DEPARTMENT OF ENVIRONMENTAL PROTECTION
Solid Waste Program Attn: Geraldine Travers
17 State House Station
Augusta, Maine 04333-0017
Telephone: (207) 287-2651

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 Administrative and Financial Services, Bureau of General Services, Juniper Ridge Landfill

Telephone: 207.624.7360

Applicant's Last Name:

First Name:

Contact Person: Michael Barden

Telephone: 207.624.7360

Applicant Name: State of Maine Bureau of General Services

Telephone: 207.624.7360

Mailing Address: 77 State House Station

Street Address:

Town: Augusta State: ME Zip: 04333

Agent/Consultant Name: NEWSME Landfill Operations, LLC

Telephone: 207.862.4200 ext. 230

Mailing Address: (NEWSME) 2828 Bennoch Road

Street Address:

Town: Old Town State: ME Zip: 04446

Billing Information

Name: NEWSME Landfill Operations, LLC

Mailing Address: 110 Main St., Suite 1308

Street Address:

Town: Saco State: ME Zip: 04072

Site/Activity Information

Project Description: Landfill - New Solid Waste Facility License Application to expand the existing Juniper Ridge Landfill solid waste boundary in Old Town by approximately 54 acres on BGS-owned land.

911 address: GPS Location: UTM Northing:4981477N UTM Easting:190521412E

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: 7/20/15

NAME: [signature]
(Applicant)

TITLE: Vice President
(If other than applicant, attach letter of agent authorization.)

PLEASE CALL GERALDINE TRAVERS AT 287-7865 TO DETERMINE THE 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. **See Volume I Section 1.1 and Volume IV Section 7.1**

Schedule.

a. Proposed date of start of construction: **Summer 2018**

b. Proposed date of start of operation: **Spring 2019**

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. **See Volume I Appendix M**

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. **See Volume I Section 3.1 and Appendix B**

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. **See Volume I Appendix M**

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. **See Volume I Section 2 and Appendices A-4 through A-6**

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. **See Volume I Section 3.2 and Appendix C**

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. **See Volume I Section 3.3 and Appendix D**

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. **See Volume I Section 10 and Appendix Q**

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: Prior to relocating Administrative Building	**Waste discharge license**: N/A	**NRPA license**: concurrent & **Section 401 Water Quality Certification** (Clean Water Act): concurrent
Plumbing permit: Prior to relocating Administrative Building	**Highway entrance license**: N/A	
Air emissions license: #A-921-70-B-R	Other (describe):§404 Clean Water Act Army Corps Permit (concurrent), **Solid Waste Permit, City of Old Town,** upon receipt of MEDEP Solid Waste Permits;	

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). **See Volume I Appendix M**

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). **See Volume I Sections 3.5and 3.6 , Volume II Sections 3.2,3.4,6.0 and Volume III Section 3.1**

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

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

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. **See Volume III**

16. **Contaminant Transport Analysis.** Submit a contaminant transport analysis conducted and reported in conformance with the requirements of Chapter 401, section 2.G. **See Volume III Section 4 and Appendix J**

17. **Plan View and Profile Drawings.** Include plan view and profile drawings prepared to meet the requirements of Chapter 401, section 2.H. **See Volume III Section 5 and Appendix E**

18. **Quality Assurance Plan.** Submit a quality assurance plan that meets the requirements of Chapter 401, section 2.I. **See Volume III Section 6 and Appendix B**

19. **Construction Contract Bid Documents.** Submit construction contract bid documents in accordance with the requirements of Chapter 401, section 2.J. **See Volume III Section 7 and Appendix A**

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. **See Volume II Section 6 and Volume IV Appendix I**

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). **See Volume I Section 3.4 and Appendix E**

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). **See Volume I Section 3.5**

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. **See Volume I Section 3.6 and Appendices F, G and H**

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. **See Volume I Section 3.7**

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. **See Volume I Section 3.8**

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. **See Volume I Section 3.9 and Appendix F and Volume V**

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. **See Volume I Section 3.12**

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. **See Volume I Section 5**

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. **See Volume I Section 7 and Volume IV**

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. **See Volume I Section 11**

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. **See Volume I Section 6.0**

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.) **See Volume I Section 8 Appendix P**

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. **See Volume I Section 9 Appendix C**

JUNIPER RIDGE LANDFILL EXPANSION APPLICATION
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

July 2015

STATE OF MAINE
GUY H. COTE, JR.
No. 5144
LICENSED
PROFESSIONAL ENGINEER
7/15

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, ME 04021 • Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

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

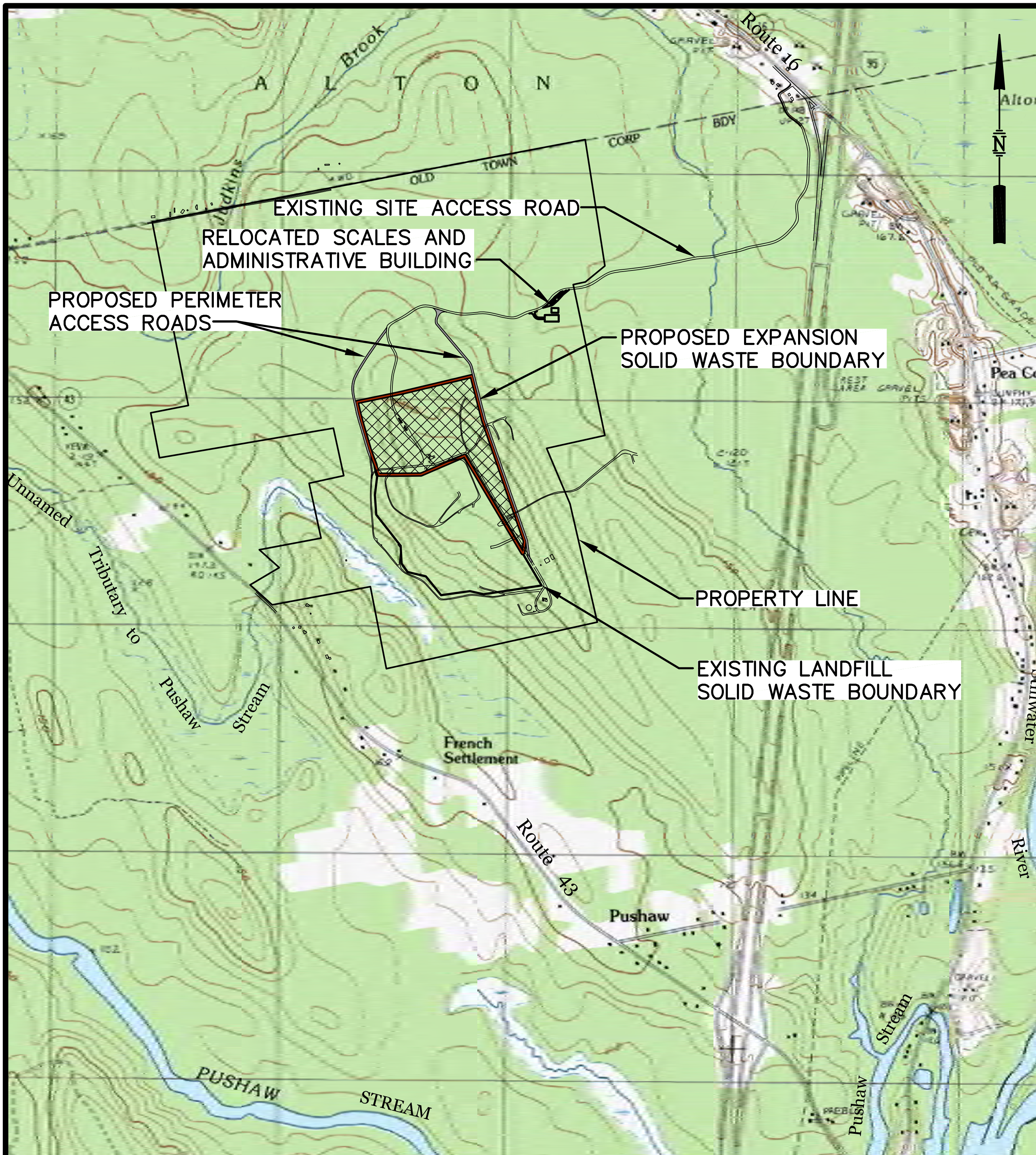
1.0 INTRODUCTION

Maine Bureau of General Services (BGS), as the owner of Juniper Ridge Landfill (JRL) in Old Town, Maine, and NEWSME Landfill Operations, LLC (NEWSME), as operator[1] of JRL, have prepared this Application for an expansion of JRL to provide an additional 9.35 million cubic yards of disposal capacity (the Expansion) to meet the State of Maine's 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, 06-096-CMR 400, 401, and 405 (Rules), 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 JRL, which is located on a 780 acre parcel in Old Town, Maine (see Figure 1-1). On April 9, 2004, the MEDEP issued Amendment Order No. S-020700-WD-N-A approving the current configuration of JRL. A copy of the Amendment Order is attached in Appendix A-1. Since 2004, 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 the last two calendar years (i.e., 2013 and 2014), JRL has accepted approximately 606,254 and 629,021 tons, respectively, of non-hazardous solid waste generated

[1] NEWSME, an indirect subsidiary of Casella Waste Systems, Inc. (CWS), operates 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, and November 2, 2006. A copy of the OSA, as amended, is included in Appendix A-1.



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE:
OLD TOWN, MAINE—1988

1000 0 2000 4000 FEET

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

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: SITELOC LMN: SITELOC CTB: SITELOC REV: 5/26/2015

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throughout the State of Maine. According to data in the MEDEP's Maine Solid Waste Generation and Disposal Capacity Report: For Calendar Year 2013, (MEDEP, 2015), JRL provides approximately 55 percent of the overall solid waste disposal capacity needs for the State of Maine.

At the end of 2014, the remaining permitted capacity at JRL was 3,903,600 million cubic yards, or about five years of disposal capacity using 2014 utilization rates.[2] The Expansion, which will ultimately expand the solid waste footprint at JRL by about 54 acres (to 122 acres total), will be developed in a phased manner similar to the existing landfill. BGS and NEWSME project the first cell of the Expansion will need to be constructed during the 2018 construction season to be available for use in 2019.[3] The Expansion will extend the life of the JRL facility by about 10 to 12 years. The 9.35 million cubic yards of disposal capacity assumes a peak landfill waste elevation of approximately 390 feet above mean sea level (ft-MSL), using 3H:1V (horizontal to vertical) exterior sideslopes on the north, east, and west sides of the facility and the southern side of the Expansion, which will abut the northern side of the existing landfill. The final, peak elevation would be the same peak elevation permitted for the existing landfill. As discussed in greater detail below, BGS and NEWSME have already obtained a Public Benefit Determination (PBD) for the Expansion, as required by 06-096 CMR 400.5 of the Rules.

The Expansion is designed with primary and secondary liners, leak detection, leachate and landfill gas collection systems, and an underdrain system under approximately 12.7 acres of the Expansion footprint. The two liners and leak detection system allow the performance of the Expansion to be monitored separately from the existing landfill. Development of the Expansion will also include the construction of additional site infrastructure, being perimeter access roads, stormwater management/erosion control structures, leachate pump stations and force mains, a landfill gas header pipe, and relocation of the existing overhead electrical line, scale house and

[2] In 2014 the capacity consumed at JRL was 733,400 cubic yards.

[3] This assumes a filling rate of 733,400 cubic yards per year between 2015 and 2019 and that, of the remaining 3.9 million cubic yards of permitted capacity, about 664,000 cubic yards is associated with construction of a Mechanically Stabilized Earthen Berm (MSEB) that was proposed as part of the original site amendment application filed in 2003. BGS and NEWSME are not planning to construct the MSEB; rather this capacity will be realized within the licensed footprint of the existing landfill when the expansion is constructed by filling against the sideslopes of the current landfill. Constructing the MSEB would require a larger expansion footprint and potentially more wetland impacts.

office building. The Expansion will also utilize portions of the existing landfill's primary site access road, leachate storage and transport systems, and landfill gas collection and treatment systems. Landfill gas generated by the facility will be either used in a landfill gas-to-energy facility, which is planned for the site, or combusted in the facility flare. Leachate from JRL, including from the Expansion, will continue to be treated off-site at the wastewater treatment plant at the Expera Specialty Solutions Mill in Old Town. Figure 1-2 depicts the proposed site development plan for the Expansion. Figure 1-3 depicts the final grading plan for the Expansion.

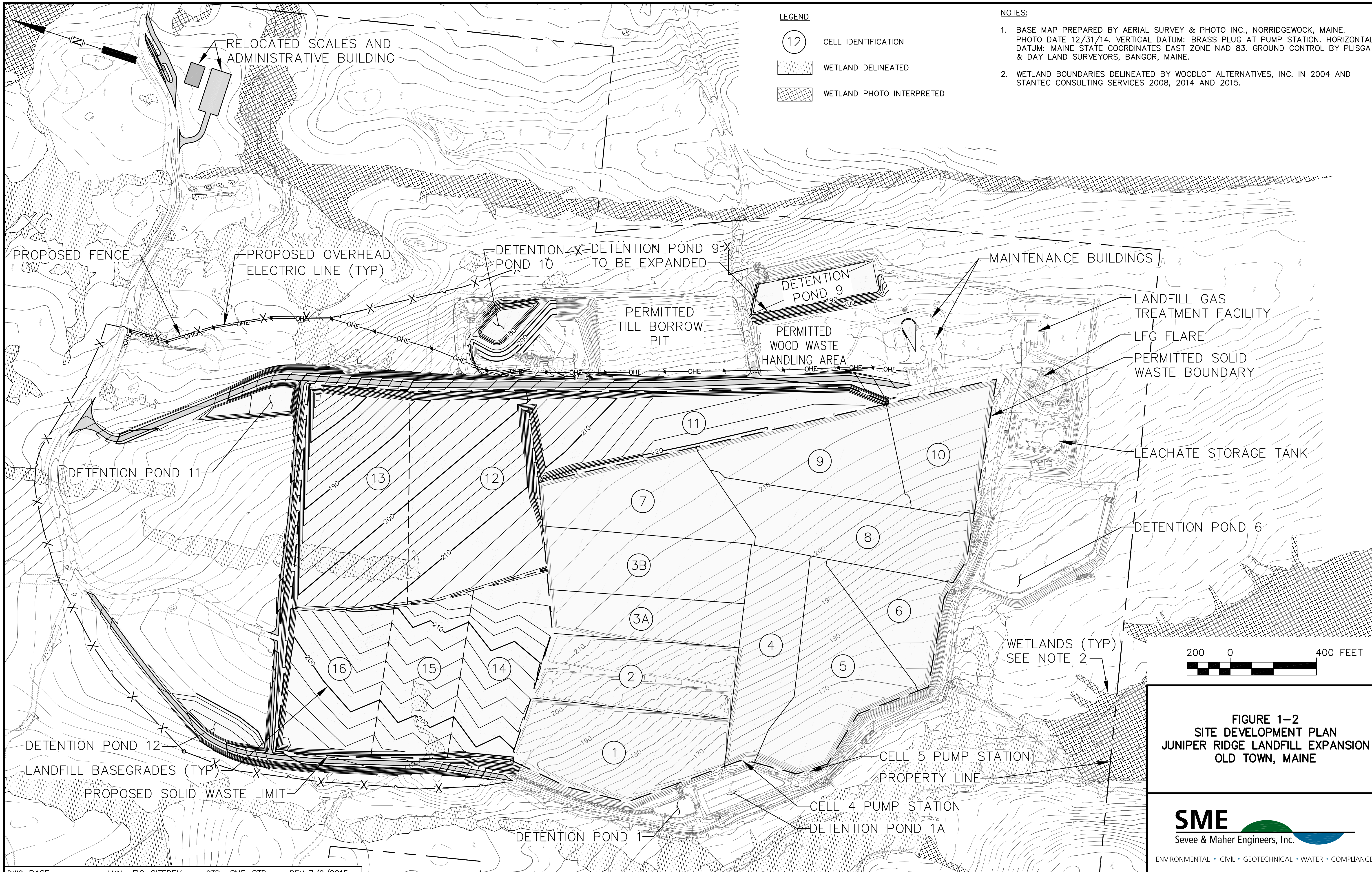
1.2 Application Structure

The Application contains the information and exhibits to demonstrate that the Expansion is designed based on the site's characteristics and will be constructed and operated so that it will not contaminate any waters of the State, contaminate ambient air, constitute a hazard to health or welfare, or create a nuisance. The Application consists of five, separately bound volumes. This volume (Volume I) addresses 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. Volume II also describes the proposed environmental monitoring plan for the Expansion and contains the time-of-travel analysis required by 06-096 CMR 401.2.C. (2) of the Rules.

Volume III, the Design Report, presents the engineering development considerations and design of the Expansion. The Design Report addresses landfill component design, including the liners, leachate, leak detection, underdrain and landfill gas systems; phased development and



LEGEND

(12)	CELL IDENTIFICATION
	WETLAND DELINEATED
	WETLAND PHOTO INTERPRETED

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC., NORRIDGEWOCK, MAINE. PHOTO DATE 12/31/14. VERTICAL DATUM: BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY PLISGA & DAY LAND SURVEYORS, BANGOR, MAINE.
2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004 AND STANTEC CONSULTING SERVICES 2008, 2014 AND 2015.

FIGURE 1–2
SITE DEVELOPMENT PLAN
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: BASE LMN: FIG–SITEDEV CTB: SME–STD REV: 7/9/2015

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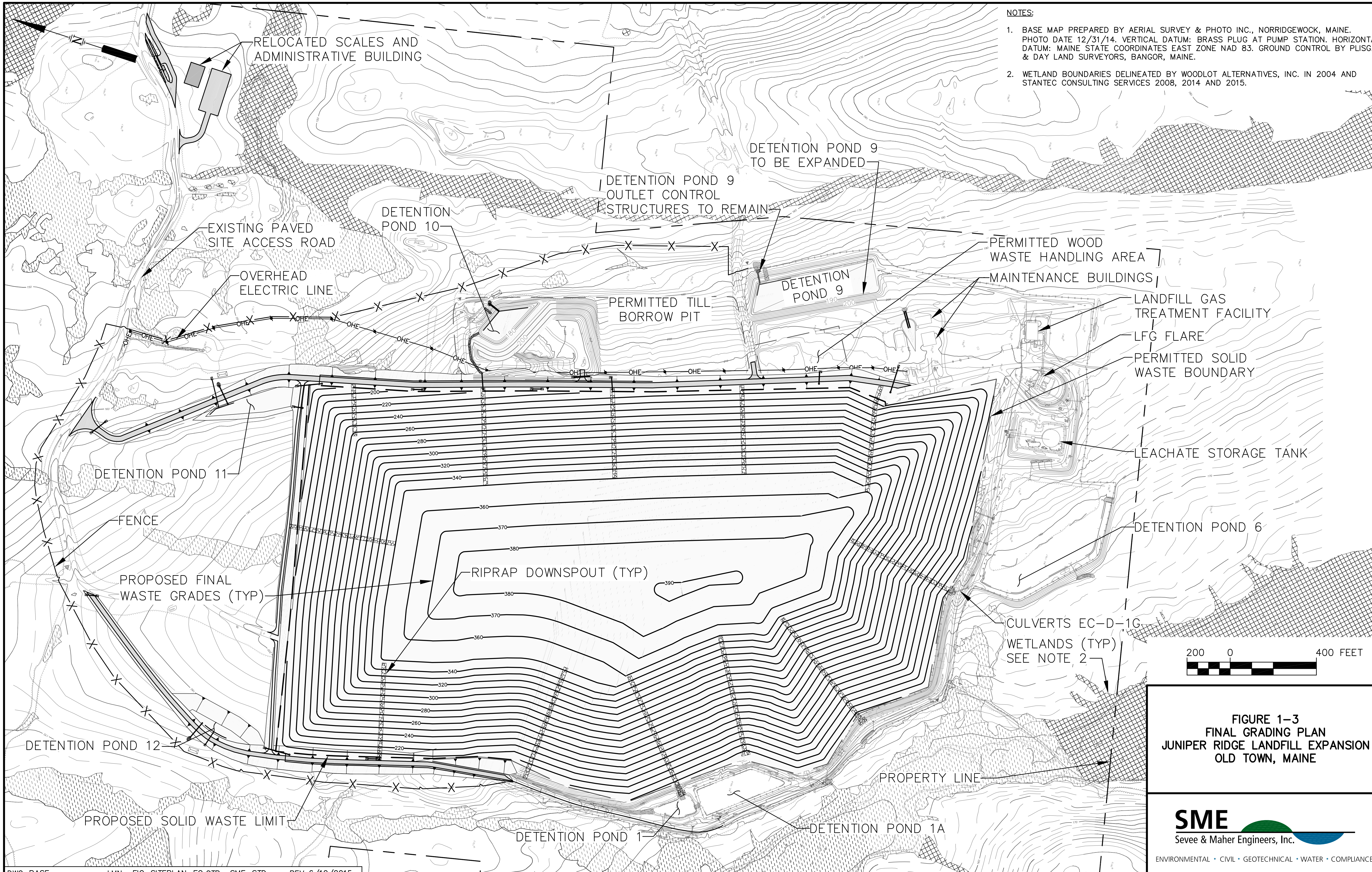


NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC., NORRIDGEWOCK, MAINE. PHOTO DATE 12/31/14. VERTICAL DATUM: BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY PLISGA & DAY LAND SURVEYORS, BANGOR, MAINE.

2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004 AND STANTEC CONSULTING SERVICES 2008, 2014 AND 2015.

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

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: BASE LMN: FIG-SITEPLAN-FG CTB: SME-STD REV: 6/10/2015 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 Expansion's operations. Since the Expansion will be a continuation of the existing site operations, most of the policies and procedures used to operate the Expansion will be the same currently employed at JRL to comply with the operating requirements of 06-096 CMR 401.4.C. of the Rules. Therefore, the manual included in this Application is consistent with the current Operations Manual, with changes only in those sections of the manual to address Expansion-specific items, such as cell development and covering plans, liner performance and environmental monitoring plans, 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-HH, and the U.S. Army Corps of Engineers 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 isolated freshwater wetland and vernal pool impacts associated with the Expansion. Volume V also contains a NRPA Permit by Rule Notification Form for the clearing activities associated with the installation of a perimeter fence and relocated power line within the 250-foot critical terrestrial habitat surrounding a Significant Vernal Pool to the east of the Expansion.

Table 1-1 provides a summary of the contents of this Application, referenced to the applicable sections of the Rules 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	See Volume I Section 3.1 and Appendix B
400.4.B	Financial Ability	See Volume I Section 3.2 and Appendix C
400.4.C	Technical Ability	See Volume I Section 3.3 and Appendix D
400.4.D	Traffic	See Volume I Section 3.4 and Appendix E
400.4.E	Buffers	See Volume I Sections 3.5 and 3.6 Appendix F
400.4.F	Existing Uses and Scenic Character	See Volume I Section 3.6 and Appendices G and H
400.4.G	Air Quality	See Volume I Section 3.7
400.4.H	Surface Water Quality	See Volume I Section 3.8
400.4.I	Natural Resources	See Volume I Section 3.9 and Volume V
400.4.J	Erosion Control Plan	See Volume I Section 3.10 Appendix K
400.4.K	No Discharge Significant Groundwater Aquifer	See Volume I Section 3.11
400.4.L	Utilities	See Volume I Section 3.12
400.4.M	Flooding, Stormwater Management	See Volume I Section 3.13 and Appendix J
400.4.N	Solid Waste Management Hierarchy	See Volume I Section 3.14
400.5	Public Benefit	See Volume I Section 4
400.6	Recycling	See Volume I Section 5
400.7.B	Municipal Intervenor Grants	See Volume I Section 6
400.9	Hazardous & Special Waste Handling & Exclusion Plan	See Volume I Section 7 and Volume IV Section 7.16
400.10	Liability Insurance	See Volume I Section 8 Appendix P
400.11	Closure and Post-Closure Funding	See Volume I Section 9 Appendix C-2
400.12	Criminal and Civil Disclosure Statement	See Volume I Section 10 Appendix Q
400.13	Variances	See Volume I Section 11
401.1.C .1(Performance Standards)		
401.1.C.1.a	Protection Against Groundwater Contamination	See Volume I Section 12.2
401.1.C.1.b	Adequate Airport Runway Setback	See Volume I Section 12.3
401.1.C.1.c	Sufficient Time of Travel to Sensitive Receptors	See Volume I Section 12.4 and Volume II Section 7.0
401.1.C.1.d	Protection of Sensitive Receptors from Contaminant Releases	See Volume I Section 12.5 and Volume III Section 4.0
401.1.C.1.e	Ability to Monitor Facility	See Volume I Section 12.6 and Volume II Section 6.0
401.1.C .2 (Prohibitive Siting Standards)		
401.1.C.2.a	1000 Feet of Class AA or SA Waters	See Volume I Section 3.6
401.1.C.2.b	Not Overlie or Within 300 Feet Significant Sand and Gravel Aquifer	See Volume I Section 3.6 & Volume II Section 2.9
401.1.C.2.c	Within 200 Feet of Holocene Fault	See Volume I Section 3.6 & Volume II Section 4.1
401.1.C.3 (Restrictive Siting Criteria)		
401.1.C.3.a	Set-Backs	See Volume I Section 3.6
401.1.C.3.b	Inplace Soil Hydraulic Conductivity	See Volume II Section 3.2
401.1.C.3.c	Site Monitoring	See Volume II Section 6.0

TABLE 1-1 (cont'd)

Law/Rule	Item	Location in Application
401.1.C.3.d	100 Year Flood Plain	See Volume II Section 2.4
401.1.C.3.e	Overlie Unstable Area	See Volume III Section 3.1
401.1.C.3.f	Significant Wildlife Habitat	See Volume I Section 3.5
401.2 (Application Requirements)		
401.2.A.1	Site & Surrounding Map	See Volume I Appendix M
401.2.A.2	Aerial Photographs	See Volume I Appendix S
401.2.B.1	Geologic Investigation	See Volume II Section 3.0
401.2.B.2	Ground and Surface Water Investigation	See Volume II Section 3.0
401.2.B.3	Geotechnical Investigation	See Volume III Section 3.1
401.2.C (**Site Assessment Report)**		
401.2.C.1	Maps Drawings and 06-096 CMR	See Volume II
401.2.C.2	Time of Travel Calculations	See Volume II Section 7.0 and Appendix X
401.2.C.3	Geotechnical Results	See Volume III Section 3.1 and Appendix F
401.2 (Design Standards)		
401.2.D(1)-(3)	Liner System Requirement	See Volume III Section 2.1
401.2.D(4)	Leachate Conveyance and Storage	See Volume III Section 2.4
401.2.D(5)	Seismic Impact Zone	See Volume III Section 2.5
401.2.D(6)	Phased Operations	See Volume III Section 2.6
401.2.F(1)	Stability	See Volume III Section 3.1.2
401.2.F(2)	Settlement	See Volume III Section 3.1.3
401.2.F(3)	Stability and Settlement Monitoring Plan	See Volume III Section 3.1.5
401.2.F(4)	Water Balance	See Volume III Section 3.2
401.2.F(5)	Leachate Management	See Volume III Section 3.3
401.2.F(6)	Gas Management	See Volume III Section 3.4 Appendix I
401.2.F(7)	Cell Development Plans	See Volume III Section 3.5
401.2.F(8)	Phased Final Cover	See Volume III Section 3.6
401.2.F(9)	Storage Areas	See Volume III Section 3.7
401.2.F(10)	Waste Characterization/Compatibility	See Volume III Section 3.8
401.2.F(11)	Surface Water Control Plan	See Volume III Section 3.9 and Appendix J and K of Volume I
401.2.F(12)	Test Pad Submission	See Volume III Section 3.10
401.2.F(13)	Special Construction Requirements	See Volume III Section 3.11
401.2.G	Contaminant Transport Analysis	See Volume III Section 4 and Appendix J
401.2.H	Plan Review and Profile View Drawings	See Volume III Section 5 and Appendix E
401.2.I	QA Plan	See Volume III Section 6 and Appendix B
401.2.J	Bid Documents	See Volume III Section 7 and Appendix A
401.2.K	Water Quality Monitoring	See Volume II Section 6 and Volume IV Appendix I
401.2.L/401.4	Operations Manual	See Volume Section and Volume IV
401.3	Landfill Construction	See Volume III Section 10
405 (Monitoring and Waste Characterization)		
405.2.A	Standards for Groundwater Monitoring	See Volume II Section 6 and Volume IV 18 Appendix I
405.2.B	Standards for Surface Water Monitoring	See Volume II Section 6 and Volume IV Appendix I
405.2.C	Types of Water Quality Monitoring Programs	See Volume II Section 6 and Volume IV Appendix I

TABLE 1-1 (cont'd)

Law/Rule	Item	Location in Application
405.3	Standards for Ground and Surface Water Data Evaluation and Reporting	See Volume II Section 6 and Volume IV Appendix I
405.4	Leachate, Leachate Collection, Leachate Detection and Leachate Treatment Residual	See Volume II Section 6 and Volume IV Appendix I
405.5	Standards for Installation, Construction and Maintenance of Wells and Piezometers	See Volume II Section 6 and Volume IV Appendix I
405.6	Solid Waste Characterization Plan	See Volume IV Appendix G

2.0 LICENSING PROCESS

This section describes the Applicants' compliance with 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-Expansion Application Requirements

2.1.1 Preliminary Information Report. A Preliminary Information Report (PIR) for the Expansion was prepared on behalf of the Applicants by Sevee & Maher Engineers, Inc. (SME) and submitted to MEDEP on November 22, 2006. The PIR was prepared for a larger, 106-acre expansion, which was designed to have capacity for 22.0 million cubic yards of waste. The current 54-acre Expansion will be located within the area addressed by the PIR. A meeting was held on February 21, 2007 to discuss the PIR for the proposed expansion at JRL. Representatives from the State Planning Office (SPO),[4] MEDEP, NEWSME, SME, and Pierce Atwood attended the meeting.

2.1.2 Determination of Environmental Feasibility. On April 13, 2007, the MEDEP issued an official response to the PIR for the larger expansion, and concluded that based upon the information contained in the PIR, the Expansion appeared to be environmentally feasible and that none of the siting criteria of 06-096 CMR 401.1.C (2) prohibited it. A copy of the April 13, 2007 letter is attached in Appendix A-2. The proposed expansion for which that environmental feasibility determination was issued was for a larger project than currently proposed; however, the currently proposed solid waste footprint is wholly contained within the larger project's proposed solid waste boundary, and therefore, it remains applicable to the current Expansion proposed in this Application.

2.1.3 Pre-Application Meetings. During 2014, BGS and NEWSME held four pre-Application milestone meetings with the MEDEP and interested parties to discuss various aspects of the

[4] Prior to July 1, 2012, SPO owned JRL and held its licenses. SPO was abolished on July 1, 2012, and pursuant to P.L. 2011, Chapter 655, Sec. GG-69, on July 1, 2012, BGS became the owner and licensee of JRL.

Expansion. Attendees at these meetings varied but included representatives of the MEDEP, the City of Old Town, the Landfill Advisory Committee, and the Penobscot Nation, as well as members of the general public. The specific discussions at the meetings included the siting criteria, geology, hydrogeology, landfill design, and operations of the Expansion. The dates of these meetings and topics discussed were as follows:

September 9, 2014	Project Overview and History
October 16, 2014	Visual, Noise, Traffic, and Natural Resources
November 20, 2014	Site Geology and Hydrogeology
December 18, 2014	Engineering and Site Design

Included in Appendix A-3 are copies of the meeting notes from these meetings. Additionally, a Public Informational Meeting (see Section 2.3) was held in Old Town in accordance with MEDEP Chapter 2.13, on June 3, 2015. From comments received at these meetings, BGS and NEWSME made changes in current site operations that will continue with the Expansion and took several initiatives requested by the public to keep them better informed about the Expansion Application process. A summary of these changes and initiatives is included in Appendix A-3.

NEWSME and BGS also met on October 29, 2014 and on April 27, 2015, with the MEDEP and U.S. Army Corps of Engineers (Army Corps) to discuss wetland and other natural resource permitting requirements. A representative from the U.S. Fish and Wildlife Service (USFWS) was present at the October 29th meeting. The October meeting focused on the various components of the NRPA, and Army Corps permit applications. The April meeting focused on the components of a compensation plan for unavoidable impacts.

Previously a number of meetings were held with the MEDEP, U.S.EPA, Army Corps and USFWS to review site issues relating to geology, hydrogeology, and wetland related issues. These meetings were held in 2007 and 2008 and addressed a larger expansion area, of which the Expansion is now a part.

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, the Old Town Host Community Benefit Agreement (HCBA), and Resolves 2005, Chapter 74, on May 1, 2015, the BGS and NEWSME sent via certified mail a preliminary notice of their intent to file this Application with the MEDEP to the City of Old Town and the Town of Alton Municipal Officials notifying Old Town and Alton of their right to apply for municipal intervenor status. Copies of these notices are in Appendix A-4.

2.3 Public Informational Meeting

On June 3, 2015, the BGS and NEWSME held a Public Informational Meeting in the City of Old Town to provide the general public with an opportunity to learn more about the proposed project and the opportunities for public comment during the application process. Pursuant to 06-096 CMR 2.13.A, on May 22, 2015, BGS and NEWSME sent a Notice of the Public Informational Meeting (PIM) by certified mail to abutters, the Old Town and Alton municipal offices, the Landfill Advisory Committee and the Penobscot Nation. The notice was also published in the Bangor Daily News on May 22, 2015. A copy of the notice, 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-5. Appendix A-5 also includes a summary of the PIM, the project summary sheet that was handed out at the meeting, a narrative responsive to 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 July 9, 2015, BGS and NEWSME sent a notice of intent to file an Application by certificate of mailing to abutters, the City of Old Town and Town of Alton municipal officials, and the Penobscot Nation. The Landfill Advisory Committee members were also notified by certified mail. The notice was also published in the Bangor Daily News and Penobscot Times on July 9,

2015. A copy of the notice, the certificate of mailings and certified mail receipts are contained in Appendix A-6.

2.5 Pre-Submission Meeting

On June 25, 2015, BGS and NEWSME held a pre-submission meeting with the MEDEP to review the contents of the Application for the Expansion.

