at the facility in order to minimize pollutant discharges and by placing flow velocity dissipation devices in stormwater swales and ditches at discharge locations, as necessary, to minimize channel and streambank erosion and scour in the immediate vicinity of discharge points. The permittee must also use structural and non-structural control measures, as necessary, to minimize the discharge of sediment.

SPECIAL CONDITIONS

H. NON-NUMERIC TECHNOLOGY-BASED EFFLUENT LIMITATIONS (cont'd)

6. **Management of runoff**. The permittee must divert, infiltrate, reuse, contain, or otherwise manage stormwater runoff to minimize pollutants in the discharges.

7. S**alt storage piles or piles containing salt.** Unless otherwise authorized by variance pursuant to *Siting and Operation of Road Salt and Sand-Salt Storage Areas*, 06-096 C.M.R. 574 (effective December 3, 2001), the permittee must enclose or cover storage piles of salt, or piles containing salt, used for deicing or other commercial or industrial purposes, including maintenance of paved surfaces, in order to minimize pollutant discharges. This includes preventing stormwater runoff from coming into contact with covered piles. The permittee must implement appropriate measures (*e.g.*, good housekeeping, diversions, containment) to minimize exposure resulting from adding to or removing materials from the pile.

8. **Employee training.** Annually, the permittee must train all employees who work in areas where industrial materials or activities are exposed to stormwater, or who are responsible for implementing activities necessary to meet the conditions of this permit (*e.g.*, inspectors, maintenance personnel), including all members of the facility's stormwater pollution prevention team. The permittee must ensure the following personnel understand the requirements of this permit and their specific responsibilities with respect to those requirements:

    a. Personnel who are responsible for the design, installation, maintenance, and/or repair of controls (including pollution prevention measures);
    b. Personnel responsible for the storage and handling of chemicals and materials that could become contaminants in stormwater discharges;
    c. Personnel who are responsible for conducting and documenting monitoring and inspections pursuant to this General Permit; and
    d. Personnel who are responsible for taking and documenting corrective actions pursuant to this General Permit.

    Personnel must be trained in at least the following if related to the scope of their job duties (*e.g.*, only personnel responsible for conducting inspections need to understand how to conduct inspections):

    e. An overview of what is in the SWPPP;
    f. Spill response procedures for expeditiously stopping, containing, and cleaning up leaks, spills, and other releases, good housekeeping, maintenance requirements, and material management practices;
    g. The location of all controls on the site required by this General Permit, and how they are to be maintained;
    h. The proper procedures to follow with respect to the General Permit's pollution prevention requirements; and
    i. When and how to conduct inspections, record applicable findings, and take corrective actions.

9. **Dust generation and vehicle tracking of industrial materials.** The permittee must utilize control measures to minimize generation of dust and off-site tracking of raw, final, or waste materials. Discharges of pollutants associated with an industrial activity as the result of off-site tracking are not authorized by this General Permit.

SPECIAL CONDITIONS

I. NUMERIC TECHNOLOGY-BASED EFFLUENT LIMITATIONS

A permittee covered under this General Permit engaging in the following regulated activities must comply with all numeric effluent limitations specified in the Sector applicable to the facility.

Regulated Activity	40 CFR Part/Subpart	Applicable Sector
Discharges resulting from spray down or intentional wetting of logs at wet deck storage areas	Part 429, Subpart I	A
Runoff from phosphate fertilizer manufacturing facilities that comes into contact with any raw materials, finished product, by-products or waste products	Part 418, Subpart A	C
Runoff from asphalt emulsion facilities	Part 443, Subpart A	D
Runoff from material storage piles at cement manufacturing facilities	Part 411, Subpart C	E
Runoff from coal piles at any coal mine at which the extraction of coal is taking place	Part 434, Subpart A	H
Mine dewatering discharges at crushed stone (SIC 1422-1429), construction sand and gravel (SIC 1442), or industrial sand mining facilities (SIC 1446)	Part 436, Subparts B, C, or D	J
Runoff from hazardous waste landfills	Part 445, Subpart A	K
Runoff from non-hazardous waste landfills	Part 445, Subpart B	L
Runoff from coal storage piles at steam electric generating facilities	Part 423	O
Runoff containing urea from airfield pavement deicing at existing and new primary airports with 1,000 or more annual non-propeller aircraft departures	Part 449	S

J. STORMWATER POLLUTION PREVENTION PLAN – GENERAL REQUIREMENTS

1. **Availability of SWPPP.** The permittee must prepare a SWPPP for the facility prior to submission of a NOI for authorization to discharge stormwater associated with industrial activity under this General Permit. If a permittee prepared a SWPPP for coverage under a previous version of this General Permit, the permittee must review and update the SWPPP to implement all provisions of this General Permit prior to submitting a NOI. Upon receiving authorization under this General Permit, a copy of the SWPPP must be available to appropriate facility staff, Department and USEPA staff, and the operator of an MS4 receiving discharges from the facility. The permittee must keep a copy of the SWPPP on-site at all times for reference and review.

2. **SWPPP preparation.** The SWPPP must be prepared in accordance with good engineering practices and to industry standards. The SWPPP may be developed by either a person on the facility's staff or a third party, but it must be developed by a "qualified person" and must be certified in accordance with the signatory requirements of 06-096 C.M.R. 521(5). A "qualified person" is a person knowledgeable in the principles and practices of industrial stormwater controls and pollution prevention, and possesses the education and ability to assess conditions at the industrial facility that could impact stormwater quality,

SPECIAL CONDITIONS

J. STORMWATER POLLUTION PREVENTION PLAN – GENERAL REQUIREMENTS (cont'd)

and the education and ability to assess the effectiveness of stormwater controls selected and installed to meet the requirements of the permit. A qualified person may include facility staff that is familiar with the facility's industrial activity and control measures necessary to reduce or eliminate the discharge of pollutants associated with the industrial activity.

3. **Amended SWPPP.** The permittee must amend the SWPPP within thirty (30) calendar days of completion of any of the following:

   a. A change in design, construction, operation, or maintenance at the facility that may have a significant effect on the discharge or potential for discharge of pollutants from the facility including the addition or reduction of industrial activity;
   b. Monitoring, inspections, or investigations by the permittee or by local, State, or Federal officials which determine the SWPPP is ineffective in eliminating or significantly minimizing the intended pollutants;
   c. A discharge under this General Permit that is determined by Department to cause or have the reasonable potential to cause or contribute to the violation of an applicable water quality standard.

K. STORMWATER POLLUTION PREVENTION PLAN – GENERAL CONTENTS

This subsection describes the minimum requirements that must be addressed or contained within an acceptable SWPPP.

1. **Stormwater Pollution Prevention Team.** The SWPPP must identify the individual(s) (by name or title) who comprise the facility's Stormwater Pollution Prevention Team. The Stormwater Pollution Prevention Team is responsible for assisting the facility/plant manager in developing, implementing, maintaining and revising the facility's SWPPP. Responsibilities of each team member must be listed.

2. **Nature of activities.** The SWPPP must provide a description of the nature of the industrial activities at the facility.

3. **Maps.** The SWPPP must contain a general location map with sufficient detail to identify the location of the facility and all receiving waters for all stormwater discharges. In addition to any Sector-specific map requirements, a site map (or multiple as necessary) depicting the following features must also be included with the SWPPP.

   a. Boundaries of the property and the size of the property in acres;
   b. Location and extent of significant structures and impervious surfaces;
   c. Directions of stormwater flow (use arrows);
   d. Locations of all stormwater control measures;
   e. Locations of all receiving waters, including wetlands, in the immediate vicinity of the facility;
   f. Locations of all stormwater conveyances including catch basins, ditches, pipes, and swales;
   g. Locations of potential pollutant sources;

SPECIAL CONDITIONS

K. STORMWATER POLLUTION PREVENTION PLAN – GENERAL CONTENTS (cont'd)

h. The location of all above ground wastewater or process water containment tanks;
i. For the purposes of the site map, identify areas of frequent spills (greater than three occurrences per year) and large spills (greater than 10 gallons) that have occurred in the last three years. All locations of fuel frequent/large spills must be documented within the SWPPP or applicable Spill Prevention Control & Counter Measure (SPCC) Plan;
j. Locations of all stormwater monitoring points;
k. Locations of stormwater inlets and outfalls, with a unique identification code for each outfall (*e.g.*, Outfall 001, 002) and an approximate outline of the areas draining to each outfall;
l. Locations of the following activities where such activities are exposed to precipitation:
   - fueling stations;
   - vehicle and equipment maintenance and/or cleaning areas;
   - loading/unloading areas;
   - locations used for the treatment, storage, or disposal of wastes;
   - liquid storage tanks;
   - processing and storage areas;
   - immediate access roads and rail lines used or traveled by carriers of raw materials, manufactured products, waste material, or by-products used or created by the facility;
   - transfer areas for substances in bulk;
   - machinery; and
   - locations and sources of run-on to the site from adjacent property that contains significant quantities of pollutants.

4. **Summary of potential pollutant sources.** The SWPPP must provide a description of the areas at the facility where industrial materials or activities are exposed to stormwater or from which allowable non-stormwater discharges originate. Industrial materials or activities include, but are not limited to: material handling equipment or activities; industrial machinery; raw materials; industrial production and processes; and intermediate products, by-products, final products, and waste products. Material handling activities include, but are not limited to: the storage, loading and unloading, transportation, disposal, or conveyance of any raw material, intermediate product, final product or waste product. Structures located in areas of industrial activity are potential sources of pollutants.

   For each separate area identified, the description must include the following.

   a. Activities in the area. A list of the industrial activities exposed to stormwater and the predicted direction of flow of stormwater from each activity and outfall.

   b. Pollutants. A list of pollutants associated with each identified activity, which could be exposed to rainfall or snowmelt and could be discharged from the facility. The pollutant list must include all significant materials that have been handled, treated, stored or disposed, and that have been exposed to stormwater in the three years prior to the date you prepare or amend your SWPPP.

SPECIAL CONDITIONS

K. STORMWATER POLLUTION PREVENTION PLAN – GENERAL CONTENTS (cont'd)

c. Spills and leaks. The permittee must document where potential spills and leaks could occur that could contribute pollutants to stormwater discharges, and the corresponding outfall(s) that would be affected by such spills and leaks. The permittee must document all frequent or large spills and leaks of oil or toxic or hazardous substances that actually occurred at exposed areas, or that drained to a stormwater conveyance, in the three years prior to the date the SWPPP was prepared or last amended. The permittee must document the circumstances leading to the release and actions taken in response to the release and the measures taken to prevent the recurrence of such releases.

d. Wastewater or process water containment. Any stationary above ground tank, container, or container storage area used for the storage of wastewater or process water that has the potential to discharge to surface waters or a stormwater conveyance during a malfunction must be held in a secondary containment device capable of containing 100% of the contents of the tank, plus precipitation. The containment devices must meet all Federal and State rules for primary and secondary containment. Secondary containment requirements are waived if the tank is equipped with a level sensor and alarm to signal an overflow or leak and the facility has a contingency plan in place to remove excess liquid to a second containment structure or off site treatment facility to prevent exposure to stormwater. The containment structures must be visually inspected for signs of deterioration at least once per year. The contingency plan and tank inspection procedure must be documented in the SWPPP.

e. Non-stormwater discharges – The permittee must document that it has evaluated its site for the presence non-stormwater discharges not listed in Section C(2). Documentation must include the following.

1. The date of the evaluation;
2. A description of the evaluation criteria used;
3. A list of the outfalls or onsite drainage points that were directly observed during the evaluation; and
4. The action(s) taken, such as a list of control measures used to eliminate unauthorized discharge(s), or documentation that a separate MEPDES permit was obtained.

f. Salt storage. The permittee must document the location of any storage piles containing salt used for deicing or other commercial or industrial purposes.

g. Sampling data. Existing dischargers must summarize all stormwater discharge sampling data collected at the facility during the previous permit term. The summary must include a narrative description (and may include data tables/figures) that adequately summarizes the collected sampling data to support identification of potential pollution sources at the facility. New dischargers and new sources must provide a summary of any available stormwater runoff data they may have.

h. Method of on-site storage or disposal. A storage practice or disposal method must be detailed for all raw materials, intermediate materials, final products and waste materials. Waste materials must be handled in accordance with applicable federal and State waste management rules and regulations.

SPECIAL CONDITIONS

K. STORMWATER POLLUTION PREVENTION PLAN – GENERAL CONTENTS (cont'd)

5. **Procedures for conducting monitoring.** The SWPPP must document the procedures and frequencies for conducting the three types of analytical monitoring (Benchmark, Numeric, and Impaired Waters) and Visual Monitoring where applicable. SWPPP documentation must include the following.

   a. Location of sample collection (outfall designation);
   b. Sampling parameters and sampling frequency for each parameter including the benchmark or limit associated with that parameter; and
   c. Monitoring schedule including monitoring exceptions, adverse weather conditions, and waivers.

L. STORMWATER POLLUTION PREVENTION PLAN – CONTROL MEASURES

This condition contains SWPPP requirements for control measures to meet effluent limitations. The permittee must review all control measures at least quarterly and complete corrective action(s) to modify any control measures that are not achieving the intended effect of minimizing pollutant discharges. The SWPPP must document the type and location of all control measures selected to ensure compliance with technology-based and water quality-based effluent limitations.

1. **Best management practices (BMPs) considerations.** Best management practices must be applied to all areas described in the summary of potential pollutant sources documented in the SWPPP. The SWPPP must include an implementation schedule for all proposed BMPs. The permittee must consider, at a minimum, the following in selection of BMPs:

   a. The quantity and nature of the pollutants, and their potential to impact the water quality of receiving waters;
   b. Preventing stormwater from coming into contact with polluting materials;
   c. Using control measures in combination to minimize pollutants in stormwater discharges;
   d. Opportunities to offset stormwater and temperature impacts from impervious areas on dry weather flows and low flow situations to streams;
   e. Minimizing impervious areas at the facility and infiltrating runoff onsite (including bioretention cells, green roofs, and pervious pavement, among other approaches);
   f. Attenuating flow using open vegetated swales and natural depressions; and
   g. Use of treatment interceptors (*e.g.*, swirl separators, sand filters, catch basin inserts/filters) to minimize the discharge of pollutants.

2. **Non-structural control measures** The permittee must comply with the non-structural control measures in Special Condition H, *Non-Numeric Technology Based Effluent Limitations*, of this permit.

SPECIAL CONDITIONS

M. STORMWATER POLLUTION PREVENTION PLAN – RECORDS

The permittee must keep the following inspection, monitoring and certification records on site with the SWPPP.

1. A copy of the NOI submitted to the Department for coverage under this General Permit;

2. A copy of the NOI approval issued by the Department for coverage under this General Permit;

3. A paper or electronic copy of this General Permit and any Sectors that are applicable to the facility;

4. Documentation of maintenance and repairs of control measures, including the date(s) of regular maintenance, date(s) of discovery of areas in need of repair/replacement, and for repairs, date(s) that the control measure(s) returned to full function, and the justification for any extended maintenance/repair schedules;

5. All inspection reports and monitoring data required by this General Permit, including any required sector-specific reports and monitoring data;

6. Documentation of monitoring exceedances and the permittee's response;

7. A description of any deviations from the schedule for visual assessments and/or monitoring, and the reason for the deviations (*e.g.*, adverse weather or it was impracticable to collect samples within the first 60 minutes of a measurable storm event);

8. Dates and descriptions of all spills and leaks that must be documented by this General Permit;

9. Corrective Action Reports and summary of completed actions taken at the site, including event(s) and date(s) when problems were discovered and modifications occurred; and

10. Documentation to support any determination that pollutants of concern are not expected to be present above natural background levels if the permittee discharges directly to impaired waters, and that such pollutants were not detected in the discharge or were solely attributable to natural background sources.

11. A copy of records for all employee training as required by Section H(8) of this permit.

SPECIAL CONDITIONS

N. MONITORING REQUIREMENTS

1. **Monitoring Generally.**

   a. **Monitoring categories and methods.** This General Permit contains the following types of monitoring: routine facility inspections; visual monitoring; Sector-specific benchmark monitoring; numeric technology-based effluent limitation monitoring; and water quality-based impaired waters monitoring. The monitoring requirements and numeric limitations applicable to a facility depend on the types of industrial activities conducted and the receiving water quality. Samples and measurements taken for the purpose of monitoring must be representative of the volume and nature of the discharge over the sampling and reporting period. The permittee must conduct sampling and analysis in accordance with a) methods approved by 40 CFR Part 136; b) alternative methods approved by the Department in accordance with the procedures in 40 CFR Part 136; or c) as otherwise specified by the Department. Samples that are sent out for analysis must be analyzed by a laboratory certified by the State of Maine's Department of Health and Human Services for wastewater. Samples that are sent to a publicly owned treatment works licensed pursuant to *Waste discharge licenses*, 38 M.R.S. § 413 are subject to the provisions and restrictions of *Maine Comprehensive and Limited Environmental Laboratory Certification Rules*, 10-144 C.M.R. 263 (effective April 1, 2010). If the permittee monitors any pollutant more frequently than required by this General Permit using test procedures approved under 40 CFR Part 136 or as specified in this General Permit, the results of this monitoring must be maintained with the SWPPP.

   Monitoring prescribed in this subsection is not required for entities covered under this General Permit that are participating in a Watershed Management Plan. The Long Creek Watershed Management Plan in the municipalities of South Portland, Portland, Westbrook and Scarborough is a Department Approved Watershed Management Plan.

   b. **Monitoring timing.** Stormwater samples should, whenever practicable, be collected within the first sixty (60) minutes of the beginning of a discharge during a qualifying storm event. If a sample cannot be collected within the first 60 minutes, the permittee must document with inspection forms the reason(s) or circumstance(s) why it was not practicable to obtain a timely sample. Samples collected more than 2.25 hours following the beginning of a discharge during a qualifying storm event are not acceptable and will be rejected by the Department.

   In the case of snowmelt, samples must be collected during a period with a measurable discharge from the representative outfall.

   If a stormwater discharge event associated with a qualifying storm event does not occur during normal operating business hours an entire calendar quarter, the permittee must document in the SWPPP that there was no discharge to sample. Monitoring requirements under these circumstances are waived.

SPECIAL CONDITIONS

N. MONITORING REQUIREMENTS (cont'd)

2. **Routine Facility Inspections.**

a. **Applicability.** All permittees covered under this General Permit must conduct routine facility inspections of areas of the facility covered by the requirements in this General Permit, including, but not limited to, the following:

1. Areas where industrial materials or activities are exposed to stormwater;
2. Areas identified in the SWPPP and those that are potential pollutant sources;
3. Areas where spills and leaks have occurred in the past three years;
4. Discharge points; and
5. Control measures used to comply with the effluent limits contained in this General Permit.

b. **Minimum inspection requirements.** Routine facility inspections must be conducted once per calendar quarter each year the permittee is covered under this General Permit. These inspections must be equally spaced with a minimum of sixty (60) days between inspections. At least once each calendar year, the routine inspection must be conducted during a period when a stormwater discharge is occurring. Alternatively, a permittee with multiple outfalls may inspect one outfall from each sector provided that it is representative of the entire sector. Representative outfalls must be rotated and all outfalls must be inspected over the course of the five-year permit cycle. The permittee must document findings from each routine facility inspection in a signed, certified report maintained with the SWPPP including, but not limited to, the following:

1. The inspection date and time;
2. The name(s) and signature(s) of the inspector(s);
3. Weather information (precipitation in the previous 48 hour period of time);

4. All observations relating to the implementation of control measures at the facility, including:
    a. A description of any discharges occurring at the time of the inspection;
    b. Any new discharges from and/or pollutants at the site;
    c. Any evidence of, or the potential for, pollutants entering the drainage system;
    d. Observations regarding the physical condition of and around all outfalls, including any flow dissipation devices, and evidence of pollutants in discharges and/or the receiving water;
5. Any control measures needing maintenance, repairs, or replacement;
6. Any additional control measures needed to comply with the General Permit requirements; and
7. Any incidents of noncompliance.

Visual monitoring requirements required by this General Permit may be satisfied at the same time a routine facility inspection is conducted provided all components of both monitoring types are included in the report.

SPECIAL CONDITIONS

N. MONITORING REQUIREMENTS (cont'd)

c. **Exception for inactive and unstaffed sites.** The requirement to conduct facility inspections on a routine basis does not apply at a facility that is inactive and unstaffed (temporarily or permanently closed), provided that there are no industrial materials or activities exposed to stormwater. Such a facility is only required to conduct an annual site inspection in accordance with the other requirements of this subsection. To invoke this exception, the permittee must maintain a signed and certified statement with the facility SWPPP stating that the site is inactive and unstaffed, and that there is no exposure to stormwater.