2.6 Application Submittal

Copies of the Application were also sent via certified courier, with return receipts requested, to the City of Old Town, the Town of Alton, and the Penobscot Indian Nation. Copies of these receipts are included in Appendix A-6.

2.7 Certificate of Good Corporate Standing and Agent Authorization

A copy of information obtained from the Secretary of State's CEC database demonstrating NEWSME's good corporate standing is included in Appendix A-7. Also included in Appendix A-7 is the BGS's August 24, 2012 letter authorizing NEWSME to act as the agent of BGS for all application submitted to MEDEP. Appendix A-7 also contains a June 19, 2015 letter addressing the status of NEWSME, principal consultant Sevee & Maher Engineers Inc., and sub-consultants, Gorrill-Palmer, SMRT, Epsilon Associates, Inc., Sanborn Head & Associates, and Stantec, as agents for BGS and NEWSME.

3.0 MEDEP REG. CHAPTER 400.4 - GENERAL LICENSING CRITERIA

3.1 Title, Right, and Interest

The Expansion will be located on a parcel of land owned by the State of Maine of approximately 780 acres that is located east of Route 43 and west of Route 16 and I-95, in Old Town, Maine. The Expansion will occupy approximately 74 acres of the parcel described above. This includes about 54 acres of lined landfill area, (i.e., the solid waste boundary), with the remaining acreage being perimeter access roadways and dikes, detentions ponds and relocated office and scale house buildings. 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 B.

3.2 Financial Ability

As provided for in the OSA NEWSME is responsible for all costs associated with the permitting, design, construction, operation, and closure of JRL. NEWSME, whose sole member, New England Waste Services of ME, Inc., is 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 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 JRL, if necessary. Included in Appendix C-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' current credit facility. Table 3-1 summarizes the approximate overall costs for the Expansion in 2015 dollars.

TABLE 3-1

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 including 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 costs of $160,400 per acre.

The anticipated first phase of construction for the Expansion has been identified as Cell 11, a 9.3-acre cell will be constructed in 2018. SME's opinion of costs for this cell construction is $6.24 million in 2015 dollars. The Bank of America N.A. letter demonstrates the ability of NEWSME and its ultimate parent company 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 over any areas of the landfill that have been developed, but where final cover has not been placed, plus post-closure monitoring and maintenance costs for the entire developed site for a 30-year post-closure period. These closure and post-closure costs are updated on a yearly basis by an independent third party, and the opinion of costs included in the Annual Report for the facility. NEWSME will provide financial assurance using a surety bond for the Expansion, as well. A copy of the current funding agreement for the above mentioned closure and post-closure costs for JRL is found in Appendix C-2. The yearly updates of both costs and the funding agreement will continue during the development of the Expansion.

3.3 Technical Ability

NEWSME has management and staff available who are well qualified to operate and care for the Expansion. NEWSME engages qualified consultants as necessary to undertake design and construction of JRL and the Expansion and provide operational guidance in a manner consistent with state, federal, and local environmental and safety requirements. NEWSME has managed the JRL facility since April 2004. NEWSME has met its obligations under the OSA and current JRL licenses and continues to operate the JRL in conformance with the MEDEP's rules and the JRL permits. NEWSME also has the ability to draw upon the corporate environmental and engineering expertise and experience of its ultimate parent, CWS. CWS is a vertically-integrated solid waste, recycling, and resource management services company that provides resource management expertise and 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. CWS and its subsidiaries operate in six states. Included in Appendix D is MEDEP's environmental review of CWS's Maine operations completed in June of 2015 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. These reviews identified no outstanding compliance or enforcement issues or clean-up responsibilities.

The proper operation and maintenance of the Expansion will be the responsibility of NEWSME and its staff. Specific staff of NEWSME that will be involved with the Expansion's construction, operation and maintenance, along with the responsibilities of each staff member, are described as follows.

<u>General Manager</u>. The General Manager of NEWSME has overall responsibility for supervision and management of site operations, staffing, construction, budgets, and compliance. With respect to the Expansion, the General Manager's responsibilities include the following:

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

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

Environmental Technician (ET). The ET is responsible for the inspection and maintenance of the various environmental systems, including the leachate, gas collection, and stormwater controls. Additionally, the ET performs the 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 site, including safety training, addressing safety issues, and updating the site safety manual.

Landfill Supervisor. The Landfill Supervisor is responsible for coordinating landfill operations, including those of the Expansion. It is the supervisor's responsibility to ensure that the facility is operating properly and is in compliance with current laws and regulations. Supervisor responsibilities include site maintenance and waste placement, street sweeping, mowing, erosion control, odor control and gas management, stormwater and leachate collection system maintenance, and site repairs.

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

Equipment Operators. The Equipment Operators' duties include operating necessary equipment to transport, place, and compact wastes in the landfill; apply daily cover; complete road construction; install gas collection infrastructure; and perform general site construction. Heavy equipment operation, general knowledge of earthwork and road construction, and the ability to perform routine maintenance and make minor repairs to equipment are desirable skills for an equipment operator.

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

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

The Applicants have utilized a number of specialty consultants to perform the detailed investigations for design and operations of the Expansion and to complete this Application. These consultants and their areas of expertise include: Sevee & Maher Engineers, Inc. (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 Gray, Maine, for traffic assessment; SMRT, Inc. of Portland, Maine, for visual assessment; Epsilon Associates of Maynard, Massachusetts, for noise impact assessment; Stantec Consulting Services Inc. (Stantec) of Topsham, Maine, for wetland and other natural resource assessments; 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 D.

3.4 Traffic Movement

The primary waste haul route to JRL for the Expansion will be along I-95 to the Route 16 (Bennoch Road, Exit 199) interchange, then Route 16 west to the JRL site access road, similar to current waste haul routes to JRL. The JRL site access road from Route 16 is located approximately 0.1 miles west of the I-95 interchange. The primary waste haul route will not change as a result of this Expansion. Currently the Average Daily Truck Volume based on data furnished by NEWSME is approximately 164 trucks (approximately 82 in and 82 out) with 78 percent using I-95 and 22 percent using Route 16. The 2011 AADT north of Route 16 (Southgate) recorded by MaineDOT was 1,650 vehicles per day, thus the trucks associated with the current site represent approximately 2.2 percent of the traffic on Route 16. JRL has a policy that advises drivers to use I-95. I-95 has a weight limit of 100,000 pounds. The site access road and the new internal 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 effect of the Expansion on regional and local traffic patterns was evaluated by GP of Gray, Maine and summarized in a Traffic Assessment, which is included in Appendix E. The purpose of the assessment was to determine if the future level of usage associated with the Expansion will be adequately accommodated by the transportation network. The assessment was based on the following information: high crash locations for 2011 to 2013, provided by the Maine Department of Transportation; turning movement volumes collected by GP from 7:00 AM to 9:00 AM and from 3:30 PM to 6:00 PM on Tuesday, September 30, 2014, at the Route 16 site access road entrance and Route 16 at the I-95 southbound on ramp and northbound off ramp; and truck logs provided by NEWSME. The assessment concluded that the existing street system currently accommodates the traffic generated by the landfill-related operations, and will continue to do so following the Expansion. In addition the internal access road has been designed to accommodate the internal flow and volume of traffic.

<u>3.4.1 Estimate of Number, Weight, and Types of Vehicles</u>. GP reviewed the weight scale records for the existing landfill for 2014 to determine the peak hour traffic at the facility. Based on a manual turning movement count completed on Tuesday, September 30, 2014, current traffic generation at the facility is approximately 18- and 14-truck round trips during the A.M. and P.M. peak hours, respectively. Total vehicle trips on the same day were 25 and 22 trips during the peak hours, respectively. Using this information, GP determined the 2014 peak design hour trip generation to be 28 and 25 during the A.M. and P.M. peak hours, respectively (see GP Report for methodology). Following the Expansion development, and assuming tonnages accepted by the facility increase from about 629,000 tons received in 2014 to 700,000 tons annually, GP forecasts that design hour trip generation would increase to 31- and 28-truck round trips during the peak A.M. and P.M. hours, respectively. The daily vehicle trips generation for the Expansion is forecasted at 203, of which 20 would be non-trucks and 183 from trucks. Trucks using the facility range from single- and double-axle trucks to tractor-trailer units with typical varying gross vehicle weights from 70,000 to 100,000 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 the state and local roadways, which have a gross vehicle weight limit of 100,000 pounds. Thus, this change has reduced the traffic on local roadways by allowing trucks to utilize I-95 to Exit 199, followed by Route 16 a short distance to the site driveway. Truck Volume based on data furnished by NEWSME[5] is approximately 164 trucks (approximately 82 entering and 82 exiting) with 128 or 78 percent using I-95 and 37 or 22 percent using Route 16. The 2011 AADT north of Route 16 (Southgate) recorded by Maine DOT was 1,650 vehicles per day, thus the trucks associated with current JRL Operations represent approximately 2.2 percent of the traffic on Route 16. Typical haul routes to the site are shown in on the figure contained in Appendix A of the GP's report included as Appendix E of this report. For the Expansion NEWSME will continue its policy of strongly 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 in nature, 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 AM and PM peak hour capacity analysis for the primary intersections (e.g., site driveway from Route 16, and Route 16 at I-95 north and south bound ramps) at the projected waste acceptance rates. This analysis showed the current level of service (2014) at the intersection was at an A level ("very good with little control delay") and these levels will remain consistent for the Expansion, and the slightly higher projected waste acceptance rates.

3.4.4 Maine DOT Accident Inventory. Accident records for the most recent available three-year period (i.e., 2011 through 2013) were obtained from the Accident Records Section of the Maine Department of Transportation (Maine DOT) Bureau of Maintenance and Operations. GP's

[5] NEWSME Traffic Survey taken between January 7 and 11, 2013.

review of the accident summaries, outlined in Table 3-2, indicates that no locations in the study area (i.e., Route 16 from the site drive to Route 43 and Route 43 from Route 16 to the I-95 ramps) are classified as "High Crash Locations" (HCL's) using Maine DOT criteria. Maine DOT defines an HCL as an intersection or roadway link that *both* experiences more than eight accidents over a three-year period *and* exhibits a critical rate factor (CRF) of 1.0 or more over a three-year period. The CRF is a statistical measure of an intersection or link's accident experience as compared to locations with similar geographic, traffic, and geometric characteristics. A copy of the Maine DOT crash data is contained in Appendix C of GP's report.

TABLE 3-2

ACCIDENT RATE SUMMARY

Location		**Number of Collisions**	**CRF**	**HCL**
MEDOT	**Intersection**			
38917	Bennoch Rd(Rte 16)/Gillman Falls Rd	6	2.59	No
39199-39200	Bennoch Rd-Alton Tannery Rd to Brown Brook	10	0.73	No
39199-41324	Bennoch Rd-Brown Brook to SB on ramp	9	0.79	No
40866-65216	W Old Town Rd-SB I-95 ramps to 0.21 miles west	4	1.64	No

3.4.5 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. The minimum desired sight distance is 360 feet, measured 10 feet from the existing edge of pavement utilizing a height of eye of 42 inches and a height of the approaching object of 51 inches. Accepted practice for driveways serving a significant amount of truck traffic is to increase the minimum sight distance by approximately 50 percent, thereby resulting in a minimum desirable sight distance of 540 feet. Available sight distances to both the east and the west exceed 1,000 feet. On previous site development projects at JRL (such as the vertical increase amendment), the Maine DOT has determined that an entrance permit is not required for the Route 16 crossing.

3.4.6 Internal Access Roads. Internal site access roads associated with the Expansion are shown in Figure 1-1. Access to the individual cells of the Expansion will be along the existing site access road. A new 3,900-foot perimeter site access road will be constructed along the eastern side of the Expansion from the current site access road to the southeast corner of the existing landfill. The new access road will have a 24-foot wide paved travelway with at least a 2.5-foot outer shoulder on each side. A new 2,200-foot long perimeter service road, with a 20-foot paved travelway and at least a 2.5-foot outer shoulder on each side will be constructed along the westerly boundary of the Expansion area as this area of the Expansion is developed. This road will connect to the existing landfill service road, thereby providing an access loop around the entire facility. This road will provide access for maintenance of the facility and function as an alternate egress route from the facility. An additional 1,740-linear, 12-foot wide gravel maintenance road will also be constructed on the northern side of the Expansion. Site internal access roads will be maintained, including plowing in the winter and dust control in the summer.

3.5 Fitting the Solid Waste Facility Harmoniously into the Natural Environment

The Expansion has been located and designed to fit harmoniously into the natural environment. As part of the design process, NEWSME retained Stantec to identify and inventory the presence of wetlands, potential significant wildlife habitats, unusual natural areas, vernal pools, and rare, threatened and endangered (RTE) species on the project site. The inventory process included background checks of existing records at appropriate federal and state agencies for known or expected occurrences of significant wildlife habitats, rare, threatened, or endangered plants and natural communities. Agencies contacted included: 1) the Maine Department of Inland Fisheries and Wildlife, addressing endangered, threatened, and special concern species, designated essential and significant wildlife habitats, and fisheries habitat; 2) the Department of Agriculture, Conservation, and Forestry, addressing the Natural Areas Program's rare and unique botanical features; 3) the Maine Department of Environmental Projection, addressing significant rivers and streams; and 4) U.S. Fish and Wildlife Service. Copies of the correspondence and responses are in Appendix F-1. Stantec also completed field surveys and natural resource agency consultation to assess the potential presence of state or federally listed RTE species and their associated habitats within the survey area. This work was completed concurrent with the wetland and waterbody delineations performed on-site. Stantec's RTE report is included in Appendix F-2. Stantec's 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, Stantec did not directly observe state or federally listed RTE plant or wildlife species on-site. Stantec identified that the forested area which makes up the facility site is within the range of the northern long-eared bat (*Myotis septentrionalis*) (NLEB), which were recently listed as threatened with a 4d ruling by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA). In June 2015, Stantec conducted an acoustic survey to determine the probable absence/presence 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 F-2.

Stantec also 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 (NMFS) 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 has evaluated the 780 acre parcel for natural resources in 2008, 2014 and in 2015. Although isolated forested wetlands occur within the facility site, and about two acres of these wetlands will be directly impacted by the expansion, there are no delineated or mapped streams in the 74-acre facility site, 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 Expansion will result in unavoidable filling 2.04 acres of freshwater wetlands impact due to the landfill cells and perimeter berm development and 0.10 acres of clearing impacts related to clearing for a relocated perimeter fence and electrical line. The wetland filling impacts will be spread out over four different areas (see Figure 3-1). The impacted wetlands are not designated as Wetlands of Special Significance, as defined by 06-096 CMR 310.4. A total of 14 vernal pools were identified within and adjacent to the proposed expansion area. One vernal pool, located outside of the Expansion landfill footprint, met the criteria to be considered a Significant Vernal Pool, (SVP) (see Figure 3-1). This SVP will not be directly impacted by the Expansion but clearing for the proposed relocated electrical line and fence will occur within the 250-foot critical terrestrial habitat surrounding this pool. This activity, which is greater than 100 feet from the Expansion, is covered by the Permit-by-Rule (PBR) standards of the NRPA. PBR notification is in Volume V of the Application. Of the 14 vernal pools, 12 met the definition of a vernal pool as provided by the Programmatic General Permit (GP) of the U.S. Army Corp of Engineers (Corps) for Maine (Maine GP). The remaining two pools were not located in jurisdictional wetlands, so they are not jurisdictional pools for the Army Corps. These two pools were natural, but did not contain enough egg masses to be considered SVPs. Six of the Corps regulated vernal pools will be directly impacted as part of the Expansion. The 94 acres of vernal pool management area impacts, as defined by the Corps, associated with these vernal pools are addressed in the project's compensation plan. The compensation plan includes the on-site preservation of a contiguous 266 total acres in area and includes approximately 57 acres of wetlands and 25 documented vernal pools. A site of this size can function as an independent ecological unit that provides more than suitable compensation for the resources being impacted according to the Army Corp's guidelines. Details of the compensation plan are found in Volume V Attachment 13. Volume V contains the MEDEP NRPA permit application and an Army Corps wetlands permit application for the wetland and vernal pool impacts associated with this project.

3.6 No Unreasonable Adverse Effect on Existing Uses and Scenic Character

The Expansion will not have an unreasonable adverse effect on the existing uses or scenic character of the surrounding areas. The Expansion will be a continuation of the existing site use. Existing land uses in the vicinity of the Expansion include landfilling, rural residences, and farming. The classes of local zoning districts in the vicinity of the Expansion include landfill, rural residence and farming, and resource protection zones. The parcel of land on which the Expansion is located provides for significant buffering capacity in terms of setback distances and vegetative cover. The setbacks and buffers from the Expansion's solid waste boundary as they compare to those required by the Rules, are summarized in Table 3-3.

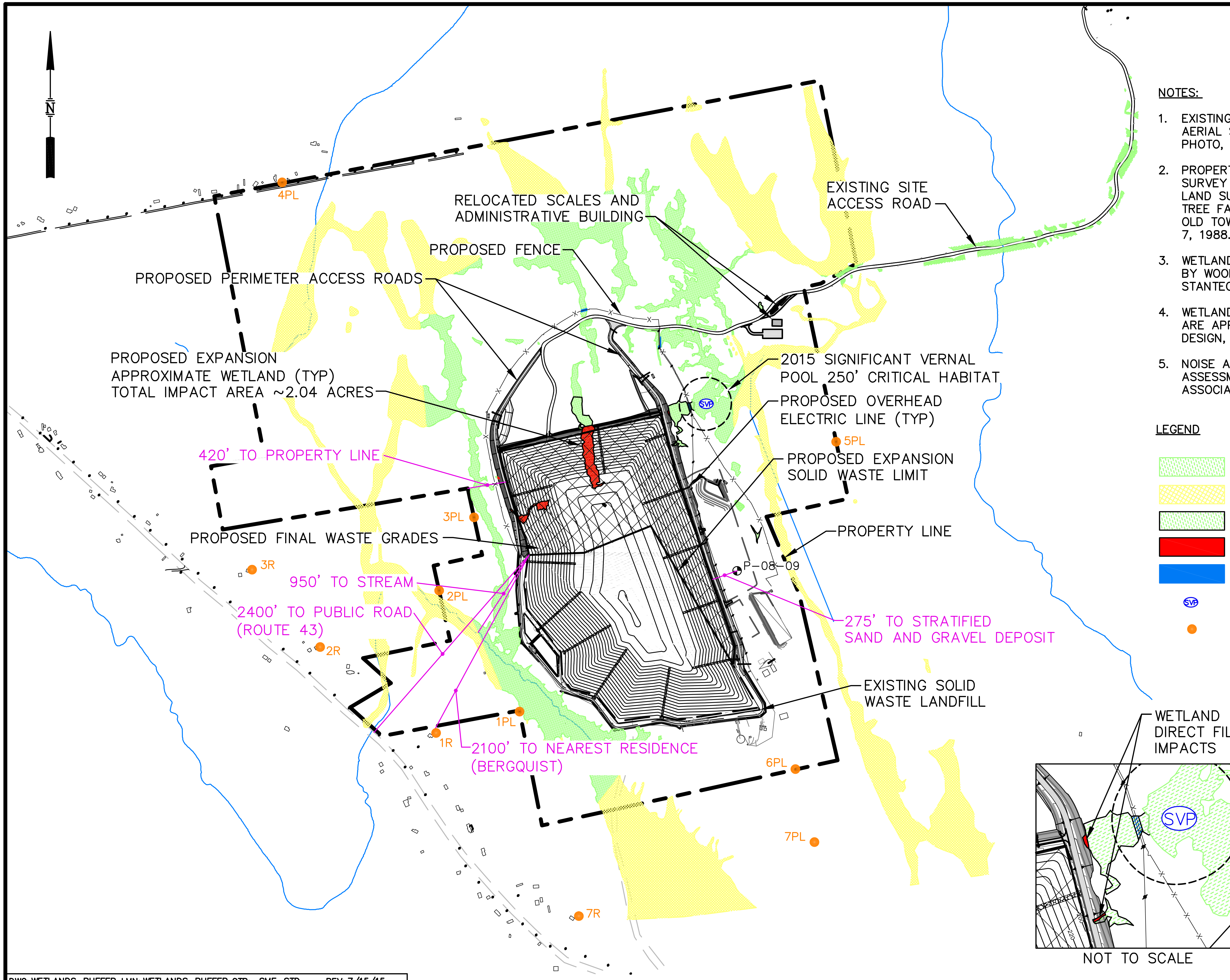
TABLE 3-3

SETBACK AND BUFFERS FOR EXPANSION

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	2,400 feet
Property boundary	300 feet	420 feet
Nearest residence	1,000 feet	2,100 feet
Stratified sand and gravel deposit	100 feet	275 feet
Classified surface water body	100 feet	950 feet
Water supply spring or well	1,000 feet	2,100 feet
Performance Standards		
Airport	10,000 feet	13,000 feet

The Expansion will be located generally to the north of the existing JRL facility. The buffers between the Expansion's solid waste boundary and abutting properties to the north, east, and west will be managed so that they maintain their general natural condition. These buffers currently exist as a mature mixed stand of hardwood and softwood that range in height from approximately 20 to 60 feet. Figure 3-1 also shows the relative size and location of buffers that will exist around the Expansion.

The 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 Expansion and property lines and/or protected locations with the exception of the tree clearing required to install the relocated electrical line and perimeter fencing. In addition, the proposed pump stations, future gas-to-energy plant, and other mechanical structures will include 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 environmental noise control devices in proper working condition and maintained as originally provided with the equipment by the



NOTES:

1. EXISTING GROUND CONTOURS FROM DECEMBER 31, 2014 AERIAL SURVEY PERFORMED BY AERIAL SURVEY AND PHOTO, INC. OF NORRIDGEWOCK, MAINE.
2. 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.
3. WETLAND BOUNDARIES AND VERNAL POOLS DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004 AND STANTEC CONSULTING SERVICES 2008, 2014 AND 2015.
4. WETLAND BOUNDARIES AND VERNAL POOL LOCATIONS ARE APPROXIMATE AND SHOULD NOT BE USED FOR DESIGN, QUANTITY, TAKE-OFFS, GRADES ETC
5. NOISE ASSESSMENT LOCATIONS FROM SOUND LEVEL ASSESSMENT REPORT PREPARED BY EPSILON ASSOCIATED, INC. 2015.

LEGEND

- WETLAND DELINEATED IN FIELD (SEE NOTE 3)
- WETLAND PHOTO-INTERPRETED
- WETLAND BOUNDARIES/VERIFIED (2014-2015)
- WETLAND WITH DIRECT FILL IMPACTS
- WETLAND CLEANING IMPACTS (0.10 ACRES TOTAL)
- SVP SIGNIFICANT VERNAL POOL (2015)
- NOISE ASSESSMENT LOCATION (SEE NOTE 5)

500 0 1000 FEET

WETLAND WITH DIRECT FILL IMPACTS

NOT TO SCALE

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

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: WETLANDS-BUFFER LMN: WETLANDS-BUFFER CTB: SME-STD REV: 7/15/15 manufacturer.[6] Sounds generated from routine construction and operations of the Expansion will be produced by approximately the same type and number of engine-powered equipment currently used at the existing landfill, which primarily consists of the following:

Large Equipment used for construction of the Expansion:

- One 27- to 40-ton excavator,
- Three to five 30- to 35-ton off-road trucks,
- Two bulldozers,
- One tracked steer skid,
- One mini-backhoe,
- Pipe fusion equipment,
- One water truck, and
- Pad foot/smooth drum rollers.

Large Equipment for ongoing landfill operation:

- Two compactors – Caterpillar 826G, and 836G or similar,
- Two bulldozers – John Deere 850J, and John Deere 850K or similar,
- One front-end loader – Caterpillar 966G or similar,
- One on-site haul truck – John Deere 400D or similar, and
- One excavator – John Deer 270 or similar.

The hourly sound levels from routine operation of the Expansion will be less than the daytime and nighttime limits provided in the Rules. 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;

[6] In response to input obtained from neighbors during the milestone meeting process, NEWSME has voluntarily replaced original backup alarms on landfill operating equipment with broadband backup alarms that have less abrupt (beeping) sounds.

- 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.

Appendix G of this document contains a Sound Level Assessment Report prepared by Epsilon Associates. Noise levels associated with the Expansion were modeled at a total of eleven locations as shown on Figure 3-1 and summarized on Table 3-4. Epsilon's assessment also incorporated the landfill gas-to-energy facility proposed for the site, which is anticipated to be operating in 2017.[7] Existing site sound level conditions were measured in April 2014, and individual sound level measurements for each piece of landfill operating equipment were obtained by Epsilon on March 10, 2015 and June 12, 2015. This data was used by Epsilon to model the noise impacts associated with the Expansion as described in its Report.

Epsilon assessed sound levels from routine operations with mobile sources in close proximity to the nearest noise sensitive receiver, which represent the greatest sound level impacts produced by the Expansion. This will occur along the closest property line to the Expansion, which is to the west of the Expansion. In addition, because sound level limits vary depending on the time of day/night and operational activities vary depending on the time of day/night, two distinct conditions ("scenarios") were modeled.

- Scenario 1 West – Daytime Operations (mobile + stationary sources)
- Scenario 2 West – Nighttime Operations (mobile + stationary sources)

[7] A separate application will be submitted for this facility.

Both scenarios consider operations along the western side of the Expansion area. Since the LFGTE facility (stationary source) has the potential to operate 24 hours per day, 7 days per week, sound sources associated with the LFGTE facility were included in each scenario. 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 six of the seven pieces of equipment identified previously are operating simultaneously at full power. Generally, one or two dozers and one or two compactors will be used simultaneously with the other one as a backup. The two compactors and a bulldozer are assumed to operating in the western region shaded in Figure 7-1. The excavator, front-end loader, and haul truck are assumed to be operating farther to the east as depicted in Figure 7-1. These mobile sources are modeled at 480 feet or greater from the nearest property line, or about 60 feet from the solid waste boundary.

At locations 2PL and 3PL, on the western side of the site, noise levels of 51 dBA and 58 dBA, respectively were modeled under Scenario 1 operating conditions. Scenario 1 demonstrated compliance with the daytime hourly limit of 60 dBA, but did not demonstrate compliance with the lower nighttime hourly limit of 50 dBA; therefore, a reduction in the amount of equipment operating simultaneously over the course of 1-hour will be necessary for operations during the nighttime hours.[8] For the modeling of nighttime operations of mobile sources, only one mobile source (compactor) operating near the western property line with a sound pressure level of 77 dBA at 50 feet is included in Scenario 2. This mobile source is approximately 480 feet from the closest western property line or about 60 feet from the solid waste boundary. No other mobile sources were included in this scenario. This scenario demonstrates compliance with both the daytime and nighttime hourly sound levels.

Table 3-4 shows the predicted broadband (dBA) hourly sound levels at the eleven (11) modeling locations for each of the modeling scenarios These hourly sound levels include contributions from operational sources on the landfill as well as the LFGTE facility.

[8] As in existing JRL, NEWSME only intends to operate for one "nighttime" hour, 6 am to 7 am.

TABLE 3-4

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)
1PL	Western Property Line – Bergquist Residence	282008.67	145580.37	46	36
2PL	Western Property Line – Perkins Residence	281756.66	145952.43	51	39
3PL	Western Property Line – Bertolino Residence	281870.34	146168.06	58	47
4PL	Northern Property Line – Residential	281238.58	147225.65	38	27
5PL	Eastern Property Line	283004.93	146417.53	41	36
6PL	Southern Property Line	282875.57	145395.14	58	58
7PL	Southern Residential Property Line	282933.55	145156.82	48	48
1R	Bergquist Residence	281733.32	145500.84	44	34
2R	Perkins Residence	281374.59	145775.97	43	33
3R	Bertolino Residence	281159.90	146019.46	42	31
7R	Southern Residence	282191.91	144923.63	41	38

Source: Epsilon 2015 Table 7-4

As shown on Table 3-4 the noise standards in the Rules will be met for the Expansion for the scenarios modeled. When operating during the night time hours (between 7:00 p.m. and 7:00 a.m.) within 60 feet of the solid waste boundary along the western sides of the Expansion, operating equipment must be limited to equipment with a combined sound pressure level of 77dBA or less at 50 feet. Based on the operating hours for the facility, this restriction would apply to first hour of site operations, and only during the placement of waste within 60 feet from the solid waste boundary along the western side of the Expansion, Cells 14, 15, and 16.

The visual assessment completed by SMRT is included as Appendix H. 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. SMRT defined existing site characteristics around the JRL facility, quantified site viewshed, and identified public viewing areas through contact with stakeholders and its own reconnaissance, developed a line of site and viewsheds maps, and prepared project illustrations of the final landfill topography for the Expansion as seen from several locations. SMRT determined that the proposed Expansion is not a radical departure from that which has been and is currently permitted. As concluded in the original visual assessment and supported in succeeding studies, the landfill when completed, capped, and vegetated “will appear highly congruous with the existing landscape in having a similar height, scale, form, orientation, and line as nearby hillsides, within existing landscape lines. The proposed landfill will be less than fully congruous with the existing forest character in color and texture.” (Jud 1991). With respect to color and congruity, this last aspect refers to the basic difference in hue, saturation, and luminosity or brightness inherent to objects or surfaces. Ultimately, the Expansion will be closed and its surface fully planted in a grass mix and maintained. By nature, though planted, this surface will be different, but not unreasonably inconsistent, with respect to color when compared to the surrounding forested landscape.

During construction and operation of the landfill, the color and form will be different. As discussed in earlier studies, the operating landfill will have a generally gray color with operating equipment in view. It will gradually grow over time to its permitted final elevation. Prior to final capping, closed cells will be covered in black protective membrane. 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 land forms, and the lighter gray operating areas will be more pronounced but will blend in with the warmer tones of intervening leafless areas.

As part of the visual assessment, SMRT also contacted stakeholders, including Maine Bureau of Parks and Lands, Maine Department of Transportation, City of Old Town, the towns of Alton, Glenburn, Greenbush, Hudson, and Milford, and the Penobscot Indian Nation, to determine the presence of public viewing areas “within 2,000 feet”[9] of the facility. No “public viewing” areas as defined were identified within 2,000 feet of the facility. SMRT used a non-regulatory 6-mile distance study area from the Expansion in response to a question raised in Public Milestone Meeting #2 on October 16, 2014 about the possibility of views from the western shore of Pushaw Lake and vicinity. Therefore, the study area was conservatively expanded to 6 miles to include this vantage point in response to this inquiry.[10]

[9] 06-096 CMR 400.4.F.3.b
[10] Objects located greater than 4-miles from a viewer are classified as “background” as established by the U.S. Forest Service methodology used to complete this assessment

Potential scenic resources within a six mile study area, as identified through the stakeholder process included: Pushaw Lake, Pushaw Stream, Penobscot River, Stillwater River, Hirundo Wildlife Refuge, Sunkhaze Meadows National Wildlife Refuge, Mud Pond, the Costigan Historical Cemetery, and Penobscot River corridor at the public boat launch. In addition to agency and municipal contacts, state sponsored studies of lakes and rivers were reviewed. No lakes within the assessment area were identified as scenic. Note that, though listed in the lakes study, Pushaw Lake is identified only for wildlife, fisheries, botanic, and cultural resources, with "No significant (scenic) features reported." (Parkin, Lortie, Humphrey, DiBello 62). No rivers within the assessment area were identified as scenic (Maine Department of Conservation). This assessment determined that scenic resources within the study area either do not have views to the landfill, or are at such distance ("background" as defined by the U.S. Forest Service to be 4 miles to the horizon) that the views have no unreasonable visual impact.

Views of the facility from area roadways within 6 miles include those from Route 16 (intermittent and infrequent), from I-95 southbound (broken by roadside vegetation and distant), and from Route 43 (effectively screened by plantings previously installed as a visual buffer by the Applicant) and are not defined public viewing areas, scenic resources, or scenic byways. Details relative to the specific sites evaluated, their features and representative photo simulations of the Expansion are provided in the SMRT's Report contained in Appendix H.

Therefore, the 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," nor will it "unreasonably interfere with existing scenic and aesthetic uses of a scenic resource."

The Expansion will not present a bird hazard to aircraft, in that the closest airport is greater than 13,000 feet away. It will also not have an unreasonable adverse effect on the preservation of historical sites (see Appendix F-1 for correspondence with the Maine Historic Preservation Commission), or, given the nature of the existing use, unreasonably adversely affect existing uses of property neighboring the proposed solid waste facility.

Therefore, the proposed Expansion will not have an unreasonable adverse effect on existing uses and scenic character in the area.

3.7 No Unreasonable Adverse Effect on Air Quality

The method used to collect and control landfill gas emissions from the landfill cells associated with the Expansion will remain the same as the current practices (i.e., active gas collection, flaring or, potentially combustion in engines, and the installation of landfill cover). The site currently has an air emission license (#A-921-70-B-R) under 38 M.R.S. § 344, and § 590 et seq. that regulates emissions from the existing facility. The license was 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 license (see Appendix I). The landfill gas emissions are monitored and reported by NEWSME as required by the air emission license. This license, which was issued in October 2014, has a term of five years, and a renewal application will need be submitted at least six months prior to expiration. This renewal application will reflect the site changes associated with the Expansion.