If circumstances change and industrial materials or activities become exposed to stormwater or the facility becomes active and/or staffed, this exception no longer applies and the permittee must immediately begin complying with the applicable monitoring requirements as if it was in the first year of permit coverage.

3. **Visual Monitoring.**

a. **Applicability.** All permittees covered under this General Permit must conduct visual monitoring.

b. **Minimum monitoring requirements.** Visual monitoring must be conducted once per calendar quarter each year the permittee is covered under this General Permit. The permittee must collect a stormwater sample from each outfall or a representative outfall during a qualifying storm event and conduct a visual assessment of these samples. See section B(13) of this permit for documenting a representative outfall. These samples are not required to be collected in accordance with 40 CFR Part 136 procedures but must be collected in such a manner that the samples are representative of the stormwater discharge. The sample must be collected in a clean, colorless glass or plastic container, and examined in a well-lit area. The visual assessment must be performed and documented in accordance with standard operating procedures outlined in document DEPLW0768, Visual Monitoring of Stormwater Discharges Associated with Industrial Activity, hereby incorporated into this General Permit.

c. **Monitoring parameters.** The permittee must visually inspect or observe the sample for the following water quality characteristics:

1. Color;
2. Odor;
3. Clarity (diminished);
4. Floating solids;
5. Settled solids;
6. Suspended solids;
7. Foam;
8. Oil sheen; and
9. Other obvious indicators of stormwater pollution

SPECIAL CONDITIONS

N. MONITORING REQUIREMENTS (cont'd)

d. **Exception for inactive and unstaffed sites.** The requirement for visual monitoring does not apply at a facility that is inactive and unstaffed, provided that there are no industrial materials or activities exposed to stormwater. To invoke this exception, the permittee must maintain a signed and certified statement with the facility SWPPP stating that the site is inactive and unstaffed, and that there is no exposure to stormwater.

4. **Sector-Specific Benchmark Monitoring.**

a. **Applicability.** This General Permit specifies pollutant benchmark thresholds that are applicable to certain Sectors. The permittee must monitor for any benchmark parameters specified for the industrial Sector(s), both primary industrial activity and any co-located industrial activities, applicable to the discharge. The sector-specific benchmark thresholds are listed in the sector-specific sections appended to this General Permit. The benchmark thresholds are not effluent limitations; a benchmark exceedance, therefore, is not a violation of this General Permit. However, if corrective action is required as a result of a benchmark exceedance, failure to conduct required corrective action is a violation of this General Permit.

b. **Minimum monitoring requirements.** Benchmark monitoring must be conducted quarterly for the first four full calendar quarters of coverage under this General Permit. When conditions prevent the permittee from obtaining four samples in four consecutive quarters, the permittee must continue monitoring until the four samples required for calculating your benchmark monitoring average have been obtained. The permittee must collect a stormwater sample from each outfall or a representative outfall for sector-specific benchmark monitoring. See section B(13) of this permit for documenting a representative outfall.

c. **Exceedances.** After collection of four quarterly samples, if the average of the four monitoring values for any parameter exceeds the benchmark threshold, the permittee must review the selection, design, installation, and implementation of the control measures to determine if modifications are necessary to meet the effluent limits in this General Permit, and either:

1. Make the necessary modifications and continue quarterly monitoring until the permittee has completed four additional quarters of monitoring for which the average does not exceed the benchmark; or

2. Propose to the Department that no further pollutant reductions are technologically available and economically practicable and achievable in light of best industry practice to meet the technology-based effluent limits or are necessary to meet applicable water-quality-based effluent limitations, in which case the permittee must continue monitoring quarterly, unless other requirements to reduce pollutants are imposed by the Department. The permittee must also document its rationale for concluding that no further pollutant reductions are achievable, and retain all records related to this documentation with the SWPPP. The Department will evaluate each proposal and make a determination as to whether or not additional pollutant reductions are technologically available and economically practicable and achievable.

SPECIAL CONDITIONS

N. MONITORING REQUIREMENTS (cont'd)

The permittee must review its control measures and perform any required corrective action within fourteen (14) calendar days (or document why no corrective action is required) without waiting for the full four quarters of monitoring data, when an exceedance of the four quarter average is mathematically certain. If after modifying the control measures and conducting four additional quarters of monitoring, the average still exceeds the benchmark (or if an exceedance of the benchmark by the four quarter average is mathematically certain prior to conducting the full four additional quarters of monitoring), the permittee must again review its control measures and take one of the two actions above.

Following the first four quarters of benchmark monitoring, if the average concentration of a pollutant exceeds a benchmark value, and that exceedance of the benchmark is attributable solely to the presence of that pollutant in the natural background, the permittee is not required to perform corrective action or additional benchmark monitoring provided that:

3. The average concentration of the benchmark monitoring results is less than or equal to the concentration of that pollutant in the natural background; and

4. The permittee documents and maintains with the SWPPP supporting rationale, including data, literature studies any other pertinent information, for concluding that benchmark exceedances are in fact attributable solely to natural background pollutant levels.

d. **Exception for inactive and unstaffed sites.** Notwithstanding applicable sector-specific requirements, the requirement for benchmark monitoring does not apply at a facility that is inactive and unstaffed (temporarily or permanent), provided that there are no industrial materials or activities exposed to stormwater. To invoke this exception, the permittee must maintain a signed and certified statement with the facility SWPPP stating that the site is inactive and unstaffed, and that there is no exposure to stormwater.

If circumstances change and industrial materials or activities become exposed to stormwater or the facility becomes active and/or staffed, this exception no longer applies and the permittee must immediately begin complying with the applicable benchmark monitoring requirements as if it was in the first year of permit coverage.

SPECIAL CONDITIONS

N. MONITORING REQUIREMENTS (cont'd)

5. **Numeric Technology-Based Effluent Limitation Monitoring.**

a. **Applicability.** Special Condition I of this General Permit establishes numeric technology-based effluent limitations based on USEPA effluent guidelines limitations. A permittee covered under this General Permit engaging in the regulated activities specified in Special Condition I of this General Permit must comply with all numeric effluent limitations specified in the Sector applicable to the facility. The effluent limitations guidelines are listed in the sector-specific sections appended to this General Permit. The effluent limitations set forth for each Sector are enforceable effluent limitations; an exceedance of an effluent limitation is a violation of this General Permit.

b. **Minimum monitoring requirements.** Stormwater effluent monitoring must be conducted once per year each calendar year the permittee is covered under this General Permit, except for permittees subject to Sectors A & J, which includes non-stormwater discharges. Minimum monitoring requirements for Sector A & J facilities are specified in Appendix A & J of this General Permit. The permittee must collect a stormwater sample from each representative outfall for numeric monitoring.

c. **Exceedances.** If any monitoring value exceeds a numeric effluent limitation contained in this General Permit, the permittee must:

1. Submit the monitoring results to the Department within 14 days of receiving monitoring results;

2. Comply with all applicable requirements for SWPPP Review and Correction Actions as specified in Special Condition O of this General Permit;

3. Conduct follow-up monitoring within 30 calendar days (or during the next qualifying storm event, should none occur within 30 days) of implementing corrective action(s). If any follow-up monitoring result exceeds a numeric effluent limitation contained in this General Permit, submit the monitoring results to the Department within 14 days of receiving monitoring results; and

4. Continue to monitor, at least quarterly, until your discharge is in compliance with the numeric effluent limit or until the Department waives the requirement for additional monitoring.

SPECIAL CONDITIONS

N. MONITORING REQUIREMENTS (cont'd)

6. **Impaired Waters Monitoring.**

a. **Applicability.** Impaired waters monitoring applies to stormwater discharges to a water body listed on the 303(d) list of the current USEPA-approved Integrated Water Quality Monitoring and Assessment Report. The Department will determine whether a facility discharges to an impaired water based on receiving water information provided by the applicant on the NOI form.

b. **Minimum monitoring requirements.**

1. If a total maximum daily load (TMDL) has not been approved for the water body, stormwater effluent monitoring must be conducted once per year each calendar year the permittee is covered under this General Permit; or

2. For storm water discharges to impaired waters with a USEPA approved or established TMDL, permittee's are not required to monitor for the pollutant(s) for which the TMDL was written unless the Department's informs the permittee, upon examination of the applicable TMDL and its wasteload allocation, that the permittee is subject to such a requirement consistent with the assumptions and requirements of the applicable TMDL and its wasteload allocation. The Department's notice will include specifications on monitoring parameters and testing frequency. Permittees must consult the Department for guidance regarding required monitoring under this section. See Attachment B of the Fact Sheet associated with this permit for a list of pollutant causing potential impairments, the specific monitoring parameters associated with the pollutant and the EPA approved method numbers. The list is being provided as guidance in the event a permittee chooses to be proactive in monitoring prior to being notified by the Department of specifications on monitoring parameters and testing frequency.

No monitoring is required when a water body's biological communities are impaired but no pollutant, including indicator or surrogate pollutants, is specified as causing the impairment, or when a water body's impairment is related to hydrologic modifications, impaired hydrology, or other non-pollutant.

c. **Monitoring parameters.** If the pollutant of concern for the impaired water body is suspended solids, turbidity or sediment/sedimentation, the permittee must monitor stormwater effluent for total suspended solids (TSS). If a pollutant of concern is expressed in the form of an indicator or surrogate pollutant, the permittee must monitor for that indicator or surrogate pollutant. Monitoring is required for all pollutants for which the water body is impaired and for which a standard analytical method exists pursuant to 40 CFR Part 136. Monitoring for specific parameters may cease when the discharge does not exceed or have reasonable potential to exceed ambient water quality criteria (AWQC) and is at or below natural background levels.

SPECIAL CONDITIONS

N. MONITORING REQUIREMENTS (cont'd)

If the pollutant of concern is not detected and not expected to be present in the discharge, or it is detected but the permittee has determined that its presence is caused solely by natural background sources, the permittee may discontinue monitoring for that pollutant. To support a determination that the pollutant's presence is caused solely by natural background sources, the permittee must keep the following documentation of this discharge with the facility's SWPPP.

1. An explanation of why the permittee believes that the presence of the pollutant of concern in the discharge is not related to the activities or materials at the facility; and
2. Data or studies which link the presence of the pollutant causing the impairment to what can be considered natural background sources in the watershed.

d. **Exceedances.** If any monitoring value exceeds a water quality-based limitation or ambient water quality criterion (AWQC), the permittee must:

1. Submit the monitoring results to the Department within 14 days of receiving monitoring results;

2. Comply with all applicable requirements for SWPPP Review and Correction Actions as specified in Special Condition O of this General Permit;

3. Conduct follow-up monitoring within 30 calendar days (or during the next qualifying storm event, should none occur within 30 days) of implementing corrective action(s). If any follow-up monitoring result exceeds a water quality-based limitation or AWQC, submit the monitoring results to the Department within 14 days of receiving monitoring results; and

4. Continue to monitor, at least quarterly, until your discharge is in compliance with the numeric effluent limit or until the Department waives the requirement for additional monitoring.

e. **Exception for inactive and unstaffed sites.** The requirement for impaired waters monitoring does not apply at a facility that is inactive and unstaffed (temporarily or permanently closed), provided that there are no industrial materials or activities exposed to stormwater. To invoke this exception, the permittee must maintain a signed and certified statement with the facility SWPPP stating that the site is inactive and unstaffed, and that there is no exposure to stormwater.

If circumstances change and industrial materials or activities become exposed to stormwater or the facility becomes active and/or staffed, this exception no longer applies and the permittee must immediately begin complying with the applicable impaired waters monitoring requirements as if it was in the first year of permit coverage.

SPECIAL CONDITIONS

O. SWPPP REVIEW AND CORRECTIVE ACTIONS

1. **Conditions Requiring SWPPP Review and Revision to Ensure Effluent Limits are Met.**

   When any of the following conditions occur or are detected during an inspection, monitoring or other means, or the Department or the operator of the MS4 through which the facility discharges informs the permittee that any of the following conditions have occurred, the permittee must review and revise, as appropriate, the SWPPP (*e.g.*, sources of pollution; spill and leak procedures; non-stormwater discharges; the selection, design, installation and implementation of your control measures) so that this General Permit's effluent limits are met and pollutant discharges are minimized:

   a. An unauthorized release or discharge (*e.g.*, spill, leak, or discharge of non-stormwater not authorized by this or another MEPDES permit to a water of the State) occurs at the facility;
   b. A discharge violates a numeric effluent limitation contained in this General Permit, including Sector-specific effluent guidelines limitations, or an applicable water quality-based limitation or ambient water quality criteria associated with impaired waters monitoring;
   c. The control measures are not stringent enough for the discharge to meet applicable water quality standards or the non-numeric effluent limits in this permit;
   d. A required control measure was never installed, was installed incorrectly, or is not being properly operated or maintained; or
   e. Whenever a visual assessment shows evidence of stormwater pollution (*e.g.*, color, odor, floating solids, settled solids, suspended solids, foam).

2. **Conditions Requiring SWPPP Review to Determine if Modifications Are Necessary.**

   If any of the following conditions occur, the permittee must review the SWPPP to determine if modifications are necessary to meet the effluent limitations in this General Permit:

   a. Construction or a change in design, operation, or maintenance at the facility that significantly changes the nature of pollutants discharged in stormwater from the facility, or significantly increases the quantity of pollutants discharged; or
   b. The average of four quarterly sampling results exceeds an applicable benchmark. If less than four benchmark samples have been taken, but the results are such that an exceedance of the four quarter average is mathematically certain (*i.e.*, if the sum of quarterly sample results to date is more than four times the benchmark level) this is considered a benchmark exceedance, triggering this review.

SPECIAL CONDITIONS

O. SWPPP REVIEW AND CORRECTIVE ACTIONS (cont'd)

3. **Corrective Actions and Deadlines.**

a. **Immediate actions.** If corrective action is needed, the permittee must immediately take all reasonable steps necessary to minimize or prevent the discharge of pollutants until a permanent solution is installed and made operational, including cleaning up any contaminated surfaces so that the material will not discharge in subsequent storm events.

Note: In this context, the term "immediately" requires the permittee to, on the same day a condition requiring corrective action is found, take all reasonable steps to minimize or prevent the discharge of pollutants until a permanent solution is installed and made operational. However, if a problem is identified at a time in the work day when it is too late to initiate corrective action, the initiation of corrective action must begin no later than the following work day. "All reasonable steps" means that the permittee has undertaken initial actions to assess and address the condition causing the corrective action, including, for example, cleaning up any exposed materials that may be discharged in a storm event (e.g., through sweeping, vacuuming) or making arrangements (i.e., scheduling) for a new BMP to be installed at a later date. "All reasonable steps" for purposes of complying with Special Condition O.2, Conditions Requiring SWPPP Review to Determine if Modifications Are Necessary, when the permittee concludes a corrective action is, in fact, not necessary, could include documenting why a corrective action is unnecessary

b. **Subsequent actions.** If the permittee determines that additional actions are necessary beyond those implemented in accordance with immediate action response, the permittee must complete the corrective actions (*e.g.*, install a new or modified control and make it operational, complete the repair) before the next storm event if possible, and within 14 calendar days from the time of discovery of the corrective action condition. If it is infeasible to complete the corrective action within 14 calendar days, the permittee must document why it is infeasible to complete the corrective action within the 14-day timeframe. The permittee must also identify the schedule for completing the work, which must be done as soon as practicable after the 14-day timeframe but no longer than 45 days after discovery. If the completion of corrective action will exceed the 45-day timeframe, the permittee may take the minimum additional time necessary to complete the corrective action, provided that the permittee notifies the Department of the intention to exceed 45 days, the permittee's rationale for an extension, and a completion date, which the permittee must also include in its corrective action documentation. Where the permittee's corrective actions result in changes to any of the controls or procedures documented in your SWPPP, the permittee must modify the SWPPP accordingly within 14 calendar days of completing corrective action work.

c. **Corrective Action Report (CAR).** A Corrective Action Report is a signed, certified report to document actions taken in response to triggering the need for corrective action review due to an exceedance of a water quality based limitation, ambient water quality criterion or a deficiency identified in a Department inspection report.

SPECIAL CONDITIONS

O. SWPPP REVIEW AND CORRECTIVE ACTIONS (cont'd)

The existence of any of the conditions listed Special Condition O.1 and O.2 of this General Permit triggers the need for corrective action review.

A complete CAR must contain the following information:

1. The existence of any of the conditions listed Special Condition O.1 and O.2 of this General Permit and description of the condition triggering the need for corrective action review;
2. For any spills or leaks: a description of the incident including material, date/time, amount, location, and cause for spill, and any leaks, spills or other releases that resulted in discharges of pollutants to waters of State, through stormwater or otherwise;
3. Date the condition was identified;
4. Description of immediate actions completed, including measures taken to prevent the reoccurrence of such releases;
5. A description of the corrective actions taken or to be taken as a result of the identified conditions;
6. The dates when each corrective action was initiated and completed (or is expected to be completed); and
7. If the event triggering corrective action is associated with an outfall that had been identified as a representative outfall, documentation that the permittee assessed the need for corrective action for all related representative outfalls. All of the subsequent actions and deadlines specified above apply to representative outfalls.

d. **Effect of corrective action.** If the event triggering the review is a violation of this General Permit (*e.g.*, non-compliance with an effluent limit), correcting it does not remove the original violation. Additionally, failing to take corrective action in accordance with this section is an additional violation of this General Permit.

P. RETENTION OF RECORDS

The permittee shall retain copies of the SWPPP, all reports, certifications and monitoring results required by this General Permit, and records of all data used to complete the Notice of Intent to be covered by this General Permit, for a period beginning the date that the facility is covered under this General Permit and lasts through the date of renewed coverage under a subsequent permit or through the date the permittee submits a Notice of Termination (NOT) for coverage under this permit.

Q. REOPENING OF PERMIT FOR MODIFICATION

In accordance with 38 M.R.S. § 414-A(5), the Department may, with notice to the permittee, reopen this General Permit to add or change conditions or effluent limitations for toxic compounds, to include specific limitations based on new information, or based on any other pertinent information obtained during the term of this General Permit.

SPECIAL CONDITIONS

R. SEVERABILITY

In the event that any provision, or part thereof, of this General Permit is declared to be unlawful by a reviewing court, the remainder of the General Permit must remain in full force and effect, and must be construed and enforced in all aspects as if such unlawful provision, or part thereof, had been omitted, unless otherwise ordered by the court.

APPENDIX D

2016 MEDEP MSGP SECTOR-SPECIFIC REQUIREMENTS

Appendix L

Sector L - Landfills, Land Application Sites, and Open Dumps

L.1 Covered Stormwater Discharges.

The requirements in Sector L apply to stormwater discharges associated with industrial activity from Landfills and Land Application Sites as identified by the Activity Code specified in Sector L of Attachment A of the General Permit.

L.2 Industrial Activities Covered by Sector L.

This permit may authorize stormwater discharges for Sector L facilities associated with waste disposal at landfills, land application sites that receive or have received industrial waste, including sites subject to regulation under Subtitle D of RCRA. This permit does not cover discharges from landfills that receive only municipal wastes.

L.3 Limitations on Coverage.

L.3.1 ***Prohibition of Non-Stormwater Discharges.*** The following discharges are not authorized by this permit: leachate, gas collection condensate, drained free liquids, contaminated ground water, laboratory wastewater, and contact wash water from washing truck and railcar exteriors and surface areas that have come in direct contact with solid waste at the landfill facility.

L.3.2 ***Prohibition Stormwater Discharges from Open Dumps.*** Discharges from open dumps as defined under RCRA are also not authorized under this permit.

L.4 Definitions.

L.4.1 ***Contaminated stormwater*** – stormwater that comes into direct contact with landfill wastes, the waste handling and treatment areas, or landfill wastewater. Some areas of a landfill that may produce contaminated stormwater include (but are not limited to) the open face of an active landfill with exposed waste (no cover added); the areas around wastewater treatment operations; trucks, equipment, or machinery that has been in direct contact with the waste; and waste dumping areas.

L.4.2 ***Drained free liquids*** – aqueous wastes drained from waste containers (e.g., drums) prior to landfilling.

L.4.3 ***Landfill wastewater*** – as defined in 40 CFR Part 445 (Landfills Point Source Category) all wastewater associated with, or produced by, landfilling activities except for sanitary wastewater, non-contaminated stormwater, contaminated ground water, and wastewater from recovery pumping wells. Landfill process wastewater includes, but is not limited to, leachate; gas collection condensate; drained free liquids; laboratory-derived wastewater; contaminated stormwater; and contact wash water from washing truck, equipment, and railcar exteriors and surface areas that have come in direct contact with solid waste at the landfill facility.

L.4.4 ***Leachate*** – liquid that has passed through or emerged from solid waste and contains soluble, suspended, or miscible materials removed from such waste.