Landfill gas (LFG) extracted from the 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. In the future, LFG may be combusted in a LFG-to-energy (LFGTE) 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, 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 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. The potential future LFGTE facility is anticipated to handle approximately 2,170 scfm at 50 percent CH_4 (three engine-generators rated for approximately 1,650 scfm and an open flare rated for approximately 520 scfm). Any excess LFG and LFG generated when the LFGTE facility is not operating would be handled by flaring. Included in Appendix I of Volume III of this Application is a LFG design report prepared by Sanborn Head & Associates, Inc. (SHA). In this report SHA presents estimates of peak LFG generation of approximately 3,600 scfm, at a methane content of 50 percent, in 2031. To account for potentially lower methane concentrations in the LFG, the main LFG header pipe for the Expansion was sized for the projected maximum LFG flow rate at 40 percent CH_4, or approximately 4,500 scfm. As noted above, the rated capacity of Flare #4 is approximately 3,550 scfm at 50 percent CH_4, or approximately 4,500 scfm at 40 percent CH_4. Therefore, Flare #4 is adequate for the Expansion. Open burning is strictly prohibited at the JRL Facility. As part of the operation of the LFG gas collection system, NEWSME performs surface scans of the landfill on a monthly basis in general accordance with the New Source Performance Standard (NSPS) for municipal solid waste (MSW) landfills contained in 40 C.F.R § 60.753(d). The results of these scans are reported to MEDEP.

NEWSME has identified three potential primary sources of odor, 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), by-pass municipal solid waste (MSW), and wastewater sludges. The leachate generated from the landfill is also a potential source of odors during its storage and transport to the wastewater treatment plant. As the waste mix in the landfill begins to degrade, it has the potential to generate landfill gases, such as methane and hydrogen sulfide (H_2S). NEWSME has an active program to manage the above sources of landfill-related odors and limit off-site migration of odor sources. This will continue with the Expansion. NEWSME has an active Odor Complaint Management and Response Plan that describes the current odor control measures that will be implemented at 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 Volume IV of this Application.

The procedures employed by NEWSME to monitor for odors are described in the plan and include daily surveys around the active landfill areas and periodic surveys at surrounding residential areas. JRL also maintains six 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:

1. Adjacent to the perimeter fence line just south of Cell 5;
2. 2824 Bennoch Road, off Route 16 northeast of the landfill (Route 16 Monitor);
3. Approximately 1 mile north of the landfill on the access road (Access Road Monitor);
4. 4 West Coiley Road, off Route 43 southeast of the landfill (West Coiley Monitor);
5. At the Fort James House off Route 43 southwest of the landfill (Fort James Monitor); and
6. Off the Old Stagecoach Road northwest of the landfill (Stagecoach Monitor).

All six 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 detects 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 Expansion.

The Odor Complaint Management and Response Plan included in Volume IV, Appendix K will be followed during the operations of the Expansion cells. This plan will be followed during the operations of the Expansion cells. NEWSME has a dedicated incoming telephone line for complaints from the public related to any aspect of the JRL operations. This system will remain active during operation of the Expansion. The complaint telephone numbers are listed in the plan for both operating hours and during evenings and weekends. 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.

<u>For odor complaints:</u>

- 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
- Observed waste materials being accepted at time of complaint.

<u>For all complaints:</u>

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

Dust Control. Dust control measures that will be used for the 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 applying calcium chloride may be required on an as-needed basis and will typically be used only on internal cell access roads. Dust control measures will be applied as weather permits. The primary access road to the Expansion will be paved to reduce dust generation.

Ash received at the Expansion will be deposited on the active working area of the landfill and completely covered with sludge recovered from various wastewater treatment plants each day. If an adequate amount of sludge is not available, other materials (such as soil or wood chips) will be used to completely cover the ash each day. Ash received at JRL has been “quenched” at the point of generation and therefore it is not prone to being wind-blown. This also will be the case for the Expansion.

3.8 No Unreasonable Adverse Effect on Surface Water Quality

During the development and operation of the Expansion, NEWSME will not (a) 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, (b) discharge any pollutant without obtaining a license to do so pursuant to 38 M.R.S. § 413, (c) 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 (d) 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.

The Expansion design incorporates several features to protect the quality of surface water leaving the site. 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 both construction activities and clean surface water runoff from within the covered portion 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 stormwater detention basins, low velocity ditches, and stone check dams within on-site ditches (ref. Stormwater Management and Erosion Control Plans contained in Appendix J and K, respectively, of this document).

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 JRL. The SWPPP will be updated to include and address the expansion construction as the Expansion is developed. The current site's SWPPP is included in Appendix N. Therefore, the Expansion will not have an unreasonable impact on the quality of surface water.

3.9 No Unreasonable Adverse Effect on Other Natural Resources

The Expansion phases will not have an unreasonable adverse effect on other on- or off-site natural resources. The development of the Expansion will result in 2.04 acres of direct freshwater wetlands impact due to filling and 0.10 acres of clearing (non-filling) impacts related to clearing for a relocated perimeter fence and electrical line. The wetland filling impacts will be spread out over several different areas (see Figure 3-1). The impacted wetlands are not designated as Wetlands of Special Significance, as defined by 06-096 CMR 310.4. A total of 14 vernal pools were identified within and adjacent to the proposed expansion area; one vernal pool, located outside the Expansion's solid waste boundary footprint met the criteria to be considered a Significant Vernal Pool, (SVP). This SVP will not be directly impacted by project but vegetation clearing for the proposed relocated electrical line and fence will occur within the 250-foot critical terrestrial habitat surrounding this pool. This activity, which is greater than 100 feet from the Expansion, is covered by the Permit-by-Rule (PBR) standards of the NRPA. The PBR notification for this activity is in Volume V of the Application.

Volume V of this Application contains the combined NRPA Tier 3/Army Corp application, as well as a copy of the Permit by Rule notification described previously. Contained within Volume V are 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 unavoidable wetland impacts. The compensation plan includes the on-site preservation of a contiguous 266 total acres and includes approximately 57 acres of wetlands and 25 documented vernal pools.

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

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. A detailed description of the surficial soils within the 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 "Maine Erosion and Sediment Control BMP Manual" (BMP-MEDEP, 2003). A comprehensive Erosion and Sedimentation Control Plan (ESCP) has been developed in accordance with the BMPs and is attached as Appendix K 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 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. Both temporary measures (e.g., silt fences, temporary seeding, mulching, and stone check dams) and permanent measures (e.g., downspouts, sedimentation ponds, permanent seeding, mulching, and culvert inlet and outlet protection) will be part of the Expansion development and will be monitored on a regular basis by the construction contractor and/or NEWSME (whichever entity is performing the construction activity) to ensure that structures are functioning properly and erosion control measures are implemented in accordance with the plan. The phased development of the 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 consistent with the BMPs and based on historical site-specific application rates.

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 MEDEP Rules for a solid waste landfill expansion, and demonstrates that no unreasonable risk of a discharge to a significant groundwater aquifer exists. The Expansion does not overlie a significant sand and gravel aquifer or pose an unreasonable threat to the quality of a significant ground water 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 Expansion (Maine Geological Survey 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 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 outside the southeast side of the Expansion at MW-06-01, MW-213, P-08-09, and P-08-10 greater than 100 feet from the proposed 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 more recent investigations for the 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 JRL. This limited zone is not mapped by MGS as a regional stratified sand and gravel deposit. However, because of its stratified sandy texture, and because it could be capable of providing sufficient water for domestic use, the potential for the Expansion to pose an unreasonable threat to this deposit was evaluated.

Groundwater from bedrock beneath, directly adjacent to, and immediately downgradient of the Expansion site is not likely to be used for domestic consumption because the land surrounding and immediately downgradient (i.e., within 400 feet) of the Expansion's solid waste boundary is owned by the State. However, because off-site bedrock, immediately adjacent to the site property boundary could be used as a water supply, the potential for the Expansion to pose an unreasonable threat to an off-site bedrock well was also evaluated.

The potential for the Expansion to pose an unreasonable threat to both these formations (i.e., the on-site stratified sand and off site bedrock) 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 7, and Volume III, Section 4.0 of this Application, respectively. These analyses demonstrate that, because of the Expansion design, with its imported clay layer, redundant secure liner systems, and the site setting, the facility poses no unreasonable risk that a discharge to a significant groundwater aquifer will occur.

3.12 Adequate Provision for Utilities and No Unreasonable Adverse Effect on Existing or Proposed 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 buildings, and at the current office building, will continue to be used by on-site landfill personnel. With the development of Landfill Cell 12, the scales and office building will be relocated to the location shown on Figure 1-2, and this facility will be served by a well and on-site disposal system design and installed as part of that development. 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) will continue to be met by the water supply sources for the existing facility. Leachate generated by the Expansion will continue to be treated at the Expera Specialty Solution Mill in Old Town or the City of Brewer wastewater treatment plant. Copies of the current leachate disposal contracts and permits are attached in Appendix L of this document.

The existing JRL facility has three-phase, 480-volt-power service which enters the site along the existing site access roadway. As part of this project a portion of this line, approximately 3,700 feet, will be relocated as shown on Figure 1-2. The Expansion leachate pump stations also will require three-phase, 480-volt power, which will be supplied to each pump station via on-site electrical cables that will run along the site access roads.

3.13 Not Unreasonably Cause or Increase Flooding

The 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 M of this document, 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. Appendix J of this document contains a Stormwater Management Plan for the 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 BGS and NEWSME will develop and operate the Expansion consistent with the State's solid waste management hierarchy (hierarchy), and promote and encourage waste reduction measures and maximization of the waste diversion efforts of 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). For many of the wastes proposed for disposal in the Expansion, there are no viable waste management techniques, which are higher on the hierarchy, that can effectively handle the volume of these materials generated in the State.[11] The ultimate 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 engages in, and encourages generators to manage their solid waste by taking advantage of opportunities to reduce, reuse, or recycle their waste using environmentally sound material management methods, including, in some cases, at JRL.

Illustrations of this include:

1. Casella Recycling, LLC's, a sister company to NEWSME, Zero-Sort® processing facility in Lewiston Maine which opened in 2014. Zero-Sort® is a single-bin recycling service where all recyclables (i.e., paper, cardboard, plastic ,glass and metals) are placed in a single bin by the generator and then, at the Lewiston processing facility, they are sorted, separated, baled and shipped to recyclers. This investment in recycling processing in Maine supports the hierarchy by providing a location for residential, commercial and industrial sources of MSW to recycle this waste. In 2014, 52 Maine municipalities, and 3,200 Maine businesses participated in Casella's Zero-Sort® program and recycled a total of about 87,700 tons of recyclable materials. The Lewiston facility is currently processing an average of 2,450 tons per month. The non-recyclable residuals from this facility, approximately 9 percent of the waste stream received, is sent to the Mid Maine Waste Action Committee (MMWAC) incinerator in Auburn for incineration, and the ash from MMWAC delivered to the Lewiston landfill. In the event that the MMWAC facility can't accept the residual, Casella has an agreement with ecomaine in Portland to accept this residual for incineration. The ash generated from incinerating this material would be placed in the ecomaine landfill. These activities support the hierarchy by recycling and reducing the volume of waste which is land disposed in the state and at JRL.

[11] 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.

2. Casella Organics, a sister company to NEWSME, manages programs to compost and land apply organic wastes and is responsible for helping its customers maximize the diversion of waste from landfill disposal as allowed by applicable rules and market conditions. For these customers, Casella Organics only landfills wastes that have physical or chemical properties that preclude them from being beneficially reused or land applied, or when issues such as a lack of site access or lack of reuse/recycling outlets for these materials preclude the wastes from being beneficially reused. For example, in 2014 Casella Organics managed a total of about 12,700 tons of wood ash from the ReEnergy Fort Fairfield Biomass Power Plant. About 72 percent of this ash was land applied throughout central and northern Maine and the rest was taken to JRL for at least one of the reasons described. Ultimately, however, even the ash that had to be landfilled was used in the operations of JRL as a bulking agent or as daily cover, avoiding the need for NEWSME to use non- waste materials (virgin soil) in these applications. Additional details on similar programs and how JRL is operated in a manner consistent with the hierarchy are summarized below.

NEWSME also will focus on utilizing by-products and residuals from waste processing facilities as beneficial use and recycling in daily operations of the Expansion in the same manner as currently used at JRL. This reduces the amount of landfill capacity consumed by non-waste materials (e.g., virgin soil) that are required by the Rules for daily cover. About 30 percent of the waste that is accepted at JRL is used in landfill operations in this manner as alternate daily cover.[12] These materials include ashes, short paper fiber, and CDD fines.

As new and alternative methods become available to recycle, process, or reuse wastes that have historically been landfilled or incinerated within the State, the Expansion will be available to handle any residuals or by-pass 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 residuals and by-pass, and ultimately reduces the amount of

[12] MEDEP evaluated the amount of alternate daily cover materials used at JRL, in comparison to the only commercial landfill in the State, the Crossroads landfill in Norridgewock, and concluded that the two landfills use a similar amount of daily cover. (See page12 of Department Order #0207000-W5-AU-N)

waste that is land disposed. These new waste materials would only be accepted in the Expansion after receiving any required approvals from the MEDEP.

For each of the major waste categories that are disposed at JRL, and are anticipated to continue to be disposed of in the Expansion, there are a number of factors that affect the feasibility of diversion from disposal at JRL. These materials have been the subject of waste reduction and recycling efforts prior to delivery at JRL to the maximum extent practicable. These efforts and the future metrics for measuring the effectiveness of diversion efforts are described by waste type below. These practices would continue during the Expansion.

Construction and Demolition Debris

CDD received at JRL comes from a number of sources in Maine, including some that are owned and operated by Casella companies other than NEWSME. In 2014, sources owned and operated by Casella companies delivered about 87,324 tons of CDD material to the JRL. At these transfer stations and processing facilities, materials such as clean wood and metal are removed and sorted from CDD received at these facilities. In 2014, the total amount of clean wood and metal removed at these facilities was 3,335 tons. This material is recycled and not disposed of at JRL. At the JRL wood waste handing area, a total of 46 tons of clean wood and stumps were received at the facility in 2014. These materials were ground and recycled as alternative landfill daily cover. It is anticipated these materials will continue to be utilized in the same manner for the Expansion.

The relevant metrics to evaluate effectiveness of the Casella controlled/operated transfer stations in removing CDD from the waste stream taken to JRL will be the tons of clean and processed wood and metal removed from the CDD (to the extent they are in the CDD received in the first place) prior to its being taken to the JRL. Also included in this metric will be the amount of CDD Casella has directed or supplied to processing facilities, such as the ReEnergy processing facility in Lewiston. The relevant metric to evaluate the effectiveness of these programs is the total tons of these materials that have been diverted from landfill disposal.

Front-End Process Residue

Front-End Process Residue (FEPR) currently received at JRL, and also expected to be received in the Expansion, come from one source, the PERC incinerator in Orrington. This material is a residue from MSW incineration, a waste management process that reduces by approximately 62 percent, the tonnage of waste requiring landfill disposal. FEPR is generated at the front end of this refuse-derived fuel (RDF) MSW incinerator, which mechanically removes about 20 percent of the non-combustible fraction of MSW prior to combustion of the RDF.

FEPR is used at JRL in the soft layer installed at the base of newly constructed landfill cells to protect the landfill liner by maintaining a minimum 5-foot separation between the liner and more coarse waste materials, such as CDD, that could puncture the liner system. This practice will continue with the Expansion cells. Other potential uses of FEPR are not within the control of NEWSME or BGS. Under current solid waste management practices allowed in Maine, secure landfill disposal is the only other available management practice for FEPR.

Municipal Solid Waste Incinerator Ash and Multi-Fuel Boiler Ash

MSW incinerator ash and multi-fuel boiler ash are disposed of at JRL, a practice that will continue with the Expansion. The use or reuse of MSW incinerator ash is not allowed by MEDEP regulatory standards for beneficial use because of its chemical characteristics. Therefore, there are no currently management alternatives other than secure landfill disposal for MSW incinerator ash.

The same is true for multi-fuel boiler ashes, although some of these ashes (i.e., clean wood ash) can be and are land applied in accordance with the MEDEP Rules, or used in the production of flowable fill. Although not, strictly speaking, within NEWSME's control, NEWSME's sister company, Casella Organics, promotes and develops programs to reuse and recycle suitable clean wood ash, and thus divert it from landfills. Casella Organics continues to develop new opportunities for these materials. As noted above, Casella Organics managed a total of about 12,700 tons of wood ash from the ReEnergy Fort Fairfield Plant in 2014. About 72 percent was land applied, in accordance with

MEDEP rules, throughout central and northern Maine. The rest was taken to JRL because additional utilization sites were unavailable. Casella Organics is also working with other generators of wood ash to develop ash utilization (land application) programs, including the ReEnergy incinerator in Ashland, Maine. These programs will continue to exist in concert with disposal in the Expansion of any remaining boiler ash, which cannot be utilized, due to chemical and physical properties, lack of alternate uses, or lack of access to utilization sites. The relevant metrics to evaluate effectiveness of these programs is the total tonnage of the materials that are reused or recycled. Casella Organics is continually exploring new options to increase the amount of ash materials that are diverted from JRL and other landfills.

It is also noteworthy that, within the operation of JRL, all the various ashes received at the facility play an important part in overall landfill operations by providing another source of material that can be used as daily cover and for odor control. Use of the ash in this way helps to eliminate the need to use non-waste material (i.e., virgin soil) as daily cover. This will continue in the Expansion.

CDD Processing Fines

CDD processing pines received at JRL currently come from several sources, including the ReEnergy CDD processing facility in Lewiston and the ARC facility in Eliot. This material is the residue from processing of CDD and is used as landfill grading, shaping and cover material. CDD processing fines will be used in the Expansion in a similar manner, which is a recycling activity as defined by 38 M.R.S. §1310-N.5-A.B.2, and therefore consistent with the hierarchy. The amount of this material recycled is maximized as it will be used as daily cover in operation of the Expansion. For example, in 2014 about 126,000 tons of this material was received at JRL and used in daily cover applications. If this material were not used as part of the Expansion operation, other sources of cover, including virgin soil, would have to be used. In addition, there are no other solid waste management techniques allowed in Maine to manage CDD processing fines other than reuse as daily cover or disposal in secure landfills.

Therefore, the use of the CDD processing fines as cover material both promotes the reuse and recycling of CDD by providing an outlet for CDD process residuals, and allows material substitution as part of routine landfill operations. The use of this material as cover material is a recycling effort that is sufficiently within the control of NEWSME; thus, the amount of this material used as daily cover (as opposed to that which is disposed) is the metric to evaluate the effectiveness of this recycling effort and it will be reported in the annual reports for the facility.

Oversized Bulky Wastes

Because of the very low volume of this material expected to be disposed in the Expansion (similar to historical amounts: about 50,000 tons per year), Oversized Bulky Waste (OBW) will have minimal impact on capacity consumption. This material is usually not generated by entities within the control of NEWSME or BGS. There are no currently viable mechanisms for the reuse, reduction, or recycling of OBW that are within the control of the BGS or NEWSME.

Municipal Wastewater Treatment Plant Sludge

Municipal wastewater treatment plant sludge (MWTPS) accepted at JRL, and also proposed for acceptance at the Expansion, comes from Maine communities with wastewater treatment plants. MWTPS is a byproduct of the wastewater treatment process. Although not the generator of this sludge, NEWSME's sister company, Casella Organics, promotes and develops programs to land apply and compost suitable sludges and continues to explore alternative sludge management opportunities for these communities. In 2014, Casella Organics diverted a total of 44,256 tons of class B biosolids and other material from landfill disposal at JRL and other landfills into 29,068 tons of high quality Class A compost and mulches under the Earthlife ™ brand name. There are practical limitations, however, on the amount of MWTPS that can be land applied (e.g., quality of the sludge and the available acreage suitable for land application, based on regulatory requirements and desires of landowners) and/or composted (e.g., processing capacity limitation such as at Casella Organics' Hawk Ridge composting facility in Unity Plantation). MWTPS from Maine sources in excess of these limitations must be disposed in a secure landfill. These recycling and composting programs will continue to exist in concert with the disposal of MWTPS in the Expansion. Casella Organics is continually exploring new options to increase the amount of sludge that is diverted from landfilling. The metric to evaluate the effectiveness of the MWTPS utilization will be a comparison of the overall amount of MWTPS managed by Casella Organics compared to the amount disposed in the Expansion.

Industrial Wastewater Treatment Plant Sludge and Residuals

Similar to MWTPS, industrial wastewater treatment plant (IWTP) sludge and residuals accepted at JRL and expected to be accepted in the Expansion come from Maine industries with wastewater or process treatment plants. IWTP sludge and residuals are byproducts of the wastewater treatment process. It is the responsibility of the generator to reduce and recycle this waste material to the maximum extent practicable. Nevertheless, NEWSME's sister company, Casella Organics, promotes and develops programs to land apply and compost suitable IWTP sludge and residuals and continues to explore opportunities for these wastes. In 2014, Casella Organics handled about 42,000 tons of short paper fiber from the Cascades Auburn Fiber pulp mill in Auburn, Maine. All but about 8,000 tons was diverted from disposal at JRL to beneficial uses. Although limited by some of the same practical issues that limit the volume of MWTPS that is diverted from landfilling, these programs will continue to exist in concert with IWTP sludge disposal in the Expansion. The relevant metric to evaluate the effectiveness of these programs is the total tons of these materials that are reused, recycled or composted, compared to the total amount of IWTP accepted at JRL. Casella Organics is continually exploring new options to increase the amount of IWTP sludge diverted from landfills, including JRL and the Expansion.

Contaminated Soils and Oil Spill Debris

Contaminated soils and oil spill debris accepted at JRL, and expected to be accepted in the Expansion, are typically waste materials for which limited reuse opportunities are available due to either the physical and chemical characteristics of the waste or practical limitations confronting the generator, such as cost of transportation which can be significant, and time and expense associated with receiving regulatory approval for alternate uses. The generators of these wastes reduce the amount of these materials that are landfilled to the maximum extent practicable by attempting to limit their generation in the first instance. Some such spills and releases are accidental or even unlawful and, when they do occur, are managed in accordance with regulated practices, such as via oil spill prevention, control, and countermeasure plans (SPCCs). In addition, generators also reduce the amount of these materials by seeking out and implementing other options available to handle these materials within the limits of various regulatory standards and directives. Some of these materials can be used in construction projects either at the source or in an alternate secure setting. Such uses are controlled and regulated by the MEDEP. The decisions on alternate uses of these waste materials, rather than placing them in the Expansion, are within the control of the generator, and not within the control of BGS or NEWSME.

Examples of wastes which are included in this category are urban fill soils and debris. These materials range in scope and composition and may be landfilled for a number of regulatory and commercial reasons, such as either the generator's or MEDEP's desire to have the waste managed in a secure landfill. Only about 6,500 tons of these materials were landfilled at JRL in 2014, about 1 percent of the total tonnage taken at JRL in 2014, and it is expected that this will continue to be a limited waste stream in the Expansion.

Miscellaneous Special Wastes

The generators of miscellaneous special wastes typically reduce the amount of these materials that require landfilling to the maximum extent practicable by seeking other options available to handle these materials within the confines of various regulatory standards, and practical considerations such as cost and transportation. An example of a material that may be diverted from the Expansion would be spoiled food waste. The decisions on alternate uses for these materials are within the control of the generator, not within the control of BGS or NEWSME. Additionally, many of the miscellaneous special waste streams are handled through individual waste stream permits (one-time or ongoing) for which there are no other management alternative to secure landfilling. An example would be pigeon waste.

MSW Bypassed From a Maine MSW Incinerator

All Maine MSW incinerators are required, as a condition of their disposal facility licenses, to provide for alternate disposal (bypass) in the event that the MSW delivered to the incinerator is in excess of its ability to accept, process, and combust that waste. The decision to bypass and where the bypass is disposed is made by the incinerator, and is not within the control of BGS or NEWSME.

The ongoing waste reduction/recycling efforts cannot completely accommodate or eliminate the future waste disposal needs of the State with current technology. As stated previously for many of the waste materials that are proposed to be accepted in the Expansion there are limited or no practicable waste management alternatives for communities and users of JRL which are higher on the hierarchy. For example, most of the wastes proposed to be accepted in the Expansion could not be practicably incinerated for several reasons including the incinerator's solid waste and air permit requirements; the waste's chemical or physical characteristics; the availability of incinerations facilities; and the limitations associated with processing the materials.

4.0 MEDEP REG. CHAPTER 400.5 - PUBLIC BENEFIT DETERMINATION

The Expansion received a PBD from the MEDEP (#S-020700-WS-AU-N) on January 31, 2012. That decision was upheld on appeal to the Maine Board of Environmental Protection on July 19, 2012. The approval was for 9.35 million cubic yards of additional JRL capacity, the volume proposed in this Expansion application. A copy of the Department Order is contained in Appendix A-8. The 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. These include ownership, capacity, and waste types that will be disposed of in the Expansion.

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. Table 5-1 summarizes the ten major waste categories proposed to be landfilled in the Expansion, their tonnages, and the percent of the overall Expansion tonnages. Table 5-1 also identifies for each material: 1) whether the material is a residual from a processing facility that has reduced the amount of material that would be landfilled; 2) whether the material is subject to recycling efforts, voluntary or otherwise, prior to disposal; and 3) how the Maine Materials Management Plan (MEDEP 2014) identifies the waste management techniques available to handle the material.

TABLE 5-1

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 is 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	Percent of Total Tonnage				
Waste Treatment Plant Sludges and Biosolids	70,000	10	No	Yes	L	H,L,N,N/A
Contaminated Soil	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 Process 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
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 Material 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.

As shown in Table 5-1, of the materials proposed to be landfilled in the Expansion, it is expected based on past disposal data that 44.2 percent will be residuals from a processing facility that reduces, prior to disposal, the amount of material landfilled, and 70.5 percent will be materials subject to recycling efforts at their source prior to landfilling or at the landfill itself.

To evaluate consistency with the recycling provisions of the State Plan, Table 5-1 presents the State Plan rankings of the current management methods for these materials for not only landfill disposal, but also source reduction, recycling, composting, and beneficial reuse. As shown on Table 5-1, nearly 90 percent of the materials, by tonnage, have a high or medium ranking for landfill disposal, meaning disposal is either the primary or a significant material management technique available in the State to handle the materials.[13] Only 10 percent of the materials proposed to be accepted in the Expansion have a high ranking for recycling. These materials include wastewater treatment plant sludges, for which a NEWSME sister company, Casella Organics, actively participates in composting and reuse at its Hawk Ridge Facility in Unity, Maine. As described in Section 3.14, in 2014 Hawk Ridge handled about 44,256 tons of biosolids and other waste materials, manufacturing 29,068 tons of high quality, Class A compost and mulches under the Earthlife ™ brand name, compared to the 38,000 tons disposed of at JRL in 2014.

Therefore, the materials proposed to be placed in the Expansion for which a processing or recycling method is available will be reduced or recycled to the maximum extent practicable. See also the discussion on consistency with the waste management hierarchy, including multiple source reduction and recycling measures, in Section 3.14.

[13] The State Plan does not include CDD fines in its evaluation. Use of these materials as daily cover is considered recycling in the State of Maine (Maine Solid Waste Management Act, 38 M.R.S. § 1310-N(5 A)(B)(2)).

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 CMR 400.7.B(2), BGS and NEWSME notified the municipal officers of the City of Old Town and the Town of Alton via certified mail on May 1, 2015, of their intent to file a solid waste Application with the MEDEP. The notice sent to the City of Old Town 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. The notice sent to the Town of Alton informed Alton that they will be granted automatic intervenor status if the Town requests such status. However, Alton is not entitled to a municipal intervenor grant pursuant to 38 M.R.S. §1310-S(4) if it intervenes, because (a) pursuant to paragraph 1.d of the Community Benefits Agreement, dated October 6, 2005, between SPO (which preceded BGS as the owner of the JRL), NEWSME and the Town, the Town agreed, among other things, not to seek grant monies or other payments from NEWSME or the State beyond the community benefit fees provided for in the Agreement and (b) Alton is not a host municipality for JRL as the Town agreed in Section 3 of the Agreement. This correspondence is contained in Appendix O.

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 the City of Old Town, and the Community Benefits Agreement with the Town of Alton are attached in Appendix O. These agreements are in effect and will remain in effect during the Expansion.

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

Only non-hazardous solid waste permitted by the MEDEP will be accepted within the 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 any and 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 CMR 400.10(C), Appendix P of this document contains the current certificate of insurance that NEWSME maintains for the JRL facility. During the operation of the Expansion, NEWSME will provide a similar certificate of insurance in the Annual Report.

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,[14] NEWSME uses a surety bond as financial assurance for closure and post-closure care, as provided in the OSA and permitted under 06-096 CMR 400.11.A(4).

Pursuant to 06-096 CMR 400.11.A(4), NEWSME maintains a surety bond 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 costs 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 C-2. The yearly updates of both costs and funding agreements will continue during the development of the Expansion.

[14] 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 CMR 400.12, are provided in Appendix Q.

11.0 MEDEP REG. CHAPTER 400.13 - VARIANCES

Development of the Expansion will not require a variance from any of MEDEP's criteria for siting, design or operation. Two variances, both related, are being requested to the construction techniques contained in 06-096 CMR 401.2.D.(1)(g)(iv) and 06-096 CMR 401.2.D(3)(e), that soil placed for the barrier soil layer of the liner, and in preparing the base soil below the liner, respectively, be placed with "maximum allowable compacted lift thickness of 9 inches." The proposed change is to allow these materials to be placed in one lift with a compacted lift thickness of 12 inches. This variance is supported by past and current site practices (i.e., construction of existing landfill Cells 7, 8, and 9) 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. As part of each of these construction projects, a test pad program was completed demonstrating the current available construction techniques used to compact these soils and achieve the performance criteria (i.e., densities, moisture content, and hydraulic conductivity) required by the Rules. A similar test pad program will be undertaken during each Expansion cell construction project. The procedures identified for the test pad construction are described Volume III Section 3.10 of the Application. 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.

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

12.1 Performance Standards

The 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:

1. The Expansion will not contaminate groundwater outside the solid waste boundary;
2. The Expansion is located greater than 10,000 feet from any airport runway and therefore does not pose a bird hazard to aircraft;
3. Travel time to sensitive receptors from the bottom of the 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 Expansion will be greater than three years;
4. The Expansion will not pose an unreasonable threat to sensitive receptors; and
5. The disturbance of soil material for the 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 Project 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 Expansion that protect against groundwater contamination include:

A. Soils that underlie the proposed Expansion consist of dense glacial till. The average till soil thickness between the landfill base grade and bedrock will be about 25 feet with the depth ranging from 2 to 62 feet.

B. 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 Expansion and surrounding properties, and the proposed site design.

C. The bedrock beneath the 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 2.6.

D. 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.

E. 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 Expansion is designed to contain and collect leachate generated by the facility. Therefore, the proposed siting and design of the Expansion and the proposed improvements are such that the Expansion will not contaminate groundwater or surface water. Details of the 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 13,000 feet from the Site. Therefore, the solid waste boundary is greater than 13,000 feet from the airport, well beyond the 10,000 setback required for turbojet aircraft.

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 7.0. Site-sensitive receptors were identified based on the definition contained in 06-096 CMR 400.1 of the Rules. Based on the Expansion site setting, seven site sensitive receptors were identified for the Expansion : 1) A sandy zone southeast of the Expansion; 2) Hypothetical Groundwater Supply Well at Closest Property Boundary on Eastern Side; 3) Hypothetical Surface Water Discharge to the East, an area which drains to an unnamed tributary to Judkins Brook; 4) Surface Water Discharge to the Southwest, to an unnamed tributary to Pushaw Stream; 5) Hypothetical Groundwater Supply Well at Closest Northern Corner of Property Boundary on Western Side 6) Hypothetical Groundwater Supply Well at Closest Southern Corner of Property Boundary on Western Side; and 7) Hypothetical Surface Water Discharge to the northwest, an area which drains to an unnamed tributary to Pushaw Brook.

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. Travel times were calculated for the existing and developed conditions. The time of travel to sensitive receptors from the bottom of the Expansion exceeds the six year travel time requirement in the Rules. The travel times from the 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 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.

Three hypothetical failure scenarios in the engineered systems were evaluated based on the design of the Project:

1. Landfill liner systems, including the primary and secondary liner systems, were assumed to have been completely eliminated and leachate allowed to drain directly into the underlying soils at a rate of 92 gallons per acre per day (gpad) controlled by the hydraulic characteristics of the imported clay soils that will be present under the entire landfill base. This analysis evaluated the worst-case scenario assuming that the leak would be continuous for an indefinite period of time.
2. Leakage through the secondary liner was assumed to be at a rate of 4.6 gpad, which corresponds to ten times the leakage rate through the secondary liner, assuming three design holes in the secondary liner and a one-foot head on the secondary liner system. To show a reasonable worst-case potential impact, it is assumed that this leakage rate is continuous for an indefinite period of time.
3. 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 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 Section 2.0 of Volume III, the soils disturbance within five feet of the bedrock surface will be limited to clearing and grubbing the site’s upper-most vegetative and organic soil layers prior to placement of the imported soil layer. In addition, extensive site monitoring, as described in Section 6.0 of Volume II, relies on a combination of monitoring of the leak detection system and the proposed 43 new monitoring locations consisting of wells, piezometers, and surface water monitoring points. This program allows the performance of the Expansion to be monitored separately from the existing JRL.

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:

1. 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 6.0 and Volume IV, Appendix I of this Application).
2. Wells and piezometers will be maintained in operating condition during the entire Application and review process.
3. 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 E of this Application).
4. Because the 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 R.
5. 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 J of this Application).

14.0 MEDEP REG. CHAPTER 401.2.A – GENERAL INFORMATION

A site and surroundings map is contained in Appendix M of this document. The site and surroundings map shows the 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 2, 2015, which provide the stereo coverage of the area within 2,000 feet of the perimeter of the facility site, are contained in Appendix S. The scale of the photographs is one inch equals 500 feet. On one photograph, the proposed facility site boundary and property boundary are clearly outlined.

REFERENCES

Borns, H.W., Jr., and W.B. Thompson, 1981. Reconnaissance Surficial Geology of the Orono Quadrangle, Maine. Open-File No. 81-6, Maine Geological Survey, Augusta, Maine.

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

APPENDIX A-1

MEDEP CURRENT FACILITY SOLID WASTE ORDER, AND OPERATING SERVICES AGREEMENT

IN THE MATTER OF

STATE OF MAINE, ACTING THROUGH THE	)	SOLID WASTE ORDER
STATE PLANNING OFFICE	)	
OLD TOWN, PENOBSCOT COUNTY, MAINE	)	
VERTICAL INCREASE and	)	
ADDITIONAL WASTE STREAMS	)	
#S-020700-WD-N-A	)	
(APPROVAL WITH CONDITIONS)	)	AMENDMENT

Pursuant to the provisions of Resolve 2003, Chapter 93; 38 M.R.S.A. Section 1301 et seq.; and 06-096 CMR Chapter 400 et seq., Solid Waste Management Regulations, effective September 6, 1999, the Department of Environmental Protection ("Department") has considered the application of the State of Maine, acting through the State Planning Office, with its supportive data, staff review comments, and other related materials on file and FINDS THE FOLLOWING FACTS:

1. APPLICATION SUMMARY

   A. Application: The State of Maine, State Planning Office ("SPO" or "the applicant") is applying for an amendment to the original license for the West Old Town Landfill ("WOTL" or "the landfill"); SPO seeks to increase the approved final elevation of the landfill without increasing the horizontal footprint of the landfill, and to dispose of additional waste streams in the landfill.

   B. History: The WOTL was licensed by the Board of Environmental Protection on July 28, 1993 as a 15-cell generator-owned landfill for the disposal of pulp and papermaking residuals generated at the Fort James Operating Company's mill in Old Town. Summaries of information on the siting and design of the landfill are contained in the landfill license, DEP #S-020700-7A-A-N ("the original license"). The licensed footprint of the WOTL, including the accessory structures, is approximately 68 acres; it sits on a parcel of land approximately 780 acres in size.

      In summary, the landfill is situated on an area of deep glacial till soils with an average fines content of 58% passing the No. 200 sieve. The average till thickness is approximately 30 feet, and after excavation and grading to the proposed base grades of the landfill a minimum of 10 feet of soil above bedrock will remain in all areas. The bedrock consists of metasediments that are generally competent and occasionally fractured; there was no mapped or observed faulting in the bedrock beneath the site. The site does not overlay, or lie adjacent to, a mapped significant sand and gravel aquifer, nor a mapped high-yield bedrock zone. The proposed facility was found not to cause an unreasonable threat to a significant sand and gravel aquifer, or to a fractured bedrock aquifer. The closest water supply well is located approximately 1500 feet west of the site across a bog and stream, and on the other side of a topographic ridge. The landfill was located on the property in an area where seepage gradients and the site's topography hydraulically isolate it from the regional ground water systems and existing water supplies.

The landfill began operation in December 1996, and cells 1 and 2 have been developed. In addition to the wastes from the Old Town Mill, bottom ash from the Lincoln Pulp and Paper Mill in Lincoln, Maine and burn pile ash from the City of Old Town's transfer station are licensed for disposal in the landfill. Fort James Operating Company is a wholly owned subsidiary of Georgia-Pacific Corporation ("GPC"). The landfill has a composite liner system, and leachate is stored in a pond with a double liner system. Approximately 300,000 tons of waste has been disposed in the landfill. No complaints from the public about any aspect of the landfill's operation were received by the Department prior to the submission of this application.

In April 2003 GPC shut down 2 tissue machines and 13 converting lines at its Old Town Mill. Through negotiations with the Office of the Governor, GPC agreed to continue operation of its mill in Old Town, Maine under certain conditions. One of the conditions was that the State of Maine purchase the company's West Old Town Landfill, and provide disposal capacity for the mill's wastes for a 30 year period. In June 2003, following a public hearing before the Legislature's Natural Resources Committee, the Maine Legislature passed Resolve 2003, Chapter 93 ("the Resolve"). The Resolve authorized SPO to purchase the WOTL from Fort James Operating Company, and to enter into any contracts necessary for the operation of the landfill; however, the landfill will continue to be owned and controlled by the State. SPO initiated a competitive bid process to select a long-term operator for the landfill. On August 18, 2003, SPO notified Casella Waste Systems, Inc. ("Casella") that it had been selected to be the long-term operator of the landfill, pending successful negotiation of mutually agreeable terms. Actual operations will be by NEWSME Landfill Operations, LLC ("NEWSME Operations"), a company in which New England Waste Services of ME, Inc., a Casella subsidiary, holds the sole membership interest. In accordance with the intent of the Resolve and the terms of the State's Request for Proposals ("RFP"), the operation of the landfill will remain revenue-neutral to the State.

SPO, Fort James Operating Company and GPC signed a purchase and sales agreement, dated November 20, 2003, for transfer of the ownership of the West Old Town Landfill from Fort James Operating Company to SPO; the purchase and sales agreement was executed on February 5, 2004**.** In addition, SPO and Casella signed an Operating Services Agreement ("OSA") on February 5, 2004. The purchase and sales agreement and the OSA state that the pulp and paper mill wastes currently licensed for disposal in the landfill will continue to be disposed in the landfill for at least 30 years, and that SPO will seek permits to expand the capacity of the landfill. Under the terms of the OSA between SPO and Casella, Casella will pay all costs associated with development, operational and closure/post-closure activities at the landfill.

On October 21, 2003, following public notice as required by 06-096 CMR Chapter 2, the Department issued conditional approval for the transfer of the licenses for the WOTL from Fort James Operating Company to the SPO (DEP #S-020700-WR-M-T and #L-019015-TH-C-T); the transfer became effective when the sale of the landfill to SPO occurred on February 5, 2004. No appeals were filed from this approval.

C. <u>Summary of Proposal:</u> SPO proposes to increase the licensed final elevation of the landfill from 270 feet (which would be about 60 feet above the original ground surface) to 390 feet. This vertical increase would result in the disposal capacity of the landfill being increased from the original estimate of 3.3 million cubic yards to an estimated 10 million cubic yards. In addition to the wastes currently disposed in the landfill (sludge from Fort James' Old Town Mill and ash from Lincoln Pulp & Paper), SPO proposes to dispose of the waste streams generated in Maine that are currently accepted for disposal at the Pine Tree Landfill in Hampden, Maine. These waste streams are the following: construction and demolition debris; the residues (ash, front-end process residue and oversized bulky wastes) generated by municipal solid waste ("MSW") incinerators located in Maine; a limited amount of MSW bypass from the incinerators; water/wastewater treatment plant sludge; and smaller amounts of miscellaneous non-hazardous wastes. The proposed vertical increase is expected to provide disposal capacity for approved waste streams for up to 15 years. After construction of a new cell is completed during the summer of 2004 and the additional wastes begin coming to the facility, the applicant estimates approximately 450,000 tons of waste per year will be disposed in the landfill; in the future, that quantity is estimated to potentially increase to 540,000 tons per year. In accordance with the RFP and the OSA between SPO and Casella, waste that is generated outside Maine will not be accepted at the landfill.

The applicant proposes to modify the approved design of the facility by using clay as the earthen part of the composite liner instead of glacial till; by placing a foot of compacted clay beneath the undeveloped portions of the landfill's footprint; by eliminating liner penetrations associated with the leachate removal system and instead installing leachate collection sumps and removal pumps above the liner system; by adding an above-ground storage tank to be used as the primary leachate containment system; and by installing an active gas extraction system as the landfill is developed. To increase the capacity of the landfill, an elevated soil berm will be constructed around the perimeter of the landfill, with the interior toe of the berm within the currently licensed solid waste boundary. The western portion of the berm will be mechanically stabilized using reinforcing geogrids.

The proposal is described in an application dated October 2003 and submitted to the Department on October 30, 2003, and includes several additional submittals prepared in response to comments on the application.

The application was accepted for processing on November 21, 2003. In addition to meetings held with municipal officials to discuss traffic impacts associated with the facility, a public informational meeting on the application was held on January 21, 2004. A written summary of the questions asked and the answers provided during the public informational meeting is part of the record. A draft license was made available to the public on February 17, 2004. The Department received written comments on the draft license and also participated in a public informational session on February 24, 2004; written comments submitted during that session are included in the record. The Department held 2 days of public sessions on the proposed project on March 29 and 30, 2004. Testimony under oath was accepted, and the sessions were recorded and transcribed. The transcriptions and copies of written comments submitted at these sessions are included in the record. The record was closed to receipt of comments on the application at the close of the last session held on March 30, 2004. The Department prepared a written summary of comments received throughout the processing of the application; this summary is included in the record. The application was reviewed by staff of the Department's Bureau of Remediation and Waste Management, staff of the Maine Department of Transportation, and the outside consulting firm Terrence J. DeWan & Associates. Mr. DeWan's firm provided the review of the updated visual impact assessment through a contract with the Department.

The Department finds that the applicant has provided a plan for all aspects of the development of the additional landfill capacity within the licensed footprint. As is typical, the applicant has not provided the detailed design packages required for construction. The applicable detailed design packages required by the Solid Waste Management Regulations ("Rules") and any information specifically described in the finding of facts below must be reviewed and approved by the Department prior to construction of the individual cells and any new ancillary structures for the landfill.

The Department received numerous comments from the public on the application, and on the State's transaction with GPC as a whole. Many of these comments, both in opposition to and in support of the transaction, were received on aspects of the transaction that are outside the purview of the Department's authority, and thus the Department cannot make findings of fact or conclusions of law on these issues. These aspects included the following issues: the legislative process, ending in the Resolve that authorized the purchase of the landfill; the RFP and bidding process that resulted in the selection of Casella as the operator of the landfill; the terms of the Purchase and Sales Agreement between GPC and the State of Maine, acting through the State Planning Office; the terms of the OSA between SPO and Casella; the establishment and duties of the Citizens Advisory Committee established by the Resolve; the host community benefits offered by SPO and/or Casella; the effect of the project on property values in the area; and the 80,000 pound weight limit on trucks using I-95, which results in heavy trucks using local roads.

The Department finds that this application for a vertical increase in the final elevation of the existing landfill is not an expansion of the landfill because solid waste will not be disposed beyond the boundaries previously licensed by the Department for solid waste disposal in the original license. The Department recognizes that under the terms of the RFP and the OSA, an application to the Department for an expansion of the landfill is required to be submitted. However, the applicant has not submitted an application for expansion or yet discussed its plans for submission of an expansion application; and thus no comments relating to development of the landfill facility beyond the vertical increase described in this application can be considered at this time.

2. PUBLIC PARTICIPATION

The Department received timely requests for a public hearing from the following 5 persons: the Town of Alton, Bruce Sidell, Oscar Emerson, William Lippincott, and the Maine Peoples Alliance. 06-096 CMR Chapter 2.7 states, in part, that "A request for a public hearing on an application must be received by the Department, in writing, no later than 20 days after the application is accepted for processing." The application was accepted for processing on November 21, 2003; thus, the 20 day period ended on December 11, 2003. On January 28, 2004, the Department notified all 5 persons that their requests did not include conflicting technical information, and thus their requests were denied because they failed to meet the standard for a public hearing in 06-096 CMR Chapter 2.7. The Department also received a timely request from the City of Brewer that the Board of Environmental Protection assume jurisdiction of the project and hold a public hearing; the City of Brewer withdrew its request on January 28, 2004 after its concerns with the traffic impacts associated with the project were addressed.

As noted in Finding of Fact #1.C, above, many comments were received by the Department that cannot be considered because they fall outside the Department's purview.

The majority of the remaining comments from people opposed to the project focused on issues related to traffic movement, ground water quality, visual impact of the facility, odors, the types of wastes to be accepted at the facility and Casella's civil and criminal record.

The majority of the remaining comments from people supporting the project focused on it being an existing and operating, well-sited landfill, and Casella's excellent records of operating facilities in their areas. Commentors also note that area residents' concerns were addressed during the original siting and licensing of the landfill, that operation of the landfill to date has not been problematic, and that the landfill will provide needed disposal capacity for the state.

As noted in Finding of Fact #1.C, above, the Department participated in several public meetings on the project: meetings were held on December 8, 2003 and December 16, 2003 with municipal officials to discuss the traffic impacts from the project; public informational meetings were held on January 21, 2004, February 24, 2004, March 29, 2004 and March 30, 2004.

Where applicable, comments on the project that are within the Department's purview are addressed in the appropriate findings of fact, below. In addition, a written summary of comments received throughout the processing of the application is included in the record.

3. DESCRIPTION OF SPO/CASELLA RELATIONSHIP

As described in Finding of Fact #1.B., above, the State of Maine SPO is the owner of the landfill and the applicant for this application. SPO advertised an RFP to operate the landfill. At the conclusion of that process, Casella was selected to be the long-term operator of the landfill. Actual operations will be by NEWSME Operations, a company in which a Casella subsidiary holds the sole membership interest. The terms and conditions of NEWSME Operations' operation of the landfill are established by the OSA, dated February 5, 2004, between SPO and Casella.

While SPO retains control of the landfill, in accordance with the Resolve and the OSA, Casella/NEWSME Operations will pay all costs associated with the development, operation, closure and post-closure care of the landfill. In addition, Casella/NEWSME Operations will establish and maintain financial assurance for the landfill sufficient to meet the closure and post-closure care provisions of the Rules, assume liability for the landfill under both the current (including past actions by GPC) and future conditions, and assure that adequate disposal capacity is provided for the wastes currently disposed in the landfill for a 30 year period.

Condition #6 of the order transferring the landfill licenses (DEP #S-020700-WR-M-T, dated October 21, 2003) from Fort James Operating Company to SPO requires that if Casella or a subsidiary of Casella is replaced as the operator, prior to finalization of a new OSA SPO must submit to the Department for its review and approval information on the financial capacity of the new operator, information on the financial assurance to be provided by the new operator consistent with Chapter 400.11 of the Rules or successor regulations in effect at that time, and information on the technical ability of the new operator.

The Department finds that in many instances the responsibility for submittals required by this license are placed on Casella/NEWSME Operations (or a successor operator) by the OSA. Therefore, reference to the applicant in this license refers to both SPO and Casella/NEWSME Operations (or a successor operator).

4. FINANCIAL CAPACITY

A. <u>Funding for development, operation, closure and post-closure care of the facility:</u> Under the provisions of the RFP and the OSA, Casella/NEWSME Operations is required to fund future development and operation of the landfill, and closure and post-closure care of the landfill. The application includes a letter demonstrating that monies are available to fund the construction proposed for 2004; thereafter evidence of financial capacity for construction costs is proposed to be demonstrated prior to each subsequent construction activity. Funds to cover facility operations and maintenance will be generated from facility tipping fees. Financial assurance will be provided as described in Finding of Fact #4.B, below. The Department finds that the applicant has demonstrated that it has the financial capacity to undertake the proposed project consistent with the State's environmental standards and laws with regards to the construction planned for 2004 and the operation of the landfill. The Department further finds that the applicant must demonstrate financial capacity for costs associated with construction of each additional cell; the information must be included in the detailed design package as required in Finding of Fact #11, below.

B. <u>Financial Assurance:</u> Casella/NEWSME Operations affirmed in a letter dated October 22, 2003 that it will initially fund a closure/post-closure care account through a trust account funded by a surety bond. In accordance with Chapter 400.11 of the Rules, the financial assurance mechanism will be submitted to the Department for its review and approval; the amount of the financial assurance will be based on the costs of a third party closing any developed areas of the landfill that have not received final cover, and conducting post-closure care and maintenance of the facility for at least 30 years after closure of the facility, in accordance with the Rules. The amount of financial assurance necessary to meet these requirements, and any changes in the financial assurance mechanism, will be calculated and adjusted annually during the operational period, and reported in the annual report for the facility. The Department finds that Casella/NEWSME Operations, as the operator of the facility and as required by the OSA, will 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, and post-closure monitoring requirements for a period of at least 30 years after closure of the facility, provided the financial assurance package submitted to the Department for its review and approval meets requirements of the Rules and Casella/NEWSME Operations updates it in accordance with the Rules on an annual basis.

5. TECHNICAL ABILITY

A. Description of Experience: The applicant provided information demonstrating the technical ability of both SPO and the selected operator, Casella, its subsidiary NEWSME, and NEWSME Operations. The application describes SPO's experience in siting, designing and licensing the Carpenter Ridge Landfill. It also describes the solid waste expertise of Casella and its subsidiaries, and its consultants and legal counsel. The application indicates the personnel currently responsible for operations at the Pine Tree Landfill in Hampden, Maine will be responsible for fulfilling the operating services contract at this landfill; the Pine Tree Landfill is consistently operated in substantial compliance with its licenses and the Rules.

The applicant retained a number of consultants in developing the application. Sevee & Maher Engineers, Inc. ("SME"), a firm specializing in waste management issues, was the primary consultant for the project. The applicant also retained SMRT, Inc. to prepare the visual impact portion of the application; Richard E. Wardwell, P.E., Ph.D. for work on the geotechnical aspects of the application; Sanborn Head & Associates for work on the active gas management system for the landfill; Eaton Traffic Engineering to prepare the traffic assessment portion of the application; Acentech Incorporated to prepare the section of the application that addresses potential noise impacts; and Odor Science & Engineering, Inc. for work on odor control measures for the facility.

The Department finds that the combination of SPO and NEWSME Operations personnel and the consultants retained by the applicant have the technical ability to develop the project in a manner consistent with State standards and laws.

B. Civil/Criminal Disclosure Statement: The applicant provided civil and criminal disclosure statements prepared in accordance with Chapter 400.12 of the Rules for SPO and Casella, including its subsidiaries and the individuals required to disclose under that regulation, in the transfer application approved by the Department on October 21, 2003; the Department did not require the applicant to provide another copy of that information in this application.

The Department received comments from the public on alleged environmental violations by Casella. Department staff ("staff") requested that Casella respond to the listing of violations; Casella provided information on each of the alleged violations. Letters from municipal and county officials praising Casella's management of many of the facilities listed in the comments have been submitted. Staff also contacted environmental enforcement staff in states where the violations were alleged to occur and discussed the list provided by the public. Staff comments that based on those conversations, and the submittals from Casella and the municipal and county employees, there is no reason to withhold this license due to Casella's civil or criminal record. Staff's evaluation of the nature, substance and severity of the violations, and state and local officials' assessment of Casella's willingness to correct violations demonstrate that, where Casella is found to have violated regulatory or license criteria, it will complete any required corrective actions.

The Department finds that the applicant filed an accurate Criminal/Civil Record, prepared in accordance with Chapter 400.12 of the Rules. The Department finds that the applicant has shown that past violations of certain environmental laws, as described in the application, will not prevent SPO from owning and controlling, and NEWSME Operations from operating, the landfill as proposed in this application in compliance with Maine laws and regulations in that Casella/NEWSME Operations has conducted the required corrective actions to resolve its previous violations.

6. TITLE, RIGHT OR INTEREST

The Department finds that the applicant has provided evidence of its interest in this project by submitting a copy of the purchase and sales agreement, dated November 20, 2003, between SPO and Fort James Operating Company. The closing on the transfer of the landfill property occurred on February 5, 2004. In accordance with Condition #2 of the transfer order (DEP #S-020700-WR-M-T, dated October 21, 2003), SPO submitted a copy of the deed to the landfill property within 30 days of its entry in the Penobscot County Registry of Deeds.

7. GEOLOGY AND HYDROGEOLOGY

A detailed description of the geology and hydrogeology of the site is contained in the original license; a summary of the siting characteristics is found in Finding of Fact #1.B, above. As confirmed during preparation of the application, the geologic and hydrogeologic characteristics of the site have not changed since the issuance of the original order and thus are not subject to the siting criteria of these Rules; however, in accordance with the Rules, the application addresses any impact the existing facility is having on water quality, affirms that groundwater flow directions and the upward seepage gradients have not changed in a significant way that would invalidate the landfill design assumptions, provides a calculation of time of travel to sensitive receptors from the bottom of the landfill and the leachate storage system, and includes a contaminant transport analysis.

A. <u>Groundwater Flow Directions:</u> Attachment 8 of the application includes a review of all groundwater data that has been collected at the site from 1991 when the original application was filed through September 2003. The applicant's consultant for this review, SME, reviewed the available groundwater information, and concluded that the phreatic groundwater surface has not significantly changed since the original application. Groundwater passing beneath the landfill continues to remain within the landfill property prior to discharge. Based on the orientation of bedrock foliation, it is suggested that the primary horizontal direction of groundwater flow in the bedrock is more or less the same direction as the interpreted direction of horizontal flow in the overburden. Groundwater in the bedrock continues to be interpreted as discharging into the stream along the westerly side of the landfill, due to the presence of a topographic hill south of the stream which significantly reduces the possibility of groundwater movement beyond it. The review of the information on vertical seepage gradients indicates groundwater continues to migrate downward in the upper portions of the site and tends overall to migrate upwards in the lower portions of the site.

All staff comments on the groundwater flow information for the site have been addressed. Based on the additional information submitted in support of the application on November 21, 2003, staff agree with SME's conclusions on groundwater flow directions and vertical seepage gradients.

The Department finds that the findings in the original license regarding the direction of groundwater flow have not changed as a result of the construction and operation of the existing landfill.

B. <u>Existing Groundwater Quality:</u> As noted in Finding of Fact #7.A, Attachment 8 of the application includes a review of all water quality data that has been collected at the site from 1991 when the original application was filed through September 2003. The site is currently monitored by 12 groundwater monitoring wells; the results from the 12 monitoring wells were analyzed for statistically significant increases. Nine of the 12 wells were found to have one or more parameters that varied over time based on the statistical analyses; of these 9 wells, SME concluded that only one, MW-204, was potentially affected by leachate. SME concluded the changes found in the other 8 wells were caused by well installation trauma or a source other than leachate in the groundwater, based on its review of the parameters for which a statistically significant change was found. With regards to the water quality changes noted in MW-204, SME noted that the well is a shallow till well located immediately adjacent to the leachate pond and the manhole used for emptying of the leachate pond for annual inspection. SME concluded the changes in MW-204 were likely attributable to small leachate spills in the vicinity of the manhole and leachate pond during emptying of the leachate pond for annual inspections, rather than directly into groundwater from the landfill or the leachate pond. SME's basis for its conclusions are described in detail in the application.

Staff conducted a comprehensive review of all water quality information available for the site, including the same historic water quality results compiled by GPC's water quality sampling consultant that were reviewed by SME in the application, the data gathered by the consultant GPC hired to perform a baseline analysis of conditions on the property just prior to its purchase by SPO, and data gathered from monitoring wells installed in January and February 2004 to resolve the source of changes in groundwater quality discussed during the review of the application. In an initial review memorandum dated December 16, 2003, staff noted that the water quality changes have occurred in 3 monitoring wells: MW-204, MW-223B, and MW-302. Staff agreed that the sources of changes noted in these wells could be those operational issues identified by SME in its report, but that the applicant had not provided sufficient evidence to conclude the landfill or the leachate pond were not the sources.

In response to the initial staff review memorandum, the applicant and GPC provided additional information concerning operational anomalies at the site, and 7 additional groundwater monitoring wells were installed by the applicant at the facility. Five of the wells are located between the landfill boundary and the leachate pond, and 2 of the wells are located downgradient of the leachate pond and/or in the vicinity of manhole #1. Staff oversaw the installation of the wells by the consultant, and staff took independent split samples from the wells. Up to 4 rounds of data have been collected from the new wells. Additional samples from the landfill underdrain, the leachate pond underdrain, and the leak detection system for the leachate pond were also taken during this period. Based on the information in Attachment 8 of the application and the new information gathered during review of the application, staff comment that, within the limitations of the data, a leak in the landfill liner system is not the source of the water quality changes noted in the initial staff memorandum regarding this project. Staff comment that the sources of the water quality changes are likely due to operational practices related to leachate management, such as the small surface spills documented to have occurred in the past. Staff recommend several operational changes which will eliminate the release of leachate. The applicant has agreed to the changes. Staff further recommend that additional investigations be conducted in Spring 2004 to monitor the performance of the facility's existing detention ponds, and that the ponds be included in the surface water quality monitoring program for the facility. The applicant submitted on April 1, 2004 a workplan for the additional investigation in the areas of the detention ponds; the workplan is under review by staff. Staff comment that the approved workplan should be revised to address staff recommendations and implemented as approved.

The Department finds that the subtle changes in groundwater quality observed in monitoring wells MW-204, MW-223B and MW-302 do not appear to be caused by leakage through the landfill liner system. The Department also finds that the applicant must submit to the Department for review and approval changes to the operations manual that address all staff recommendations; complete the investigation in the areas around and beneath detention ponds 1 and 2 in accordance with the workplan approved by the Department; and include the ponds in the surface water quality monitoring program for the facility. The Department further finds that the facility is not contaminating groundwater in that no primary drinking water standards have been exceeded, and no statistically significant changes in measured parameters indicating a deterioration in water quality have been demonstrated through an assessment monitoring program.

The Department received many comments from the public in reaction to staff's initial memorandum regarding the water quality assessment; no independent information on water quality was submitted by the public. The Department finds that, as noted in this finding, the comments on existing water quality have been addressed by the additional information gathered during the review process. The Department also received comments from the public on the hydrologic connection between the landfill and the City of Old Town's drinking water supply. As described in Finding of Fact #1.B, above, the facility is hydraulically isolated from private drinking water supplies in the area of the landfill. The City of Old Town's public drinking water supply is wells located in Stillwater and along Spring Street; there is no direct hydraulic connection between these wells and the groundwater beneath the landfill. The Department finds that the landfill does not pose an unreasonable threat to the public drinking water supply.

C. Existing Surface Water Quality: Attachment 8 also includes a review of the surface water quality data that has been collected at the site from 1991 when the original application was filed through September 2003. There are 3 surface water monitoring points (SW-1, SW-2 and SW-3) along the unnamed stream on the westerly boundary of the facility. The report notes that there were no apparent or significant changes in water quality at these locations. This stream is the sensitive receptor for the landfill; see Finding of Fact #7.D, below. Although labeled as a surface water monitoring location, SW-4 is actually the sampling manhole for the cells 1 and 2 underdrains; the report notes that the data from this monitoring point is comparable to upgradient monitoring locations. There are 3 surface water monitoring points along the entrance road into the landfill (SW-AR1, SW-AR2 and SW-AR3); the results from these locations also show no changes in water quality data over time. Staff concur with the applicant's conclusions regarding the historical surface water quality monitoring results.

The Department received comments from the public that baseline testing for biological indicators of water quality should be done at the site.

The Department finds that the facility is not contaminating surface water. The Department further finds that baseline surface water quality was established in accordance with the Rules before the landfill was developed and that the Rules do not include provisions for biological indicators testing.

D. Updated Time of Travel Calculations and Contaminant Transport Analysis: Updated time of travel calculations for the landfill prepared in accordance with the Rules are found in Section 7 of the application. Using available water level information collected at the site since 1991, the applicant calculated groundwater time-of-travel from the bottom of the landfill liner systems to the sensitive receptor for the site – the unnamed stream along the westerly boundary. The updated contaminant transport analysis, also prepared in accordance with the Rules, assesses the potential for an unreasonable threat to the unnamed stream at the westerly boundary of the landfill, and identifies operational and monitoring measures that would be utilized to ensure protection of the stream if contaminants were released to groundwater beyond the engineered systems.

The report modeled contaminant transport from within 3 areas of the landfill, the leachate storage tank, and the leachate force main in hypothetical failure scenarios. The results demonstrate that even under the unrealistic failure scenarios required to be modeled, the sensitive receptor in the vicinity of the landfill will not be threatened.

In response to initial staff comments on the time-of-travel calculations and contaminant transport analysis, SME recalculated some of the travel time analyses and hypothetical leachate containment system failure analyses for the entire flow path to the unnamed stream to the west, using the groundwater velocities in the bedrock submitted in the original application. Staff comment that the revised calculations show that the regulatory time frames are met.

The Department received comments from the public that the bedrock underneath the landfill is “cracked”. The Department finds that the entire State of Maine is underlain by fractured bedrock. The Rules require a detailed evaluation of underlying fractured bedrock aquifers to determine that a facility will not pose an unreasonable threat to an underlying fractured bedrock aquifer.

The Department finds that the applicant has demonstrated that the time of travel to the sensitive receptor for the landfill is greater than 6 years, and greater than 3 years for the proposed leachate force main and storage tank. The Department also finds that the contaminant transport analysis demonstrates that contaminant releases from the area within the solid waste boundary or the leachate management system will not pose an unreasonable threat to sensitive receptors.

8. WATER QUALITY MONITORING

The proposed environmental monitoring plan ("EMP") for the facility was prepared in accordance with the Rules and is found in Appendix H of the application. The applicant proposes to continue monitoring groundwater at the existing 12 monitoring wells, surface water at the existing 6 monitoring points, the underdrains for the landfill and the leachate pond at the existing 2 surface water points, and leachate quality. Monitoring will be done 3 times per year, using low flow methodology. The applicant proposed to continue monitoring for the existing detection monitoring list for the landfill, plus sulfide during the spring and fall sampling events, and for parameters on the expanded list for the landfill during the summer sampling event. The EMP describes the sampling procedures to be used, the quality assurance/quality control program, the submission of the data to the Department, and procedures for the abandonment of wells.

Staff proposed several revisions to the EMP to clarify that the EMP will require ongoing revisions as the facility is developed. Although the results from the new groundwater monitoring wells described in Finding of Fact #7.B, above, appear to corroborate the applicant's conclusions as to the source of the slight changes in existing water quality, staff recommend that assessment monitoring be initiated at monitoring wells MW-204, MW-302, MW-223B, MW-212 and MW-303 during the Spring 2004 sampling event and that new monitoring locations in the area of the detention ponds be added to the assessment monitoring program after their installation. Staff further recommend that the 3 new clusters of monitoring wells proposed in the application be installed in Spring 2004, and that new monitoring wells #DP-4, #P-04-02 and #P-04-04 and the 2 existing detention ponds be included in the detection monitoring program. Staff further recommend that the underdrain for the landfill be added to the EMP for the facility; all landfill underdrain discharge locations should be monitored monthly for the field parameters in Appendix A, Column 1 of Chapter 405 of the Rules, and be sampled 3 times per year for the facility's suite of detection parameters at the same time as the other monitoring locations.

Staff also comment that the existing underdrains for the landfill and the leachate pond are directed through manholes where water quality monitoring can be conducted. The system allows for the removal of the water into the leachate containment system instead of discharge into the stormwater structures if the water quality results indicate it should not be discharged. Staff recommended, based on investigations done in January and February 2004 that the underdrain for the leachate pond be routed into the leachate pond. A pump has been installed in manhole #MH 7 and this underdrain discharge is being directed to the leachate pond. Staff also recommend that the underdrain for the existing leachate pond be sampled weekly throughout 2004, and an analysis of the results be included in the 2004 annual report for the facility.

The Department finds that the applicant has proposed an EMP prepared in accordance with the Rules. The Department further finds that the applicant must update the EMP on an ongoing basis as recommended by staff, beginning with the submittal of the 2003 Annual Report. The Department also finds that assessment monitoring must be initiated at existing monitoring wells MW-204, MW-302, MW-223B, MW-212 and MW-303 during the Spring 2004 sampling event; that the new monitoring locations in the area of the detention ponds be included in the assessment monitoring program beginning with the Summer 2004 sampling event; and that the new monitoring wells #DP-4, #P-04-02 and #P-04-04 and the 2 existing detention ponds must be included in the detection monitoring program in addition to the 3 new clusters of monitoring wells proposed in the application to be installed in Spring 2004. The Department also finds that the underdrain for the landfill must be added to the EMP for the facility; all landfill underdrain discharge locations must be monitored monthly for the field parameters in Appendix A, Column 1 of Chapter 405 of the Rules, and be sampled 3 times per year for the facility's suite of detection parameters at the same time as the other monitoring locations. The Department also finds that the underdrain for the leachate pond has been routed into the leachate pond, and that the leachate pond underdrain water quality must be sampled weekly throughout the rest of 2004 and an analysis of the results be included in the 2004 annual report for the facility. The Department also finds that the proposed construction at the facility will not affect the ability to monitor water quality at the facility site.

9. LANDFILL DESIGN

A. Summary of Current Design: The design of the facility is described in the original license and the construction documentation for cells 1 and 2. Cells 1 and 2 of the landfill have been developed; a temporary geomembrane intermediate cover has been placed on cell 1 and cell 2 is currently operational. The approved composite liner system for these cells consists of, from top to bottom, a 15-inch drainage sand leachate collection system with perforated collection pipes (underlain by a drainage geocomposite in cell 2); an 80-mil textured high-density polyethylene (“HDPE”) geomembrane; a geosynthetic clay liner (“GCL”), and 24 inches of recompacted glacial till with a maximum hydraulic conductivity of $3x10^{-6}$ cm/sec. A groundwater underdrain system consisting of a 6-ounce non-woven geotextile, 12 inches of drainage sand with collection pipes, and another 6-ounce non-woven geotextile underlies most areas under these cells. Leachate is conveyed by gravity to a leachate storage pond located outside the western boundary of the landfill. Leachate is transported from the pond via a force main to a loading rack where it is loaded into tank trucks for transport and subsequent treatment and disposal at the Old Town Mill's wastewater treatment facility. The pond has a double liner system, consisting of two 80 mil HDPE geomembranes, with a drainage geocomposite and sand leak detection layer in between. The secondary geomembrane is underlain by a GCL and 2 feet of recompacted glacial till with a maximum hydraulic conductivity of $3x10^{-6}$ cm/sec. Landfill gas is passively vented to the atmosphere.