L.4.5 ***Non-contaminated stormwater*** – stormwater that does not come into direct contact with landfill wastes, the waste handling and treatment areas, or landfill wastewater. Non-contaminated stormwater includes stormwater that flows off the cap, cover, intermediate cover, daily cover, and/or final cover of the landfill.

L.5 Additional Technology-Based Effluent Limits.

L.5.1 ***Preventive Maintenance Program.*** As part of your preventive maintenance program, maintain the following: all elements of leachate collection and treatment systems, to prevent commingling of leachate with stormwater; the integrity and effectiveness of any intermediate or final cover (including repairing the cover as necessary), to minimize the effects of settlement, sinking, and erosion.

L.5.2 ***Erosion and Sedimentation Control.*** Provide temporary stabilization (e.g., temporary seeding, mulching, and placing geotextiles on the inactive portions of stockpiles) for the following in order to minimize discharges of pollutants in stormwater: materials stockpiled for daily, intermediate, and final cover; inactive areas of the landfill or open dump; landfills or open dump areas that have gotten final covers but where vegetation has yet to establish itself; and land application sites where waste application has been completed but final vegetation has not yet been established.

L.6 Additional SWPPP Requirements.

L.5.1 ***Drainage Area Site Map.*** Document in your SWPPP where any of the following may be exposed to precipitation or surface runoff: active and closed landfill cells or trenches, active and closed land application areas, locations where open dumping is occurring or has occurred, locations of any known leachate springs or other areas where uncontrolled leachate may commingle with runoff, and leachate collection and handling systems.

L.5.2 ***Summary of Potential Pollutant Sources.*** Document in your SWPPP the following sources and activities that have potential pollutants associated with them: fertilizer, herbicide, and pesticide application; earth and soil moving; waste hauling and loading or unloading; outdoor storage of significant materials, including daily, interim, and final cover material stockpiles as well as temporary waste storage areas; exposure of active and inactive landfill and land application areas; uncontrolled leachate flows; and failure or leaks from leachate collection and treatment systems.

L.7 Additional Inspection Requirements.

L.7.1 ***Inspections of Active Sites.*** Inspect operating landfills, open dumps, and land application sites at least once every 7 days. Focus on areas of landfills that have not yet been finally stabilized; active land application areas, areas used for storage of material and wastes that are exposed to precipitation, stabilization, and structural control measures; leachate collection and treatment systems; and locations where equipment and waste trucks enter and exit the site. Ensure that sediment and erosion control measures are operating properly. For stabilized sites and areas where land application has been completed, or where the climate is arid or semi-arid, conduct inspections at least once every month.

L.7.2 ***Inspections of Inactive Sites.*** Inspect inactive landfills, open dumps, and land application sites at least quarterly. Qualified personnel must inspect landfill (or open dump) stabilization and structural erosion control measures, leachate collection and treatment systems, and all closed land application areas.

L.8 Additional Post-Authorization Documentation Requirements.

L.8.1 ***Recordkeeping and Internal Reporting.*** Keep records with your SWPPP of the types of wastes disposed of in each cell or trench of a landfill or open dump. For land application sites, track the types and quantities of wastes applied in specific areas.

L.9 Sector-Specific Benchmarks.

No benchmarks are established for Sector L.

L.10. Effluent Limitations Based on Effluent Limitations Guidelines.

Table L-2 identifies effluent limitations that apply to the industrial activities described below. Compliance with these effluent limitations is to be determined based on discharges from these industrial activities independent of commingling with any other waste streams that may be covered under this permit.

Table L-2[1]

Industrial Activity	Parameter	Effluent Limitation
Discharges from non-hazardous waste landfills subject to effluent limitations in 40 CFR Part 445 Subpart B.	Biochemical Oxygen Demand (BOD_5)	140 mg/L, daily maximum
		37 mg/L, monthly avg. maximum
	Total Suspended Solids (TSS)	88 mg/L, daily maximum
		27 mg/L, monthly avg. maximum
	Ammonia	10 mg/L, daily maximum
		4.9 mg/L, monthly avg. maximum
	Alpha Terpineol	0.033 mg/L, daily maximum
		0.016 mg/L monthly avg. maximum
	Benzoic Acid	0.12 mg/L, daily maximum
		0.071 mg/L, monthly avg. maximum
	p-Cresol	0.025 mg/L, daily maximum
		0.014 mg/L, monthly avg. maximum
	Phenol	0.026 mg/L, daily maximum
		0.015 mg/L, monthly avg. maximum
	Total Zinc	0.20 mg/L, daily maximum
		0.11 mg/L, monthly avg. maximum
	pH	Within the range of 6-9 standard pH units (s.u.)

[1] Monitor annually. As set forth at 40 CFR Part 445 Subpart B, these numeric limitations apply to contaminated stormwater discharges from MSWLFs that have not been closed in accordance with 40 CFR 258.60, and to contaminated stormwater discharges from those landfills that are subject to the provisions of 40 CFR Part 257 except for discharges from any of the following facilities:

(a) landfills operated in conjunction with other industrial or commercial operations, when the landfill receives only wastes generated by the industrial or commercial operation directly associated with the landfill;

(b) landfills operated in conjunction with other industrial or commercial operations, when the landfill receives wastes generated by the industrial or commercial operation directly associated with the landfill and also receives other wastes, provided that the other wastes received for disposal are generated by a facility that is subject to the same provisions in 40 CFR Subchapter N as the industrial or commercial operation, or that the other wastes received are of similar nature to the wastes generated by the industrial or commercial operation;

(c) landfills operated in conjunction with CWT facilities subject to 40 CFR Part 437, so long as the CWT facility commingles the landfill wastewater with other non-landfill wastewater for discharge. A landfill directly associated with a CWT facility is subject to this part if the CWT facility discharges landfill wastewater separately from other CWT wastewater or commingles the wastewater from its landfill only with wastewater from other landfills;

APPENDIX E

SPILL REPORTING FORM

SPILL REPORTING FORM

Emergency Contact Information	
Fire Department	911
Medical Emergency	911
MEDEP Oil Spill Response Hotline	1-800-482-0777
National Response Center	1-800-424-8802

Spill Information		
Site Name/Company:		
Street Address:	City or Town/State:	
Date & Time of Spill:	Product Spilled:	Quantity Spilled:
Location of Spill:	Source of Spill:	
Immediate Measures Taken to Control Spill:		
Measures Taken to Prevent Re-Occurrence:		

Notifications	Yes	Not Required	Date & Time	Contact Name
911				
MEDEP 1-800-482-0777				
Other				

Name **Signature**

APPENDIX F

INITIAL EVALUATION OF NON-STORMWATER DISCHARGES

INITIAL EVALUATION OF NON-STORMWATER DISCHARGES

<table>
<tr><td colspan="2">Site Name/Company: Juniper Ridge Landfill/NEWSME Landfill Operations, LLC</td></tr>
<tr><td>Evaluation Date: 1/4/16 & 1/15/21</td><td>Evaluation Time: 12:00 PM</td></tr>
<tr><td>Inspector Name/Title: Anthony Ortiz/Project Mgr.</td><td>Inspector Signature: </td></tr>
<tr><td>Which of the outfalls described in the SWPPP were observed during the evaluation?</td><td>Outfalls #1-7</td></tr>
<tr><td colspan="2">The following non-stormwater discharges are authorized under the MSGP:
Firefighting activities
Fire hydrant flushing
Portable water, including water line
Uncontaminated condensate from air conditioners, coolers, other compressors, and outside storage of refrigerated gases or liquids
Irrigation drainage
Landscape watering
Routine external building wash-down/power wash water not contaminated with detergents or hazardous cleaning products
Uncontaminated groundwater and springs
Uncontaminated utility vault dewatering
Water from building foundations or footings not contaminated by contact with process materials
Incidental mist from cooling towers that collects on roofs or adjacent portions of the site
Incidental water that does not contain detergents from on-site rinse stations
Incidental condensed steam that does not contribute to violations of water quality standards
Wash water from cleaning roads, parking lots, sidewalks or other paved surfaces that does not contain detergents, hazardous cleaning products, oil & grease, or toxic pollutants
Wash water from vehicles and equipment cleaning
Non-stormwater discharges explicitly authorized in Sectors A through AD</td></tr>
<tr><td>Unauthorized discharges or outfalls observed?</td><td>None observed</td></tr>
<tr><td>Source of the unauthorized discharge?</td><td>N/A</td></tr>
<tr><td>Actions taken to control measures to eliminate unauthorized discharges:</td><td>N/A</td></tr>
<tr><td>New MEPDES permit required?</td><td>N/A</td></tr>
</table>

INITIAL EVALUATION OF NON-STORMWATER DISCHARGES

Site Name/Company: Juniper Ridge Landfill/NEWSME Landfill Operations, LLC	
Evaluation Date: 12/1/2023	Evaluation Time: 3:00 PM
Inspector Name/Title: Thalia Harrington/Project Mgr.	Inspector Signature: Thalia Thurpe
Which of the outfalls described in the SWPPP were observed during the evaluation?	Outfalls #1-7, Outfalls #8-9 under construction
The following non-stormwater discharges are authorized under the MSGP: • Firefighting activities • Fire hydrant flushing • Portable water, including water line • Uncontaminated condensate from air conditioners, coolers, other compressors, and outside storage of refrigerated gases or liquids • Irrigation drainage • Landscape watering • Routine external building wash-down/power wash water not contaminated with detergents or hazardous cleaning products • Uncontaminated groundwater and springs • Uncontaminated utility vault dewatering • Water from building foundations or footings not contaminated by contact with process materials • Incidental mist from cooling towers that collects on roofs or adjacent portions of the site • Incidental water that does not contain detergents from on-site rinse stations • Incidental condensed steam that does not contribute to violations of water quality standards • Wash water from cleaning roads, parking lots, sidewalks or other paved surfaces that does not contain detergents, hazardous cleaning products, oil & grease, or toxic pollutants • Wash water from vehicles and equipment cleaning • Non-stormwater discharges explicitly authorized in Sectors A through AD	
Unauthorized discharges or outfalls observed?	None observed
Source of the unauthorized discharge?	N/A
Actions taken to control measures to eliminate unauthorized discharges:	N/A
New MEPDES permit required?	N/A

APPENDIX G

SWPPP TRAINING LOG

SWPPP TRAINING LOG

Trainer Name:	**Location:**
Title:	
Date:	

Training Topics:

- An overview of the SWPPP;
- Spill response procedures, maintenance requirements, and material management practices;
- The location of all controls on the site required by the MSGP, and how they are to be maintained;
- The proper procedures to follow with respect to the MSGP's pollution prevention requirements;
- When and how to conduct inspections, record applicable findings, and take corrective actions;
- Used and spent oil solvent management;
- Fueling procedures;
- General good housekeeping practices; and
- Used battery management.

Name	**Signature**

APPENDIX H

VISUAL MONITORING OF STORMWATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY MEDEP PROCEDURE – DEPLW0768

Standard Operating Procedure
Attachment A
Bureau of Land and Water Quality
Date: April 20, 2006
Revised: June 12, 2017
Doc num: DEPLW0768

Instructions for Completing the Visual Monitoring Form

1. Completely fill out all required information on the top of the visual monitoring form.

2. Pour the sample into a 1 L clear polycarbonate Imhoff cone or 1000 ml graduated cylinder. Record the total sample volume measured in the cone or graduated cylinder to the nearest 10 milliliter. Evaluate the sample for the following parameters according to the following instructions.

   - **Odor:** The must be recorded first. If the sample has no odor other than natural rainwater or snowmelt, write "normal" on the visual monitoring form. Note the presence of any of the following odors if detected: Gasoline, diesel, oil, solvents (WD-40, other petroleum products, etc.), landfill, fishy, glycol, any other unusual odors not normally present in clean stormwater runoff from the area(s) sampled.

   - **Foam:** This must be recorded second. Examine the sample for foam immediately after pouring it into the cone. Record foam results on the visual monitoring form as they most closely match one of the descriptions listed below.

     i. **None**-Most bubbles break down within ten (10) seconds of pouring; only a few large bubbles persist longer than ten (10) seconds.

     ii. **Moderate**-Many small bubbles are present but these bubbles persist for less than two (minutes) after pouring.

     iii. **High**-Many small bubbles are present and they persist longer than two (2) minutes after pouring.

3. Examine the sample for the following criteria after it has settled for ten (10) minutes. Record the results on the visual monitoring form as they most closely match the descriptions listed below.

   - **Color:** Record the best description of the sample color in the appropriate space on the visual monitoring form.

   - **Clarity:** Record sample clarity results as they most closely match one of the descriptions listed below.

     i. **Clear**-Sample doesn't filter out any light, can be seen through regardless of color.

     ii. **Cloudy-**Sample filters out some light; not clear but objects can still be identified when looking through the cone.

     iii. **Very Cloudy**-Sample filters out most light; objects are indiscernible when looking through the cone.

iv. **Opaque**-Sample doesn't allow any light to pass through; objects cannot be seen when looking through the cone.

- **Floating Solids:** Give a general description of the type of floating solids present (wood chips, leaf debris, algae, etc) in the general comments section for each sample. Record results for amount floating solids present as they most closely match the descriptions listed below. Record amount data in the appropriate box on page 1 of the visual monitoring form.

  i. **None**- No floating solids present on the surface of the sample.

  ii. **Slight**-Only a few floating particles observed on the surface of the sample.

  iii. **Moderate**- Less than 20% of the surface of the sample is covered with floating solids.

  iv. **High**- More than 20% of the surface of the sample is covered with floating solids.

- **Settled Solids:** Give a general description of the type of settled solids present (sand, decayed plant matter, rust particles etc) in the general comments section for each sample. Allow settle for one hour. Measure the settled solids in the bottom of the cone to the nearest milliliter and record the results in the appropriate box on page 1 of the visual monitoring form.

- **Suspended solids:** In the general comments section for each sample, give a general description of the type of solids present if any are observed suspended below the sample surface. Record whether or not settled solids were present in the appropriate box on page 1 of the visual monitoring form.

- **Oil Sheen:** Record whether or not an oil sheen is present in the sample.

- **General Comments Section on Page 2:** Make sure you have described the type of floating, settled and suspended solids observed in the samples in the general comments section provided for each outfall sample. Also note the following conditions at each outfall during the time sampled: General volume of water and flow, algae (if any is present), odor, color, and any other unusual characteristics noticed at the sampling location. Record the number of days since the last known measurable storm or runoff event.

4. Ensure that all visual monitoring forms are filed on site with the Stormwater Pollution Prevention Plan (SWPPP) each time visual monitoring is performed.

APPENDIX I

QUARTERLY VISUAL MONITORING FORM

QUARTERLY VISUAL MONITORING FORM

Person Collecting Sample:

Person Performing Visual Assessment:

Site Name and Address: Juniper Ridge Landfill, 2828 Bennoch Road, Alton, Maine

Date and Time:

Time Since Previous Storm Event:

Time Since Current Storm Event Began:

Measurable Discharge from Outfall(s):

Outfall	Time	Type of Discharge (rainfall/ snowmelt)	Observations								
			color	odor	clarity	floating solids	settled solids	suspended solids	foam	oil sheen	other
Outfall #1											
Outfall #2											
Outfall #3											
Outfall #4											
Outfall #5											
Outfall #6											
Outfall #7											
Outfall #8											
Outfall #9											
Comments											

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:_____ Title:_____ Date:_____

APPENDIX J

ROUTINE INSPECTION FORM

ROUTINE INSPECTION REPORT

Site Name/Company	Juniper Ridge Landfill/NEWSME Landfill Operations, LLC
Location	2828 Bennoch Road, Alton, Maine
Date of Visit	
Inspector Name/Signature	
Weather	

Does this inspection qualify as the one required annual inspection conducted during qualifying storm event? ☐ Yes ☐ No

Are there any new discharges or pollutants at the site? ☐ Yes ☐ No

Table 1
Inspection of Potential Pollutant Sources (PPS)

Description	
Industrial Activity or Area	**Describe where any of the following were observed:** • **Any discharges present at the time of inspection;** • **Any evidence of pollutants entering the drain system or outfalls;** • **The condition of the outfalls, including any restricted flow;** • **Industrial materials, residue or trash on the ground;** • **Leaks or spills from industrial equipment, drums, barrels, tanks or other containers;** • **Offsite tracking of industrial or waste materials or sediment; and** • **Tracking or blowing of raw, final, or waste materials.**
Scale House and Scale	
Salt & Sand Storage Area	
Soil Stockpile Areas	
Borrow Pit	
Wood Waste Handling Area	

Table 1
Inspection of Potential Pollutant Sources (PPS)

Maintenance Building	
Rubb Building	
LFG Treatment Facility	
RNG Facility	
Leachate Storage Tank	
Leachate Loading Rack	
Leachate Collection System	
Gravel Laydown Area	
Employee Parking Area	
1,500-Gallon Gasoline Tank	
2,500-Gallon Diesel Delivery Truck	
Access Roads	
Foam Production Well	

Table 2
Inspection of Structural Control Measures and Outfalls

BMP	Describe where any of the following were observed: • Any evidence that the BMP is not functioning properly; • Any evidence of erosion; and • Industrial materials, residue, or trash.
Detention Pond 1	
Geomembrane Lined Storage Pond	
Detention Pond 2	
Detention Pond 6	
Litter Fence	
Leachate Storage Tank Containment Area	
Leachate Storage Tank Containment Area Riprap Outlet	
Leachate Loading Rack Catch Basin	
Detention Pond 9	
2,000-Gallon Underground Storage Tank	
Detention Pond 10	
Detention Pond 11	
RNG Facility Stormwater Pond	

Table 2
Inspection of Structural Control Measures and Outfalls

Outfall No. 1	
Outfall No. 2	
Outfall No. 3	
Outfall No. 4	
Outfall No. 5	
Outfall No. 6	
Outfall No. 7	
Outfall No. 8	
Outfall No. 9	

Table 3
Corrective Actions Required for PPS(s) and/or Existing Structural Control Measures

Reference	Description/Schedule	Date Completed

Table 4
Recommendation for New PPS(s) and/or Structural Control Measures

Reference	Description/Schedule	Date Completed

Table 5
Modifications Required to SWPPP or Site Plan

Reference	Description

Certification

☐ Site is in compliance with SWPPP and MSGP.
☐ Site is not in compliance with SWPPP and MSGP and either structural control measure maintenance, additional controls, or modifications to the SWPPP are required.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name:	**Telephone:**
Signature:	**Date:**

APPENDIX K

WEEKLY/MONTHLY INSPECTION FORM

WEEKLY/MONTHLY INSPECTION FORM

Site Name/Company	Juniper Ridge Landfill/NEWSME Landfill Operations, LLC
Location	2828 Bennoch Road, Alton, Maine
Date of Visit	
Inspector Name/Signature	

Note: For weekly inspections, only Table 1 and Table 3 need to be completed. For monthly inspections, Tables 1, 2 and 3 need to be completed.

Table 1
Inspection of Active Areas at the Facility

Active Areas at the Facility			
Leachate	Is leachate observed on the ground, or leaking from tanks or piping, with evidence of or the potential to impact stormwater?	☐ Yes ☐ No	☐ Comments (see below)
Access Roads	Are industrial materials, residue or trash observed on roads where vehicles enter or exit the active landfill with evidence of or the potential to impact stormwater?	☐ Yes ☐ No	☐ Comments (see below)
MSW and CDD (windblown debris)	Is MSW and/or CDD on ground, tracking, blowing or whirling with evidence of or the potential to impact stormwater?	☐ Yes ☐ No	☐ Comments (see below)
Borrow Pit	Is there evidence of tracking or erosion from site soil borrow areas with potential to impact stormwater?	☐ Yes ☐ No	☐ Comments (see below)
Mobile Equipment	Is mobile equipment leaking oil or other liquids with evidence of or the potential to impact stormwater?	☐ Yes ☐ No	☐ Comments (see below)

Active Areas at the Facility	
Comments	

Table 2
Inspection of Stabilized Areas at the Facility

Stabilized Active Areas at the Facility			
Leachate	Is leachate observed on the ground, or leaking from tanks or piping, with evidence of or the potential to impact stormwater?	☐ Yes ☐ No	☐ Comments (see below)
Access Roads	Are industrial materials, residue or trash observed on roads where vehicles enter or exit the active landfill with evidence of or the potential to impact stormwater?	☐ Yes ☐ No	☐ Comments (see below)
MSW and CDD (windblown debris)	Is MSW and/or CDD on ground, tracking, blowing or whirling with evidence of or the potential to impact stormwater?	☐ Yes ☐ No	☐ Comments (see below)
Comments			

Table 3
Inspection of Stormwater BMPs, Conveyances and Outfalls

BMP	Describe where any of the following were observed: • Any evidence that the BMP is not functioning properly.
Detention Pond 1	
Geomembrane Lined Storage Pond	
Detention Pond 2	
Detention Pond 6	
Litter Fence	
Leachate Storage Tank Containment Area	
Leachate Storage Tank Containment Area Riprap Outlet	
Leachate Loading Rack Catch Basin	
Detention Pond 9	
2,000-Gallon Underground Storage Tank	
Detention Pond 11	
RNG Facility Stormwater Pond	
Detention Pond 10	
Outfall No. 1	

Table 3
Inspection of Stormwater BMPs, Conveyances and Outfalls

BMP	Describe where any of the following were observed: • Any evidence that the BMP is not functioning properly.
Outfall No. 2	
Outfall No. 3	
Outfall No. 4	
Outfall No. 5	
Outfall No. 6	
Outfall No. 7	
Outfall No. 8	
Outfall No. 9	

Table 4
New Potential Pollutant Source and/or Recommendations for Additional BMPs

Reference	Description	Schedule

Certification

☐ Site is in compliance with SWPPP and MSGP. ☐ Site is not in compliance with SWPPP and MSGP and either structural control measure maintenance, additional controls, or modifications to the SWPPP are required.
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name:	**Telephone:**
Signature:	**Date:**

APPENDIX L

CORRECTIVE ACTION REPORT

CORRECTIVE ACTION REPORT

Site Name/Company:	
Location:	
Contact Name:	**Contact Signature:**
Date of Discovery:	
Date of Corrective Action Initiation:	
Date of Corrective Action Completion:	
Condition Requiring Corrective Action	
Immediate Measures Taken to Control	
Measures Taken to Prevent Re-Occurrence	

Corrective actions must be completed within 14 days of the discovery of the condition. SWPPP modifications must be completed within 14 days of the completion of the corrective action. In the case of a spill, fill out Appendix E – Spill Report in addition to this form.