B. General Description of Proposed Design: As noted above, cells 1 and 2 have already been developed. The waste currently in these cells will be excavated and mixed with incoming waste to improve the geotechnical stability characteristics of the existing sludge (see Finding of Fact #10.A, below) and then cells 1 and 2 will be refilled. The leachate collection, liner, and underdrain system for cells 1 and 2 will continue in service. Cells 3 through 8 will be located on the base grade for the landfill, and cells 9, 10 and 11 will be developed over cells 1 through 8. To accommodate the proposed vertical increase in the final elevation, a berm will be constructed around the perimeter of the landfill as it is developed. The berm will be constructed entirely of soil, except for the western portion of the berm which is proposed to have mechanically stabilized exterior grades. The landfill will be developed in a sequential manner as shown on the cell development plan for the facility.

All base grade cells will include a liner system overlain by a leachate collection system. The original liner system has been modified through the use of compacted clay rather than compacted glacial till for the soil component of the composite liner system. Instead of the pipe liner penetrations currently used to convey leachate from cells 1 and 2 (which will be removed and repaired as part of cell 4 construction), cells 3 through 8 will have leachate collection sumps and pumps located above the liner system. A groundwater underdrain system will underlie the liner system for cells 3 through 8. Gas produced by the landfill will be burned off initially through the use of passive flares. When the gas produced is of sufficient quantity and quality to support combustion, an active gas extraction system will be installed as described in Finding of Fact #9.E. The cells will be developed sequentially, and intermediate or final cover will be placed as the cells are filled. The leachate from the landfill will be conveyed through a force main to a new above-ground storage tank with the existing leachate pond used only as a backup system. The stored leachate will be emptied into tank trucks for transport to the Old Town Mill's wastewater treatment plant. In the future, the leachate may be transported to the City of Old Town's wastewater treatment plant via a new sewer line along Route 43, after studies of the treatment plant, and any necessary upgrades identified in the studies, are completed and if the City of Old town approves the acceptance of the leachate. As described more fully in this finding and in Finding of Fact #11, below, detailed design packages will be submitted to the Department for review and approval prior to each construction project at the facility.

The Department received comments from the public regarding bioreactor (wet cell) landfills. Commentors suggested that the Department require that landfill cells constructed under this license utilize wet cell technology. The Department finds that the applicant did not propose and the Rules do not require an applicant to consider the use of wet cell technology. Furthermore, the United States Environmental Protection Agency published a Final Rule in the Federal Register on March 22, 2004 entitled Research, Development, and Demonstration Rule (RD&D) for municipal solid waste landfills. The effective date of this rule is April 21, 2004. This rule addresses design and operational criteria variances that are necessary in order to develop information on bioreactor landfills. The applicant has provided correspondence dated April 5, 2004 documenting its willingness to explore the feasibility of wet cell or bioreactor technology.

C. Liner System and Perimeter Berm: The liner system proposed for the base grade cells of the landfill will consist of, from top to bottom: a leachate collection layer consisting of 12 inches of drainage sand with perforated HDPE collection pipes over a drainage geocomposite; an 80-mil HDPE textured geomembrane; a GCL; and one foot of compacted clay with a maximum hydraulic conductivity of $1x10^{-7}$ cm/sec. The liner system will be underlain by an additional foot of compacted clay with a maximum hydraulic conductivity of $1x10^{-7}$ cm/sec. Three internal leachate sumps will be constructed to collect all leachate generated by both the existing and new cells. The existing leachate transport pipes that penetrate the liner system to convey leachate to the storage pond will be removed and the liner repaired and tested. The landfill liner will be underlain by a groundwater underdrain system consisting of twelve inches of sand with perforated HDPE collection pipes. The underdrain system is designed with groundwater quality monitoring sumps.

As noted previously, a berm is proposed to be constructed around the perimeter of the landfill. The berm is required to achieve the increase in the final elevation of the landfill. It will be constructed entirely of soil, except for the western portion where it is proposed to have mechanically stabilized exterior grades due to wetland setback limitations. The interior of the berm will have 3 horizontal to 1 vertical sideslopes. The exterior sideslopes where the berm will be constructed entirely of soil will have 2 horizontal to 1 vertical grades. The mechanically stabilized earthen (“MSE”) portions of the berm will have 1 horizontal to 3 vertical sideslopes. The height of the berm will vary from 19 feet along the western side to 30 feet along the eastern side of the landfill. The top surface of the berm will be approximately 44 feet wide. A 20-foot wide access road, surface water drainage ditches and the valve houses for the leachate pumping stations will be located on the top of the berm. The berm will be constructed in phases concurrent with cell development. Geotechnical analyses of the berm, for both short- and long-term conditions, demonstrate that it will remain stable with the appropriate factors of safety; see Finding of Fact #10.C, below.

Staff comment that all issues raised in initial review memoranda regarding the liner system and the perimeter berm have been satisfactorily resolved, provided that the detailed design packages to be submitted prior to each construction project address all staff recommendations regarding the design, the technical specifications, and the construction quality assurance plan as agreed to in SME’s January 22, 2004 responses to the comments provided in 3 initial engineering review memoranda by staff.

The Department finds that the liner system and the perimeter berm proposed by the applicant are designed in accordance with the Rules, provided that the detailed design packages to be submitted to the Department for review and approval prior to each construction project address all staff recommendations on the design, the technical specifications, and the construction quality assurance plan as agreed to in SME’s January 22, 2004 responses to the comments provided in 3 initial engineering review memoranda by staff.

D. <u>Leachate Collection, Conveyance and Storage System:</u> The leachate collection system for the base grade cells will consist of a 12-inch layer of drainage sand (drainage stone on the top 10 feet of the sideslopes) with perforated leachate collection pipes, a drainage geocomposite, several leachate collection inlets, and tee connections on the leachate collection system cleanouts. The inlets and tee connections will help facilitate leachate drainage during operations, including the development of upper lifts. Pressure transducers will be placed within each base grade cell in order to monitor the performance of the leachate collection system.

Leachate will be collected within the perforated pipes, directed to sumps, and pumped through a double-walled force main to an above ground storage tank. The existing leachate storage pond will be used for back-up storage capacity with the leachate flows pumped directly to it if the leachate storage tank is full.

The applicant proposes to construct a new 81-foot diameter by 25-foot high above-ground tank with a capacity of 900,000 gallons for the storage of leachate generated by the landfill. The tank will be underlain by a leak detection system and a secure secondary containment structure sized to contain 110 percent of the maximum tank storage capacity. An assessment of the quantity of leachate anticipated to be generated by the landfill was completed. Based on a comparison with data from another facility, SME concluded that the modeling parameters used to estimate leachate provided a good representation of actual leachate generation rates. The anticipated leachate production rates during the period identified as having the highest leachate volume were used to size the leachate collection, conveyance and storage structures. From the storage tank, leachate will be loaded into tank trucks and transported to the Old Town Mill's wastewater treatment facility.

Staff comment that all issues raised in initial engineering review memoranda regarding the leachate collection, conveyance and storage systems have been satisfactorily resolved, provided the detailed design packages submitted to the Department for review and approval prior to each construction project address all staff recommendations regarding the design, the technical specifications, and the construction quality assurance plan as agreed to in SME's January 22, 2004 responses to the comments provided in 3 initial engineering review memoranda by staff.

The Department finds that the applicant has proposed leachate collection, conveyance and storage systems designed in accordance with the Rules, provided that the detailed design packages to be submitted to the Department for review and approval prior to each construction project address all staff recommendations regarding the design, the technical specifications, and the construction quality assurance plan as agreed to in SME's January 22, 2004 responses to the comments provided in 3 initial engineering review memoranda by staff.

E. <u>Gas Management System:</u> The applicant proposes to install an active gas extraction system within the landfill. The primary purpose of the system is to control emissions of landfill gas from the landfill to provide compliance with current Title V New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements. A secondary benefit of the system is the control of potential landfill odors. The system will be installed sequentially during site development.

The active gas extraction system will consist of vertical gas extraction wells, and may be supplemented by horizontal collector pipes as needed, along with the associated header and lateral piping to transport the gas to a blower and flare station. The blower and flare station will be constructed near the area where the leachate storage tank is proposed to be located. Condensate from the gas management system will be pumped directly into the leachate management system, both at the cell 4/5 leachate collection sump and the leachate storage tank.

Staff comment that the active gas extraction system was sized, and the installation timing of the components proposed, in part, on the projected disposal rates in the application. To ensure the effectiveness of the active gas extraction system, staff comment that each year's annual report should include an evaluation of the of the sizing and the installation timing of the system components over the reporting period, and an evaluation of the effectiveness of the system based on the quantities and types of wastes projected for the next year.

In response to staff comments, the applicant has committed to an accelerated schedule for installation of the active gas extraction system. During initial operations in cell 3, the applicant proposes to install passive flares. The location and number of passive flares will be included in the detailed design package for cell 3 submitted to the Department for review and approval. The applicant proposes to monitor the passive flare locations for gas flow rate, and concentrations of methane, carbon dioxide, and oxygen. Once the monitoring data shows that the gas is of a sufficient quality and quantity to support combustion with an active gas management system, the applicant will finalize the design of the active gas management system, including a schedule for installation of the system. Furthermore, the applicant proposes to install gas collection infrastructure to provide the ability to collect gas generated from solid waste in place for 12 months or longer through either vertical extraction wells or horizontal collectors, or a combination thereof.

The applicant will install temporary connections to the active gas management system components at the time of construction if the necessary infrastructure is not in place to accommodate the planned permanent connections. The applicant also proposes to use a portable blower and flare unit if the permanent blower and flare station has not been constructed at the time it is initially needed.

In response to staff comments regarding access to the well-heads on areas that have received intermediate cover, the applicant stated that soil intermediate cover will be utilized as the primary option. This will allow operating personnel to have safe access to the well-heads to monitor and balance the well-field. The applicant further stated that temporary geomembrane tarps will be a secondary option, and acknowledged that protection of the well-heads and safe access provisions, particularly during the winter months, will be necessary if temporary geomembrane tarps are utilized. Staff comment that well-head protection and access provisions need to be submitted to the Department if temporary geomembrane tarps are utilized for intermediate cover.

The applicant proposes to submit the operating plan for the gas management system with the appropriate annual report. Staff comment that the operational procedures for the gas management system, inclusive of monitoring, record-keeping, and reporting procedures for both the well-field, and the blower and flare unit, should be submitted with the detailed design package for construction of the system.

The Department finds that the applicant has demonstrated that the active gas extraction system proposed for phased construction in the landfill is designed to reduce fugitive emissions of landfill gas and control odors associated with the landfill, provided the detailed design package to be submitted to the Department for review and approval prior to each phase of construction addresses staff recommendations regarding the design, the technical specifications, and the construction quality assurance plan as agreed to in Sanborn Head & Associates' ("SHA") submittal dated January 21, 2004 and the applicant's letter dated February 4, 2004, provided the active gas system operating plan, inclusive of monitoring, record-keeping and reporting procedures, is submitted for review and approval with the detailed design packages; provided that each year's annual report includes an evaluation of the of the sizing and the installation timing of the active gas system components over the reporting period, and an evaluation of the effectiveness of the system based on the quantities and types of wastes projected for the next year; and provided plans are submitted to the Department for review and approval detailing the provisions to be utilized to protect the well-heads and provide safe access to the well-heads if temporary geomembrane tarps are utilized for intermediate cover.

F. <u>Closure Design:</u> The applicant proposes to construct a phased final cover system throughout the operational life of the landfill as areas of the landfill with no plans for future waste placement are filled to final grade. The proposed cover system will meet the applicable requirements of the Rules for a secure landfill that govern at the time of closure. Prior to the placement of final cover on any area, the applicant will submit the detailed design package and supporting information on the design required by the applicable requirements in Chapter 401.5 of the Rules to the Department for review and approval. The Department finds that the applicant has proposed to apply a phased final cover system in accordance with the Rules, provided the detailed design packages for the placement of phased final cover are reviewed and approved by the Department prior to each application of final cover. The Department further finds that the applicant must submit to the Department for its review and approval a final closure plan for the landfill, prepared in accordance with the Rules in effect at that time, and complete final closure of the landfill in accordance with the approved final closure plan. As required by the Rules, the final closure plan must include a post-closure monitoring and maintenance plan covering a period of at least 30 years following closure. The Department also finds that the post-closure monitoring and maintenance plan must be revised throughout the post-closure period to comply with any changes in the post-closure monitoring and maintenance requirements of the Rules. The Department further finds that post-closure monitoring and maintenance requirements do not automatically cease after 30 years; they must continue to be met until the Department approves their cessation.

10. SETTLEMENT AND GEOTECHNICAL STABILITY

A. Test Plot Program: GPC has been conducting a pilot project at the existing landfill since October 1999. The purpose of the project is to evaluate the short-term stability of the sludge in the field, and to evaluate operational issues associated with the initial loss of shear strength in the sludge. The consultant for the pilot project is Richard E. Wardwell, P.E., Ph.D. ("REW"). The applicant retained REW to evaluate the settlement and stability aspects of this application in part because of his working knowledge of the characteristics of the sludge already disposed in cells 1 and 2 of the landfill. Based on the Department's recommendations, due to geotechnical stability concerns, the applicant proposed to remove the existing sludge and mix it with other incoming wastes (including new sludge from the Old Town Mill) in order to improve its geotechnical characteristics.

Originally the applicant proposed to mix no more than 15% of the existing and new sludge by volume into the incoming waste. Stability of the waste at this percentage would meet the regulatory criteria, but it was predicted to take several years to complete the mixing process and require a large operating area. The large operating area would result in greater leachate production and an increase in potential odor generation. The applicant now proposes to determine the optimum ratio at which the existing sludge can be mixed with the incoming waste and still achieve deposit stability by constructing an initial test plot in the existing, unused area of cell 2. The test plot construction is expected to take at least 6 weeks to complete, and will require a total of approximately 98,000 cubic yards of waste. Of this amount, approximately 60% of the waste will be diverted from the Pine Tree Landfill in Hampden and the remaining 40% will be existing and new sludge. It is important for the test plot program to operate through the spring thaw period because this has been observed to be the most biologically and chemically active time in the existing sludge. As a result, the amount of waste delivered to the landfill for mixing with the sludge will exceed the projected rate of filling at the landfill for this time period.

The test plot is proposed to consist of 3 sections; in each of the 3 sections the existing sludge will be mixed with incoming waste at different ratios (20%, 40% and 60% sludge to other wastes). The test plot has been designed to mimic actual operating conditions and will provide necessary information on the operating criteria that will be used to effectively run the landfill. In addition to gathering data for the stability evaluation through instruments installed in the test plot, air monitoring (oxygen, methane, and hydrogen sulfide) will be conducted. Based on the findings of the test plot program, the need to re-assess geotechnical stability will be evaluated, a finalized geotechnical monitoring plan for the facility will be prepared, the operating requirements for cell 3 will be finalized, and an odor control plan for sludge excavation and mixing will be prepared. All of the above will be submitted to the Department for review and approval.

The Department finds that the use of the proposed test plot program to determine the optimum rate at which the existing sludge can be excavated and mixed with incoming waste will result in a stable landfill configuration provided operations are conducted in accordance with approved recommendations from the program. The Department further finds that it is acceptable for the applicant to divert the necessary quantity of any waste delivered to PTL to the WOTL for use in the test plot within the time frame needed for completion, as outlined in the description of the test plot program proposal.

B. Settlement Analysis: Short and long-term settlement was analyzed to assure that load and non-load related strains associated with primary compression and waste decomposition will not be detrimental to the performance of the proposed liner, leachate collection, underdrain, and final cover system. Liner, leachate collection, and underdrain system settlement was evaluated considering the elastic deformation of the subgrade soils. Cover system settlement was estimated from the projected secondary compression of the mixed solid waste using coefficients that have been observed for similar waste streams at a similar facility. The Department finds that the applicant demonstrated that the landfill liner, leachate collection, underdrain, and final cover systems will maintain their integrity and performance at the maximum predicted settlements.

C. Geotechnical Stability Analysis: Geotechnical stability analyses for the proposed vertical increase at the landfill were completed in accordance with the Rules. The stability assessment analyzed potential failure planes through the foundation soils and along liner and cover system interfaces. The minimum required factors of safety were achieved for all identified critical failure planes. The need to re-assess geotechnical stability will be evaluated once the findings of the test plot program described in Finding of Fact #10.A, above, are available. Stability of the MSE berm was also evaluated and the minimum required factors of safety were achieved. The Department finds that the applicant has demonstrated that the landfill, including the MSE berm, will meet or exceed the minimum required factors of safety during construction, operation and the post-closure periods under both static and seismic conditions, provided an appropriate ratio of sludge to other incoming waste is chosen and approved by the Department through an evaluation of the findings of the test plot program.

D. Settlement and Stability Monitoring Plan: After completion of the test plot program described in Finding of Fact #10.A, above, the applicant will prepare and submit to the Department for review and approval a proposed geotechnical monitoring plan that will include the proposed waste mixing procedures for cells 1, 2 and 3 as well as routine operational stability monitoring. The applicant also proposes periodic settlement monitoring of completed cells to determine site specific compression coefficients, and monitoring and observations of the final cover system, to confirm that total and differential strains are within tolerable limits. The Department finds that the applicant has proposed to provide a plan to monitor stability and settlement during construction, operational and post-closure periods, and report the results to the Department, including an interpretation of the results by a qualified geotechnical engineer. The Department also finds that the applicant proposes to prepare and submit the geotechnical monitoring plan for the landfill to the Department for review and approval once the findings of the test plot program have been evaluated.

11. CONSTRUCTION

The landfill, and some of the proposed ancillary structures, will be constructed over time, as capacity is needed. New cells will be constructed by a general contractor who can demonstrate familiarity and experience with the various aspects of landfill construction, and by subcontractors with specialized experience in the installation of geosynthetics.

The applicant has prepared a preliminary construction quality assurance ("CQA") plan that establishes the requirements for CQA testing and installation oversight of all construction materials to assure that the design specifications and performance requirements are achieved during construction. Geosynthetics and soil components will be tested, certified, and inspected by qualified CQA personnel independent of SPO, NEWSME Operations and any contractor hired for the project.

CQA personnel will provide on-going, thorough project documentation during construction. Daily and weekly reports will be prepared and provided to the Department. A final construction report will be prepared and submitted for Department review and approval within 45 days of the conclusion of each construction project.

Following installation of the leachate collection system, the applicant proposes to conduct an electric leak location survey of the geomembrane liner to assure that it was not damaged during overburden placement. Electric leak location is an innovative quality assurance technology developed to detect any breaches in the geomembrane after placement of the protective layer (once the greatest potential for damage to the geomembrane has passed). It is accomplished by impressing a voltage across the geomembrane then scanning the surface for current flow. The geomembrane is an insulator and will not allow current to pass through it unless a hole is present. If a hole is found, it will be exposed, repaired, and retested before the liner system is placed into service.

The applicant has prepared preliminary construction contract documents as part of the application. Prior to construction of each cell, the applicant will provide the Department for review and approval a detailed design package which will include design details and calculations, a complete set of project specific construction contract bid documents, including drawings, technical specifications, contract administrative documents, and the construction quality assurance plan for that project.

The applicant proposes to initiate construction of the test plot program described in Finding of Fact #10.A, above, shortly after approval of this application is received. The test plot construction is anticipated to take at least 6 weeks to complete. The findings of the test plot program will then be used to evaluate the need for additional geotechnical stability analyses, to finalize the operating requirements for cells 1, 2 and 3, to finalize a geotechnical monitoring plan for the facility, and to develop an odor control plan for sludge excavation and mixing operations. Staff comment that all recommendations regarding the construction, operation, and monitoring of the test plot have been adequately addressed, provided the work is completed as described in REW’s work plan as revised in REW’s submittal dated January 16, 2004.

The detailed design package for cell 3, and the new leachate storage tank and ancillary structures, are expected to be submitted to the Department for review and approval in Spring 2004. It will include the technical specifications, construction drawings, construction quality assurance plans, and construction monitoring and documentation provisions required by the Rules. It will include all information recommended by staff during review of the application, as agreed to in SME’s submittal dated January 22, 2004 and as responded to in staff memoranda dated January 26, 28, and 30, 2004.

Construction of cells 4 through 11, inclusive of the leachate management system for the cells, is expected to proceed sequentially. The applicant proposes to submit to the Department for review and approval the detailed design package for each of these cells at least 6 months prior to the date planned for initiation of operation. Each detailed design package will include the technical specifications, construction drawings, a construction quality assurance plan, and the construction monitoring and documentation provisions required by the Rules. Each detailed design package will include all information recommended by staff during review of the application as agreed to in SME's submittal dated January 22, 2004 and as responded to in staff memoranda dated January 26, 28 and 30, 2004. Staff further comment that, if the Rules applicable to any aspect of construction of the landfill cells change during the development of the landfill, the applicant should be required to address the new design requirements in the subsequent detailed design submittals.

Construction of the perimeter berm, including the MSE berm, is expected to proceed sequentially as the landfill cells are developed. A detailed design for the construction of the perimeter berm in the area of cell construction will be included in the detailed design package submitted for construction of the individual cells. Staff comment that all issues identified in the review of the application have been satisfactorily addressed, provided all recommendations in staff memoranda are addressed as agreed to in SME's submittal dated January 22, 2004 and as responded to in staff memoranda dated January 26, 28 and 30, 2004. Staff further comment that, if the Rules applicable to any aspect of construction of the perimeter berm change during the development of the landfill, the applicant should be required to address the new design requirements in the subsequent detailed design packages.

Construction of the active gas extraction system is expected to occur on an annual basis. The details for the following year's installation are proposed to be described in the annual report for the facility, and in detailed design packages provided to the Department for review and approval prior to construction. Staff comment that all issues identified in the review of the application have been satisfactorily addressed, provided all recommendations in the staff memoranda are addressed as agreed to in SHA's submittal dated January 21, 2004 and the applicant's letter dated February 4, 2004, provided the active gas system operating and monitoring plans are submitted with the detailed design package, and provided plans are submitted detailing the provisions to be utilized to protect the well-heads and provide safe access to the well-heads if temporary geomembrane is utilized as intermediate cover. Staff further comment that, if the Rules applicable to any aspect of construction of the active gas extraction system change during the development of the landfill, the applicant should be required to address the new design requirements in the subsequent detailed design packages.

Construction of the phased final cover will occur as areas of the landfill are filled to the proposed final grade. Prior to the placement of final cover on any area, the applicant will submit to the Department for review and approval a detailed design package to include the detailed construction plans, technical specifications, a construction quality assurance plan, and supporting information on the design as required by the applicable provisions of Chapter 401.5 of the Rules. Staff comment that all issues identified in the review of the application have been satisfactorily addressed, provided all recommendations in staff memoranda are addressed as agreed to in SME’s submittal dated January 22, 2004 and as responded to in staff memoranda dated January 26, 28 and 30, 2004. Staff further comment that, if the Rules applicable to any aspect of the placement of phased final cover change during the development of the landfill, the applicant should be required to address the new closure requirements in the subsequent phased final cover submittals. Staff comment that the applicant must also submit to the Department for its review and approval a final closure plan for the landfill, prepared in accordance with the Rules in effect at that time, and complete final closure of the landfill in accordance with the approved final closure plan. As required by the Rules, the final closure plan should include a post-closure monitoring and maintenance plan covering a period of at least 30 years following closure. The post-closure monitoring and maintenance plan should be revised throughout the post-closure period to comply with any changes in the post-closure monitoring and maintenance requirements of the Rules.

The Department finds that the applicant has addressed all aspects of the construction and closure of the proposed vertical increase of the landfill, provided detailed design packages are submitted to the Department for review and approval prior to the initiation of any construction project, and provided the various ongoing construction activities described in this finding are designed, constructed, monitored, operated, closed, and monitored and maintained during the post-closure period in accordance with the application, staff recommendations on the application and responses to staff recommendations submitted by the applicant and its consultants in submittals dated January 16, 2004; January 21, 2004; January 22, 2004; and February 4, 2004. The Department also finds that, as recommended in Finding of Fact #4.A, above, the applicant must include a demonstration of financial capacity for costs associated with construction of cells 4 through 11 as part of the detailed design packages for these cells. The Department further finds that, if the Rules applicable to any aspect of construction or post-closure care of the vertical increase of the landfill and its ancillary structures change during the development of the landfill, the applicant must address the new requirements in subsequent submittals.

12. OPERATIONS

The applicant proposes to continue using the current operations manual for the landfill until the completion of construction of cell 3. The current operations manual for the facility includes the detailed operating requirements specific to the GPC waste characteristics and generation rates. Until the time cell 3 is available for disposal, only the wastes currently approved for disposal will be landfilled, except during the construction of the test plot program described in Finding of Fact #10.A, above. Operational criteria specific to the test plot program have been reviewed and found to be acceptable by staff.

The applicant proposes to update the operations manual to reflect the proposed waste characteristics, generation rates, mixing requirements, and cell development sequence and provide it to the Department for review and approval prior to the commencement of waste placement in cell 3. A conceptual cell development plan for the proposed life of the landfill was included in the application; staff comment that all recommendations regarding the conceptual cell development plan have been adequately addressed provided the plan is revised as described in SME's January 22, 2004 submittal. The applicant proposes to provide a detailed cell development plan, covering the first 2 years of operations, for the landfill prior to the commencement of filling in cell 3, and provide it to the Department for review and approval. As required by the Rules, proposed revisions to the operations manual, including the annually updated cell development plan, will be included in the facility's annual report, and the operations manual will be revised to comply with any changes in the operating requirements in the Rules. The operations manual will again be updated and submitted to the Department for review and approval following completion of the test plot program and prior to the excavation of sludge from cells 1 and 2.

The hours of operation for the landfill are proposed to be 6 AM to 8 PM on weekdays and 8 AM to 4 PM on weekends, although Casella's contract with PERC requires that the landfill be available for disposal of its residues outside the normal business hours. The operations manual for the facility addresses basic functions such as the maintenance of the access road, and includes the many plans and provisions for the orderly operation of the landfill addressed throughout this order.

The Department finds that the operations manual was prepared in substantial accordance with the Rules, and that it provides the information necessary to enable supervisory and operating personnel, and persons evaluating the operation of the landfill, to determine the sequence of operation, policies and procedures for the landfill, as well as the monitoring, maintenance, inspection and legal requirements that must be met for the operation of the landfill on an ongoing basis, provided the operations manual is revised prior to the commencement of waste placement in cell 3 and as recommended by staff. The revisions to the operations manual must include the following information: the conceptual and detailed cell development plans;, and changes made to address staff recommendations as agreed to in SME's January 22, 2004 submittal addressing staff memoranda. The operations manual must be updated again to incorporate changes needed to address the findings of the test plot program. All changes to the operations manual are to be submitted to the Department for review and approval, and implemented as approved by the Department.

13. ACCEPTABLE WASTES

A. Waste Types and Sources: The landfill is currently licensed to accept pulp and paper mill wastewater treatment plant sludge from the Old Town Mill, smaller quantities of other special wastes from the Old Town Mill (lime wastes and grit, woodwaste and inert debris, soil and sawdust contaminated with non-hazardous process chemicals, virgin oily contaminated debris, sand from sandfilters, and non-hazardous sandblast grit), flyash from Lincoln Pulp and Paper, and burn pile ash from the City of Old Town's transfer station.

This application proposes to add the solid wastes approved for disposal at Pine Tree Landfill in Hampden that are generated in Maine, including solid waste from all 4 licensed incinerators, to the list of wastes acceptable for disposal in the landfill. The wastes proposed to be added would consist primarily of front-end process residue ("FEPR") from PERC in Orrington, Maine and Maine Energy in Biddeford, Maine; oversized bulky wastes; MSW bypassed from incinerators located in Maine; construction and demolition debris; ash from incinerators located in Maine; and water/wastewater treatment sludge. Small quantities of other miscellaneous non-hazardous waste streams are also listed in the application for disposal in the landfill. There are 34 wastes listed in the miscellaneous category; in total, they are anticipated to equal approximately 50,000 tons per year. In addition, Appendix K of the application includes a listing of the generator, type of solid waste and permit number of several individually permitted wastes currently approved at Pine Tree Landfill that the applicant proposes to accept at WOTL. The yearly quantity of solid waste to be accepted at the landfill is not expected to exceed 540,000 tons per year.

The applicant has committed to the same limitations on MSW accepted for disposal at WOTL as at Pine Tree Landfill. Department License #S-001987-WD-QA-M, issued to Pine Tree Landfill on February 26, 2002, limits the MSW Pine Tree Landfill is allowed to accept to unprocessed MSW bypass from the following sources: the PERC incinerator in Orrington and the Maine Energy incinerator in Biddeford; waste delivered under an interruptible contract with PERC; or waste delivered in excess of processing capacity at other MSW incinerators in Maine. An annual limit of 310,000 tons on the amount of unprocessed MSW destined for Maine Energy, and then incinerated at Maine Energy or bypassed to Pine Tree Landfill, was selected. This is not the annual amount of MSW anticipated to come to Pine Tree Landfill and/or the WOTL from Maine Energy; this is the maximum total amount of unprocessed MSW destined for Maine Energy that will be delivered to all 3 Casella owned or operated disposal facilities: Maine Energy, Pine Tree Landfill and WOTL. Unprocessed MSW from Maine Energy is only bypassed to a landfill for disposal during temporary shutdowns for repairs or maintenance, and when the amount of contracted waste exceeds the plant's capacity. Conditions #2 through 7 of that license specify the limitations and parameters under which Pine Tree Landfill can accept MSW from the Maine incinerators.

In accordance with the RFP and OSA, the applicant will not accept solid wastes generated from out-of-state sources at the WOTL. The applicant proposes to manifest all wastes brought to the facility for disposal, including those not required to be manifested by law. The Department finds that the monthly activity reports submitted to the Department must be designed to provide the data needed for determining the quantities of the various waste types, and their sources, delivered to the landfill. The Department further finds that the applicant must submit an application to the Department for review and approval prior to accepting for disposal any waste not listed in the application.

The Department received comments from the public regarding specific wastes and whether they would be regarded as in state or out of state waste. The Department responded that FEPR and ash from incinerators in Maine, as well as a limited amount of bypass, would be considered waste generated in Maine, but that waste delivered from out of state to another facility (such as a transfer station, or a compost facility if no processing occurs) for transfer to WOTL in its original form would be considered waste generated outside Maine. As noted above, the amount of bypassed MSW from the incinerators will be limited and the amount of MSW bypassed from Maine Energy, also owned by Casella, will in addition be tied to production at Maine Energy. The applicant has committed, in a letter dated March 9, 2004, that no out of state MSW will be bypassed to the landfill, and that waste from the tipping floor of any of the incinerators will not be transported to the landfill if it contains any out of state waste. The Department also received comments that the landfill would be required to accommodate MSW from the closure of existing municipal landfills due to Department violations; as noted above, MSW will be accepted only from the 4 incinerators in Maine. Additional sources of MSW would require Department review and approval prior to acceptance for disposal.

B. Waste Characterization and Compatibility: The procedures for characterizing the solid wastes accepted at the landfill are identified in the Solid Waste Characterization Plan for the facility; the plan is located in Appendix K of the application and will be part of the facility's operations manual. The facility proposes to accept non-hazardous wastes for disposal using the same procedure as approved for Pine Tree Landfill. The wastes fall into 2 categories: those accepted on an ongoing basis under general permitting requirements for specific categories of wastes and those accepted under individual permits. Each waste required to be characterized by the Rules has a testing frequency, list of parameters to be tested for, and the acceptance criteria for each parameter, based on the requirements of Chapter 405 of the Rules. Copies of all analyses will be kept on file at the facility and may be viewed during normal business hours. The wastes proposed for disposal in the landfill have been demonstrated to be compatible with each other and the liner and leachate collection system components at Pine Tree Landfill; the same materials are proposed to be used in the construction of cells 3 through 11 at WOTL.

The Department received several comments related to the waste characterization process and its reliability in terms of keeping hazardous wastes out of the facility. The Department finds that the waste characterization plan proposed for use at WOTL provides adequate provisions for the testing of wastes coming into the landfill and a proven, reliable method of keeping hazardous waste from being disposed. The Department further finds that the proposed waste streams are compatible with each other and the components of the landfill system.

C. Reporting Requirements: As described in Finding of Fact #13.A, above, the Department finds that a monthly summary of the wastes accepted for disposal will be submitted to the Department, and the monthly activity reports submitted to the Department must be designed to provide the data needed for determining the quantities of the various waste types, and their sources, delivered to the landfill. As found in Finding of Fact #13.A, above, the Department finds that the information on the source and quantity of MSW accepted for disposal is to be reported to the Department on both a monthly and an annual basis, as follows:

1. The monthly reports on the wastes accepted for disposal at the landfill shall include the amount and source of unprocessed MSW accepted for disposal;

2. The total amount of (a) unprocessed MSW incinerated at Maine Energy and (b) MSW bypassed from Maine Energy for disposal at the WOTL and at Pine Tree Landfill's Secure III Landfill Expansion shall not exceed 310,000 tons in any calendar year, unless changes in conditions or circumstances occur that cause the Department to revise this cap; and

3. In addition to the specific requirements of Chapter 401.4(D) of the Rules, the annual reports for the facility submitted to the Department shall include the amount of unprocessed MSW received at WOTL from each of the approved sources, including statements from the incinerators providing an estimate of the percentage of the MSW that originated outside Maine.

14. AIR QUALITY

A. Fugitive Dust: To control fugitive dust from unpaved access roads, the applicant will apply water and/or calcium chloride to the road surfaces on an as-needed basis. The applicant also proposes to pave an additional portion of the access road from where it begins at Route 16 such that the first one-half mile of the road will be paved. If necessary to control dust, the applicant has also committed to pave an additional portion of the access road. The applicant has committed to daily cleaning of the paved surface using a street sweeper. The Department received comments on existing dust control methods and the potential for additional problems with fugitive dust emissions associated with the increased traffic at the landfill entrance. The Department finds that the dust control measures proposed by the applicant are sufficient to control fugitive dust. However, the Department also finds that if staff find that operation of the landfill as proposed unreasonably adversely affects air quality additional fugitive dust control measures will be required.

B. Landfill Gas: The applicant proposes to install an active gas extraction system for control of fugitive emissions of gas generated by the landfill. Passive flares will be installed initially and monitored to determine when the gas quantity and quality is adequate to support combustion. At that time the detailed design of the active gas extraction system will be prepared and the system installed. (See Finding of Fact #9.E, above.) The Department finds that the applicant has proposed adequate measures to control fugitive emissions of gas from the landfill.

C. Odor Control: The applicant proposes to use several mechanisms to control odors associated with the facility; an odor assessment, including proposed odor control mechanisms, prepared by Odor Science & Engineering, Inc., is included in Attachment 7 of the application. As fully described in Finding of Fact #9.E, above, one of the benefits of the proposed gas management system is the control of potential landfill odor. The applicant will also employ operational practices, including the use of a portable odor neutralizer system and minimization of the active working face of the landfill. Odors associated with the leachate will be minimized by the use of an above-ground leachate storage tank instead of the existing open leachate pond. The applicant has committed to odor training of its landfill personnel, the implementation of a community odor complaint response plan, and to the installation of perimeter hydrogen sulfide monitoring instruments. The applicant will also monitor odors during the sludge mixing test plot program, described in Finding of Fact #10.A, above, and will prepare a detailed odor control plan for sludge excavation and mixing operations following completion of the program and prior to full-scale operations.

The Department received comments from the public that odors from the existing landfill have been a problem. Staff comment that, prior to the submission of this application, no odor complaints about this facility were received by the Department.

The Department finds that the applicant has proposed odor control mechanisms sufficient to control nuisance odors. However, the Department also finds that if staff find that operation of the landfill as proposed unreasonably adversely affects air quality additional odor control measures will be required. The Department further finds that the applicant must submit to the Department for review and approval the following information on the perimeter hydrogen sulfide monitoring program prior to implementation of the program: the number and locations of instruments, based on meteorological conditions; system security measures; monitoring program details and responsibilities; and reporting procedures.

15. TRAFFIC MOVEMENT

The parcel of land which includes the landfill is located between Routes 43 and 16. Although the landfill is located much closer to Route 43 than to Route 16, it is accessed from Route 16 by a road into the property that existed at the time of the original licensing. A large wetland exists between the landfill and Route 43; the applicant does not propose to change the access to the landfill from Route 16 to Route 43 now or in the future. The access road intercepts Route 16 approximately 600 feet west of I-95.

At the time this application was filed, approximately 16 trucks were hauling sludge from the Old Town Mill, ash from Lincoln Pulp & Paper, leachate from the landfill back to the Old Town Mill's wastewater treatment plant, and gravel during the peak hour; approximately one-half of these vehicles were hauling gravel to the landfill for use as daily cover.

Attachment 4 of this application contains a new traffic assessment prepared by Eaton Traffic Engineering in accordance with the Rules.

With the increased use proposed by the applicant, approximately 30 total vehicles (9 of them passenger vehicles) will enter the landfill during the peak hour at the initial projected waste acceptance rate of 450,000 tons/year, and up to 35 total vehicles (still 9 of them passenger vehicles) will enter the landfill during the peak hour at the highest projected waste acceptance rate of 540,000 tons/year. These peak numbers include the current vehicles, except that the gravel deliveries will cease.

The total daily number of trucks anticipated to enter the facility on a daily basis is 108 at the 450,000 tons/year rate of waste acceptance. The total daily number of trucks at the 540,000 tons/year rate is 140 trucks per day. The existing daily trips into the landfill are estimated at 45-50 trips per day.

The trucks hauling wastes that are currently disposed at the landfill are expected to continue using the same haul routes; likewise, the trucks hauling leachate to the Old Town Mill's wastewater treatment plant will continue using the same routes.

A major haul route for transporting waste in trucks weighing over 80,000 pounds from Pine Tree Landfill to WOTL is identified in the application; the route includes roads within Hampden, Bangor, Brewer, Eddington, Bradley, Milford and Old Town. During the peak hour, the number of over 80,000 pound trucks is anticipated to be 7 at 450,000 tons/year and up to 10 at 540,000 tons/year. The major haul route identified for trucks and other vehicles weighing less than 80,000 pounds is I-95; the remaining new traffic associated with the project would use I-95 to deliver waste to the landfill, and all empty trucks would use I-95 on their return trip.

The Maine Department of Transportation ("MDOT") was asked to review the traffic section of the application; it reviewed high crash locations, roadway geometrics, traffic volumes and traffic signal progression along the identified route. The volume of traffic associated with the landfill falls far below the threshold for review of the project under MDOT's Chapter 305 "Rules and Regulations Pertaining to Traffic Movement Permits", effective May 20, 2000; that threshold is 100 or more passenger car equivalent vehicles during the peak hour. In a memorandum dated December 12, 2003 MDOT concluded that the route identified in the application was acceptable in terms of geometrics, traffic volumes, and economic feasibility, but that an alternative route identified in the MDOT memorandum as Alternative 1 was more desirable. The only difference in the two routes was the bridge used to cross the Penobscot River from Bangor into Brewer.

In response to numerous comments on traffic associated with the project, MDOT staff identified in a memorandum received by the Department on February 4, 2004 a total of 5 routes (plus I-95 for the less than 80,000 pound vehicles) that could safely accommodate the number, weight and types of vehicles transporting waste to and from the facility from the south or west. Each of the routes have minor deficiencies; however, since the drivers are likely to make their choices of routes depending on the time of day, day of the week or time of year, all of the routes are viable alternatives over which trucks now travel. MDOT noted that all of the identified routes can handle traffic generated by the landfill, and that the functionality of any of the 6 routes will not be negatively affected by the landfill's traffic.

MDOT also reviewed the Route 16/landfill access road intersection. It concluded that there is adequate sight distance for the posted speed of Route 16, and that no turn lanes are needed. No high crash locations within the immediate vicinity of the site were identified. MDOT did recommend that overhead lights be installed at the entrance to the facility to make it easier for trucks to locate the entrance.

As noted above, the Department received many comments from the public on the proposed haul route for the facility. Many commentors requested that the Department require that all haulers use I-95 to access the facility; other commentors expressed concern over increased traffic, and associated road damage and other safety and esthetic impacts, through their neighborhood.

The only change proposed to the 10,950 foot long, 24 foot-wide mostly gravel access road into the site is an extension of the paved section from the first 500 feet to the first one-half mile of the road. If necessary to control dust, the applicant has also committed to pave an additional portion of the access road. A scale, and a small scale house, are proposed to be constructed approximately 250 feet from the landfill perimeter security fence; parking will be provided at this location for only the scale house operator. The gravel parking area at the operations office will be expanded to approximately 4,000 square feet to provide parking for up to 20 cars. The perimeter access road for the landfill is proposed to be located on top of the perimeter berm described in Finding of Fact #9.C, above. Gravel maintenance roads will also be provided for access to the leachate pond pump station, the leachate storage tank and the blower and flare for the active gas extraction system.

The Department finds that the applicant has made adequate provisions for the safe and uncongested movement of traffic of all types into, out of, and within the facility, provided it installs overhead lights, or another effective lighting system, at the entrance to the facility to make it easier for trucks to locate the entrance. The Department further finds that it is outside its purview to require that waste haulers using this facility limit their truck weights to 80,000 pounds and use I-95 as the only haul route for the facility, and affirms MDOT's statement that there is an affirmative right for all individuals and entities, public and private, domestic or commercial, to travel on all State and State Aid Highways in Maine.

16. EXISTING USES AND SCENIC CHARACTER

A. Visual Analysis: The original application included a visual impact assessment report prepared by Environmental Analysis and Design. In summary, the report concluded that the landfill would not have an unreasonable adverse effect on the scenic character of the area because of its limited viewshed, small visual magnitude and its low visual contrast.

Attachment 5 of this application contains an updated visual impact assessment report prepared by SMRT, Inc. in accordance with the Rules. The consultant evaluated the proposal in terms of unreasonable interference with views from established public viewing areas as well as other potential viewshed locations. The applicant states that the landfill will not be visible from an established public viewing areas as defined by the Rules or any new viewsheds. As predicted in the original application, people traveling on Route 43 in a northerly direction will be able to see the landfill along an approximately 3/8 mile long stretch; the view will last about 21 seconds if the viewer is driving the speed limit. The applicant has offered to plant a tree screen along this stretch if permission is granted by the landowner.

The Department received written comments from a Route 43 resident who owns property and a business off Route 43. The commentor noted that the landfill is currently visible from Route 43, in contradiction to the original visual assessment, and that the landfill would be visible from Route 43, Route 16, I-95 and at other points within Old Town if the Department did not limit the height of the landfill. He commented that the proposed final elevation would be 150 feet higher than the highest point in Old Town (Fairdale Hill, at 240 feet).

The Department retained Terrence J. DeWan & Associates, Inc. ("tjd&a") to perform an independent review of SMRT, Inc.'s updated assessment. Tjd&a's report, dated February 6, 2004, confirms the results of SMRT, Inc.'s assessment. It also makes several suggestions for making the updated visual impact assessment a stand-alone document, and for providing corroborative information on the conclusions reached in the SMRT, Inc. report. At staff's request, tjd&a also responded to written comments from the Route 43 resident. Although tjd&a agrees with some of the commentor's statements, tjd&a concludes that the proposed increase in the landfill's height will not unreasonably adversely affect the use of the resident's property or other existing uses in the area.

The Department finds that the design of the project continues to take into account the scenic character of the surrounding area, and that the development has been located and screened to minimize its visual impact, but that the visibility of the landfill would be lessened if the section of Route 43 where the landfill is visible is screened. The Department finds that the development will not have an unreasonable effect on the scenic character of the surrounding area, provided the results of a future visual analysis, performed when the final elevation of the landfill reaches 330 feet, agree with the projections provided in the application, and provided the applicant negotiates in good faith with the Route 43 landowner for permission to plant a tree screen in the location identified in the visual impact assessment.

B. Noise: The original application included a noise study prepared by Acentech Incorporated ("Acentech"). In summary, the study demonstrated that the noise standards of the applicable Rules would be met by the implementation of several noise abatement measures during construction and operation, and that noise would be reduced by atmospheric adsorption and the proposed buffer strips around the facility. As a check on the actual noise levels from the facility, the Department placed Condition #7 in the original license. The condition required that noise studies be performed within the first month of operation, and again within the first month of operation of cell 4 of the landfill. The noise study performed when the landfill became operational demonstrated the facility was operating within the noise limits; cell 4 has not been developed.

The applicant retained Acentech to address noise impacts associated with the proposed facility. A copy of Acentech's report is contained in Attachment 6 of the application. The noise study modeled the projected noise levels from the landfill operating equipment to the nearest property boundary and the nearest residence; the study demonstrated that the facility will comply with the 60 dBA day time noise standards of the Rules. Between 7 p.m. and 7 a.m., the 50 dBA night time standards of the Rules apply, and the applicant will limit the spreading and compacting equipment to 1 compactor and 1 dozer or loader if necessary to meet the noise standards. (The landfill is proposed to operate between 6 a.m. and 8 p.m. on weekdays.)

The Department finds that the noise study for the proposed facility indicates that it will not generate excessive noise at the property boundary or at any protected location as defined by the Rules. However, the Department also finds that the applicant must perform 2 additional noise studies to confirm the model used in the study: one within the first month of operation of cell 3, and the other within the first month of operation of cell 9. If the actual noise limits are above the limits in the Rules, additional noise measures must be promptly implemented to meet the requirements of the Rules.

C. Existing Uses and Conditions: The portions of the 780 acre parcel that are currently undeveloped will not be altered, and the current allowed uses of the property by the public described in Finding of Fact #24 of the original order will be allowed to continue. The Department finds that its original finding that the facility will not unreasonably interfere with existing uses and conditions, and has enhanced values in some areas, is not changed.

17. STORMWATER MANAGEMENT

The Department found in the original license that the project is not located on a floodplain. The applicant has provided an updated stormwater management plan for the proposed facility, prepared in accordance with the Rules and the three general objectives of the Department's *Stormwater Management for Maine: Best Management Practices* (MDEP, 2003): effective drainage, flood prevention and erosion control. The plan is contained in Section 5.7 of the application.

The proposed stormwater management measures, which include the erosion and sedimentation control plan for the facility (see Finding of Fact #18, below), will assure that peak runoff rates for the post-development conditions at the site will be equal to or less than the peak runoff rates for the site's pre-development (prior to 1991) conditions. A major consideration in the grading and layout of the landfill in the original application was the minimization of wetlands impact; the same consideration was applied to the vertical increase of the landfill proposed in this application. Existing drainage courses will be utilized where feasible; no surface water drainage outlet structures from the developed site will discharge concentrated flows directly onto abutting properties. Where necessary, the runoff from the developed site will discharge into detention or sedimentation basins that will attenuate peak flow rates to the unnamed tributary feeding Pushaw Stream, located at the lowest elevation of the facility. This runoff will be only from areas outside the landfill footprint and from landfill areas that have received final or intermediate cover material. Runoff from areas where waste is exposed or has received only daily cover is considered leachate and is handled within the leachate collection and conveyance systems.

A drumlin oriented in a northwest to southeast direction effectively divides the 780-acre parcel into 4 major watersheds: northeast, northwest, southeast and southwest. The Department received comments from the public that the ditches on the Stagecoach Road contain runoff contaminated by the existing landfill. Staff comment that the Stagecoach Road is located in the northwest watershed of the parcel. The landfill is located in the southwest watershed of the parcel, and runoff from this watershed drains to a wetland area that serves as the headwater of an unnamed tributary that empties into Pushaw Stream, not towards the Stagecoach Road.

The Department has also received comments from the public that contaminated runoff from the landfill can flow into ditches along Route 43 and onto property across Route 43. Staff comment that water in the unnamed stream directly downgradient of the landfill has been consistently sampled at least 3 times per year since 1991; no changes in surface water quality have been observed. Staff also comment that no analyses or other documentation of contamination of ditches in either area was submitted to the Department.

Staff comment that all issues raised in the initial engineering review memorandum regarding the provisions for stormwater management have been satisfactorily resolved.

The Department finds that the facility’s stormwater management plan will control run-on and run-off; and infiltrate, detain or retain water falling on the facility site during a storm of intensity up to and including a 25-year, 24-hour event 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 prior to construction of the facility. The Department also finds that the preponderance of the evidence indicates that runoff from the landfill is not impacting ditches along Route 43 or the Stagecoach Road.

18. EROSION AND SEDIMENTATION CONTROL

The application contains an erosion and sedimentation control plan prepared in accordance with the *Maine Erosion and Sedimentation Control Best Management Practices* (MDEP, 2003) and the requirements of the Rules. The plan is contained in Appendix F of the application. The plan includes the construction of two new stormwater detention ponds, several new drainage structures (ditches, catch basins and culverts), and it addresses the inclusion of terrace drainage swales and downchutes on the landfill cover system. To minimize erosion during construction and operation, both temporary and permanent erosion control measures will be used. All measures will be continuously monitored and all necessary maintenance will be performed to assure that the measures are functioning properly. In response to staff comments, the applicant confirmed that the design of construction-related erosion and sedimentation control systems will be included in the detailed design package for each phase of the landfill development. For all cells other than cell 3, which will utilize the existing sedimentation control structures, it is anticipated that water generated within the cell construction area will be contained within that landfill cell, thus allowing sediment to settle out within the cell before being pumped out. If necessary, additional sediment removal techniques will be employed.

The Department finds that ongoing construction of the proposed facility will not cause unreasonable sedimentation or erosion of soil, provided the erosion and sedimentation control plan is implemented as described in the application, and as amended during the review of the detailed design package submitted for the Department's review and approval prior to each phase of landfill construction.

19. RECYCLING AND SOURCE REDUCTION

The landfill will accept only solid waste that is subject to recycling and source reduction programs at least as effective as those imposed by State law. The recycling and source reduction programs included in the OSA will affect the region served by the landfill and the rest of the state, and includes several innovative recycling initiatives that will advance the State's solid waste management policy.

In signing the OSA, Casella agreed, in part, to use its best efforts to operate the landfill following the State's solid waste management hierarchy. Specific actions listed in the OSA include the following:

A. Implementation of a technology for recovery and recycling of all color glass containers so that glass does not require separation by color in order to be recycled;

B. Work with the Municipal Review Committee ("MRC"), which represents over 160 municipalities that are limited partners in PERC and/or users of PERC, to:

1. through Casella's Fairfield County Recycling Division, analyze and develop the best collection, processing and marketing options for paper recycling;
2. help develop organics recycling programs that enhance or expand current practices of MRC members;
3. develop a program to collect, store and process (where applicable) universal wastes and mercury containing products; and
4. develop programs to identify, collect and properly dispose of household hazardous wastes;

C. 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 wood from construction and demolition debris ("CDD") as a fuel source, as proposed for new GPC biomass boiler; and

D. Expand the CDD processing capability of Casella and its affiliates to achieve a decrease in CDD waste volume requiring disposal with a focus on recovering the clean CDD wood waste that would assist in meeting the biomass fuel commitment of the OSA. Other recyclable materials, including cardboard, aggregate and metals, would be separated and utilized in other applications.

The Department finds that the provisions of 38 M.R.S.A. §1310-N(5) and the Rules are not applicable to this application because it is not an application for a new landfill or an expansion of an existing landfill. (See Finding of Fact #1.C, above.) However, to address public comments on the need for additional recycling rather than additional disposal capacity, the applicant submitted a summary of the recycling initiatives included in its response to the RFP and in the OSA.

20. PROTECTED NATURAL RESOURCES

The original application, and the application submitted to the Army Corps of Engineers, included an extensive wetlands study of the property. The original licenses permitted the filling of 8.84 acres of wetlands, and contained a compensation plan for the activity. Condition #4 of the original license required that the original licensee submit annual reports on the restoration and enhancement projects in the compensation plan for a 3 year period; compliance with this condition has been demonstrated.

No additional wetland areas will be impacted by the proposed project. However, the reconstruction of the access road from the landfill berm to the existing leachate pump station, and the construction of the leachate force main will include construction activities within 75 feet of the upland boundary of the forested wetland to the west of the site, and thus the applicant will file Permit By Rule applications under the Department's Chapter 305, Sections 4 and 9, Regulations prior to this construction, and will comply with the standards in the regulations.

The Department finds that the proposed facility will not unreasonably adversely effect protected natural resources in that no new impact on protected natural resources will occur, provided that the applicant obtains, and complies with the standards of, permits-by-rule under 06-096 CMR Chapter 305.4 and 305.9.

21. SETBACKS AND BUFFERS

The setbacks to public roads, private residences, public and private water supplies protected natural resources, airports and the property boundary are not changed as a result of this proposal, and thus continue to exceed the setbacks set forth in the Rules. As required by Condition #9 of the original license, the 100 foot forested buffer between the western side of the facility between the landfill and the emergent wetland to the southwest of the facility will be maintained. The

Department finds that Finding of Fact #22 of the original license, which sets forth required buffers, is not changed by this proposal.

22. UTILITIES

On site single-phase power is supplied from Route 16 via buried electrical lines. Potable water will continue to be provided by an on-site well. On-site sanitary wastewater treatment is provided by a licensed subsurface wastewater disposal facility. The applicant proposes to upgrade the facility from 113 gallons/day to 420 gallons/day; a copy of the HH200 form for the upgraded facility is contained in Attachment 10 of the application. As described in Finding of Fact #9.D, above, leachate will initially be trucked to the Old Town Mill's wastewater treatment plant, but may be transported via sewer line or truck to the City of Old Town Wastewater treatment plant in the future, if the necessary upgrades are made and the City of Old Town is willing. The Department 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.

23. ALL OTHER FINDINGS OF THE ORIGINAL ORDER

The Department finds that all of the remaining Findings of Fact of the original license will be unchanged by the proposed amendment for a vertical increase, in that the horizontal footprint of the landfill will be unchanged by the proposal.

BASED on the above Findings of Fact, the Department CONCLUDES the following:

1. The applicant has provided adequate evidence of financial capacity and technical ability to meet air and water pollution control standards, provided an acceptable package for financial assurance is submitted and maintained, and provided evidence of financial capacity for construction of each cell is provided as part of the detailed design package submitted prior to each construction season.

2. The information submitted by the applicant and supplied by state and local officials regarding Casella's previous violations of certain environmental laws, as described in the civil and criminal record for SPO and Casella/NEWSME

Operations, demonstrates that Casella has willingly conducted all required corrective actions; thus the civil and criminal record does not provide a basis to deny approval for SPO to own and control, and NEWSME Operations to operate, the landfill as proposed in this application in compliance with Maine laws and regulations.

3. The applicant has provided adequate evidence of title, right or interest in the parcel of property containing the existing landfill.

4. The proposed vertical increase of the landfill will not pose an unreasonable risk that a discharge to a significant groundwater aquifer will occur in that the landfill is not located over a significant sand and gravel aquifer and the proposed vertical increase of the landfill does not pose an unreasonable threat to the quality of a significant sand and gravel aquifer which it does not overlie, or to an underlying fractured bedrock aquifer, in that soils under the landfill and the proposed design of the vertical increase, combined with the groundwater flow conditions, provide adequate protection to water quality.

5. The proposed vertical increase of the landfill will not pollute any waters of the State, contaminate the ambient air, constitute a hazard to health and welfare, or create a nuisance, provided the environmental monitoring plan for the landfill is updated in accordance with staff recommendations, and provided the landfill is constructed, operated, closed and monitored and maintained throughout the post-closure period in accordance with staff recommendations and the approved design and then-current operational standards, including reporting requirements. Compliance with the intent of the Solid Waste Management Regulations has been affirmatively demonstrated.

6. The applicant has adequately addressed the settlement and stability of the landfill, provided it monitors the facility in accordance with an approved settlement and stability monitoring plan that incorporates all recommendations made by staff.

7. The applicant has made adequate provisions for traffic movement of all types into, out of and within the development area, provided overhead lights, or another effective lighting system as approved by the Department, are installed at the

entrance to the access road prior to the operation of cell 3. The traffic increases attributable to operation of the landfill will not result in unreasonable congestion or unsafe conditions on a road in the vicinity of the project.

8. The applicant has made adequate provisions for fitting the development harmoniously into the existing natural environment and the development will not adversely affect the existing uses, scenic character, or natural resources in the municipality or in neighborhood municipalities provided the landfill is properly operated, properly closed, and properly cared for after closure, all in accordance with then-current regulatory requirements; that the applicant obtains the necessary Natural Resource Protection permit-by-rules before construction of the MSE berm; and provided the results of future visual and noise analyses confirm the projections contained in the application.

9. The proposed change in the landfill will not cause unreasonable erosion of soil or sediment, nor inhibit the natural transfer of soil. The applicant has made adequate provisions for controlling erosion and managing stormwater, provided the approved stormwater management plan and erosion control plan are fully implemented.

10. The applicant has made adequate provisions for utilities, including water supplies, sewerage facilities, solid waste disposal and roadways required for the development, and the landfill will not have an unreasonable adverse effect on existing or proposed utilities in the City of Old Town, the Town of Alton, or the area served by those services.

THEREFORE the Department APPROVES the above noted application of the STATE OF MAINE, ACTING THROUGH THE STATE PLANNING OFFICE, SUBJECT TO THE ATTACHED CONDITIONS, and all applicable standards and regulations.

1. The Standard Conditions of Approval, a copy attached as Appendix A.

2. 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 or operation of the facility.

3. Prior to May 15, 2004, the applicant shall submit a financial assurance package for closure and post-closure care to the Department for review and approval that meets requirements of the Rules. The applicant shall implement the approved package. The approved financial assurance package shall be updated on an annual basis by the applicant in accordance with the Rules.

4. The applicant shall complete the investigation in the areas around and beneath detention ponds 1 and 2 in accordance with the workplan approved by the Department.

5. The applicant shall update the EMP on an ongoing basis as recommended by staff, beginning with the submittal of the 2003 Annual Report. Monitoring of detention ponds 1 and 2, and monitoring wells #DP-4, #P-04-02, and #P-04-04 shall be added to the EMP. The 3 new well clusters proposed in the application shall be installed in locations approved by the Department, and added to the monitoring program for the facility. All landfill underdrain discharge locations shall be added to the monitoring program for the facility; they shall be monitored monthly for the field parameters in Appendix A, Column 1 of Chapter 405 of the Rules, and sampled 3 times per year for the facility's suite of detection parameters at the same time as the other monitoring locations.

6. The applicant shall initiate assessment monitoring in accordance with the Rules at monitoring wells MW-204, MW-302, MW-223B, MW-212 and MW-303 during the Spring 2004 sampling event. New wells installed in accordance with Condition #4, above, shall be included in the assessment monitoring program during the Summer 2004 sampling event.

7. The applicant shall continue to route the discharge from the leachate pond underdrain into the leachate storage pond until the Department authorizes a resumption of the surface discharge. The leachate pond underdrain water quality shall be sampled weekly throughout the rest of 2004 for field parameters including pH, specific conductivity and temperature, and an analysis of the results shall be included in the 2004 annual report for the facility. The analysis of the results shall include a proposal for future monitoring at this location, and the

necessary changes to the EMP. After review and approval by the Department, the changes shall be incorporated into the EMP and implemented as approved.

8. The applicant shall construct the sludge mixing test plot in accordance with the proposed plan, as revised in accordance with staff recommendations. At least 60 days prior to landfilling of sludge from cells 1 and 2 with other waste outside of the test plot, the applicant shall propose to the Department for review and approval, based on the findings of the test plot program, a ratio of existing and new sludge to incoming waste to be placed in cells 1, 2 and 3, detailed procedures for mixing the waste streams, and an odor control and monitoring plan for sludge excavation and mixing operations.

9. At least 60 days prior to landfilling of sludge from cells 1 and 2 with other waste outside of the test plot, the applicant shall submit to the Department for review and approval, based on the findings of the test plot program, an updated geotechnical stability analysis and a finalized geotechnical monitoring plan for the landfill.

10. At least 45 days prior to the commencement of waste placement in cell 3, the applicant shall submit to the Department for review and approval an updated operations manual, including a finalized conceptual cell development plan for the life of the landfill and a detailed cell development plan for the next 2 years of operation. The updated operations manual shall address all staff recommendations as agreed to in SME’s January 22, 2004 submittal addressing staff memoranda. The operations manual shall be updated again following completion of the test plot program and prior to excavation of sludge from cells 1 and 2. All changes to the operations manual for the facility are to be implemented as approved by the Department.

11. The applicant shall include in each of the facility’s annual reports proposed revisions to the operations manual, including an annually updated cell development plan. Each year’s annual report shall also include an evaluation of the sizing and the installation timing of the active gas extraction system components over the reporting period, and an evaluation of the effectiveness of the system based on the quantities and types of wastes projected for the next year.

The operations manual shall be revised as conditions dictate and to comply with any changes in the operating requirements in the Rules.

12. Prior to the commencement of operations in cell 3, the applicant shall install overhead lights, or another lighting system that identifies the entrance road into the facility, at the entrance to the facility.

13. The applicant shall obtain prior to construction of the MSE berm, and comply with the standards of during construction, permits-by-rule under 06-096 CMR Chapter 305.4 and 305.9.

14. At least 60 days prior to the planned commencement of operations in cell 3, the applicant shall submit to the Department for review and approval the following information on the perimeter hydrogen sulfide monitoring program: the number and locations of instruments, based on meteorological conditions; system security measures; monitoring program details and responsibilities; and reporting procedures.

15. At least 6 months prior to the planned commencement of operation of new cells or other structures, the applicant shall submit to the Department for review and approval detailed design packages for each construction activity. The detailed design packages shall include a complete set of project specific contract bid documents, including construction drawings, technical specifications, contract administrative documents, construction monitoring and documentation provisions, construction quality assurance plans, erosion and sedimentation control plans, and the following information:

    A. For the landfill cells other than cell 3, the perimeter berm, the leachate storage tank and the ancillary structures, the detailed design packages shall also address all staff recommendations regarding the design, the technical specifications, the construction drawings, and the construction quality assurance plan as agreed to in SME’s January 22, 2004 responses to the comments provided in 3 initial engineering review memoranda by staff. In addition, the applicant shall include a demonstration of financial capacity for costs associated with the construction of each cell developed after cell 3.;

B. For the active gas extraction system, the detailed design package shall also address staff recommendations regarding the design, the technical specifications, the construction drawings, and the construction quality assurance plan as agreed to in SHA's submittal dated January 21, 2004 and the applicant's letter dated February 4, 2004. The detailed design package for the initial construction of the active gas extraction system shall also include the active gas system operating plan, inclusive of monitoring, record-keeping, and reporting procedures; and the provisions to be implemented to protect and provide safe access to the well-heads if temporary geomembrane tarps are proposed for intermediate cover; and

C. For the phased final cover system, the detailed design package shall include the supporting information required by the applicable provisions of Chapter 401.5 of the Rules, and address the recommendations in staff memoranda as agreed to in SME's submittal dated January 22, 2004 and as responded to in staff memoranda dated January 26, 28 and 30, 2004.

If the Rules applicable to any aspect of the design and construction of the vertical increase of the landfill and its ancillary structures change during the development of the landfill, the applicant shall address the new requirements in subsequent submittals.

16. With regards to the acceptance of MSW for disposal, consistent with its proposal, the applicant:

A. shall not dispose of unprocessed MSW from any source other than bypass from the following sources: PERC incinerator in Orrington and the Maine Energy incinerator in Biddeford; waste delivered under an interruptible contract with PERC; or waste delivered in excess of processing capacity at other MSW incinerators in Maine;

B. shall not accept waste from an incinerator without verifiable authorization from either the owner/operator of an incinerator or from a regulatory entity with jurisdiction over the incinerator that a bypass has been called or, for holders of interruptible contracts, the contracts have been interrupted in accordance with the contractual provisions;

C. shall limit the total amount of (a) unprocessed MSW incinerated at Maine Energy and (b) MSW bypassed from Maine Energy for disposal at the WOTL and at Pine Tree Landfill's Secure III Landfill Expansion to no more than 310,000 tons in any calendar year, unless changes in conditions or circumstances occur that cause the Department to revise this cap; and

D. shall notify the Department if waste deliveries in excess of processing capacity at MSW incinerators continue from a particular incinerator for a period exceeding 1 week, and provide such information as the Department may request to demonstrate that the deliveries are due to either planned outages or unplanned production problems.

17. The monthly activity reports submitted to the Department by the applicant shall provide the data needed to determine the quantities of the various waste types, and their sources, delivered to the landfill. The monthly reports on the wastes accepted for disposal at the landfill shall include the amount and source of unprocessed MSW accepted for disposal.

18. Prior to accepting for disposal any waste not listed in the application, the applicant shall submit an application for the new waste to the Department for review and approval.

19. The applicant shall include in the annual reports for the facility submitted to the Department, in addition to the specific requirements of Chapter 401.4(D) of the Rules, the amount of unprocessed MSW received at WOTL from each of the approved sources.

20. If Department staff find that operation of the landfill as proposed unreasonably adversely results in unreasonable odors or fugitive dust emissions, the Department shall require additional odor control measures or fugitive dust control measures at the facility.

21. The applicant shall perform 2 additional noise studies in accordance with the provisions of the Rules: one within the first month of operation of cell 3, and the other within the first month of operation of cell 9. The results of each of the noise studies shall be submitted to the Department for its review and comment within 2 weeks of completion. If the actual noise levels are above the limits prescribed in the Rules, additional noise measures shall be implemented to meet the requirements of the Rules within 1 month of the submittal of the noise study.

22. The applicant shall conduct a future visual analysis, performed when the final elevation of the landfill reaches 330 feet, and demonstrate that the results agree with the projections provided in the application. If that demonstration cannot be made, the applicant shall propose alternative mechanisms for meeting the visual impact standards of the Rules within 1 month of the date of the visual analysis.

23. The applicant shall negotiate in good faith with the Route 43 landowner for permission to plant a tree screen in the location identified in the visual impact assessment.

24. The applicant shall submit the detailed construction plans for the placement of phased final cover to the Department for its review and approval at least 90 days prior to each application of final cover. In addition, the applicant shall submit to the Department for its review and approval a final closure plan for the landfill, prepared in accordance with the Rules in effect at that time, and complete final closure of the landfill in accordance with the approved final closure plan. The final closure plan shall include a post-closure monitoring and maintenance plan covering a period of at least 30 years following closure. The post-closure monitoring and maintenance plan shall be revised throughout the post-closure period to comply with changes in site conditions or any changes in

the post-closure monitoring and maintenance requirements of the Rules. Post-closure monitoring and maintenance shall continue until the Department approves its cessation.