If it is not feasible to complete the corrective action within 14 days, please describe the reason and proposed schedule for completion: _____

_____

_____

If corrective actions cannot be completed within 45 days of discovery, MEDEP must be notified.

APPENDIX P

HOST COMMUNITY AGREEMENTS

P-1 OLD TOWN HOST COMMUNITY AGREEMENTS
P-2 ALTON HOST COMMUNITY AGREEMENTS

SME
SEVEE & MAHER
ENGINEERS

OLD TOWN HOST COMMUNITY AGREEMENTS

SME
SEVEE & MAHER
ENGINEERS

HOST COMMUNITY COMPENSATION AND FACILITY OVERSIGHT AGREEMENT

This Agreement ("Agreement") made as of the 8th day of December, 2005, by and among the STATE OF MAINE, acting by and through its Executive Department, State Planning Office (the "State"), the City of Old Town, Maine, a municipal corporation organized and existing under the laws of the State of Maine, having its principal offices at 150 Brunswick Street, Old Town, Maine 04468 (the "City") and Casella Waste Systems, Inc., a Delaware corporation having a place of business at 25 Greens Hill Road, Rutland, Vermont 05702 ("Casella").

WITNESSETH:

WHEREAS, the STATE OF MAINE, acting by and through its Executive Department, State Planning Office, pursuant to Resolve 2003, ch. 93 (the "Resolve"), agreed to purchase from Fort James Operating Company ("FJ"), and FJ agreed to sell to the State, FJ's solid waste landfill (the "Landfill") located in Old Town, Maine; and

WHEREAS, an operator of the landfill was sought through a competitive bid process conducted by the State Planning Office; and

WHEREAS, Casella was selected as the operator of the Landfill; and

WHEREAS, by deed dated 3 February 2004, recorded in the Penobscot County Registry of Deeds in Book 9188, Page 153, FJ conveyed the Landfill to the State; and

WHEREAS, the State, acting pursuant to the Resolve has entered into an Operating Services Agreement, dated 5 February 2004 with Casella; and

WHEREAS, the parties hereby acknowledge that landfills and their operations may have ongoing impacts on host communities, and the State and Casella agree to provide benefits to the City pursuant to 38 M.R.S.A. § 2170 et. seq. and as further provided in this Agreement; and

WHEREAS, except as provided in the Resolve, 38 M.R.S.A. §§ 2170 to 2177 requires the State to provide certain benefits to the City as the municipality in which the Landfill is located; and

NOW, THEREFORE, in consideration of the foregoing, the mutual promises and agreements herein contained, and for other and good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the State, the City and Casella agree as follows:

SECTION 1 DEFINITIONS

"Acceptable Waste" shall mean such material as may from time to time be legally accepted at the Landfill in accordance with applicable MDEP permits and other applicable laws and regulations excluding, however, all Excluded Waste.

"Biomass Ash" shall mean the ash resulting from the operation of the Biomass Generating Facility to the extent the same is disposable at the Landfill under the Existing Permit and meets the definition of "special waste" as defined under Maine Environmental Law.

"Biomass Generating Facility" shall mean the electric generating facility fueled principally with biomass fuel, to be installed at the Old Town Mill.

"City" shall mean the City of Old Town, Maine, a municipal corporation organized and existing under the laws of the State of Maine, also referred to herein as the Host Community.

"Commencement Date" shall be the effective date of this Agreement, which shall be deemed to be the date on which all parties have signed the Agreement.

"Disposal" or "Dispose" shall mean and include the disposal or deposit of Acceptable Waste at or in the Landfill in accordance with applicable DEP permits and other applicable federal, State or local laws, regulations and ordinances, excluding, however, all Excluded Waste.

"Environmental Law" shall mean any federal, state or local law, statute, rule, order, directive, judgment, Governmental Approval or regulation or the common law relating to the environment (including the ambient air, surface water, groundwater, land surface or subsurface strata), or exposure of persons or property to Materials of Environmental Concern, including any statute, regulation, administrative decision or order pertaining to: (a) the presence of or the treatment, storage, disposal, generation, transportation, handling, distribution, manufacture, processing, use, or recycling of Materials of Environmental Concern or documentation related to the foregoing; (b) air, water and noise pollution; (c) groundwater and soil contamination; (d) the release, threatened release, or accidental release into the environment, or other areas of Materials of Environmental Concern, including emissions, discharges, injections, spills, escapes or dumping of Materials of Environmental Concern; (e) transfer of interests in or control of real property; (f) land use, subdivision and zoning; (g) community or worker right-to-know disclosures with respect to Materials of Environmental Concern; (h) the protection of wild life, aquatic and marine life and wetlands, and endangered and threatened species; and (i) storage tanks, vessels, containers, abandoned or discarded barrels and other open or closed receptacles. As used above, the term "release" shall have the meaning set forth in CERCLA, and to the extent it is more extensive or comprehensive, as defined in Maine Environmental Law. Without limiting the

foregoing, the term "Environmental Law" shall include the Maine Forest Practices Act, 12 M.R.S.A. §§8867-A et. seq.

"Existing Permit" shall mean Maine Department of Environmental Protection Permit #S- 20700-7A-A-N, issued July 28, 1993, as amended or revised.

"Excluded Waste" shall mean (a) any Acceptable Waste or any other waste of any nature generated outside of the State of Maine, (b) any waste as of the date of this Agreement under contract for delivery to another disposal facility or processing facility unless agreed to in writing by such facility's waste generator or responsible party, and (c) any other waste or material excluded from disposal in the Landfill by applicable laws or regulations, or excluded by any of the terms and conditions of any permits, licenses, authorizations or approvals obtained with respect to the construction or operation of the Landfill, provided that Excluded Waste shall not include any waste that would otherwise constitute Excluded Waste hereunder if such category of waste is accepted at another disposal facility in the State of Maine owned or operated by the State, subject in all instances to the prior receipt of any and all required licenses or permits for such category of waste. Notwithstanding the foregoing, the parties acknowledge and agree that, subject to applicable laws and regulations and such certifications as the State may reasonably require, Casella may bring construction and demolition waste generated outside the State of Maine for processing within the State of Maine solely for the purposes of allowing Casella to generate biomass fuel required in connection with the provision of biomass fuel to FJ or its successor or assigns under the C&D Fuel Agreement between FJ and Casella dated February 5, 2004. Casella agrees to use its best efforts to ensure that any such construction and demolition waste generated outside the State of Maine and processed in the State of Maine is free of putrescible waste. This term shall also include such other wastes and materials as Casella determines, in the reasonable exercise of its commercial judgment, pose a risk or danger to the operation or safety of the Landfill or to the human or natural environment or are otherwise reasonably unacceptable to Casella provided, however, that in no event may FJ Waste be excluded or otherwise deemed Excluded Waste unless such exclusion is required by applicable law, regulation, permit, license, authorization or approval.

"Expansion Permit" shall mean any and all federal, state, local and other governmental permits, permit modifications, operation plan modifications, other modifications, statutory amendments and legislation, licenses, approvals, authorizations or amendments necessary for the expansion of the Landfill beyond the licensed footprint as of the date hereof.

"FJ" shall mean Fort James Operating Company, a Delaware Corporation with a place of business in Old Town, Maine or its successors or assigns.

"FJ Waste" shall mean collectively all Mill Waste and all Biomass Ash.

"Force Majeure" shall mean any act, event or condition affecting the Landfill or to the extent that it materially and adversely affects the ability of either party to perform or comply with any obligation, duty or agreement required of the party under this Agreement, provided such act, event or condition is beyond the reasonable control of the party or its agents relying thereon and is not the result of the willful or negligent act or omission of the party relying thereon. Force Majeure includes, without limitation but by way of illustrating the actions, events and conditions constituting a Force Majeure hereunder: (a) an act of God, epidemic, lightning, earthquake, fire, explosion, storm, flood or similar occurrence; (b) an act of the public enemy, war, blockage, insurrection, riot, general arrest or restraint of government and people, civil disturbance or disobedience, sabotage or similar occurrence; or (c) a strike, work slowdown, or similar industrial or labor action.

"Governmental Approval" means any and all approvals, licenses, permits, authorizations (or the transfer thereof) required by any Governmental Authority for the design, construction, improvement, alteration, ownership or operation of the Landfill and all related projects, improvements or land use or the transfer thereof.

"Host Community Fee" shall mean the fees to be paid monthly by Casella (and/or the State) for Acceptable Waste disposed of at or in the Landfill as stated in Section 3 herein.

"Host Community" shall mean the City of Old Town and may also be referred to as the "Host Municipality" or the "City".

"Landfill" shall mean the solid waste landfill located in Old Town, Maine, that the State has acquired from FJ pursuant to the Resolve and all of the assets and properties acquired by the State from FJ in connection with said landfill, including any expansion of the solid waste landfill located at the Premises, whether such expansion is effected under the Existing Permit or under a new, amended or additional Governmental Approval, and any associated land, buildings, appurtenances, equipment and fixtures, the full benefit of all utility arrangements, licenses, approvals and permits to the extent transferable, including rights of assignment to the extent any such licenses and permits are assignable (but subject to any third party consents when required).

"License Amendment" shall mean any and all federal, state, local and other governmental permits, permit modifications, operation plan modifications, other modifications, statutory amendments and legislation, licenses, approvals, authorizations or amendments necessary for the development of the Landfill within the currently permitted footprint for an additional seven (7) million cubic yards.

"Lincoln" shall mean Lincoln Paper & Tissue Co., LLC

"Lincoln's Biomass Ash" shall mean the ash resulting from the operation of the Lincoln biomass boiler located at Lincoln's Mill in Lincoln, Maine.

"Materials of Environmental Concern" shall mean any: pollutants, contaminants or hazardous substances (as such terms are defined under CERCLA, the Maine Protection and Improvement of Waters Act, 38 M.R.S.A. § 361-A, or the Maine Uncontrolled Hazardous Substances Sites Law, 38 M.R.S.A. § 1362.1), pesticides (as such term is defined under the Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. §§ 136 et seq.), solid wastes and hazardous wastes (as such terms are defined under the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901 et seq., and Maine's Hazardous Waste, Septage and Solid Waste Management Act, 38 M.R.S.A. §§ 1301 et seq.), chemicals, other hazardous, radioactive or toxic materials, oil, petroleum and petroleum products (and fractions thereof), asbestos and asbestos-containing materials, polychlorinated biphenyls (PCBs") or PCB-containing materials, or any other material (or article containing such material) listed or subject to regulation under any law, statute, rule, regulation, order, Governmental Approval, or directive due to its potential, directly or indirectly, to harm the environment or the health of humans or other living beings.

"MDEP" shall mean the Maine Department of Environmental Protection, and any successor agency or department of the State of Maine.

"Mill Waste" shall mean waste from the Old Town Mill of a composition consistent with the waste FJ (or its successors or assigns) is permitted to dispose of at the Landfill under the Existing Permit, provided it meets the definition of "special waste" as currently defined by Maine Environmental Law.

"Operating Services Agreement or OSA" shall mean the Agreement between the State and Casella effective on 5 February 2004 and pursuant to which Casella is authorized to operate the Landfill.

"Premises" shall mean the real estate, together with all buildings and improvements thereon, situated in Alton and Old Town, Maine and more particularly described in Exhibit A of the Operating Services Agreement, including the Landfill.

"Reconciliation Notice" shall mean the written notice provided by the State and/or Casella to the City each month indicating the number of tons of Mill Waste, Biomass Ash and other waste of any kind or material disposed of or utilized at or in the Landfill during the month.

"Resolve" shall mean Resolve 2003, Chapter 93 of the Maine Legislature pursuant to which the State was authorized to acquire from FJ, and to own and cause to be operated, the Landfill.

"SPO" shall mean the State Planning Office, an Executive Department of the State.

SECTION 2 STATE LAW, OPERATING SERVICES AGREEMENT

2.1 State Law. The parties agree that the construction, operation and maintenance of the Landfill are subject to the procedures and requirements of 38 M.R.S.A. §§ 2170 to 2177 and the Resolve, as in effect on the date of this Agreement. In the event that any provision of 38 M.R.S.A. §§ 2170 to 2177 conflicts with the specific language of the Resolve, the language of the Resolve shall prevail. The City agrees that Casella's and the State's performance of their obligations under this Agreement fully satisfies the State's and Casella's obligations to the City under these statutory sections and the Resolve for the duration of Casella's role as operator under the OSA.

2.2 Operating Services Agreement. The responsibilities of the State and Casella, relative to the landfill and its operation, are identified in the Operating Services Agreement between the parties, signed February 5, 2004. The State Planning Office is the owner of the landfill property and holds the landfill permits and licenses. .

SECTION 3 FEES

The City shall receive the following fees:

3.1 Host Community Fee. Casella shall pay the City a monthly Host Community Fee for Acceptable Waste disposed of at or in the Landfill, as follows:

(a) Per ton fee. $ 1.85 per ton for all Acceptable Waste disposed of at or in the Landfill, except as otherwise provided herein. Construction and Demolition Debris and other Acceptable Waste generated by the City and disposed of at the Landfill at no cost pursuant to Section 4, FJ Mill Waste, as described in Section 2.8 (b)(i) of the OSA (up to 50,000 tons per calendar year), and Lincoln Biomass Ash, as described in Section 2.8 (c) of the OSA (up to 6000 tons per calendar year), disposed of at or in the Landfill, materials approved for beneficial use by MDEP in writing and set forth in Exhibit 1, as expanded from time to time by Casella as new materials are approved in writing by MDEP for beneficial use at or on the Landfill, tire chips or wire for drainage, lime, fine woodash for cell construction or odor control or other such beneficial use, which must be generated by third parties and used on a short term, sporadic basis, or other materials that Casella accepts for beneficial use and for a tipping or disposal fee (exclusive of transportation costs) of $5.00 per ton or less, shall be exempt from the per ton fee. Waste collected from City residents or businesses shall not be deemed generated by the City. FJ Mill Waste in excess of 50,000 tons per calendar year and Lincoln Biomass

Ash is excess of 6000 tons per calendar year, respectively, disposed of at the Landfill shall be subject to the $1.85 Host Community Fee described above.

Annual adjustment. The base Host Community Fee set forth above shall be adjusted annually by multiplying 3.7% times the increase (assuming there is one) in the annual average third party tipping fee (exclusive of transportation, intra-Casella company tip fees and any tipping fees on waste or material not subject to the Host Community Fee) paid at the Landfill. Casella agrees to maintain tipping fees on waste separate and distinct from transportation fees and to avoid offering third parties the opportunity to dispose of waste at lower tipping fees in exchange for higher transportation fees. The first annual adjustment shall be made effective May 1, 2006 and will be in effect for the following twelve months. The next annual adjustment shall be made (assuming an increase or decrease is calculated) on May 1, 2007 and every May 1 thereafter for the term of this Agreement.

(Example of annual adjustment calculation: If the average third party tip fee for the period prior to May 1, 2005 was $42.50/per ton and the average third party tip for the period May 1, 2005 to May 1, 2006 is $45 per ton, the annual adjustment effective May 1, 2006 would be: $45 minus $42.50 = $2.50 x 3.7% = $.09 increase in host per ton fee, or $1.85 + $.09 = $1.94 per ton). In no event shall the per ton fee fall below $1.85 ton.

(b) Per ton fee on new categories of waste. $2.50 per ton on any category of solid waste not currently approved by MDEP for acceptance at the Landfill that subsequently is licensed as an Acceptable Waste. The categories of wastes currently approved for acceptance at the Landfill are set forth on Exhibit 2. Casella shall provide the City with a copy of all blanket permits related to categories of waste referred to in Exhibit 2 and copies of all specific permits or approvals related to all other waste streams listed in Exhibit 2. Acceptance of a new customer's waste does not constitute a new category of waste if that customer's waste is listed as a currently approved waste category on Exhibit 1. One example of a category of waste for which Casella agrees to pay this higher per ton fee is any waste disposed at the Landfill after a bypass event at the Maine Energy Recovery Company in Biddeford, ME ("Maine Energy") that involves a complete cessation of processing and incineration at Maine Energy for a period of at least 120 consecutive days. The $2.50 per ton fee would apply to all such Maine Energy waste disposed at the Landfill after the 120 day period and would revert to the per ton fee under Section 3.1(a) if and when Maine Energy resumed operations. Casella agrees that if Maine Energy ceases to operate permanently as a result of a decision by its management

and/or owners, or the Cities of Biddeford and/or Saco or by order of any governmental authority, then the $2.50 per ton fee would apply from the date of such cessation of operations.

(c) Reconciliation Notice. No later than fifteen (15) days following the end of each calendar month, Casella shall provide the City with a written Reconciliation Notice for the previous month showing the Host Community Fee owed for the previous month, the number of tons of waste disposed of at or in the Landfill and specifically the number of tons of Mill Waste, Biomass Ash and Lincoln Biomass Ash disposed of at or in the Landfill.

(d) Payment. Fees payable under this Section shall be paid monthly with payment to be made no later than thirty-five (35) days after the last day of each calendar month. Payments under this Section shall be deemed to have begun accruing on September 1, 2005.

(e) Adjustments. Upon receiving the Reconciliation Notice, the City may inspect the relevant books and records from the operation of the Landfill in order to verify the Reconciliation Notice and the City may propose any adjustment that such review of books and records may disclose. Casella may accept or reject said adjustment, and in the event Casella rejects said adjustment, the parties shall resolve such rejection through the dispute resolution process set forth in Section 20 below. In the event that it is ultimately determined through arbitration that the City shall be entitled to the adjustment in whole or in part, the City shall be entitled to said adjustment together with the legal rate of interest the City may charge on overdue taxes from the date the payment was due as set forth in (d) above.

(f) Suspension of Payments. Notwithstanding anything above to the contrary, the obligation of Casella to make the payments or provide the benefits set forth in Sections 3.1(a) and 3.1(b) above shall be suspended in the event that, and for so long as, the City:

(i) appeals or funds a third party to appeal to any administrative or judicial body any federal, state or local permit, license, approval or determination including, but not limited to, any of the foregoing issued by DEP to the State and/or Casella relating to the Landfill or any expansion thereof (provided that the City's participation in any such permit, license, approval or determination process up to the point of decision shall not be a basis for suspending payment under this provision), or

(ii) imposes, through ordinance (whether enacted by the City Council or adopted as a result of a citizen initiative or referendum), permit, condition, or other act (including, but not limited to, denial of a Landfill-related application) or failure to act (including, but not limited to, failure to act on a Landfill-related application within the time period required by law), any substantial or material limitation on the State and/or Casella's ability to operate the Landfill or any expansion thereof in accordance with permits and licenses issued by DEP (e.g., enactment or enforcement of an ordinance or regulation that effectively prohibits the operation of the Landfill or any expansion thereof), other than any such ordinance, permit, condition or other act or failure to act that is authorized to be enacted, implemented, done or omitted by the City under the Resolve.

If any of the actions described in clauses (i) or (ii) above occurs, Casella shall, subject to the notice of suspension provision below, place the Host Community Fees normally due the City into an escrow account as of the effective date of the event until the disputed action is resolved by negotiation, mediation, arbitration, or litigation after all appeals, if any, have been exhausted. Disposition of the escrowed Host Community Fees through negotiation or mediation shall be by agreement of the City and Casella. Disposition of the escrowed Host Community Fees through arbitration shall be as determined by the arbitrator. Disposition of the Host Community Fees through litigation shall be payment to the City if the City prevails, and retention by Casella if Casella prevails. If the City prevails in any arbitration or litigation under this subsection, Casella shall pay the escrowed Host Community Fees, plus interest at the rate set forth in 14 M.R.S.A. § 1602-C (1) (B). Following resolution of the disputed action, Host Community Fee payments shall resume as described in Section 3.1 a-e.

This Section 3.1(f) is not intended to preclude the City from exercising any statutory authority it may have to act in its own interest under applicable law, but rather to provide a contractual means for Casella to withhold certain benefits under this Agreement until resolution of the action taken by the City. With respect to clause (ii) above, the parties agree to conduct ongoing communication concerning the operation of the Landfill or any expansion thereof. The City shall make a good faith effort to provide Casella with: (1) copies of agendas of the meetings of the City on which the Landfill appears at the time they are provided to the City Council, (2) copies of any proposed ordinance relating to the Landfill, and (3) written notice at least 15 to 30 days in advance of any meeting of the City in which the City may take action that could reasonably be anticipated to impose a substantial or material limitation

on the ability of Casella to continue to operate the Landfill including any expansion of same. The commencement of an action by the City to prosecute a violation of its Ordinances or of this Agreement shall not constitute grounds for suspension as set forth in this Section 3.1(f).

Notice of Suspension. Casella shall make a good faith effort to advise the City in writing within 15 days of receipt of notice from the City if any ordinance, or other act, or failure to act, of the City described in clause (ii) above could reasonably be anticipated to impose a substantial or material limitation on the operation of the Landfill including any expansion thereof. In the event that Casella elects to suspend payments pursuant to this Section 3.1(f), Casella shall provide 14 days prior written notice of the suspension to the City, which notice shall state the reason(s) for the suspension. In the event the parties do not resolve the matter within 14 days of the receipt of said notice, the suspension shall become effective as of the date of the acts of the City that trigger the right to suspend or the effective date of a City vote in the case of a referendum, as set forth above ("Suspension Effective Date"). In the event that Casella suspends payments pursuant to this Section 3.1(f), Casella shall pay, and the City shall be entitled to, the fees due under Sections 3.1(a) and 3.1(b) up to the Suspension Effective Date.

(g) Books and Records. The acceptance of Host Community Fee payments shall be without prejudice to the City's rights to an examination of the relevant books and records from the operation of the Landfill during normal business hours in order to verify the amount of the Host Community Fee payments. The State and/or Casella shall keep accurate and true records, books and dates with respect to all material received at the Landfill. Accurate books and other records and data of account shall be kept of such business whether payment was made for cash or otherwise and whether or not monies were actually received. Any examination of the books and records described in this paragraph shall occur at the usual location where such materials are maintained.

3.2 Impact Payments. Casella shall make annual impact payments to the City in accordance with 38 M.R.S.A. § 2176. The impact payments shall be in the amount of $50,000.00 payable on an annual basis beginning on the Commencement Date and on each subsequent annual anniversary date of the Commencement Date during the term of this Agreement. Casella agrees that it will make the 2005 Impact Payments upon execution of this Agreement. Every five (5) years during the term of this Agreement, the annual Impact Payments shall be increased by $5,000. The payments shall be used by the City to help determine or help offset potential impacts on the City's public welfare, budget, infrastructure and services arising

out of the construction, operation and maintenance of the Landfill and any expansion thereof in the City, which may include, without limitation, the following:

(a) Roads. Improvements, maintenance and repair of local roads or traveled ways affected by the Landfill.

(b) Emergency Response. Development and maintenance of adequate or additional local emergency response capacity relating to the Landfill.

(c) Employee Monitoring. Financial support to retain, train and supervise municipally employed personnel to monitor the State's, Casella's or the Landfill's compliance with any Environmental Law or the terms of this Agreement.

(d) Consultant Monitoring. Financial support to retain and supervise consultants as deemed necessary by the City to monitor the State's, Casella's or the Landfill's compliance with any Environmental Law or the terms of this Agreement.

(e) Budget. Financial support to offset potential losses of tax revenues due to any reductions in assessed values for properties in the City directly attributable to the construction, operation or maintenance of the Landfill.

3.3 Payment in Lieu of Taxes. Casella has already paid the payment in lieu of taxes for the City's fiscal year 2005-2006, which started on July 1, 2005 and will end on June 30, 2006. Beginning in 2006 and on an annual basis thereafter, Casella shall make on or before October 1 of each year a payment in-lieu of taxes to the City equal to the amount of property tax that would have been assessed during the tax year if said property had not been exempt from municipal taxation, calculated in accordance with the financial model utilized by the City and agreed to by Casella. The financial model is attached as Exhibit 3 and will be updated annually for changes in costs, revenues, capitalization rate and available volumes. By way of example, the application of the model resulted in a taxable basis of $8,780,192 for the City's fiscal year 2005-2006. Future calculations of the payment in lieu of taxes shall apply such model in a manner consistent with that used to produce the result described in the immediately preceding sentence.

3.4 Exclusive Payment Obligations. The parties agree and acknowledge that the payment obligations set forth in this Section 3 shall be the exclusive payment obligations from the State or Casella arising out of or related to the ownership or operation of the Landfill or any expansion thereof, and that the City may not collect or seek to collect other payments, fees, costs, taxes, or payments in lieu of taxes from Casella or the State in respect thereof under laws, regulations, or common law theories in effect at the Commencement Date or under laws, regulations, or common law theories enacted or arising in the future, provided, however, that

nothing in this section shall limit the City's ability to assess taxes related to new projects developed or in connection with the Landfill or for equipment (including motor vehicles) owned currently or in the future by Casella or third parties or to collect reasonable fees that may be required by local ordinances, development review or otherwise, in effect or enacted in the future in accordance with the limitations of the Resolve, provided that all such ordinances and the fees required therein are applicable to all industrial facilities or other businesses with similar impacts in the City.

SECTION 4 CONSTRUCTION AND DEMOLITION DEBRIS AND OTHER ACCEPTABLE WASTE GENERATED BY OLD TOWN

Casella agrees to dispose up to the following amounts of construction and demolition debris, as defined in MDEP Rules Chapter 400.1(FF), and other Acceptable Waste generated by the City (exclusive of waste collected from residents or businesses) at no cost to the City; provided, however, it shall be the City's responsibility and obligation to deliver said construction and demolition debris and other Acceptable Waste to the Landfill:

Year	Tons per calendar year
May 1, 2005 to April 30, 2006	500 tons
May 1, 2006 to end of term	3000 tons

In the event the State and Casella secure a permit to expand the Landfill (as said Expansion Permit is defined herein), and construct the expansion, Casella agrees to accept up to 3000 tons annually (May 1 to April 30) of construction and demolition debris or other Acceptable Waste generated by the City at no cost to the City. The tipping fee for amounts of City-generated Acceptable Waste in excess of those described above shall be the prices of the published Landfill tipping fees for the waste delivered.

SECTION 5 INFORMATION AND ENFORCEMENT

5.1 Information from the State. During the Term of this Agreement, the State agrees to provide all of the following information to the City or the City's consultant designee in a timely fashion:

(a) Copies of any State or MDEP inspection report relating to the Landfill within five (5) working days of the preparation of the report or its presentation to the State or MDEP.

(b) Notification of all enforcement or emergency orders for or related to the Landfill, including, but not limited to, abatement orders, cessation orders, final civil penalty assessments, consent orders and decrees and notices of violation within five (5) working days of issuance.

(c) Copies of all air, soil and water quality monitoring data collected by the State or the MDEP at the Landfill, including, without limitation, leachate and ash testing results and test results related to landfill gas, within five working days after laboratory analysis becomes available to the State.

(d) Copies of all analyses of the data compiled under subparagraph (c).

5.2 Information from Casella. During the Term of this Agreement, Casella agrees to provide all of the following information to the City or the City's consultant designee in a timely fashion:

(a) Copies of all air, soil and water quality monitoring data related to the Landfill, including, without limitation, leachate and ash testing results and test results related to landfill gas, conducted by or on behalf of Casella, within five (5) working days after the information becomes available to Casella. Said information shall include the results of any tests which are not required by permit or State regulation.

(b) A copy of the annual report prepared by Casella and provided to the State pursuant to Section 10.1 of the Operating Services Agreement summarizing in reasonable detail the business and technical operation of the Landfill during the preceding calendar year or portion thereof and such other books and records as the City may reasonably request at the same time that such information is provided to the State. Casella shall maintain accurate records, books and data with respect to the amount of all Acceptable Waste disposed of at or in the Landfill.

5.3 Local Inspections. The City, acting by and through its Code Enforcement Officer, or his or her designated representative, shall have the right to inspect the Landfill during reasonable business hours to ensure that only Acceptable Waste is being received at the Landfill and to confirm compliance with the provisions of this Agreement and the requirements of all Environmental Laws and other applicable laws. The City shall also have the right to take all necessary action to monitor the amount and type of solid waste materials delivered to the Landfill and to perform air, soil and water quality testing at the site, including the right to perform testing at the Landfill in emergency situations without prior notice to the State and/or Casella.

5.4 Hotline. Casella agrees to continue to operate a hotline twenty-four (24) hours per day. The operator of the hotline shall at all times have access to one or more persons with the authority to address any citizen concerns or emergency conditions at the Landfill. Casella shall maintain a written log of all calls to the hotline and upon request by the City, shall promptly provide a copy of the log to the City. If the parties agree at some point in the future that a twenty-four (24) hour hotline is no longer necessary, then Casella may limit the hours of operation of the hotline to no less than eight (8) hours per day/five (5) days per week.

SECTION 6 PROPERTY VALUE OFFSET

The parties acknowledge that under state statute, 38 M.R.S.A. § 2175-A and Chapter 475, The Property Value Offset Program of the Maine State Planning Office, owners of property in the City, the value of which has been affected by a state-owned landfill are eligible for reimbursement from the state for loss in property value directly attributable to the construction and operation of the Landfill.

SECTION 7 WATER SUPPLY MONITORING AND PROTECTION

The parties acknowledge that under state statute, 38 M.R.S.A. § 2177, persons owning land contiguous to a State-owned Landfill may request that quarterly water quality sampling and analysis be performed on their private water supply and that the provisions of this statute apply.

SECTION 8 OTHER LANDFILL-RELATED DEVELOPMENT

The parties acknowledge that in the future Casella may seek to develop projects at or in connection with the Landfill other than for disposal of solid waste. Such future development projects may include, but are not limited to, a landfill gas to energy generation facility and a greenhouse powered by waste heat from a landfill gas to energy facility, or recycling or processing facilities. Casella agrees to work with the State to establish any such project as a taxable facility and Casella further agrees that the City shall derive tax revenue from any leased property and any new non-Landfill structure built thereon. Moreover, prior to the development of any such project, Casella shall invite the City to become a partner in the development venture, with revenue sharing proportionate to the City's investment. The terms of any such arrangement shall be the subject of future negotiations between the City and Casella, which the parties agree shall be undertaken in good faith. Any agreement reached between the parties shall be memorialized in a separate written agreement.

SECTION 9 TERM OF AGREEMENT

The term of this Agreement shall be deemed to commence on the Commencement Date and shall end on the earlier to occur of: (a) thirty (30) years after the Commencement Date; or (b) the date the Operating Services Agreement is terminated by either the State or Casella as provided therein, including, without limitation, as set forth in Section 5.3(a) of said Agreement; or (c) the date this Agreement is terminated by one or more of the parties as provided herein.

SECTION 10 EXPANSION OF LANDFILL

The parties specifically acknowledge that Casella has an obligation to the State under the Operating Services Agreement to prepare on or before 5 February 2007, an application for an Expansion Permit. At least sixty (60) days prior to submission of the application to the MDEP, Casella shall provide to the City written notice of said proposed expansion. The parties agree to meet within thirty (30) days after receipt of said notice for purposes of discussing the proposed expansion and the draft application. A copy of the Application shall be provided by Casella to the City not later than its submission to MDEP. If Casella demonstrates to the City's satisfaction that the application for an Expansion Permit meets all applicable environmental standards, including the provisions of the City's Ordinances in effect at that time, the City agrees to use reasonable efforts to actively support the application before all applicable agencies, including the MDEP.

SECTION 11 COOPERATION BETWEEN THE PARTIES

During the term of this Agreement, the State and Casella agree to cooperate and to work together with the City to minimize and manage the impacts from the Landfill's operations. The parties agree to conduct ongoing communication concerning the operation of the Landfill or any expansion thereof.

SECTION 12 SUBCONTRACTING

In the performance of their obligations hereunder, the State and Casella shall have the unrestricted right to subcontract those services that they deem appropriate in their sole discretion, including, without limitation, construction, engineering, design, permitting, operation, maintenance, management and administration; provided, that the State and Casella shall remain fully responsible for the performance of any and all obligations subcontracted hereunder.

SECTION 13 NO JOINT VENTURE

Except as otherwise provided in Section 8 herein, and without limiting the State's or Casella's obligations hereunder, the parties acknowledge and agree that nothing contained in this Agreement is intended to nor shall be construed to create a partnership or joint venture between the City and Casella or the City and the State or make the City, Casella and the State partners or joint venturers, or make either party in any way liable or otherwise responsible for the debts, actions, obligations or losses of the other party.

SECTION 14 CLAIMS UNDER THIS AGREEMENT

The City agrees that Casella and/or the State may seek injunctive relief to enforce the obligations of the City under this Agreement, and the City hereby waives its governmental immunity for this limited purpose. This provision is expressly intended to permit those legal actions of Casella and the State that may arise directly under or be necessarily related to a breach of this Agreement. Except as provided in Section 3.1(f), the parties agree that, in the event of any dispute or disagreement hereunder, Casella shall continue to make payment of all amounts due hereunder in the manner and at the times specified herein until final resolution of such dispute, whether by mutual agreement or final decision of a court, arbitrator or other dispute resolution mechanism; provided however, that nothing herein shall constitute a waiver of the City's tort immunity.

SECTION 15 CERTAIN REPRESENTATIONS, WARRANTIES AND COVENANTS OF THE CITY

The City represents and warrants to the State and Casella as follows:

15.1 The City is validly existing as a political subdivision of the State of Maine in good standing under the laws of the State of Maine.

15.2 The City has full power and authority to enter into this Agreement and to fully perform its duties and obligations hereunder. The City's Town Council has duly authorized the execution and delivery of this Agreement and the City's performance of its duties and obligations hereunder, and this Agreement constitutes a valid and legally binding obligation of the City, enforceable in accordance with its terms.

SECTION 16 CERTAIN REPRESENTATIONS, WARRANTIES AND COVENANTS OF CASELLA

Casella represents and warrants to the City and the State as follows:

16.1 Casella is a corporation duly organized and existing under the laws of the State of Delaware and authorized to do business and in good standing under the laws of the State of Maine with the full legal right, power and authority to enter into and fully and timely perform its obligations under this Agreement.

16.2 Casella has duly authorized, executed and delivered this Agreement, and this Agreement constitutes a legal, valid and binding obligation, enforceable against Casella in accordance with its terms, subject to bankruptcy, insolvency and other laws affecting creditors' rights generally.

16.3 Neither the execution nor delivery by Casella of this Agreement nor the performance by Casella of its obligations in connection with the transactions contemplated hereby or Casella's fulfillment of the terms and conditions hereof conflicts with, violates or results in a breach of any law or governmental regulation applicable to Casella or materially conflicts with, violates or results in a breach of, any term or condition of any order, judgment or decree or any agreement or instrument to which Casella is a party or by which Casella or any of its properties or assets is bound, or otherwise constitutes a default thereunder.

16.4 No approval, authorization, order, consent, declaration, registration or filing with any federal, state or local governmental authority or agency is required for the valid execution and delivery by Casella of this Agreement or the performance by Casella of its obligations hereunder.

16.5 Casella covenants and agrees to operate the Landfill and otherwise conduct all aspects of its business at the Landfill including compliance with all closure and post closure requirement in compliance with all Environmental Laws and other applicable laws and regulations and permits.

16.6 Throughout the Term hereof, Casella agrees to participate in, and to use reasonable efforts to support the joint citizen advisory committee comprised of representatives from the City of Old Town, the Penobscot Indian Nation and the Town of Alton, as created by the Resolve and amended by LD 597 in the First Special Session of the 122nd Legislature.

SECTION 17 SURVIVAL OF REPRESENTATIONS, WARRANTIES AND COVENANTS

All representations, warranties, promises, agreements, statements and covenants made herein or in any schedules or exhibits attached hereto, or in any instrument or document delivered by or on behalf of any party pursuant to this Agreement, shall remain in effect during the Term and shall survive termination hereof to the extent specifically contemplated herein.

SECTION 18 TERMINATION

18.1 This Agreement may be terminated at any time by mutual written agreement of all of the parties.

18.2 This Agreement may be terminated for an Event of Default as set forth in Section 18 below.

18.3 Effects of Termination.

Termination of this Agreement for any reason shall not relieve a party of its obligations arising prior to the termination date or those that expressly survive termination as set forth herein, except obligations that are expressly extinguished by said termination. In the event the Operating Services Agreement is terminated, Casella's obligations hereunder shall terminate, and the State shall notify the City immediately in writing of such termination, however the State shall remain obligated to perform all of the State's obligations under this Agreement. The State further agrees that in any request for proposals issued by the State for a new operator of the Landfill the State shall include as a specification that the successful vendor shall enter into a host community benefits agreement under terms and conditions at least as favorable to the City as those set forth in this agreement. The City and State agree to meet within thirty (30) days after receipt by the City of notice that the Operating Services Agreement has been terminated for the purposes of discussing the impact of the termination.

SECTION 19 DEFAULT AND REMEDIES

19.1 Notice/Cure. If any party fails to perform a material obligation under this Agreement, then any other party shall give notice to all parties of such alleged material failure, describing the alleged material failure and the action required to cure such material failure, if any. If the party or parties receiving such notice fail to cure any such material failure to perform pursuant to Section 20 hereof, then an "Event of Default" shall be deemed to have occurred and the other party or parties shall have the rights and remedies set forth in this Agreement.

19.2 Remedies. If any Event of Default occurs (as defined in subsection 19.1 above), then (a) this Agreement may be terminated by a non-defaulting party by giving notice of termination to the defaulting party or parties, and/or (b) pursuant to the dispute resolution process set forth in Section 21 below or the limited judicial process set forth in Section 21.4 below, the non-defaulting party shall have the right to seek whatever damages or remedies that are available in an action at law or in equity it deems necessary or desirable to collect any amounts then due or thereafter to become due under this Agreement or to enforce performance of any covenant or obligation of the defaulting party or parties under this Agreement.

19.3 Sovereign Immunity. Casella and the City acknowledge and agree that nothing in this Agreement, or the execution and delivery of this Agreement, or the agreement by the State to perform its obligations hereunder constitutes or is intended to constitute abrogation of the sovereign immunity of the State with respect to each and every term of this Agreement. In this regard, the State expressly reserves its right of sovereign immunity with respect to its obligations hereunder, and the execution and delivery of this Agreement by the State, and its undertakings herein in no way waive, partially waive, imply a waiver, limit or restrict the State's unconditional right to exercise its right of, or to assert sovereign immunity with respect to any matter, term or issue arising under or relating to this Agreement.

SECTION 20 RIGHT TO CURE BREACH

Upon its receipt of a notice of alleged material failure to perform a material obligation under this Agreement issued under Section 19 hereof, the receiving party or parties shall either:

20.1 Cure the material failure to perform within thirty (30) days of receipt of the written notice from any other party; or

20.2 Continuously demonstrate, within such thirty (30) day cure period, if cure cannot reasonably be effectuated during such period, that it is actively pursuing a course of action which reasonably can be expected to lead to a cure of the material failure to perform (and the cure period shall be extended for so long as the curing party or parties are actively and continuously pursuing such course of action) within a commercially reasonable period of time not to exceed ninety (90) days.

SECTION 21 RESOLUTION OF DISPUTES

21.1 Negotiation. The parties agree that in the event of any dispute, controversy or claim arising under or relating to this Agreement or any alleged breach thereof, other than a breach by Casella of its payment obligations, the parties shall attempt to come to a reasonable settlement of any dispute (a) by having their authorized representatives attempt to negotiate a resolution of the dispute for a period of thirty (30) days, and, if not resolved by the authorized representatives, (b) by having other more senior members of each party's management, who have no previous involvement in the dispute, but who have the authority to resolve the dispute, attempt to negotiate a resolution of the dispute for an additional fifteen (15) days.