DONE AND DATED AT AUGUSTA, MAINE THIS ________9th_________DAY

OF ____April_____________, 2004.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Dawn R. Gallagher

Dawn R. Gallagher, Commissioner

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

Date of initial receipt of application: _October 30, 2003________
Date application accepted for processing: _November 21, 2003___

Date filed with Board of Environmental Protection:

XCD51106/cwd

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 "<u>Environmental Matters</u>" 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 (30^{th}) 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 <u>RECORDS, AUDITS AND CONFIDENTIALITY</u>

10.1 <u>Annual Report; Inspection Rights</u>. 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 <u>TERMINATION</u>

15.1 <u>Events</u>. 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 (15^{th}) 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: Michael 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 H MacDonald

By: Martha E. Freeman
Name: Martha E. Freeman
Its Director

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.

CASELLA WASTE SYSTEMS, INC.

____
Witness

By: ______________________
Name: Brian Oliver
Title: Authorized Agent

STATE OF MAINE, acting by and through Its Executive Department, State Planning Office

____
Witness

By: Martha Freeman
Name: Martha Freeman
Title: Director

SEEN AND AGREED TO:

RED SHIELD ENVIRONMENTAL, LLC

By: ______________________
Name: EDWARD T PASLAWSKI
Title: CHAIRMAN

APPENDIX A-2

MEDEP APRIL 13, 2007 LETTER “DETERMINATION OF ENVIRONMENTAL FEASIBILITY” PROPOSED EXPANSION

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN ELIAS BALDACCI
GOVERNOR

DAVID P. LITTELL
COMMISSIONER

April 13, 2007

George MacDonald, Manager
Waste Management & Recycling Program
State of Maine Executive Department
State Planning Office
38 State House Station
Augusta, Maine 04333-0038

Martin L. Drew, Divisional Landfill Manager
Juniper Ridge Landfill
2828 Bennoch Road
Alton, Maine 04468

Re: Staff Response to Preliminary Information Report for Expansion of Juniper Ridge Landfill; DEP # S-020700-WQ-X-N

Dear George and Marty:

The Department has completed its review of the Preliminary Information Report ("PIR"), dated November, 2006, for a proposed expansion of the Juniper Ridge Landfill, owned by the State of Maine and operated by NEWSME, LLC.

The purpose of the PIR is to demonstrate that the proposed landfill will meet the prohibitive siting criteria in Chapter 401.1.C(2) of the Solid Waste Management Regulations, and to preliminarily identify any of the restrictive siting criteria in Chapter 401.1.C(3) to which a variance may be needed.

The majority of the information required to be included in the PIR concerns basic geologic/hydrogeologic information about a proposed landfill site, thus most of the discussion at the preliminary information meeting held on February 21, 2007 at JRL was led by Dick Behr, the staff geologist for the project. Included with this letter is a memorandum prepared by Dick, dated April 3, 2007, which summarizes his review of the PIR. The memorandum also accurately summarizes Dick's comments during the February 21st meeting; staff expect that the comments and recommendations will be incorporated into the preparation of the expansion 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
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 04769-2094
(207) 764-0477 FAX: (207) 760-3143

web site: www.maine.gov/dep

Also included with this letter are two other documents: one is a copy of my notes from the February 21st meeting, and the other is a summary of the various steps required by statute and/or regulation that apply to applications to expand a landfill.

In conclusion, based on the Department's review of the limited information contained in the PIR, staff have determined that the proposed landfill expansion appears to be environmentally feasible. We concur that none of the siting criteria of Chapter 401.1.C(2) prohibit the proposed landfill. This opinion does not constitute the Department's approval of the landfill or the site. This opinion is the Department's concurrence with the applicant that the site warrants further investigation to determine its suitability and further define the facility design, and that the Department expects to see an application prepared and filed in accordance with all applicable statutory and regulatory requirements.

Sincerely,

Cynthia W Darling

Cynthia W. Darling
Division of Solid Waste Management
Bureau of Remediation and Waste Management
Eastern Maine Regional Office

Encl.

pc: Steve Patch
Dick Behr
Amanda Wade

XCD62308

STATE OF MAINE

DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF REMEDIATION AND WASTE MANAGEMENT

M E M O R A N D U M

TO: Cyndi Darling, Project Manager - Project Manager
Solid Waste Facility Regulation
Bureau of Remediation and Waste Management

FROM: Dick Behr, Certified Geologist - GE#342
Division of Technical Services
Bureau of Remediation and Waste Management

DATE: April 3, 2007

RE: Juniper Ridge Landfill Expansion Project
Preliminary Information Report
State Planning Office, State of Maine, Augusta, Maine
NEWSME Landfill Operations, LLC
Saco, Maine November 2006
Prepared by Sevee & Maher Engineers, Inc.

****

I have completed a comprehensive review of the PIR to determine if it contains the required information. As suggested, I have paid particularly attention to both the prohibitive siting and the restrictive siting criteria. Although it may be necessary to obtain a variance for one of the restrictive criteria, overall the proposed expansion project site looks promising. Further, I find the PIR contains all of the information outlined in Chapter 401.1(E).

The following comments are preceded by the applicable page number and section heading. Please give me a call if you have any questions.

Pg 3-7 <u>3.2.3 Water Level Measurements</u> It appears that Appendix F doesn't contain all of the water level information for all the piezometers/wells. For example, while there is data for P-04-06B, I couldn't locate any water level information for P-04-06A. It looks like the table only includes water level data for a single instrument at a given location. Without the potentiometric head data for the nested well locations, I am unable to evaluate vertical gradients.

Pg 3-7 3.2.4 In Situ Hydraulic Conductivity Testing SME conducted ten slug tests within the expansion area and the data is presented in Appendix G. I have summarized the data in the attached table. SME determined the geometric mean of the ten tests was 7 x 10^{-6} cm/sec. The attached summary table contains a slightly larger geometric mean (i.e., 7.4 x 10^{-6} cm/sec). The geometric mean is thought to produce a reasonable estimate of the in-situ hydraulic conductivity of the stratigraphic unit of interest. However, based on the estimated groundwater velocity determined from the tracer test (i.e., 17 ft/year), it appears the geometric mean of the ten tests may not represent the in-situ hydraulic conductivity throughout the proposed footprint. With a horizontal gradient equal to 0.02, an estimated effective porosity of 0.25 and the geometric mean of the hydraulic conductivity, the estimated groundwater velocity is 0.6 ft/year. This velocity is far less than that estimated from the tracer test and suggests the geometric mean may not be an appropriate estimate of the hydraulic conductivity of the glacial till.

It would be helpful to also include the slug test data obtained from the wells and piezometers installed beyond the proposed solid waste boundary.

Pg 3-7 3.2.5 Geophysical Survey It would be helpful to include the results and interpretation of the referenced resistivity surveys conducted by Northeast Geophysical Services.

Pg 3-7 3.2.6 Horizontal Groundwater Velocity in Glacial Till I commend SME for conducting the tracer test to estimate groundwater velocity. It's encouraging to learn that the most recent test produced a velocity in the same ball park as the tracer test conducted by J.D. Tewhey Associates, Inc. I think it's particularly noteworthy that the groundwater velocity calculated using the slug test determined hydraulic conductivity, the horizontal gradients from the observations wells and an assumed effective porosity of 0.1 is 19 ft/year. This value is essentially equivalent to the tracer test determined velocity of 17 ft/year.

Pg 3-8 3.2.7 Groundwater Age-Dating SME collected groundwater from two observation wells for dating purposes. The sample collected from P-04-06A produced an age of 14 years. SME reports that groundwater gradients are nearly vertical at this location and therefore the age indicates a transport time greater than 6 years through the till. I am not certain this is an appropriate interpretation of the data. Here's why….if gradients are nearly vertical then one can assume a flow path equal to the well depth (~ 42 ft bgs). Based on the estimated age of 14 years, a 42 ft long flow path would produce an estimated groundwater velocity of about 3 ft/year. This velocity is far lower than the velocity estimated from the tracer test.

If the groundwater velocity is known, the groundwater age data may be more useful for estimating possible groundwater flow paths. In this example, if one uses the estimated groundwater velocity (17 ft/year) along with the groundwater age, one would estimate precipitation entered the saturated zone about 240 ft upgradient of P-04-06A. Therefore, the resulting hydraulic gradient at P-04-06A should not be considered "nearly vertical."

SME collected the second sample from P-04-07B. This well is screened in the shallow bedrock and SME believes it may represent a conservative estimate of how long it takes groundwater to discharge to surface water. The age determined from the tritium/helium method is about 21 years. One may reasonably assume this particular flow path originated 21 years "upgradient." Therefore, with a combination of reliable age data and groundwater velocity estimates, it is possible to predict the most likely groundwater flow paths.

Pg 5-1 5.1 Prohibitive Siting Criteria (401.1C(2)) There are no apparent issues relating to the prohibitive siting criteria. As noted in the PIR, the closest sand and gravel aquifer is located about one mile east of the proposed expansion. Like the existing landfill, the majority of the proposed expansion area is underlain by dense glacial till.

Pg 5-2 5.2 Restrictive Siting Criteria (401.1C(3)) It appears all but one of the restrictive criteria are clearly met. One of the dozen restrictive criteria requires the undisturbed in-situ soil beneath the footprint to have an undisturbed hydraulic conductivity less than or equal to 1×10^{-5} cm/sec. As the report notes, the geometric mean of the hydraulic conductivity data collected to date was 7×10^{-6} cm/cm. However, the values ranged from a maximum of 7.9×10^{-5} to a minimum of 3.1×10^{-7} cm/sec (see attached Table). Additional hydrogeological investigations will certainly yield more information about the true range of in-situ hydraulic conductivity throughout the proposed footprint. Depending on the outcome of additional hydraulic testing, a variance may be needed. Given my understanding of the geologic setting and the proposed liner system (i.e., composite liner with leak detection), approval of a variance request appears reasonable.

Pg 5-7 5.4 PIR Requirements This section states no variances to the Solid Waste Management Rules will be required. As stated above, it's possible a variance to the hydraulic conductivity restrictive criteria may be required.

Juniper Ridge Landfill		
Summary of Hydraulic Conductivity Data		
Boring ID	**Depth Interval, ft bgs**	**K, cm/sec**
MW-04-111	12.5	7.90E-05
P-04-05A	48	7.16E-06
P-04-05B	14	6.82E-07
P-04-06B	10	1.92E-06
P-04-08A	39	3.15E-07
P-04-08B	16	1.85E-06
P-04-09B	14	3.50E-05
P-04-10B	8	5.11E-05
P-04-11A	9	3.24E-05
P-04-11B	49	1.86E-05
Average		**2.3E-05**
Geometric Mean		**7.4E-06**
Maximum		**7.9E-05**
Minimum		**3.2E-07**

Email: Richard Heath
Amanda Wade

attach agenda + attendance sheet

2-21-07

JRL Expansion - PIR discussion

I - purpose: CWD explained that DEF no longer in the rules; letter will be sent providing staff comments on the PIR (+ memo from Dick)

II - Dick: Casella/SME did more work than the rules require for a PIR; the flow paths look good; obviously there'll be more work done, espec. for frac. b'rock

he noticed the PIR had a summary of the H_2O flow data; he'd like the data = OK

P-04-06B - only "B" mentioned but it's a nested well?

PIR used the geometric mean for K (10 values); he calc. an effec. porosity that's lower (J. Sevee - that's why ran tracer test)

he noted the geophysical lines = good; he'd like to see the data; John Sevee - using geophysics to help determine depth to b'rock & frac. zones; Dick = good to use resistivity to find the transmissive frac. zones

age dating + P-04-6A - use a comb. of tracer + age dating info to eval. travel times; John - trying to use GW divide locs where can access; Dick - be careful when using vert. gradient

Dick would like to know when addit. age dating is done + have input on the locs

Shallow b'rock areas - S. Patch - thinks know the b'daries w/in 100'; some are <5'

J. Sevee - asked what addit work would like for the rock; plan to do tracer test; need pump test? will discuss + give answer

Amanda - OK with what saw in the report; S. Patch - will be sump + pump; plan/want to have 6yr K to b'rock; discussion of sensitive receptors (SW, b'rock?)

IV - CWD - staff concur that none of the prohibited siting criteria are triggered; Dick - would like to see more emphasis on the TOT rather than the CTA

V - plan to submit applic in 2/09; most of the work will be done in 2008 (not much in 2007)

talked abt. NRPA applic - separate or 1 SW/NRPA decision? prob. will be BEP's call

VI - CWD will send letter summarizing staff comments; plz. let Dick know when work is going on so he can be there if possible; Tom G - asked that letter include info on the rest of the process = OK; discussed s'holder meetings but no need for a while; need to figure out format

Cynd D. Darling

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JOHN ELIAS BALDACCI
GOVERNOR

DAVID P. LITTELL
COMMISSIONER

AGENDA

JUNIPER RIDGE LANDFILL
PRELIMINARY INFORMATION REPORT DISCUSSION
&
PRE-APPLICATION MEETING

February 21, 2007 – 10 am
Juniper Ridge Landfill Conference Room, Old Town

I. Introductions – Cyndi Darling, Project Manager

   A. Purpose of meeting
   B. Introduction of attendees

II. Discussion of Hydrogeologic/Geologic Aspects of the PIR – Dick Behr, Project Geologist

III. Discussion of Engineering Aspects of the PIR – Amanda Wade, Project Engineer

IV. Discussion of Proposed Site and the Prohibitive Criteria of the Rules – DEP project team

V. General Discussion of Preparation/Contents of the Expansion Application

VI. Path Forward / Wrap-up

AUGUSTA
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RAY BLDG., HOSPITAL ST.

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Juniper Ridge Landfill Expansion Project Feb 21, 2007

Preliminary Information Report - Meeting

NAME	FIRM
Steve Patch	SME
George MacDonald	SPO
DAN DUTILE	JRL CASELLA
Tom Gilbert	JRL
Amanda Wade	MEDEP
MARTY DREW	JRL / NEWME, LLC
Cyndi Darling	MEDEP
Dick Behr	MDEP
Tom Doyle	Pierce Atwood
John Sevee	SME
Larry B. Lackey	Casella
WAYNE Boyd	Casella
Don Meagher	Casella
Toni King	Casella

APPENDIX A-3

MILESTONE MEETING NOTES AND SUMMARY OF CHANGES AND INITIATIVES AS A RESULT OF PUBLIC COMMENTS

JUNIPER RIDGE LANDFILL EXPANSION
MILESTONE MEETING # 1 SUMMARY

September 9, 2014

On September 9, 2014, representatives of NEWSME Landfill Operations, LLC convened the first milestone meeting at 2836 Bennoch Road, Old Town, near the access road for the Juniper Ridge Landfill. This is a summary of Milestone Meeting # 1.

Attendees

Attachment 1 sets forth the list of attendees, which included representatives of the Maine DEP, the Landfill Oversight Committee, the City of Old Town and NEWSME Landfill Operations, LLC.

Summary of Meeting

Don Meagher explained the purpose of the milestone meeting process, which is to review and obtain the participants' input on the design and supporting information for the BGS/NEWSME proposed expansion of the Juniper Ridge Landfill, a 9.35 million cubic yard horizontal expansion. Cyndi Darling added that these meetings are an opportunity for participants to understand what will be prepared in the application and why it is being prepared. It also allows for input into the application itself. These meetings are not, however, an approval of the application.

It also was noted that these meetings are not a requirement of the application process, just an add-on.

Ralph Leonard stated that he "applauds the process."

Don Meagher explained the chronology of the expansion proposal, which began as long ago as 2006 with the preparation and submission of the Preliminary Information Report (see Attachment 2).

Mike Booth explained what is now being proposed for the 9.35 million cubic yard expansion. The proposed expansion would have a solid waste footprint of approximately 53.5 acres. Among other expansion highlights are the following:

- Final peak waste grade will be at elevation 390 (same as the final elevation of existing JRL), and final waste sideslope grades will be 3 (horizontal) to 1(vertical).
- The scale house and office building will need to be moved to another area of the parcel near the existing access road.
- The first expansion cell (Cell 11) will likely need to be constructed in 2018, to be available for use in 2019, based on remaining site capacity as of July of 2014, and current waste disposal rates at existing JRL.

- The licensed MSE berm for the existing landfill will not be constructed, but the same landfill capacity (about 650,000 cubic yards) will be gained within the current licensed footprint with the construction of the expansion cells beginning with Cell 11.
- Leachate and landfill gas will be collected and transported to the existing leachate tank and landfill gas flare respectively.
- There will be a double composite liner system with a dedicated leak detection system between the liners. This will be explained in greater detail in a subsequent milestone meeting.
- Potential traffic, noise, scenic, and, of course, wetland and other natural resource impacts will be evaluated and reported on.
- The expansion is expected to last 12 years at current disposal rates. This projected life could be different depending on changes in market conditions affecting solid waste management in Maine, including what happens at the end of 2018 with PERC and the MRC.

Mike Booth stated that the expected filing date for the JRL expansion application is July of 2015.

Cyndi Darling suggested that group members discuss issues now if you have them.

Ralph Leonard suggested that it would be helpful to have a breakdown of the estimated tonnage in terms of waste categories. Peter Dufour wondered if we could get a copy of the landfill's annual report, which Cyndi Darling stated may be found online at the DECD's website.

There was brief discussion about the pending MRC proposal to construct a new landfill in either Argyle or Greenbush. Cyndi Darling explained that a decision is expected in early October with a draft order to be issued at the end of September. (A draft order was issued during the week of September 23.)

Don Meagher noted that NEWSME and BGS submitted a comment letter on the MRC PBD application explaining that if MRC pursues an integrated processing facility, Juniper Ridge could be available for disposal of that facility's residue or bypass.

Peter Dufour asked about MRC's integrated facility and the percentage of waste reduction that is being proposed. Don Meagher noted that he believed MRC is proposing a 70% reduction with 30% residuals. Cyndi Darling referenced the Fiberite facility, a pilot project, in Virginia.

Jim Katsiaficas inquired about the City of Old Town application and when we expect to submit it. Don Meagher explained that typically this would occur after, or near the very end of, the DEP permitting process. It was noted that Old Town would have automatic intervenor status if it so sought it in the solid waste application process. Alton could as well, but could not receive any grant money, pursuant to a Resolve that was passed in 2005.

Wayne Boyd distributed a report on waste activity at Juniper River over the last 3 years. Also distributed at the meeting were the dates and projected topics for milestone meetings 2 through 4 (Attachment 3). A 5th meeting may be scheduled if needed.

The meeting adjourned at approximately noon.

JRL Expansion - Milestone Meeting #1 9/9/14

NAME		AFFILIATION
PETER DUFOUR	hmgd@Juno.com	City Old Town Rev. Comm.
Mike Booth		Sevee & Maher Engineers
Bill Thompson	bill.thompson@penobscotnation.org	Penobscot Nation, Juniper Ridge LAC
Amanda Wade		MEDEP
Richard S. Behr		MEDEP
Mike Parker		MeDEP
Cynthia Darling		MEDEP
Bill Mayo	bmayo@old-town.org	Manager, City of Old Town
Ralph Leonard		City of Old Town Rev. Comm.
DON MEAGHER		CASELLA
Wayne Boyd		Casella
TONI KING		CWS
Tom Doyle		Pierce Atwood
DAVID RUSSELL		City of Old Town Code Enforcement
Jim KATSIAFICAS		City of Old Town / Perkins Thompson

Chronology of Juniper Ridge Landfill Expansion

November 22, 2006	Submission of Preliminary Information Report.
April 13, 2007	DEP Determination of Environmental Feasibility.
October 23, 2008	Preliminary Notice of intent to file expansion application in Bangor Daily News and to City of Old Town.
October 31, 2008	Letter from DEP that Town of Alton must receive the Preliminary Notice.
November 4, 2008	City of Old Town requests automatic intervenor status in the Juniper Ridge Landfill expansion application.
March 9, 2009	Preliminary Notice sent to Town of Alton.
April 4, 2009	Letter from Town of Alton that the Town intends to intervene in the expansion application but will not apply for municipal intervenor grant funding.
October 16, 2009	Public Benefit Determination application for Juniper Ridge Landfill expansion submitted to the DEP by Casella Waste Systems.
November 3, 2009	DEP determines application is not acceptable for processing due to late receipt of application copy by City of Old Town.
November 19, 2009	Public Benefit Determination application for Juniper Ridge Landfill expansion resubmitted by State Planning Office.
January 5, 2010	DEP issues draft denial of Public Benefit Determination application.
January 13, 2010	State Planning Office withdraws Public Benefit Determination application.
September 16, 2011	Public Benefit Determination application for Juniper Ridge Landfill expansion submitted by State Planning Office.
September 23, 2011	Public Benefit Determination application accepted as complete for processing.
October 24, 2011	Public meeting on Public Benefit Determination application.
January 31, 2012	Partial approval of Public Benefit Determination by DEP Commissioner.
July 19, 2012	Board of Environmental Protection denies the appeal of the determination of public benefit for the JRL expansion.

September 12, 2012	In response to submission of an amendment application to accept non-bypass MSW at JRL under the existing license, the Commissioner determined that inclusion of this waste stream in the expansion would constitute a material change in the underlying facts or circumstances upon which the PBD was based, requiring a modification of the PBD.
July 10, 2014	Casella representatives meet with DEP staff to discuss proceeding with JRL expansion, with no modification of the PBD at this time. Next step is to conduct a milestone process to discuss the various topics that will be included in the expansion application.
September 9, 2014	First milestone process meeting.

JUNIPER RIDGE LANDFILL
9.35 MILLION CUBIC YARD EXPANSION
MILESTONE PROCESS MEETING OUTLINE

Objective: Prior to submission of an application, to review and obtain milestone process participants' input on the design and supporting information for the JRL 9.35 Cubic Yard Expansion.

Stakeholders: MEDEP Permitting and Technical Staff, State Landfill Manager, NEWSME Landfill Operations, LLC, Sevee and Maher Engineers Inc, Pierce Atwood; City of Old Town Representative, Town of Alton Representative, Landfill Oversight Committee Representative.

Format: informal meetings where the approaches and exhibits to meet the various permitting standards and criteria are reviewed and discussed.

Possible Topic and Meeting Dates:

Meeting 1: Project Overview and History **Date: September 9, 2014**

Meeting 2: General Licensing Standards and Exhibits **Date October 16, 2014**

Meeting 3: Geology and Hydrogeology **Date November 20, 2014.**

Meeting 4: Engineering and Site Design **Date December 18, 2014.**

Meeting 5: If needed to be determined.

Meeting 1
Project History and Overview

Objective: Kick off meeting: overview, and history of the expansion project

- **General Discussion of the Pre-application Milestone Process**

- **Site History and Previous Investigations**
  - Determination of Environmental Feasibility
  - Public Benefit Determination
  - 2009 Application and information that will be used from that Application.

- **Conceptual Development Plan for 9.35 Million Cubic Yard Expansion**
  - Location
  - Size
  - Peak Elevation
  - Estimated Life
  - Key Design Features
  - Construction of First Cell
    - Location
    - Time Period

- **Permitted Waste and Volumes**

- **Permits Required**

  - **Federal** Army Corps
  - **State**
    - NRPA (wetland Impacts estimated at 1.6 acres)
    - Solid Waste
    - Modification to Air Permit
  - **Local**
    - City of Old Town Solid Waste Ordinance Chapter 24

- **Schedule for Remaining Milestone Meetings in 2014**

- **Other**

Meeting 2
General Licensing Standards and Exhibits

- **General Licensing Criteria**
  - Title Right and Interest
  - Financial Ability
  - Technical Ability
  - Traffic Movement
  - Fitting the Solid Waste Facility Harmoniously into the Natural Environment
    - Wetlands and Vernal Pools
    - Significant wildlife habitats, rare, threatened or endangered plants and natural communities.
    - Buffers
  - No Unreasonable Adverse Affect on Existing Uses and Scenic Character
    - Archaeological Sites
    - Protected Locations (400.1 (Hh) established public viewing areas.
    - Noise Study Updated to reflect recently complete study.
    - Visual Assessment.
  - No Unreasonable Adverse Effect on Air Quality
    - Air License Updates
    - Odor
    - Dust
  - No Unreasonable Adverse Effect on Surface Water Quality
  - No Unreasonable Adverse Effect on Other Natural Resources
    - Updated Wetlands Delineation and permits
  - Soil Types that are Suitable and will not Cause Unreasonable Erosion
  - No Unreasonable Risk that a Discharge to a Significant Groundwater Aquifer Will Occur
  - Adequate Provision for Utilities and No Unreasonable Adverse Effect on Existing or Proposed Utilities
  - Not Unreasonably Cause or Increase Flooding

- General Licensing Requirements
  - Public Benefit Determination
  - Recycling
  - Consistency with the Solid Waste Hierarchy
  - Host Community Agreement
  - Hazardous and Special Waste Exclusion Plan
  - Liability Insurance
  - Financial Insurance For Closure and Post Closure
  - Criminal or Civil Record
- Variances

Meeting 3
Geology and Hydrogeology

- Site Setting and Geologic Information used to Support Application
    - Borings and Monitoring Locations
    - Water level measurements
    - **Use of Information within and round the revised landfill footprint**

- Bedrock Pumping Test Results (January 2009)

- Groundwater Model and Potential Sensitive Receptors.

- Travel Time Analysis

- Site Water Quality and Monitoring Existing Versus Expansion Landfill Cells

- Environmental Monitoring
    - Locations
    - Parameters
    - Frequency

Meeting 4
Engineering and Site Design

- Expansion Layout and Cell Development Sequence
  - Cell Capacity
  - Sequencing
  - Final Cover Placement

- Design Standards
  - Liner Systems Design
  - Leachate Collection and Transport Systems Design
    - Leachate Sump Design
    - Leachate Disposal Locations
  - Landfill Gas Design

- Geotechnical Design
  - Stability Analysis
  - Settlement Analysis
  - Geotech Monitoring

- Contaminant Transport Analysis for Hypothetical Failures of Engineering Systems
  - Approach
  - Assumptions

- Operations

JUNIPER RIDGE LANDFILL EXPANSION
MILESTONE MEETING #2 SUMMARY

October 16, 2014

Representatives of NEWSME Landfill Operations, LLC (NEWSME) and Mike Barden, State Landfill Manager, today convened the second milestone meeting at 2836 Bennoch Road, Old Town, near the access road for the Juniper Ridge Landfill. This is a summary of Milestone Meeting #2.

<u>Attendees</u>

Attachment 1 sets forth the list of attendees, which included representatives of the Maine DEP, the Old Town Landfill Host Committee, the City of Old Town, and NEWSME Landfill Operations, LLC, as well as a resident of Old Town, Ed Spencer. In addition, several consultants to NEWSME, who are working on the expansion application, attended to discuss their respective topic areas.

<u>Summary of Meeting</u>

NEWSME's Don Meagher welcomed everyone and asked if there were any comments or suggested changes on the summary of Milestone Meeting #1, which was circulated via email in advance of this meeting. There were no comments or suggested changes.

Sevee and Maher Engineering's (SME) Mike Booth circulated a one-page spreadsheet entitled, "Comparison of Waste Quantities received at JRL between 2004 and 2014 and Proposed Expansion Tonnages," which is appended as Attachment 2. The yellow column is the projected tonnages for various waste categories for the expansion. Mike explained that they look at tonnages that are reasonably projected based on past tonnages and anticipated events. Mike described how he arrived at each of the tonnages listed for each of the waste categories. He explained that the SME engineers design the landfill from these tonnages. He also explained that SME and other consultants perform a number of analyses based on the tonnages projected, including but not limited to traffic, stability, and estimation of landfill gas that will be generated. Mike asked if there were any questions on the spreadsheet, but there were none.

Don Meagher distributed a revised history of the JRL expansion process to date that explained that the 2009 draft expansion application was never submitted to the DEP because of the legislation passed in 2009 requiring a public benefit determination for expansion of state-owned landfills.

Mike went on to discuss the Chapter 400 standards, including title, right, and interest, financial capacity, and technical ability. Referring to the landfill site plan, he said that he expects there to be six cells and the peak elevation of the expansion would be Elevation 390, (height above mean sea level), the same as the peak licensed elevation of existing JRL. Sedimentation ponds are expected to be located on each side of the expanded landfill near the access road, which will run adjacent to both the northeast and northwest corners of the expanded landfill. Mike said that a cell development plan for the expansion will be discussed during a later milestone meeting.

Mike explained that the proposed landfill footprint has been laid out to minimize impacts to wetlands to the maximum extent practicable.

Doug Stewart of Stantec briefly described the expected process for permitting any impacts to wetland and other protected natural resources, including those required by the Natural Resources Protection Act and Army Corps of Engineers process. Stantec reviewed the expansion site for wetlands and rare plants of concern in September 2014, updating previous reviews of the site, the most recent one completed in 2008. Doug explained that the wetlands that may be impacted are primarily forested. There are no streams or rare plants of concern. Stantec also is consulting with the USFWS and IF&W on wildlife issues, including rare, threatened and endangered wildlife species. No RTE species were encountered during prior investigations. Currently, wetland impacts are expected to be approximately two acres, a figure which will depend on the exact footprint of the landfill infrastructure and how steep the outer side slopes of the landfill perimeter berm and roadway will need to be. Doug explained that a new man-made wetland, approximately a ¼ acre in size, was created by proper performance of an existing sedimentation pond and the level spreader associated with it. He said that wetland compensation will likely be required and that they need to perform a functions and values assessment on the wetlands. Doug also explained that Stantec is working to set up a meeting with the MEDEP and Army Corps to discuss the project and permitting requirements for both the NRPA and Army Corps permits that will be required.

Stantec expects to look for any vernal pools that may be present during the appropriate investigation period in the spring of 2015.

Mike Booth next explained how the landfill will satisfy buffer requirements. He also stated that JRL's existing scales and office building will need to be relocated to an appropriate site further up the access road during the operation of the expansion area once fill activities approach these existing facilities.

Mike then introduced Mark Johnson of SMRT. Mark is the visual consultant for the project. Mark explained the process he is undertaking for the visual assessment for the expansion. He referred to an aerial plan of the site that shows an area as far as four miles from the landfill property line. Although a 4 mile radius is not required by the Solid Waste Rules, SMRT is using this distance as a maximum "background" view, based on US Forest Service guidelines. SMRT has searched for established "public viewing areas," as defined in the rules, within 2000 feet (required by the Solid Waste Rules) and within 4 miles, and has not found any.

Old Town's Peter Dufour mentioned the effort to screen with planted cedar trees the view of the existing landfill from a segment of Route 43, suggesting that, from his perspective, it hasn't been that successful. Mark Johnson believes, to the contrary, that is has been quite successful. Tom Doyle noted that standard in the Solid Waste Rules is not that the landfill cannot be seen, but rather that it not "unreasonably adversely affect existing uses and scenic character," including specifically "unreasonably interfering with views from established public viewing areas."

DEP's Mike Parker asked that the visual study show what the landfill may look like not only in the closure phase, but also in the operational phase.

Ed Spencer queried whether a public body of water is a public viewing area. Cyndi Darling pointed out that there is a definition of public viewing area in Chapter 400 of the Solid Waste Rules; that definition does not include lakes or streams. Ed said he was happy to report that he saw nothing of the landfill from Mud Pond.

Mike Booth explained how Sevee and Maher determines the remaining capacity at existing JRL, noting that they "fly the site" twice a year to obtain existing topography of the site. This topography is compared to the final permitted landfill grades to determine the remaining site capacity. He explained that the remaining capacity reported includes capacity located over the existing sideslopes, which currently have intermediate cover in-place, and capacity associated the MSE berm construction. This capacity isn't practically available until right before the final cover construction is completed. It will be present on existing sideslopes that do not abut the expansion area, and when the expansion cells are constructed to allow the MSE associated capacity to be filled over the existing landfill sideslopes within the currently licensed footprint. The type of wastes that can be placed on the sideslopes that will receive final cover are limited to materials that provide a suitable substrate for the final cover construction. Consequently, the first expansion cell needs to be constructed at an earlier date than a simple calculation which considers only the remaining landfill capacity and yearly fill rate. Mike further explained that because the landfill construction season is typically limited to May through October, and it takes an entire construction season to build a new cell, this must be considered when projecting the time frame for construction of new landfill capacity associated with the expansion. Mike also stated that the State's remaining years of capacity figures do not account for capacity that becomes available only when the operator/owner is in closure or expansion mode for the factors described above. Based on these factors, the current disposal rates and remaining capacity projections, Sevee and Maher believes that there is a need to build an expansion cell in 2018 to be ready to accept waste in 2019.

The City's Bill Mayo explained that the City's biggest issues concern life, health and safety. Jim Katsiaficas described the City's Chapter 24 Solid Waste Ordinance that will be triggered by the expansion. He said that the City will look at the expansion, but not the existing landfill. Once the review is completed on the State's side, the City will review it. The City's ordinance is modeled after the State's solid waste standards, and, as required by State law, has standards that are no stricter than the State's standards. It is also expected that the City will be an intervenor in the DEP process. He explained that the City's review will parallel DEP's and that the City may or may not hire outside experts.

Epsilon's Rob O'Neal then explained how the noise assessment will be conducted. Continuous noise measurements were taken at the JRL property boundary along the western side of JRL (closest to existing residents) in April 2014 as part of the condition compliance application. No additional property boundary noise measurements are planned for the expansion. However, as part of the noise modeling for the expansion, the noise levels of actual JRL equipment will be taken.

Jim Katsiaficas asked a question about what might be done to help with back-up alarms, explaining that he was aware of a “white noise” back-up alarm that is acceptable to OSHA. Peter Dufour stated that the only thing he hears, on those occasions when he hears sounds from the landfill, are the back-up alarms. It was pointed out that these alarms are exempt under State regulations because of safety concerns.