21.2 Mediation.

(a) In the event that the parties are unable to resolve any dispute through negotiation, the parties agree to mediate any such dispute. The parties agree that mediation shall be conducted promptly and efficiently in an effort to resolve any such dispute.

(b) Any party desiring to invoke mediation shall send notice to the other party regarding the issues to be mediated. Both parties shall, within ten (10) days of such notice, agree upon a mutually acceptable mediator who shall be independent and impartial, have full authority to implement the process required by this paragraph, and have full authority to schedule meetings and to require the production or exchange of relevant information as is necessary to promptly resolve the dispute. If the parties cannot agree upon a mediator within ten (10) days of such notice, then the dispute shall be referred to the American Arbitration Association for the appointment by them of a mediator reasonably local to Penobscot County. Both parties shall pay the cost of the mediator equally.

(c) Any compromise achieved through mediation shall be memorialized in a report rendered by the mediator. In the event that the dispute is not resolved through mediation within sixty (60) days after the mediator has been appointed, the mediator shall render a report regarding the nature of this dispute, the mediator's opinion as to how the dispute should be resolved, and the mediator's opinion regarding which party is at fault in the dispute. The report rendered by the mediator shall be non-binding and shall not be admissible in court against either party, except in connection with an application for attorney's fees as provided below.

(d) Any time limit in this paragraph may be extended by mutual agreement of the parties.

21.3 Arbitration. Subject to Section 21.4 below, any controversy between the parties hereto involving the construction or application of any terms, covenants or conditions of this Agreement, or any claims arising out of or relating to this Agreement, or the breach or default hereof or thereof, not resolved by negotiation or mediation pursuant to Sections 21.1 and 21.2, will be submitted to and settled by final and binding arbitration in the State of Maine, in accordance with the rules of the American Arbitration Association then in effect, and judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. In the event of any arbitration under this Agreement each party shall cover its own expenses, attorney's fees and costs incurred therein. The prevailing party shall be entitled to recover from the losing party reasonable expenses, attorneys' fees and costs incurred in the enforcement or collection of any judgment or award rendered therein.

21.4 Availability of Judicial Relief and Consent to Jurisdiction. In addition to any rights or remedies that the parties might otherwise be entitled to invoke, the parties may seek specific enforcement of any provision of this Agreement or injunctive relief in a legal or equitable proceeding. For purposes of the preceding sentence, and for the enforcement of any arbitration award rendered pursuant to Section 21.3 hereof, the parties and their assigns submit to the jurisdiction of any state or federal court located in the State of Maine in connection with any proceeding or action arising from or relating to this Agreement or the agreements referred to herein. The parties consent to the jurisdiction and venue of any such court and waive any argument that venue in such forums is not convenient. In the event a party commences any action in another jurisdiction or venue under any tort or contract theory arising directly or indirectly from the relationship created by this Agreement, the other parties at their option shall be entitled to have the case transferred to the jurisdiction and one of the venues above-described, or if such transfer cannot be accomplished under applicable law, to have such case dismissed without prejudice.

SECTION 22 FORCE MAJEURE

If any party hereto is rendered unable, in whole or in part, to perform any of its obligations under this Agreement (other than an obligation to pay money when due) as a result of the occurrence of an event of Force Majeure, then the obligations of the affected party shall be suspended and its non-performance thereof excused during the continuation of the event of Force Majeure. At any time that a party intends to rely upon an event of Force Majeure to suspend its obligations or excuse its non-performance as provided in this Section, the affected parties shall notify the other party as soon as reasonably practicable (but in no event later than seventy-two (72) hours following such event) describing in reasonable detail the circumstances of the event of Force Majeure and its ongoing efforts to mitigate the effects of such event of Force Majeure. Notice shall again be given when the effect of the event of Force Majeure has ceased. As a condition of invoking the protection afforded by this Section, the party relying upon an event of

Force Majeure shall be required to exercise its best and most diligent efforts to eliminate the Force Majeure or devise a means of performance notwithstanding the Force Majeure and re-establish performance hereunder as rapidly as possible.

SECTION 23 INSURANCE

23.1 General Insurance Requirements. The State shall require Casella to maintain liability, fire and workers' compensation insurance insuring the City, the State and Casella in the amounts set forth in Schedule 21 of the Operating Services Agreement, as the same may be amended from time to time, issued by financially sound and reputable insurance companies reasonably acceptable to the State that are authorized and licensed to issue such policies in the State of Maine. Casella shall pay any premiums with respect to such policies as they come due. If Casella fails to pay any such premiums when due, the State shall have the right and option to pay any such premiums, whereupon the amount of any such premiums paid by the State shall be reimbursed by Casella to the State upon demand therefore. Upon request from the City, Casella shall promptly provide copies of such policies to the City.

SECTION 24 MISCELLANEOUS PROVISIONS

24.1 Assignment. This Agreement may not be assigned by any party without the prior written consent of the others, which consent may not be unreasonably withheld; notwithstanding the foregoing, Casella shall have the right to assign this Agreement without the consent of the other parties (i) to any Affiliate provided that Casella remains fully liable hereunder and provides reasonable assurances of the same to the State and the City in connection with any such assignment, (ii) in connection with the sale of all or substantially all of Casella's assets (or those of its affiliates) provided, however, in the event of such a sale, Casella shall provide advance notice to the City if in the judgment of Casella's counsel such notice may be given without violating securities or other applicable laws

24.2 Cumulative Remedies. The specified remedies available to a party under this Agreement are not exclusive of any other remedies or means of redress to which such party may be lawfully entitled in the event of any breach or threatened breach by the other party of any provision(s) of this Agreement.

24.3 Captions and Headings. Captions and headings contained in this Agreement are inserted for convenience and reference only and the words contained therein shall in no way be held or deemed to define, limit, describe, explain, modify, amplify or add to the interpretation, construction or meaning of any provision or of the scope or intent of this Agreement, nor in any way to affect this Agreement.

24.4 Amendments and Modifications. This agreement shall not be amended, modified or changed, except pursuant to an agreement in writing signed by or on behalf of the party against whom enforcement of the amendment, modification or change is sought.

24.5 Notices. All notices or other communications required or permitted hereunder shall be in writing and may be given by personal delivery, by overnight express delivery, or by registered or certified U.S. mail, postage prepaid, return receipt requested, properly addressed as follows:

To the State:

Executive Department
State Planning Office
38 State House Station
Augusta, Maine 04333-0038
Attention: Director

With a copy to:

William Laubenstein, Esq.
Office of Attorney General
6 State House Station
Augusta, ME 04333-0006

To Casella:

c/o Casella Waste Systems, Inc.
25 Greens Hill Lane
Rutland, VT 05702-0866

With a copy to:

Thomas R. Doyle, Esq.
Pierce Atwood
One Monument Square
Portland, ME 04101

To City of Old Town:

City Manager
City of Old Town
150 Brunswick Street
Old Town, Maine 04468

With a copy to:

Robert E. Miller, Esq.
282 Main Street, P.O. Box 414
Old Town, Maine 04468
and
Catherine Lee, Esq.
Gallagher, Callahan & Gartrell, P.A.
P.O. Box 5010
Augusta, ME 04332-5010

Any party may change the address to which notices are required to be sent by giving notice of such change in the manner provided in this Section 24.5. All notices shall be deemed to have been received on the date of delivery if service is made in person, on the day after sent by overnight express delivery service, or on the third (3rd) business day after mailing in accordance

with this Section 24.5, except that any notice of a change of address shall be effective only upon actual receipt.

24.6 Strict Performance. The failure of either party to insist on the strict performance of any of the terms, covenants and provisions of this Agreement or to exercise any right, remedy or option herein contained shall not be construed as a waiver or a relinquishment for the future of such term, covenant, condition, provision, right, remedy or option.

24.7 Severability. In the event that anyone or more of the terms or provisions of this Agreement shall for any reason he held by a court or other tribunal of competent jurisdiction to be invalid, illegal or unenforceable in any respect, in whole or in part, such invalidity, illegality or unenforceability shall not affect any other terms or provisions of this Agreement, and this Agreement shall be construed as if such invalid, illegal or unenforceable term or provision had never been contained herein, provided that it is the intention of the parties that, in lieu of such term or provision held to be invalid, illegal or unenforceable, there shall be added by mutual agreement as a part of this Agreement a term or provision as similar in term to such illegal, invalid or unenforceable term or provision as may be possible, valid, legal and enforceable.

24.8 Construction. Words connoting the singular number shall include the plural in each case, and vice versa, and words connoting persons shall include corporations, companies, firms or other entities. The terms "herein", "hereunder", "hereby", "hereof" and any similar terms shall refer to this Agreement; the term "heretofore" shall mean before the date of execution of this Agreement. This Agreement is the result of joint negotiations and drafting and no part of this Agreement shall be construed as the product of anyone of the parties hereto.

24.9 Entire Agreement. This Agreement constitutes the entire agreement between the City, the State and Casella with respect to the subject matter hereof, and supersedes all prior or contemporaneous negotiations, representations, understandings and agreements, whether written or oral, between the parties with respect to the subject matter hereof.

24.10 Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original for all purposes, but all of which together shall constitute one and the same agreement.

24.11 Governing Law. This Agreement shall be governed by and construed and enforced in accordance with the laws of the State of Maine, without regard to the conflicts of law principles of such State.

24.12 Binding Effect; No Third Party Rights. This Agreement shall be binding upon and shall inure to the benefit of the parties hereto and their respective legal representatives, successors (whether by sale, assignment, transfer, merger, other acquisition, operation of law, or

court ruling) and/or permitted assigns. Subject to the foregoing, nothing in this Agreement shall be construed to confer any benefit on, or create any obligation, duty or liability to, or create any standard of care with respect to, any person, firm or entity not a party to this Agreement.

24.13 Authority of Parties. Each party hereto represents and warrants that the individual who has executed this Agreement on its behalf has the full and complete authority to sign on behalf of such party for the purpose of duly binding such party to this Agreement.

IN WITNESS WHEREOF, the undersigned have executed this Agreement on and as of the date first above written.

WITNESSETH:

Name:

Name:

Name:

STATE OF MAINE

By
Its

CITY OF OLD TOWN, MAINE

By
Its City Manager

CASELLA WASTE SYSTEMS, INC.

By
Its

EXHIBIT 1

Materials Approved By MDEP For Beneficial Use

Bark pile adjacent to the Landfill.

EXHIBIT 2
List of Acceptable Categories of Maine Waste
Licensed by the DEP for Disposal at WOTL
As of September 2005

Air and water filtration media
Approved land utilization wastes
Ash and soot
Catch basin grit
Commercial and industrial laundry waste
Construction and demolition debris
Contaminated soil
Dredge spoils
Filter press cake and collegin scrapings
Front-end process residue
Leather manufacturing wastes and scraps
Metal grinding waste
Municipal Solid Waste (incinerator bypass only)
Off-spec., spent, or spilled chemicals
Over-sized bulky waste
Papermill sludge
Petroleum contaminated debris
Pigeon waste
Railroad ties and treated wood
Sand blast grit
Spoiled/discarded food or consumable related wastes
Tire shredder waste
Treatment sludge
Waste water treatment plant grit and screenings
Wood chips

EXHIBIT 3

Financial Model for Calculating Annual Payment in Lieu of Taxes

Example 2 of Proposed Landfill Valuation Methodolgy

Assume 600 acres of land

1	Active Landfill Area	82	acres
	Lincensed and Developed		
A	Total Volume	-	cy
B	Volume Consumed to Date	-	cy
C	Remaining Volume	-	cy
B	Estimate Annual Usage of available volume	-	cy
C	Estimate Remaining Life of Active Landfill Area	30.25	years
D	Estimate Annual Gross Income per year	#DIV/0!	
E	Estimate Annual Expenses per year including escrowed amounts for proper closure	$ -	
F	Estimate Annual Net Operating Income Per Year After Startup	#DIV/0!	
G	Determine a discount rate	15%	

H Discount Annual Net Operating Income to Current Value	Year	Income
YEAR 1	2005	#DIV/0!
2	2006	#DIV/0!
3	2007	#DIV/0!
4	2008	#DIV/0!
5	2009	#DIV/0!
6	2010	#DIV/0!
7	2011	#DIV/0!
8	2012	#DIV/0!
9	2013	#DIV/0!
10	2014	#DIV/0!
11	2015	#DIV/0!
12	2016	#DIV/0!
13	2017	#DIV/0!
14	2018	#DIV/0!
15	2019	#DIV/0!
16	2020	#DIV/0!
17	2021	#DIV/0!
18	2022	#DIV/0!
19	2023	#DIV/0!
20	2024	#DIV/0!
21	2025	#DIV/0!
22	2026	#DIV/0!
23	2027	#DIV/0!
24	2028	#DIV/0!
25	2029	#DIV/0!
26	2030	#DIV/0!
27	2031	#DIV/0!
28	2032	#DIV/0!
29	2033	#DIV/0!
30	2034	#DIV/0!
31	2035	#DIV/0!
32	2036	#DIV/0!
33	2037	#DIV/0!
Net Present Value		#DIV/0!

Example 2 of Proposed Landfill Valuation Methodolgy

4	Buffer Land			
	Value at appropriate value per acre	Unit Value		
		718 $ -	$ -	
	Total Value		#DIV/0!	
	Exempt Property @ 40% of Active Landfill		#DIV/0!	
	Taxable Value		#DIV/0!	

ANTICIPATED ANNUAL VOLUME

TYPE	TONS	FEES	GROSS
PROCESSING RESIDUAL	-	$ -	$ -
GP SLUDGE	-	$ -	$ -
C&D	-	$ -	$ -
WASTE TO ENERGY ASH	-	$ -	$ -
WASTE TO ENERGY FRONT END RESIDUAL	-	$ -	$ -
WASTE TO ENERGY BIPASS	-	$ -	$ -
SPECIAL WASTE	-	$ -	$ -
TOTAL	-		$ -

SUMMARY STATEMENT WAS 401,000 CY PER YEAR WITH LIFE OF 30.25 ACRES — AVG #DIV/0!

PERIOD OF 2/4/04 TO 4/30/05

TYPE	TONS	FEES	GROSS
PROCESSING RESIDUAL	-	$ -	$ -
GP SLUDGE	-	$ -	$ -
C&D	-	$ -	$ -
WASTE TO ENERGY ASH	-	$ -	$ -
WASTE TO ENERGY FRONT END RESIDUAL	-	$ -	$ -
WASTE TO ENERGY BIPASS	-	$ -	$ -
SPECIAL WASTE (SLUDGE)	-	$ -	$ -
TOTAL	-		$ -
EXPENSE			#DIV/0!
INCOME			#DIV/0!

	COSTS	TONS	COST PER TON
ANNUAL COST	$ -	-	#DIV/0!

FIRST AMENDMENT TO HOST COMMUNITY AND FACILITY OVERSIGHT AGREEMENT

This First Amendment to Host Community and Facility Oversight Agreement ("Amendment") is made as of this **17th** day of **September, 2009**, by and between the STATE OF MAINE, acting by and through its Executive Department, State Planning Office (the "State"), the CITY OF OLD TOWN, Maine, having its principal offices at 150 Brunswick Street, Old Town, Maine 04469 (the "City") and CASELLA WASTE SYSTEMS, INC., a Delaware corporation having a place of business at 25 Greens Hill Lane, Rutland, Vermont 05702 ("Casella").

WITNESSETH:

WHEREAS, the State, the City and Casella are parties to a Host Community and Facility Oversight Agreement, dated as of December 8, 2005 (the "Host Community Agreement"); and

WHEREAS, the State and Casella are parties to an Operating Services Agreement dated as of February 5, 2004, as amended by the First Amendment to the Operating Services Agreement dated as of July 28, 2006, and as further amended by the Second Amendment to the Operating Services Agreement dated as of November 2, 2006 (the "OSA"); and

WHEREAS, the State, the City and Casella wish to amend the Host Community Agreement to clarify the Host Community Agreement (HCA). Two amendments to the Operating Services Agreement (OSA) between the State and Casella have resulted in the need to make the amendment to the HCA ;

WHEREAS, in 2009, State Planning Office instituted new rules regarding holding a public hearing prior to making further amendments to the OSA. The inconsistencies between the OSA and HCA created a misperception that Casella is not operating in compliance with the HCA even though the HCA does not regulate landfill operations.

NOW, THEREFORE, in consideration of the mutual promises and agreements hereinafter contained, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

1. The recitals and identification of the parties to this Amendment are incorporated by reference as though fully set forth herein. Capitalized terms not defined or amended herein shall have the meaning given to them in Host Community Agreement.

2. The definitions in the Host Community Agreement are intended to be consistent with the definitions in the OSA. To the extent there is any inconsistency between, or conflict with, a definition in the Host Community Agreement and the same term in the OSA, as it may be amended from time to time, the parties shall consult and agree on which definition shall control.

3. For purposes of clarification and the avoidance of doubt, residue and bulky waste generated at a processing facility located in Maine that produces construction and

demolition wood fuel was a category of acceptable Maine waste licensed by the DEP for disposal at Juniper Ridge Landfill as of September 2005 and therefore is included on Exhibit 2 and does not represent an "expansion of the type of waste" as defined in the Resolve.

The Host Community Agreement is intended to provide for the exclusive payments and other benefits provided by the State and Casella to the City pursuant to State law for the duration of Casella's role as operator of the Juniper Ridge Landfill under the OSA. The Host Community Agreement is not intended to regulate the Landfill or any Expansion thereof, or to give rise to City enforcement of the MDEP License Amendment for said Landfill, any expansion thereof, or otherwise. Any City regulation of the Landfill expansion will occur pursuant to the terms of the City Solid Waste Facilities Ordinance, dated June 1, 2009 provided, however, that this paragraph does not exempt the State and Casella from any obligation to make payment to the City of fees for applications, licenses, reviews, permits and approvals under State, local, federal laws, regulations and ordinances, including but not limited to the City Solid Waste Facilities Ordinance, dated June 1, 2009, all of which shall be in addition to any payments required to be made to the City under the OSA and/or the HCA

4. The first sentence of Section 5.2 of the Host Community Agreement is hereby amended as follows: "During the Term of this Agreement, Casella agrees to make available upon request the following information to the City or the City's consultant designee in a timely fashion."

5. The first sentence of Section 10 of the Host Community Agreement is hereby amended as follows: "The parties specifically acknowledge that Casella fulfilled its obligation to the State under the Operating Services Agreement as amended, to prepare a draft application for an Expansion Permit on or before 5 February 2009."

6. In all other respects, the Host Community Agreement shall remain in full force and effect in accordance with its terms.

IN WITNESS WHEREOF, the undersigned have executed this Agreement on and as of the date first above written.

WITNESSETH:

Name:

Name:

Name:

STATE OF MAINE
By: Martha Freeman
Its Director, State Planning Office

CITY OF OLD TOWN, MAINE
By:
Its City Manager

CASELLA WASTE SYSTEMS, INC.
By:
Its Vice President

SECOND AMENDMENT TO HOST COMMUNITY COMPENSATION AND FACILITY OVERSIGHT AGREEMENT

This Second Amendment to the Host Community Compensation and Facility Oversight Agreement ("Second Amendment") is made as of this 22 day of ~~January~~ February, 2013, by and among the STATE OF MAINE, acting by and through the Department of Administrative and Financial Services, Bureau of General Services (the "State"), the CITY OF OLD TOWN, Maine, having its principal offices at ~~150 Brunswick~~ 265 Main Street, Old Town, Maine 04469 (the "City") and CASELLA WASTE SYSTEMS, INC., a Delaware corporation having a place of business at 25 Greens Hill Road, Rutland, Vermont 05702 ("Casella").

WITNESSETH:

WHEREAS, the State, the City and Casella are parties to a Host Community Compensation and Facility Oversight Agreement, dated as of December 8, 2005, as amended by the First Amendment to Host Community and Facility Oversight Agreement dated as of September 17, 2009 (the "Host Community Agreement"); and

WHEREAS, the State, the City and Casella wish to amend the Host Community Agreement to clarify Casella's obligations in light of the cessation of operations of the Maine Energy Recovery Facility located in Biddeford, Maine ("Maine Energy"); and

WHEREAS, the closure of Maine Energy has resulted in the need to make this amendment to the Host Community Agreement;

NOW, THEREFORE, in consideration of the mutual promises and agreements hereinafter contained, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. The recitals and identification of the Parties to this Amendment are incorporated by reference as though fully set forth herein. Capitalized terms not defined or amended herein shall have the meaning given to them in the Host Community Agreement.

2. Section 3.1(b) of the Host Community Agreement currently provides for the payment of a Host Community Fee in the amount of $2.50 per ton for new categories of waste permitted by the Maine Department of Environmental Protection ("MDEP"), as Acceptable Waste for disposal at the Landfill. For purposes of clarification and the avoidance of doubt, the parties agree that this includes specifically up to 93,000 tons of MSW generated in Maine that is licensed as Acceptable Waste by DEP, including but not limited to the MSW that would have been disposed of at Maine Energy but for a permanent cessation of operations at Maine Energy. Subject to paragraph 5 hereof, the $2.50 per ton fee shall apply from December 31, 2012, the date of cessation of Maine Energy's operations. Section 3.1(b) of the Host Community Agreement is hereby amended by inserting at the beginning thereof "Notwithstanding any other provision of this Agreement to the contrary,"

3. The Parties have agreed that the $2.50 per ton fee referred to in paragraph 2 above shall be adjusted annually using the same formula in the Annual adjustment set forth in Section 3.1(a) of the Host Community Agreement. Section 3.1(b) of the Host Community Agreement is hereby amended by adding the following at the end of the existing provision: "Casella agrees to an annual adjustment to the Host Community Fee to be paid for all categories of solid waste not approved by MDEP as of the date of the Host Community Agreement for acceptance at the Landfill that is subsequently licensed as Acceptable Waste, including for MSW generated in Maine, including but not limited to MSW that would have been disposed of at Maine Energy while it was operational but which has been approved for disposal at the Landfill due to a permanent cessation of operations at Maine Energy, and is in fact disposed of at the Landfill. The adjustment shall be calculated by multiplying 3.7% times the increase (assuming there is one) in the annual average third party tipping fee (exclusive of transportation, intra-Casella company tip fees and any tipping fees on waste or material not subject to the Host Community Fee) paid at the Landfill. Casella agrees to maintain tipping fees on waste separate and distinct from transportation fees and to avoid offering third parties the opportunity to dispose of waste at lower tipping fees in exchange for higher transportation fees.

   The first annual adjustment (assuming an increase or decrease is calculated) shall be made effective one year after the date on which Casella (or its affiliate) receives a final permit that is not subject to further appeal providing for the disposal at the Juniper Ridge Landfill of up to 93,000 tons of municipal solid waste per year. An annual adjustment (assuming an increase or decrease is calculated) shall be made on each subsequent anniversary thereof for the remaining Term of the Host Community Agreement. In no event shall the per ton fee for such waste fall below $2.50 per ton."

4. In all other respects, the Host Community Agreement shall remain in full force and effect in accordance with its terms as amended previously.

5. The parties agree and acknowledge that the effectiveness of Section 3 of this Amendment shall be subject to and conditioned upon the receipt by Casella (or its affiliate) of a final permit that is not subject to further appeal, providing for the disposal at the Juniper Ridge Landfill of up to 93,000 tons of municipal solid waste per year, in accordance with the application submitted by Casella which is under consideration as of the date of this Amendment.

IN WITNESS WHEREOF, the undersigned have executed this Agreement on and as of the date first above written.

WITNESSETH:

_____
Name:

_____
Name:

_____
Name:

STATE OF MAINE

By: _____
Donald McCormack
Dir. Bureau of General Services

CITY OF OLD TOWN, MAINE

By: William J. Mayo
William Mayo
Its City Manager

CASELLA WASTE SYSTEMS, INC.

By: _____
Its Vice President

9. Notices. Any notice, request, demand or statement made under this Agreement shall be in writing and deemed given when delivered by hand, registered or certified mail with postage prepaid, telegraph, telecopy or nationally recognized overnight courier directed to the following addresses:

If to NEWSME Operations:

Casella Waste Systems
110 Main Street, Suite 1308
Saco, ME 04720
Attn: Regional Vice-President

With a copy to:

Director
Maine State Planning Office
38 State House Station
Augusta, ME 04333-0038

If to the Town:

Town of Alton
~~3352~~ Bennoch Road
Alton, Maine 04468
Attn: First Selectman

If to the State:

Director
Maine State Planning Office
38 State House Station
Augusta, ME 04333-0038

or at such other address as a party may, from time to time, designate in writing.

10. Binding Effect. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns.

11. Counterparts. This Agreement may be executed in any number of counterparts, each of which will be deemed an original instrument, but all such counterparts together will constitute but one agreement.

12. Modifications. No modifications or amendments to this Agreement shall be valid unless in writing and signed by the parties, their respective successors or assigns.

13. Severability. If the terms, covenants or conditions of this Agreement, or the application of any such term, covenant or condition shall be held invalid by any court having jurisdiction, all other terms, covenants and conditions of this Agreement and their applications shall not be affected thereby and shall remain in full force and effect.

14. Integration. The terms and provisions contained in this Agreement between the State, NEWSME Operations and the Town constitute the entire Agreement and shall supercede all previous and contemporaneous communications, representations, or similar agreements, either

verbal or written, between the parties with respect to this Agreement.

15. No Rights Conferred on Others. Nothing in this Agreement shall be construed as giving any individual, corporation, partnership, joint venture, association, joint stock company, trust, unincorporated organization, governmental entity or quasi-governmental entity, other than the parties hereto, and their successors and assigns, any right, remedy or claim under or in respect to this Agreement, or any provision hereof.

16. Resolution of Disputes

a. Negotiation. The parties agree that in the event of any dispute, controversy or claim arising under or relating to this Agreement or any alleged breach thereof, the parties shall attempt to come to a reasonable settlement of any dispute by having their authorized representatives attempt to negotiate a resolution of the dispute for a period of thirty (30) days.

b. Arbitration. Subject to Section 16(c) below, any controversy between the parties hereto involving the construction or application of any terms, covenants or conditions of this Agreement, or any claims arising out of or relating to this Agreement, or the breach or default hereof or thereof, not resolved by negotiation pursuant to Section 16(a), will be submitted to and settled by final and binding arbitration in the State of Maine, in accordance with the rules of the American Arbitration Association then in effect, and judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. In the event of any arbitration under this agreement, the parties agree that they will bear their own costs, attorney fees, and expenses associated therewith.

c. Availability of Judicial Relief and Consent to Jurisdiction. In addition to any rights or remedies that the parties might otherwise be entitled to invoke, the parties may seek specific enforcement of any provision of this Agreement or injunctive relief in a legal or equitable proceeding. For purposes of the preceding sentence, and for the enforcement of any arbitration award rendered pursuant to Section 16 (b) hereof, the parties and their assigns submit to the jurisdiction of any state or federal court located in the State of Maine in connection with any proceeding or action arising from or relating to this Agreement or the agreements referred to herein. The parties consent to the jurisdiction and venue of any such court and waive any argument that venue in such forums is not convenient. In the event a party commences any action in another jurisdiction or venue under any tort or contract theory arising directly or indirectly from the relationship created by this Agreement, the other parties at their option shall be entitled to have the case transferred to the jurisdiction and one of the venues above-described, or if such transfer cannot be accomplished under applicable law, to have such case dismissed without prejudice.

IN WITNESS WHEREOF, the undersigned have executed this Agreement on and as of the date first above written.

WITNESSETH:

Thomas R. Doyle
Name: Thomas R. Doyle

Ronald F. Boya
Name:

Name:

Name:

Name:

NEWSME LANDFILL OPERATIONS, LLC.

By

TOWN of ALTON, MAINE

By
Selectman

By Ronald F. Boya
Selectman

By James T. Kennedy Sr.
Selectman

STATE OF MAINE

By Martha Frumpan

P-2

ALTON HOST COMMUNITY AGREEMENTS

SME
SEVEE & MAHER
ENGINEERS

COMMUNITY BENEFITS AGREEMENT

This Community Benefits Agreement ("Agreement") is made this 6th day of October, 2005, by and among the STATE OF MAINE, acting by and through its Executive Department, State Planning Office (the "State"), NEWSME Landfill Operations, LLC, a limited liability company organized and existing under the laws of the State of Maine with a principal place of business at 110 Maine Street, Suite 1308, Saco, Maine ("NEWSME Operations"), and the Town of Alton, Maine, a municipal corporation organized and existing under the laws of the State of Maine, having its principal offices at 3352 Bennoch Road, Alton, Maine 04468 (the "Town").

WITNESSETH:

WHEREAS, NEWSME Operations' sole member, New England Waste Services of Maine, Inc., is a wholly owned subsidiary of Casella Waste Systems, Inc., a Delaware corporation ("Casella"); and

WHEREAS, the STATE OF MAINE, acting by and through its Executive Department, State Planning Office, pursuant to Resolve 2003, ch. 93 (the "Resolve"), agreed to purchase from Fort James Operating Company ("FJ"), and FJ agreed to sell to the State, FJ's solid waste landfill (the "Landfill") located in Old Town, Maine; and

WHEREAS, Casella has entered into an Operating Services Agreement (the "Operating Agreement") with the State regarding the operation and development of the Landfill; and

WHEREAS, pursuant to the Operating Agreement Casella may assign its obligations to an affiliated company such as NEWSME Operations; and

WHEREAS, by Maine Department of Environmental Protection ("DEP") Orders dated October 21, 2003 (#S-0200700-WR-M-T) and April 9, 2004 (#S-020700-WD-N-A), the DEP has authorized NEWSME Operations to operate and develop the Landfill pursuant to the terms of such orders and to increase its capacity; and

WHEREAS, Casella, through NEWSME Operations, and the State wish to enter into a community benefits agreement with the Town.

NOW, THEREFORE, in consideration of the foregoing, the mutual promises made herein, and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the State, NEWSME Operations and the Town agree as follows:

1. Community Benefits Fee. NEWSME Operations shall pay the Town a fee for solid waste disposed of at the Landfill, as follows:

a. Fees. $.15 per ton for years 2005 – 2014
$.30 per ton for years 2015 – 2024
$.40 per ton for years 2025 – End of term of Operating Agreement

The per ton fee payable to the Town does not include mill waste and biomass ash delivered to the Landfill by FJ or Lincoln Paper & Tissue, free tonnage, if any, allocated

to the City of Old Town, or materials DEP approves for beneficial reuse at the Landfill, for the duration of this Agreement;

b. Timing. Fees payable under this Section shall be paid on a monthly basis, with payment to be made no later than 30 days after the end of each calendar month. Payments under this Section shall begin accruing on the first day of the first calendar month following the Effective Date of this Agreement, which is the date all parties have executed this Agreement and any necessary Town approval is obtained ("Effective Date").

c. CPI Escalator. The per ton fee under paragraph (a) of this Section shall be subject to increase every year (commencing January 1, 2006), in accordance with changes in the Consumer Price Index ("CPI") since the Effective Date of this Agreement (with respect to the initial adjustment) or the immediately preceding adjustment, as applicable. For purposes of this paragraph, the CPI shall mean the Consumer Price Index for "NORTHEAST URBAN REGION, all items (Series I.D. CUUR0100SA0) as published monthly by the United States Bureau of Labor Statistics in a report currently entitled 'CPI Detailed Report.'" If this Index ceases to be available at some time in the future, a comparable Index will be designated by NEWSME Operations and the Town following consultation. In the event the CPI-escalated rate surpasses the rate increase as described in paragraph 1(a) herein before the year designated, the fee per ton will not be decreased at that time, but will continue to be adjusted according to the CPI.

d. Exclusive Payment Obligations. The parties agree and acknowledge that the payment obligations set forth in this Section 1 shall be the exclusive payment obligations from the State, Casella, and NEWSME Operations arising out of or related to the ownership or operation of the Landfill and any expansion thereof, and that the Town may not collect or seek to collect other payments, fees, costs, grant monies, taxes, or payments in lieu of taxes from the State, Casella, or NEWSME Operations in respect thereof. The preceding sentence is not intended to preclude the Town from recovering any damages it may suffer in the event of any unforeseen catastrophic event caused by the operation of the Landfill.

2. Term of Agreement. The term of this Agreement shall be deemed to commence on the Effective Date and shall end on the earlier to occur of: (a) February 5, 2034, (b) the date the Operating Agreement is terminated by either the State or Casella as provided therein, including, without limitation, as set forth in Section 5.3(a) of said Agreement, or (c) the date this Agreement is terminated by all or any of the parties as provided herein. In the event the Operating Agreement between the State and Casella is extended or renewed beyond February 5, 2034, the parties agree to negotiate in good faith to extend or renew this Community Benefits Agreement on terms mutually acceptable.

3. Authority and Representations. The parties to this Agreement represent and warrant that they have full power and authority and the legal right to enter into and perform in accordance with the terms of this Agreement for the full term set forth herein and to execute and deliver this Agreement, having taken all necessary and required actions therefor. The parties to this Agreement further represent and warrant that no approval or vote by referendum or otherwise is required of any other person, group or entity which is a prerequisite to the valid execution, delivery and performance of this Agreement, other than those that have been duly obtained or made. The Town further represents and warrants that the Landfill purchase and operation is the subject of the Maine

Legislature's Resolve 2003, Chapter 93 and that the Town is not a host municipality for the Landfill as defined in State law.

4. Waiver. No waiver of any of the provisions of this Agreement shall be deemed or shall constitute a waiver of any other provisions hereof, whether or not similar, nor shall such waiver constitute a continuing waiver unless otherwise expressly provided. Any term or provision of this Agreement may be waived at any time by any party entitled to the benefit thereof as set forth in the terms of this Agreement by a written instrument duly executed by such party.

5. Good Faith. Each party shall act in good faith in the performance of all obligations and the exercise of all rights under this Agreement. Use of the term "good faith" elsewhere in this Agreement shall not be construed to limit the general applicability of that standard to the conduct of the parties hereunder.

6. Termination.

a. This Agreement may be terminated at any time by mutual written agreement of all of the parties and NEWSME Operations' obligations under Section 1 shall be extinguished as of the date of such mutual agreement.
b. This Agreement may be terminated by NEWSME Operations or the State in the event additional financial obligations to Alton are imposed upon either NEWSME Operations, Casella or the State whether such obligations are the result of a change in or amendment to law, ordinance, rule, regulation or judicial decision.
c. Effects of Termination; State Assurance. Termination of this Agreement for any reason shall not relieve a party of its obligations arising prior to the termination date or those that expressly survive termination as set forth herein, except obligations that are expressly extinguished by said termination. In the event the Operating Agreement is terminated, this Agreement shall terminate, the parties' obligations hereunder shall terminate, and the State shall notify the Town immediately in writing of such termination. The State further agrees that in any request for proposals issued by the State for a new operator of the Landfill the State will include as a specification that the successful vendor will enter into a community benefits agreement under the terms and conditions set forth in this Agreement. The Town and State agree to meet within ninety (90) days after receipt by the Town of notice that the Operating Agreement has been terminated for the purposes of discussing the impact of the termination.

7. Headings and References. The titles and headings included throughout this Agreement are inserted for reference purposes only and shall not be construed or considered in interpreting any term or provision of this Agreement. Except as otherwise provided herein, all references to sections contained herein are references to sections of this Agreement.

8. Governing Law. This Agreement shall be interpreted and construed in accordance with the laws of the State of Maine, excluding conflicts of law principles which would refer to the laws of another jurisdiction.

9. Notices. Any notice, request, demand or statement made under this Agreement shall be in writing and deemed given when delivered by hand, registered or certified mail with postage prepaid, telegraph, telecopy or nationally recognized overnight courier directed to the following addresses:

If to NEWSME Operations:

Casella Waste Systems
110 Main Street, Suite 1308
Saco, ME 04720
Attn: Regional Vice-President

With a copy to:

Director
Maine State Planning Office
38 State House Station
Augusta, ME 04333-0038

If to the Town:

Town of Alton
~~3352~~ Bennoch Road
Alton, Maine 04468
Attn: First Selectman

If to the State:

Director
Maine State Planning Office
38 State House Station
Augusta, ME 04333-0038

or at such other address as a party may, from time to time, designate in writing.

10. Binding Effect. This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns.

11. Counterparts. This Agreement may be executed in any number of counterparts, each of which will be deemed an original instrument, but all such counterparts together will constitute but one agreement.

12. Modifications. No modifications or amendments to this Agreement shall be valid unless in writing and signed by the parties, their respective successors or assigns.

13. Severability. If the terms, covenants or conditions of this Agreement, or the application of any such term, covenant or condition shall be held invalid by any court having jurisdiction, all other terms, covenants and conditions of this Agreement and their applications shall not be affected thereby and shall remain in full force and effect.

14. Integration. The terms and provisions contained in this Agreement between the State, NEWSME Operations and the Town constitute the entire Agreement and shall supercede all previous and contemporaneous communications, representations, or similar agreements, either

verbal or written, between the parties with respect to this Agreement.

15. No Rights Conferred on Others. Nothing in this Agreement shall be construed as giving any individual, corporation, partnership, joint venture, association, joint stock company, trust, unincorporated organization, governmental entity or quasi-governmental entity, other than the parties hereto, and their successors and assigns, any right, remedy or claim under or in respect to this Agreement, or any provision hereof.

16. Resolution of Disputes

a. Negotiation. The parties agree that in the event of any dispute, controversy or claim arising under or relating to this Agreement or any alleged breach thereof, the parties shall attempt to come to a reasonable settlement of any dispute by having their authorized representatives attempt to negotiate a resolution of the dispute for a period of thirty (30) days.

b. Arbitration. Subject to Section 16(c) below, any controversy between the parties hereto involving the construction or application of any terms, covenants or conditions of this Agreement, or any claims arising out of or relating to this Agreement, or the breach or default hereof or thereof, not resolved by negotiation pursuant to Section 16(a), will be submitted to and settled by final and binding arbitration in the State of Maine, in accordance with the rules of the American Arbitration Association then in effect, and judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction thereof. In the event of any arbitration under this agreement, the parties agree that they will bear their own costs, attorney fees, and expenses associated therewith.

c. Availability of Judicial Relief and Consent to Jurisdiction. In addition to any rights or remedies that the parties might otherwise be entitled to invoke, the parties may seek specific enforcement of any provision of this Agreement or injunctive relief in a legal or equitable proceeding. For purposes of the preceding sentence, and for the enforcement of any arbitration award rendered pursuant to Section 16 (b) hereof, the parties and their assigns submit to the jurisdiction of any state or federal court located in the State of Maine in connection with any proceeding or action arising from or relating to this Agreement or the agreements referred to herein. The parties consent to the jurisdiction and venue of any such court and waive any argument that venue in such forums is not convenient. In the event a party commences any action in another jurisdiction or venue under any tort or contract theory arising directly or indirectly from the relationship created by this Agreement, the other parties at their option shall be entitled to have the case transferred to the jurisdiction and one of the venues above-described, or if such transfer cannot be accomplished under applicable law, to have such case dismissed without prejudice.

IN WITNESS WHEREOF, the undersigned have executed this Agreement on and as of the date first above written.

WITNESSETH:

Thomas R. Doyle
Name: Thomas R. Doyle

Ronald F. Boya
Name:

Name:

Name:

Name:

NEWSME LANDFILL OPERATIONS, LLC.

By

TOWN of ALTON, MAINE

By
Selectman

By Ronald F. Boya
Selectman

By James T. Kennedy Sr.
Selectman

STATE OF MAINE

By Martha Frumpan

APPENDIX Q

LIABILITY INSURANCE

SME
SEVEE & MAHER
ENGINEERS

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 4/23/2025

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Noyle Johnson Group an Alera Group Company
119 River Street
Montpelier VT 05602

CONTACT NAME: Amanda Hamilton
PHONE (A/C, No, Ext): (802)684-8096 **FAX (A/C, No):** (802)223-7515
E-MAIL ADDRESS: casella@nwjinsurance.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Westchester Surplus Lines Ins Co	10172
INSURER B : Old Republic Insurance Co.	24147
INSURER C : The Cincinnati Casualty Company	28665
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
NEWSME Landfill Operations, LLC
dba Juniper Ridge Landfill
2828 Bennoch Rd.
Old Town ME 04468

COVERAGES **CERTIFICATE NUMBER:** JuniperRidge LF 2025 #2 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS		
A	X COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$	2,000,000
	CLAIMS-MADE X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$	1,000,000
	X XCU is Included			G74302178 002	04/30/2025	04/30/2026	MED EXP (Any one person)	$	10,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						PERSONAL & ADV INJURY	$	2,000,000
	POLICY X PRO-JECT LOC						GENERAL AGGREGATE	$	4,000,000
	OTHER:						PRODUCTS - COMP/OP AGG	$	4,000,000
								$	
B	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$	5,000,000
	X ANY AUTO			MWTB 311995 25	01/01/2025	01/01/2026	BODILY INJURY (Per person)	$	
	ALL OWNED AUTOS / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$	
	X HIRED AUTOS / X NON-OWNED AUTOS						PROPERTY DAMAGE (Per accident)	$	
	X MCS-90							$	
	UMBRELLA LIAB OCCUR						EACH OCCURRENCE	$	
	EXCESS LIAB CLAIMS-MADE						AGGREGATE	$	
	DED RETENTION $							$	
B	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY						X PER STATUTE / OTH-ER		
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? Y/N: N (N/A) (Mandatory in NH)			MWC 311994 25	01/01/2025	01/01/2026	E.L. EACH ACCIDENT	$	1,000,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - EA EMPLOYEE	$	1,000,000
							E.L. DISEASE - POLICY LIMIT	$	1,000,000
B	Excess Auto Liability			MWZX 315503 25	04/30/2025	04/30/2026	$2M Excess $5M Auto Liability		2,000,000
C	Excess Auto Liability			EXS0575546	04/30/2025	04/30/2026	$3M Excess $7M Auto Liability		3,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

Maine Department of
Environmental Protection
17 State House Station
Augusta, ME 04333-0017

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Timothy Ayer/AUDREY

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APPENDIX R

CIVIL AND CRIMINAL DISCLOSURE STATEMENT

SME
SEVEE & MAHER
ENGINEERS

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
ADMINISTRATIVE & FINANCIAL SERVICES
BUREAU OF GENERAL SERVICES
77 STATE HOUSE STATION
BURTON M. CROSS BUILDING
111 SEWALL STREET, 4TH FLOOR
AUGUSTA, MAINE 04333-0077

DEPARTMENT OF
ADMINISTRATIVE & FINANCIAL SERVICES
KIRSTEN LC FIGUEROA
COMMISSIONER

BUREAU OF GENERAL SERVICES
BRIAN KEEZER
BUREAU DIRECTOR

Criminal or Civil Record for the Bureau of General Services

July 2025

All applicants for a new or amended license, or transfer of a solid waste license, shall submit, at the time of application, a disclosure statement with the Department containing information, as described in Maine Department of Environmental Protection's Solid Waste Management Rules, Chapter 400, Section 12.

1. The facility, known as Juniper Ridge Landfill, is owned by the State of Maine, through the Bureau of General Services,77 State House Station, Augusta, Maine 04333-0077. The State's Federal Employer Identification number is 016000001. The Director of the Bureau of General Services is Edward Dahl, 77 State House Station, Augusta, Maine 04333-0077

2. The Bureau of General Services does not hold an equity interest in any company which collects, transports, treats, stores or disposes of solid or hazardous waste.

3. The Bureau of General Services has no felony conviction or criminal convictions of environmental laws of any state or county.

4. The Bureau of General Services has no adjudicated civil violations of environmental laws.

5. The Bureau of General Services is not a party to any ongoing court proceedings, consent agreements or enforcement actions concerning environmental laws administered by the DEP or the State.

6. The U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency have regulatory responsibility over the Agency in connection with the disposal of solid waste at the Juniper Ridge Landfill site.

. Neither the DEP nor the Maine Attorney General's Office has requested information, other than listed here, relating to the character of the Bureau of General Services.

8. The applicant has not entered into any administrative consent agreements or consent decrees for violations of environmental laws.

State of Maine
Department of Environmental Protection
Disclosure Statement for NEWSME Landfill Operations, LLC
August 2025

Applicant: **NEWSME Landfill Operations, LLC**
Immediate/Ultimate Parent Company: **New England Waste Services of ME, Inc.**

Criminal and Civil Record Disclosure is required by owner, operator or any person having a legal interest in the applicant or the facility and shall disclose whether said owner, operator or person has been convicted of any criminal law or adjudicated or otherwise found to have committed any civil violation of environmental laws or rules of the State, other states, the United States or another country. Such an adjudication or finding can be by means of a court order or consent decree, or by means of an administrative order or agreement.

Disclosure is required by:

Officers, Directors, Partners

All persons or business concerns having managerial or executive authority and having more than 5 percent of the equity in or debt of that business.

All persons or business concerns having a 25 percent or greater financial interest in the applicant.

Managerial person with operational responsibility of the facility.

Corporate Disclosure:

A disclosure concerning the applicant is attached hereto.

Officers, Directors and Partners of NEWSME Landfill Operations, LLC

NEWSME Landfill Operations, LLC is a subsidiary of New England Waste Services of ME, Inc. The directors and officers of NEWSME Landfill Operations, LLC. are as follows:

DIRECTORS:

None

PARTNERS:

None

OFFICERS:

John W. Casella	President & Secretary
Edmond R. Coletta	Vice President
Thomas Cribben	Vice President
Bradford J. Helgeson	Vice President & Treasurer
Shelley E. Sayward	Vice President & Assistant Secretary

PERSONS with MANAGERIAL/EXECUTIVE AUTHORITY

President: John W. Casella

EQUITY/DEBT OWNERSHIP:

100% of the Equity in NEWSME Landfill Operations, LLC is held by New England Waste Services of ME, Inc.

Submitted to the Department of Environmental Conservation for the State of Maine, as required by the General Provisions of Chapter 400 of the Maine Department of Environmental Protection Regulations.

Dated this 20th day of August, 2025

John W. Casella, President and Secretary of
NEWSME Landfill Operations, LLC

STATE OF VERMONT
COUNTY OF RUTLAND

On this 20th day of August, 2025, personally appeared John W. Casella, President and Secretary of NEWSME Landfill Operations, LLC and acknowledged and the foregoing to be his free act and deed and the free act and deed of NEWSME Landfill Operations, LLC.

Sylvia D. Jerome
Notary - Vermont

Notary Public State of Vermont
Sylvia D Jerome
My Comm. Expires 01/31/2027
Commission
No. 1570014203

Maine Disclosure Form

Name	NEWSME Landfill Operations, LLC	
Business Address	358 Emerson Mill Road, Hampden, ME 04444	
Home Address (if app)	NA	
Date of Birth	Formed September 18, 2003	
Social Security or Tax ID	[redacted]	
Criminal Convictions	**No**	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
Civil Violations	Explain any adjudicated civil violation(s) of environmental laws or rules administered by the State, other states, the United States, or another in the 5 years immediately preceding the filing of this application.	
Explanation	**None adjudicated**	
Consent Decrees and Administrative Orders	List and explain administrative orders and consent decrees entered into by or administrative orders for violations of environmental laws administered by the Department, the State, other States, the United States, or another country in the 5 years immediately preceding the filing of this application.	
	Please see attached disclosure.	
Other Proceedings	List and explain any ongoing court proceeding, administrative consent agreement negotiation, or similar ongoing administrative enforcement action not already provided in which disclosing entity or person is a party and which concerns environmental laws administered by the Department or State.	
	None	
Other Information	List any agencies outside the State of Maine that have regulatory responsibilities over the applicant in connection with its collection, transportation, treatment, storage, or disposal of solid or hazardous waste and any other information required by the Department of the Attorney General that related to the enforcement history or character of the applicant.	
	The company is subject to extensive and evolving Federal, state, and local environmental laws and regulations. The environmental regulations affecting the Company are administered by the EPA and other Federal, state, and local environmental, zoning, health, and safety agencies.	
Entities in Which Person or Entity Executing Disclosure has 5% or Greater Equity Interest	**None**	
	Date August 20, 2025	By John W. Casella, President & Secretary

State of Vermont
COUNTY OF RUTLAND

On the 20th day of August , 2025, personally appeared John W. Casella and acknowledged the foregoing to be his free act and deed.

Notary Public State of Vermont
Sylvia D Jerome
My Comm. Expires 01/31/2027
Commission
* No. 1570014203 *

Sylvia D Jerome
Notary Public

Maine Disclosure Form

Name	New England Waste Services of ME, Inc.	
Business Address	207 Larrabee Road, Unit 1, Westbrook, ME 04092	
Home Address (if app)	NA	
Date of Birth	Incorporated October 11, 1974	
Social Security or Tax ID	[redacted]	
Criminal Convictions	**No**	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
Civil Violations	Explain any adjudicated civil violation(s) of environmental laws or rules administered by the State, other states, the United States, or another in the 5 years immediately preceding the filing of this application.	
Explanation	**None adjudicated.**	
Consent Decrees and Administrative Orders	List and explain administrative orders and consent decrees entered into by or administrative orders for violations of environmental laws administered by the Department, the State, other States, the United States, or another country in the 5 years immediately preceding the filing of this application.	
	Please see attached disclosure.	
Other Proceedings	List and explain any ongoing court proceeding, administrative consent agreement negotiation, or similar ongoing administrative enforcement action not already provided in which disclosing entity or person is a party and which concerns environmental laws administered by the Department or State.	
	None	
Other Information	List any agencies outside the State of Maine that have regulatory responsibilities over the applicant in connection with its collection, transportation, treatment, storage or disposal of solid or hazardous waste and any other information required by the Department of the Attorney General that related to the enforcement history or character of the applicant.	
	The company is subject to extensive and evolving Federal, state and local environmental laws and regulations. The environmental regulations affecting the Company are administered by the EPA and other Federal, state and local environmental, zoning health and safety agencies.	
Entities in Which Person or Entity Executing Disclosure has 5% or Greater Equity Interest	**NEWSME Landfill Operations, LLC**	
	August 20, 2025	
	Date	By John W. Casella, President & Secretary

State of Vermont
COUNTY OF RUTLAND

On the 20th day of August, 2025, personally appeared John W. Casella and acknowledged the foregoing to be his free act and deed.

Notary Public

Notary Public State of Vermont
Sylvia D Jerome
My Comm. Expires 01/31/2027
Commission
* No. 1570014203 *

Maine Disclosure Form

Name	John W. Casella	
Business Address	25 Greens Hill Lane, Rutland, Vermont 05701	
Home Address (if app)	[redacted]	
Date of Birth	[redacted]	
Social Security or Tax ID	[redacted]	
Criminal Convictions	**No**	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
Civil Violations	Explain any adjudicated civil violation(s) of environmental laws or rules administered by the State, other states, the United States, or another in the 5 years immediately preceding the filing of this application.	
Explanation	**None**	
Consent Decrees and Administrative Orders	List and explain administrative orders and consent decrees entered into by or administrative orders for violations of environmental laws administered by the Department, the State, other States, the United States, or another country in the 5 years immediately preceding the filing of this application.	
	None	
Other Proceedings	List and explain any ongoing court proceeding, administrative consent agreement negotiation, or similar ongoing administrative enforcement action not already provided in which disclosing entity or person is a party and which concerns environmental laws administered by the Department or State.	
	None	
Other Information	List any agencies outside the State of Maine that have regulatory responsibilities over the applicant in connection with its collection, transportation, treatment, storage or disposal of solid or hazardous waste and any other information required by the Department of the Attorney General that related to the enforcement history or character of the applicant.	
	See Applicant Disclosure	
Entities in Which Person or Entity Executing Disclosure has 5% or Greater Equity Interest	No interest equal or exceeding 5% of any entity that collects, transports, treats, stores or disposes of solid or hazardous waste, per Chapter 400, Maine Department of Environmental Protection Regulations.	
	Date August 20, 2025	Signature [signature] John W. Casella

State of Vermont
COUNTY OF RUTLAND

On the 20th day of August, 2025, personally appeared John W. Casella and acknowledged the foregoing to be his free act and deed.

Notary Public State of Vermont
Sylvia D Jerome
My Comm. Expires 01/31/2027
Commission
* No. 1570014203 *

[signature]
Notary Public

Maine Disclosure Form

Name	Edmond R. Coletta	
Business Address	25 Greens Hill Lane, Rutland, Vermont 05701	
Home Address (if app)	[redacted]	
Date of Birth	[redacted]	
Social Security or Tax ID	[redacted]	
Criminal Convictions	**No**	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
Civil Violations	Explain any adjudicated civil violation(s) of environmental laws or rules administered by the State, other states, the United States, or another in the 5 years immediately preceding the filing of this application.	
Explanation	**None**	
Consent Decrees and Administrative Orders	List and explain administrative orders and consent decrees entered into by or administrative orders for violations of environmental laws administered by the Department, the State, other States, the United States, or another country in the 5 years immediately preceding the filing of this application.	
	None	
Other Proceedings	List and explain any ongoing court proceeding, administrative consent agreement negotiation, or similar ongoing administrative enforcement action not already provided in which disclosing entity or person is a party and which concerns environmental laws administered by the Department or State.	
	None	
Other Information	List any agencies outside the State of Maine that have regulatory responsibilities over the applicant in connection with its collection, transportation, treatment, storage or disposal of solid or hazardous waste and any other information required by the Department of the Attorney General that related to the enforcement history or character of the applicant.	
	See Applicant Disclosure	
Entities in Which Person or Entity Executing Disclosure has 5% or Greater Equity Interest	No interest equal or exceeding 5% of any entity that collects, transports, treats, stores or disposes of solid or hazardous waste, per Chapter 400, Maine Department of Environmental Protection Regulations.	
	Date: August 20, 2025	Signature: Edmond R. Coletta
		Edmond R. Coletta

STATE OF VERMONT
COUNTY OF RUTLAND

On the 20th day of August, 2025, personally appeared Edmond R. Coletta and acknowledged the foregoing to be his free act and deed.

Sylvia D Jerome
Notary Public

Notary Public State of Vermont
Sylvia D Jerome
My Comm. Expires 01/31/2027
Commission
No. 1570014203

Maine Disclosure Form

Name	Bradford J. Helgeson	
Business Address	25 Greens Hill Lane, Rutland, VT 05701	
Home Address (if app)	[redacted]	
Date of Birth	[redacted]	
Social Security or Tax ID	[redacted]	
Criminal Convictions	**No**	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
Civil Violations	Explain any adjudicated civil violation(s) of environmental laws or rules administered by the State, other states, the United States, or another in the 5 years immediately preceding the filing of this application.	
Explanation	**None**	
Consent Decrees and Administrative Orders	List and explain administrative orders and consent decrees entered into by or administrative orders for violations of environmental laws administered by the Department, the State, other States, the United States, or another country in the 5 years immediately preceding the filing of this application.	
	None	
Other Proceedings	List and explain any ongoing court proceeding, administrative consent agreement negotiation, or similar ongoing administrative enforcement action not already provided in which disclosing entity or person is a party and which concerns environmental laws administered by the Department or State.	
	None	
Other Information	List any agencies outside the State of Maine that have regulatory responsibilities over the applicant in connection with its collection, transportation, treatment, storage, or disposal of solid or hazardous waste and any other information required by the Department of the Attorney General that related to the enforcement history or character of the applicant.	
	See Applicant Disclosure	
Entities in Which Person or Entity Executing Disclosure has 5% or Greater Equity Interest	No interest equal or exceeding 5% of any entity that collects, transports, treats, stores, or disposes of solid or hazardous waste, per Chapter 400, Maine Department of Environmental Protection Regulations.	
	Date: August 20, 2025	Signature: Bradford J. Helgeson

STATE OF VERMONT
COUNTY OF RUTLAND

On the 20th day of August, 2025, personally appeared Bradford J. Helgeson and acknowledged the foregoing to be his free act and deed.

Notary Public State of Vermont
Sylvia D Jerome
My Comm. Expires 01/31/2027
Commission
No. 1570014203

Notary Public

Maine Disclosure Form

Name	Shelley E. Sayward	
Business Address	25 Greens Hill Lane, Rutland, Vermont 05701	
Home Address (if app)	[redacted]	
Date of Birth	[redacted]	
Social Security or Tax ID	[redacted]	
Criminal Convictions	**No**	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
Civil Violations	Explain any adjudicated civil violation(s) of environmental laws or rules administered by the State, other states, the United States, or another in the 5 years immediately preceding the filing of this application.	
Explanation	**None**	
Consent Decrees and Administrative Orders	List and explain administrative orders and consent decrees entered into by or administrative orders for violations of environmental laws administered by the Department, the State, other States, the United States, or another country in the 5 years immediately preceding the filing of this application.	
	None	
Other Proceedings	List and explain any ongoing court proceeding, administrative consent agreement negotiation, or similar ongoing administrative enforcement action not already provided in which disclosing entity or person is a party and which concerns environmental laws administered by the Department or State.	
	None	
Other Information	List any agencies outside the State of Maine that have regulatory responsibilities over the applicant in connection with its collection, transportation, treatment, storage or disposal of solid or hazardous waste and any other information required by the Department of the Attorney General that related to the enforcement history or character of the applicant.	
	See Applicant Disclosure	
Entities in Which Person or Entity Executing Disclosure has 5% or Greater Equity Interest	No interest equal or exceeding 5% of any entity that collects, transports, treats, stores or disposes of solid or hazardous waste, per Chapter 400, Maine Department of Environmental Protection Regulations.	
	Date: August 20, 2025	Signature: Shelley E Sayward
		Shelley E. Sayward

STATE OF VERMONT
COUNTY OF RUTLAND

On the 20th day of August, 2025, personally appeared Shelley E. Sayward and acknowledged the foregoing to be her free act and deed.

Notary Public State of Vermont
Sylvia D Jerome
My Comm. Expires 01/31/2027
Commission
No. 1570014203

Sylvia D Jerome
Notary Public

Maine Disclosure Form

Name	Thomas E. Cribben	
Business Address	25 Greens Hill Lane, Rutland, Vermont 05701	
Home Address (if app)	[redacted]	
Date of Birth	[redacted]	
Social Security or Tax ID	[redacted]	
Criminal Convictions	**No**	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
Civil Violations	Explain any adjudicated civil violation(s) of environmental laws or rules administered by the State, other states, the United States, or another in the 5 years immediately preceding the filing of this application.	
Explanation	**None**	
Consent Decrees and Administrative Orders	List and explain administrative orders and consent decrees entered into by or administrative orders for violations of environmental laws administered by the Department, the State, other States, the United States, or another country in the 5 years immediately preceding the filing of this application.	
	None	
Other Proceedings	List and explain any ongoing court proceeding, administrative consent agreement negotiation, or similar ongoing administrative enforcement action not already provided in which disclosing entity or person is a party and which concerns environmental laws administered by the Department or State.	
	None	
Other Information	List any agencies outside the State of Maine that have regulatory responsibilities over the applicant in connection with its collection, transportation, treatment, storage or disposal of solid or hazardous waste and any other information required by the Department of the Attorney General that related to the enforcement history or character of the applicant.	
	See Applicant Disclosure	
Entities in Which Person or Entity Executing Disclosure has 5% or Greater Equity Interest	No interest equal or exceeding 5% of any entity that collects, transports, treats, stores or disposes of solid or hazardous waste, per Chapter 400, Maine Department of Environmental Protection Regulations.	
	Date 8/19/25	Signature [signature]
		Thomas E. Cribben

STATE OF VERMONT
COUNTY OF RUTLAND

On the 19th day of August, 2025, personally appeared Thomas Cribben and acknowledged the foregoing to be his free act and deed.

Notary Public State of Vermont
Sylvia D Jerome
My Comm. Expires 01/31/2027
Commission
* No. 1570014203 *

[signature] Notary Public

State of Maine
Department of Environmental Protection
Disclosure of Environmental Compliance History
For the Applicant – NEWSME Landfill Operations, LLC
For the Parent Company of the Applicant – New England Waste Services of ME, Inc.

A. Disclosure Statement for the Environmental Compliance History for the Applicant, NEWSME Landfill Operations, LLC (5-year period)

The following statement is provided for NEWSME Landfill Operations, LLC, for which is included a compliance history for the 5-year period from August 6, 2020 to August 6, 2025, and is limited to the Juniper Ridge Landfill.

Received From	Type of Notice	Description
Maine Department of Environmental Protection	Request for Compliance	Request for Compliance issued on July 12, 2024 by the Maine Department of Environmental Protection (MaineDEP) for requiring a compliance schedule and framework to meet the requirements of MaineDEP's interpretation of Maine law changes regarding the statutory definition of "Waste generated within the State." Pending.

B. Disclosure Statement for the Environmental Compliance History of the Parent Company of the Applicant, New England Waste Services of ME, Inc. (5-year period)

There are no compliance items to disclose for the parent company of the applicant, New England Waste Services of ME, Inc., for the 5-year period from August 6, 2020 to August 6, 2025.

APPENDIX S

AERIAL PHOTOGRAPH

SME
SEVEE & MAHER
ENGINEERS

2024 AERIAL PHOTO
JUNIPER RIDGE LANDFILL
NEWSME LANDFILL OPERATIONS
OLD TOWN, MAINE

NOTE:
AERIAL IMAGE FROM MAINE AERIAL SURVEY & PHOTO, INC., NORRIDGEWOCK, MAINE, DATED 5/21/2024. ADDITIONAL PHOTO BEYOND AERIAL SURVEY AND PHOTO, INC.'S AERIAL FROM GOOGLE EARTH, DATED 5/10/2023.

SME
SEVEE & MAHER ENGINEERS
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • sme-engineers.com

DWG: AERIAL LMN: NONE CTB: SME-STD.CTB REV: 11/6/2025