Cyndi Darling added that “if you can take care of the back-up alarms,” that would be huge. NEWSME’s Don Meagher and Toni King committed to looking into the possibility of the use of alternatives to back-up alarms to satisfy the concerns expressed. Toni noted that neither NEWSME nor BGS would be able to do anything about third-party haulers and their back-up alarms.

DEP’s Dick Behr asked about whether any measurements were planned for Old Stage Coach Road. Rob O’Neal stated that given the distance to Old Stage Coach Road and the fact that no noise complaints have occurred from Old Stage Coach Road, nothing was currently planned for that area in terms of noise assessment.

Mike Booth then explained that, since the existing odor control procedures have proven to be effective, odor will be addressed in the expansion application using the same procedures currently used at JRL. Dust also will be controlled by using standard procedures currently used at the JRL site.

With respect to potential impacts on surface water quality, this too will be addressed. There will be no direct discharges. Leachate will be treated and there are no impaired streams in the vicinity. For the expansion application, NEWSME will propose updates to the existing JRL SPCC and Stormwater Pollution Prevention Plans.

Mike explained that there has been a lot of work done on the suitability of the soils for a landfill. There is no significant sand and gravel aquifer or deposits in the vicinity of the landfill and the applicants will show that there will be no unreasonable impact on a fractured bedrock aquifer. This will be discussed in more detail at the next milestone meeting.

With respect to utilities, there will be no change in power demand and the leachate will either go to Old Town Fuel & Fiber or to the City of Brewer (currently a backup). There is no expected change in leachate quality. NEWSME will estimate the average peak of leachate volumes. The facility is not expected to increase flooding and through the use of stormwater modeling, stormwater issues will be addressed and detention ponds will be designed and used, as needed.

With respect to the Public Benefit Determination, NEWSME will principally be relying on the 2012 Public Benefit Determination. The issue of recycling will also be discussed in the application. With respect to Host Community Benefits, there are currently agreements for host community benefits with the City of Old Town and the Town of Alton. These Agreements also address the expansion.

There will be a hazardous waste and special waste exclusion plan that will be based on current practices at the JRL.. Cyndi Darling noted that the real importance of this plan is what steps must be taken if an unexpected waste shows up. She said that the current plan worked quite well recently when large volumes of red substance showed up at the landfill and, after investigation; it turned out to be large quantities of ketchup.

Mike Booth explained that the application will provide financial assurance for closure and post-closure care as does existing JRL. There will also be a civil and criminal disclosure statement.

Mike did not currently anticipate that any variances addressing siting and design standards in the Rules will be required, but this will be looked at more closely as the design progresses. NEWSME/BGS and SME are considering proposing an improved liner design from what is contained in the Rules and this would be supported by an alternative design assessment as outlined in the Rules. The details of this alternative liner design will be discussed during future milestone meetings.

Dick Behr asked about whether NEWSME/BGS are considering any alternative leak detection or monitoring techniques, such as the use of synthetic DNA as a tracer. Mike Booth and Don Meagher stated that they will look into this. In response to a question from Tom Doyle, Dick noted that there is not much variation in design or monitoring at other landfills in the State compared to Juniper Ridge.

Near the end of the meeting, Randy Dunton of Gorrill-Palmer Engineers, the traffic consultant, arrived. He explained that Gorrill-Palmer has performed a traffic count and is analyzing the data now. Cyndi Darling asked whether it would be possible to look at solid waste haulers versus non-landfill related traffic on Route 16. It was explained that most of the traffic to the site comes from I-95 South and very little comes from I-95 North. A question was posed about whether MDOT has a traffic improvement plan for the area. Either Randy or Tom Gorrill will look into this. Bill Mayo mentioned the poor condition of Route 16, realizing that this is a DOT issue, not a BGS/NEWSME issue, as all sorts of truck traffic unrelated to Juniper Ridge uses Route 16.

Ed Spencer asked about KB Trucking and whether they overnight trailers at their site. Cyndi Darling responded that yes, they sometimes do, but they have a choice to do so. It was noted that the expansion would not trigger the standard for a traffic movement permit, which requires 100 passenger car equivalents during a peak hour.

The next meeting was set for November 20 at 10:00 a.m. Among the expected topics are geology, hydrogeology, and monitoring.

The meeting adjourned at approximately 12:25 p.m.

Attachment 1

Attendance

Name	Representing	Email
Michael Bart	SME	msb@smemaine.com
Michael Barden	State of Maine - DECD	michael.barden@maine.gov
Mark Johnson	SMRT	mjohnson@smrtinc.com
Doug Stewart	Stantec Consulting	Doug.Stewart@stantec.com
Robert O'Neal	Epsilon Associates	roneal@epsilonassociates.com
Bill Mayo	Old Town, Manager	bmayo@old-town.org
Mike Parker	MeDEP	michael.t.parker@maine.gov
Amanda Wade	MEDEP	amanda.wade@maine.gov
Cyndi W Darling	MEDEP	cyndiw.darling@maine.gov
Richard S. Behr	Maine DEP	richard.s.behr@maine.gov
Thomas Doyle	Pierce Atwood	tdoyle@pierceatwood.com
Peter DuFour	Old Town Landfill Host Comm.	hmgc@juno.com
Ralph Leonard	" " " "	HOMEPORTME@AOL.COM
Ed Spencer	Resident - West Old Town	cjkspencer@gmail.com
Jim Katsiaficas	Perkins Thompson - For Old Town	jkatsiaficas@perkinsthompson.com
David Russell	City of Old Town	drussell@old-town.org
Toni King	CWS	TONI.KING@CASELLA.COM
Randy Dunton	Gorrill-Palmer	rdunton@gorrillpalmer.com
Don Meagher	CASELLA	don.meagher@casella.com

COMPARISION OF WASTE QUANTITIES
RECIEVED AT JRL BETWEEN 2004 AND 2014 AND PROPOSED EXPANSION TONNAGES

Attachment 2

Waste Category	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Application Tonnages based on 700,000 tons/year	
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Percent
WWTP and miscellaneous bio solids/sludge material	26,686	35,336	36,286	61,262	72,275	70,265	58,558	51,053	49,270	64,559	57,113	70,000	10.0%
Contaminated soils			31,712	8,451	43,910	2,585	6,407	17,526	2,615	11,017	6,385	30,000	4.3%
Front-end process residue	393	45,644	105,139	74,763	117,118	84,727	125,250	103,306	94,178	53,654	52,832	54,000	7.7%
Municipal Incinerator ash		58,269	34,087	30,029	94,350	101,262	104,865	105,526	101,276	57,435	54,162	58,000	8.3%
Biomass and fossil fuel combustion ash	20,880		52,385	61,968	64,809	29,870	26,322	12,855	7,785	8,715	23,506	35,000	5.0%
MSW bypass and soft layer material		2,035	11,155	7,620	21,426	39,524	39,524	22,355	729	7,326	39,616	25,000	3.6%
Construction and demolition debris		76,088	163,581	143,453	125,790	104,309	145,488	149,744	150,706	167,418	199,862	195,000	27.9%
Oversized bulky waste		12,271	29,225	9,649	21,405	51,438	96,520	98,888	64,689	54,353	43,868	60,000	8.6%
Miscellaneous Waste	5,453	14,740	19,868	34,295	11,551	13,871	17,815	17,326	13,884	28,862	17,782	35,000	5.0%
C&D process fines (used as daily cover)		7,931	42,320	41,109	45,148	46,744	87,449	125,301	152,171	152,915	122,732	138,000	19.7%
TOTAL	**53,412**	**252,314**	**525,758**	**472,599**	**617,782**	**544,595**	**708,198**	**703,880**	**637,303**	**606,254**	**617,858**	**700,000**	100.0%

1. Waste received in 2004 consists primarily of pulp and paper mill waste
2. The waste received in 2005 was limited by the sludge mixing program
3. The 2014 tons represent a straight line projection for twelve months based on the amount of tonnages received at the site through September of 2014

JUNIPER RIDGE LANDFILL EXPANSION
MILESTONE MEETING #3 SUMMARY

November 20, 2014

Representatives of NEWSME Landfill Operations, LLC (NEWSME) and Mike Barden, State Landfill Manager, convened the third milestone meeting today at 2836 Bennoch Road, Old Town, near the access road for the Juniper Ridge Landfill. The following is a summary of Milestone Meeting #3.

Attendees

Attachment 1 sets forth the list of attendees, which included representatives of the Maine DEP, the City of Old Town Landfill Committee, the City of Old Town, the public, Mr. Barden and NEWSME.

Summary of Meeting

NEWSME's Don Meagher welcomed everyone and asked if there were any comments or suggested changes on the summary of Milestone Meeting #2, which was circulated via email in advance of this meeting. Ed Spencer said that not all of his comments were fully reported in the last summary. He said that although he commented that he could not see the landfill from Mud Pond, he has been on top of the landfill and reports being able to see Mud Pond and Pushaw Lake.

Mike Booth reported on NEWSME's October 29, 2014 meeting with the Army Corps, DEP and U.S. Fish and Wildlife Service to discuss Army Corps and NRPA permitting. At the request of USFWS, the application process will need to address the potential Endangered Species Act listing of the northern long-eared bat. NEWSME's consultants will be surveying for the bat in the spring. Don Meagher noted that the meeting also addressed wetland and other wildlife issues.

Don Meagher explained that today's meeting is principally about protecting water quality, while the next milestone meeting, in December, will discuss the design of the landfill. He stressed that water quality protection is a major part of the application.

Mike Booth explained that protection of water quality is based on the understanding of both the hydrogeology and geology of the site, and that both have been extensively studied for this site. He stated that this is possibly the most intensively investigated landfill site in the State.

He then provided an overview of the licensing requirements from Chapter 401, the Department's Rules for Landfill Siting Design and Operation. He described the two-stage licensing process which includes (i) the Public Information Report (PIR) and (ii) the full application. The result of the PIR process is a determination from the Department whether it's reasonable to pursue a landfill expansion at the site. In 2006, this site went through the PIR process for an even larger expansion footprint than now proposed. The Department issued a Determination of Environmental Feasibility in 2007. Mike explained that the second stage is where we are now, the full application stage.

He next discussed the siting performance standards a landfill or expansion must meet, which include both prohibitive and restrictive siting criteria. These are identified on pages 1-3 of Chapter 401. Mike explained how the JRL expansion site meets all of them. He noted that the in situ soils in the expansion area are generally very tight, in the 10^{-6} to the 10^{-7} hydraulic conductivity range, which explains why it is considered a good site for a landfill. There were no questions or comments on this discussion.

Mike went on to describe how Sevee & Maher located the water table and established groundwater contours through a hydrogeological study. He showed a water contour map and a bedrock contour map. He described how soil borings are tested in Sevee & Maher's lab and described the pump tests that were conducted.

At this point, Ralph Leonard commented on the imperfect pre-application process back in 1988 for the Township 30 landfill effort and he said he much prefers the current two-stage process. He also commented that the only reason his group did not pursue the Juniper Ridge site was "political." He and his geologists knew it was a good site for a landfill.

Mike next turned the discussion over to John Sevee, a certified hydrogeologist and professional engineer with Sevee & Maher. John Sevee emphasized the importance of finding a good hydrogeologic site so if a problem with the landfill liner were to occur, it could be detected and resolved before contaminants moved away from the landfill. He explained that in terms of subsurface information at this site, Sevee & Maher is not finding differences with its earlier investigations for the original landfill and each of the points of data that have been gathered are supporting data found earlier. He also noted that the hydrogeological investigations have increased exponentially today versus the early '90s, even for this site.

He said the underlying bedrock is competent but fractured, which is common in Maine. He said DEP has asked a number of questions about better defining the direction of groundwater flow in the bedrock. The bedrock in the expansion area is covered with a mantel of till that is very clayey. This mantel is relatively impermeable. Water moves very slowly in the till and more rapidly in the bedrock. Sevee & Maher has conducted between 100-200 explorations in the till and bedrock. Tewhey & Associates also looked at this site 10-11 years ago, at the time of the transfer to the State. Sevee & Maher has also conducted isotope studies (movement of groundwater in the till). He said the direction of groundwater in the till is downhill (from higher to lower topography).

DEP's Dick Behr noted that there are some areas where water moves from till to bedrock and then back out again. John Sevee noted that the bedrock is more complicated than the till and you to need to understand the fracture network. There are some areas where bedrock sits on or near the ground surface and Sevee & Maher analyzed these to determine their ability to transmit groundwater and in what direction. He said the fracture system is integrated and the more integrated it is, the more its behavior is knowable and it makes it easier to monitor. He then described geophysical surveys conducted by Sevee & Maher to determine the more permeable zones in the bedrock. These surveys are done to find areas with more potential to move groundwater. Sevee & Maher also has conducted pump tests to understand the subsurface movement of groundwater. He stated that there is a greater chance for groundwater to move along the northeast-southwest orientation in the bedrock than in other directions. They measured the rate of movement in the bedrock toward the nearest streams. There is general consistency of movement of water in the bedrock. He described Sevee & Maher's use of a salt solution as a tracer and this supported prior studies on the rate and direction of groundwater flow in the bedrock.

John explained that there is a natural hydrogeologic protection for this site, which is why it was selected originally by James River (which was later acquired by G-P) and makes it a very good site for a landfill. Groundwater moves from the higher topographic areas to lower areas, where it typically encounters groundwater moving from the opposite direction, i.e., the wetland area to the west of the site. Toward Route 16, John said that groundwater would have to move over a number of hills in order to move in that direction, which would be impossible. The oldest particle of water found during the investigations was about 20 years old to the east of the site. John described the rate of groundwater travel in the till as an order of magnitude less than that in the bedrock.

Sevee & Maher has constructed a mathematical model for groundwater movement, with topography and regional features included. This simulation allows one to change different factors in the model, to test the model, to identify sensitivities and sensitive receptors.

Groundwater does not reach residential wells or a sand and gravel aquifer along Route 16.

Dick Behr interjected at this point with the following question: isn't there less water moving to the east due to the existing landfill? John said, yes. Dick also asked whether Sevee & Maher has looked at how groundwater will flow due to the existing landfill. John replied, yes, Sevee & Maher has looked at this. The data corroborates Sevee & Maher's understanding of groundwater flow.

After a short break, Mike Booth discussed the time of travel analysis and the identification of sensitive receptors. He explained the need to achieve a travel time of six years or more between the landfill and sensitive receptors. He said that from Route 43, water is moving toward the landfill instead of from the other direction. Sevee & Maher has conducted residential water sampling along the residences on Route 43 and the water quality in those wells is excellent. Potential sensitive receptors identified for the expansion include a point on the closest property line to the west as a potential residential sensitive receptor as well as adjacent surface water bodies on the east and west sides of the expansion. Travel times will be calculated to these locations. The inclusion of a potential sensitive receptor along the northern property boundary in the vicinity of Old Stage Coach road was discussed. SME evaluation was that although this location was potentially a sensitive receptor for the previously discussed larger expansion, the site hydrogeologic setting precludes this location from consideration for this project. Dick Behr agreed with this conclusion.

Mike next explained that the liner proposed is a double liner with leak detection. He said that the liner itself gives the project two or three years of travel time credit. He explained the credit given for imported soils and Sevee & Maher is considering adding one foot of imported clay for an additional three years of travel time credit. He explained how the time of travel analysis will be conducted.

Mike stated the design of the landfill is based on the site's geology. In response to a question, he said that Sevee & Maher does not believe groundwater from the landfill can get to the residential wells on Stage Coach Road due to the site hydrogeology.

The discussion then turned to water quality monitoring. The first line of water quality monitoring will be the leak detection system right below the landfill liner. There will be shallow monitoring wells, screened in the till, and bedrock wells, screened in bedrock. Mike also discussed the proposed wells to be used for background wells. Overall, there are 14 monitoring wells (7 pairs, one shallow and one deep) proposed. In response to this discussion, Dick Behr commented that overall the number of monitoring wells "seemed a little sparse." Mike stated that they would review this, but the primary monitoring item is leak detection and this factored into the number of wells being proposed. Peter Dufour asked whether there is a standard depth for the wells and John Sevee responded that it depends on whether the well is screened in the soil or in bedrock.

Dick Behr suggested that one approach is to have more wells with fewer parameters tested in each well. DEP's Amanda Wade noted that the environmental monitoring plan is a living document and changes are made throughout the operational life of a landfill. Dick stated that, for characterization purposes, one could do a subset of the full suite of wells. Toni King added that NEWSME would install monitoring wells "as we go" during the operating life of the landfill.

Dick Behr then discussed the issue of a tracer. He said he's been thinking about this and that an inexpensive tracer may be sodium bromide, noting that road salt has almost no bromide in it. Dick agreed that the leak detection system is the first line of defense as the location where a leak would first be detected. There was also a brief discussion of the proposed liner system, which will be discussed in more detail at the next meeting.

Tom Doyle noted that one of the goals of the milestone meetings and pre-application investigations is to have sufficient hydrogeologic and other information so that the Department can make a timely decision, and not have to ask for more information. The Department was encouraged to raise issues and comments now. DEP's Cyndi Darling asked Dick Behr how much background information he wants. Dick said it was important to have a good characterization of the geology and a robust environmental monitoring plan for the application. Dick said it was difficult at this point to state what else he might need given that he hasn't seen and studied the information that has been gathered. Mike Booth noted that once we present the information, let Sevee & Maher know what else he needs because Sevee & Maher probably has it. Mike noted that "we have a basis for everything we've done at the site."

The next meeting is scheduled for December 18 at 10:00 a.m. Among the expected topics are landfill design and operations.

The meeting adjourned at approximately 12:50 p.m.

Attendance List

NAME	AFFILIATION	EMAIL
Tom Doyle	Pierce Atwood, Casella	tdoyle@pierceatwood.com
Jeremy Labbe	Casella	jeremy.labbe@casella.com
Ed Spencer	Public	cjkspencer@gmail
DANA SNOWMAN	Public	MEMONETARY111183@gmail.com
DON MEAGHER	CASella	
Cyndi Darling	MDEP	cyndi.w.darling@maine.gov
Amanda Wade	MeDEP	amanda.wade@maine.gov
Richard S. Behr	Maine DEP	richard.s.behr@maine.gov
Ralph Leonard	City of Old Town Com.	HOMEPORTME@AOL.Com
PETER DUFOUR	CITY OF OLD TOWN COMM	hmgc@JUNO.COM
Michael Borden	State of Maine DECD	michael.borden@maine.gov
TONI KING	CWS	TONI.KING@CASELLA.COM
Mike Booth	SME	msb@smemaine.com
John Sevee	SME	jsevee@smemaine.com
David Russell	City of OLD TOWN CODE	drussell@old-town.org
Cheryl Spencer	Public	(Same as Ed) cjkspencer@gmail.com

JUNIPER RIDGE LANDFILL EXPANSION
MILESTONE MEETING #4 SUMMARY

December 18, 2014

Representatives of NEWSME Landfill Operations, LLC (NEWSME) and Mike Barden, State Landfill Manager, convened the fourth milestone meeting today at 2836 Bennoch Road, Old Town, near the access road for the Juniper Ridge Landfill. The following summarizes the discussion during this fourth Milestone Meeting.

Attendees

Attachment 1 sets forth the list of attendees, which included representatives of the Maine DEP, the City of Old Town, the City of Old Town Landfill Committee, the Juniper Ridge Landfill Advisory Committee, the public, a BDN newspaper reporter (for part), Mr. Barden, and NEWSME.

Summary of Meeting

NEWSME's Don Meagher welcomed everyone and asked for comments or suggested changes on the written summary for Milestone Meeting #3, which had been circulated via email in advance of the meeting. There were no comments on the summary from Milestone Meeting #3.

Don Meagher noted that Milestone Meeting #3 focused on protection of water quality. Today's meeting focuses on the engineering design to ensure that groundwater and surface water quality is protected, including the actual landfill liner, and discussion of the gas collection system.

Sevee & Maher's Mike Booth then discussed the design of the landfill noting that its many layers are not unlike the many layers of an onion. He noted that the landfill liner, the leachate collection system, and the gas collection system are all facilities that are engineered and constructed on top of what is already a very good landfill site.

Pointing to a site plan, Mike explained that Cell 11 would be the first cell of six cells to be built in the expansion area, and then others will follow in sequence. The plan is to build the first cell in 2018, with the proceeding cells built on an as needed basis for an overall projected life (of the expansion) until 2032.

Mike noted that leachate consists of both water in the waste and stormwater or other precipitation that falls on the waste and is expressed from it. The leachate collection system is designed to manage this water. He described the layout of the leachate pipes which are oriented such that they can be cleaned from the perimeter of the landfill. He then described how the leachate collection system will work. The eastern cells will drain to the northeast corner, and the western cells will drain to the northwest corner and the leachate will be pumped via leachate force mains to the existing on-site leachate storage tank. From there it is transported via truck to the Old Town Mill's wastewater treatment plant for treatment. All the site pump stations will be internal leachate sumps to avoid liner penetrations. Temporary leachate pump stations will be placed in certain cells during the waste filling period to accommodate the sequence of cell development and the overall landfill base grades. Two permanent pump stations, similar to the pump stations currently used at the site, will be constructed in the northeast and northwest corner of the expansion.

The northeast area of the expansion will have an underdrain system to manage groundwater in this area and allow construction of the landfill base in this area. This area was identified in tan on the site plan. Areas described in grey are where Sevee & Maher/NEWSME is proposing an augmented secondary liner. Mike explained that the average depth of soil across the site is about 24 feet, is more in some areas but it is less in certain areas such as those depicted in grey. The augmented secondary liner will be used in those areas. Mike commented on this in the context of explaining the time of travel analysis, which will be discussed more fully in the application.

Mike next presented a graphic drawing of the landfill liner system for the existing landfill, which is consistent with DEP Rules, compared to the proposed liners for the expansion area. The proposed expansion liner will have both a primary liner and a secondary liner. The primary liner will be a composite liner system using both geosynthetics and soil materials. The leachate collection system will be located above this liner. The secondary liner will be a combination of a single geomembrane and a composite liner system in augmented liner areas. The entire secondary liner system will be underlain by a compacted natural clay layer, and overlain by a leak detection system. As Mike explained, the proposed liners go beyond what is required by the DEP's regulations by using thicker geomembranes for both the primary and secondary liners. Mike noted that by using a double liner system the "head," or the amount of liquid that can build up on the secondary liner system, is significantly reduced. This provides a significant level of protection to site water quality from the proposed liner design. He then described how the leak detection system will work. The leak detection system also will have dedicated pumps, with water quality monitoring associated with them.

Mike explained that it is very common to have some liquid in the leak detection system from the water that's naturally contained in the clays and in the sand soils used to construct the liner system. It also rains during construction from time to time and some of this water can be trapped in the leak detection system. The presence of water in the leak detection system, however, should not be confused with a leak in the liner systems. Mike said that they typically see approximately 6 to 30 gallons of water per acre per day in the leak detection systems at other double-lined landfill sites. The monitoring of both flow and water quality in the leak detection layer allows for an assessment of the source of water that is collected in the leak detection system. Sevee & Maher has developed an assessment procedure, which is used at other double lined landfills in the State, to evaluate the source of liquids found in the leak detection system. This procedure will be proposed for the expansion. The procedure looks at the conductivity of the water in the leak detection system. A threshold value is set, beyond which there may be something "going on." When a threshold level is exceeded, it needs to be investigated. He said that landfill operators, in this case NEWSME, monitor the leak detection layer for a suite of parameters.

Ralph Leonard asked what occurs if one detects a leak. Mike responded that if one detects a leak, you first collect facts, find the defect, and then fix it. He explained that there is usually a specific reason for a problem, if one exists. He said if a problem occurs, it has typically been on the sides of a landfill. In response to a question from DEP's Cyndi Darling, Mike then explained the detailed Quality Assurance/Quality Control process for installing the liner. DEP's Amanda Wade noted that when a leak occurs, it has often been caused by damage that has occurred during the construction phase. At JRL, the liner is surveyed after it has been constructed and prior to placing waste in the cells using a geophysical technique to identify any construction related defects to the liner system. If defects are identified by the survey, they are repaired prior to waste placement. This survey will be done for the expansion cells. Ed Spencer asked how often conductivity is tested. Mike responded typically once per month, under normal conditions, but could be done more frequently (e.g., weekly or daily) if the data suggest this frequency of testing is appropriate.

The estimate for leachate generation depends on rainfall, the size of the developed landfill, and the area open in a cell at any given time. Consistent with the regulations, Sevee & Maher uses the HELP model to estimate leachate generation based on the proposed liner design, operating conditions, and local weather data. Sevee & Maher will use actual precipitation data between 1980 to the present recorded in Orono and Bangor to estimate leachate generation at the site.

The leachate tank has a storage capacity of 900,000 gallons and leachate is typically removed from the tank on a daily basis. The amount of leachate removed from the tank varies depending on the time of year. Mike stated that there is typically 600,000 gallons of available capacity during any given day, so there will be adequate capacity in the tank to handle the expansion flows along with the existing landfill flows. As part of the design of the leachate collection system, Sevee & Maher evaluates leachate storage capacity for a 25 year, 24 hour storm event. The amount of leachate collected from this event is dependent on the operating area (i.e., the area were intermediate of final cover has not been applied) of the cell. The typical operating area in a cell is between 6 and 6.5 acres. A typical cell is approximately 12 acres in size.

The discussion then turned to the topics of settlement and stability. With respect to settlement, Mike explained that this analysis focuses on the landfill once final cover has been applied to evaluate the function of the cover's drainage system. The engineer must first determine how much the landfill will settle once landfilling is complete. He said we estimate this, and will be able to use actual settlement rates from the existing landfill. Mike reported that it's pretty straightforward for the JRL site because the site is underlain by glacial till, which is very compact and not prone to large settlements.

With respect to stability, Mike explained that Sevee & Maher looks at the most critical sections of the landfill, usually where the landfill base grades and waste sideslope are steepest. He explained that the DEP's rules require that certain factors of safety be met for a number of conditions during construction, operations and closure, and in the event of an earthquake.

DEP's Amanda Wade commented that Sevee & Maher should be sure to use the most current earthquake data from the USGS in its stability and settlement calculations.

The discussion then turned to landfill gas and the collection of landfill gas. This portion of the meeting was led by Sanborn Head's Eric Steinhauser, who first explained how landfill gas is estimated for the expansion. Using a graphic, Eric discussed how Sanborn Head uses an EPA model to project the estimated gas flow. In response to a question from DEP's Dick Behr, Eric said that the model's numbers compare very favorably with actual numbers experienced at existing JRL. In response to a question from Ed Spencer about the so-called second wave of methane referred to by the Sierra Club, Eric said that there is a minimum 30-year post-closure period where landfill gas will be collected and monitored. Cyndi Darling added that a licensee must still monitor the landfill gas regularly during the post-closure period and if there were a "break," would need to find it. Eric also explained that when an operator/owner collects landfill gas, one reaches a static period sooner. DEP's Amanda Wade commented that there will be a lot of experience from the existing Juniper Ridge closure to draw from as well, and the DEP and the licensee will be visiting and monitoring the site regularly.

Sanborn Head's Ryan Clay next explained the master plan for the landfill gas collection system. The landfill gas system is installed as each cell is filled, not afterwards. He explained the placement of both horizontal and vertical pipes, the former being constructed of HDPE (for flexibility) and the vertical wells which are made of PVC. Each vertical well has an approximate 100-foot zone of influence. The landfill gas from these wells are monitored at least twice per month. The horizontal pipes are actually slanted so that water that may enter them empties back into the landfill where it is collected by the leachate collections system. The landfill gas collected is transported by header pipes, to the on-site flare, which burns the landfill gas. There will be a 24-inch landfill gas header on the east and west sides of the landfill with a 12-inch header on the north side. The flare is sized to burn the landfill gas for the entire project. Sulfur present in the landfill gas is treated at the site prior to proceeding to the flare. Ryan explained that JRL may or may not need a larger flare.

After a short break, the discussion turned to the issue of stormwater control.

Mike then explained the contaminant transport analysis which is required by DEP's Rules. One assumption that needs to be evaluated is that no liner exists and one needs to determine where a hypothetical contaminant concentration will travel for several specified time periods. The results of this analysis will be set forth in the application. Other assumptions evaluated look at hypothetical liner and leachate leakage scenarios.

The discussion then turned to the construction of the landfill, which is tightly regulated by the Maine DEP. Mike commented that there is likely more QA/QC for landfill construction required in Maine than in almost any other state, and that Maine regulators are actually on-site reviewing and checking the construction.

Mike stated that one variance will be requested: the standard for placement of liner soil in 9-inch lifts. He said that with today's technology (it's been at least 25 years since this standard was included in the Rules), it's easier to place the liner soil in one-foot lifts, and a variance on this issue will be requested.

With respect to waste characterization, there is nothing unique or different about any of the waste streams to be disposed in the expansion area. All by now are well known to the DEP and the licensee, and nothing is incompatible with the landfill materials.

The projected submittal of the application is July 2015.

There was a brief discussion of the anticipated capacity of existing JRL and the proposed expansion.

This was the last scheduled milestone meeting. The meeting adjourned at approximately 12:50 p.m.

Attachment 1

Milestone Meeting #4

Name	Representing	Email
Michael Borden	State of Maine	michael.borden@maine.gov
Bill Mayo	City of Old Town	bmayo@old-town.org
Jim Katsiaficas	City of Old Town	jkatsiaficas@perkinsthompson.com
Richard S. Behr	Maine DEP	richard.s.behr@maine.gov
Amanda Wade	MEDEP	amanda.wade@maine.gov
Cyndi Darling	MEDEP	cyndi.w.darling@maine.gov
Ralph Leonard	City of Old Town Land Fill Com.	HOMEPORTME@AOL.com
PETER DUFOUR	CITY OF OLD TOWN LANDFILL Comm	AMJC@JUNO.COM
Laura Sanborn	JRL Advisory Comm	hlsanborn@aol.com
Ed Spencer	The Public	cjkspencer@gmail.com
RYAN CLAY	SANBORN HEAD	rclay@sanbornhead.com
ERIC STEINHAUSER	SANBORN HEAD	esteinhauser@sanbornhead.com
WAyne Boyd	Casella	wayne.boyd@casella.com
Mike Booth	Sevee & Maher	[illegible]
Tom Doyle	Pierce Atwood	tdoyle@pierceatwood.com
Don Meagher	Casella	
Toni King	"	
Jeremy Labbe	"	
Nok-Noi Ricker	BDN Staff	

Changes Made By NEWSME/BGS As Result of Public Comments Made During Pre-Application Meetings

The pre-application process for the Juniper Ridge Landfill Expansion Project has included a number of stakeholders and informational meetings with the public and local government officials to describe the project and its various components. As a result of the input obtained from these meetings, BGS and NEWSME have incorporated participants' comments into both current landfill operations and the Expansion Application. Among the comments received and actions taken are:

Comment: Noise from backup alarms on landfill equipment travels a long way.

Action: Although such safety alarms are exempt from noise regulation, NEWSME installed in the Fall of 2014 broadband backup alarms on landfill equipment which produce a quieter "white noise" sound compared to the sharp tonal beep of a standard backup alarm.

Comment: Some residents who live in the proximity of the landfill, but are not abutters, requested that they receive a mailed public notice of intent to file the expansion application.

Action: In addition to complying with the notification requirements of DEP Chapter 2 and the Solid Waste Rules that require notifications be sent to abutters, municipal officials and newspapers, NEWSME will send the public notice by regular mail to non-abutting landfill neighbors, serving to notify approximately 200 additional individuals. In addition to placing the public notice in the Bangor Daily News, the notice will also be published in the Penobscot Times.

Comment: Has the Penobscot Indian Nation had a chance to comment on historic or archeological features that might be present in the project area?

Action: NEWSME has followed-up on several previously unsuccessful attempts to contact the Penobscot Indian Nation about this topic, with additional outreach directly to the tribal department that has responsibility for this topic. NEWSME and BGS notified the Penobscot Nation in writing and invited the Penobscots to participate in four pre-application milestone meetings as well as the recently convened Public informational Meeting held in early June 2015.

Comment: There was interest by several individuals in the procedures that are used to sample and analyze surface and groundwater as part of the JRL environmental monitoring program.

Action: Consistent with similar past requests and a coordination of environmental sampling with the Penobscot Indian Nation, NEWSME is willing for interested parties to participate in quarterly environmental sampling efforts. They just need to contact NEWSME to coordinate these efforts.

Comment: Trucks leaving the landfill often use the Bennoch Road rather than enter on I-95 southbound at exit 199 in order to avoid the weigh station.

Action: NEWSME has a standing policy encouraging trucks to use I-95 immediately after they exit the landfill. However, this is done by direct communication with the drivers. NEWSME will convey this policy to their customers with the request that they encourage the trucking companies they use to follow the policy.

APPENDIX A-4

PRELIMINARY NOTICE OF INTENT TO FILE/ NOTICE OF RIGHT TO INTERVENOR ASSISTANCE – CITY OF OLD TOWN

JUNIPER RIDGE LANDFILL

Operated By
NEWSME Landfill Operations, LLC

May 1, 2015

City Council
City of Old Town
265 Main Street
Old Town, Maine 04468

Dear City Councilors:

Preliminary Notice to Municipal Officials
Juniper Ridge Landfill Expansion Application

The Bureau of General Services (BGS), having an address of Department of Economic and Community Development, State House Station #59, Augusta, Maine 04333-0059, and NEWSME Landfill Operations LLC (NEWSME), having an address of 358 Emerson Mill Road, Hampden, Maine 04444, are preparing to file an application with the Maine Department of Environmental Protection (MEDEP/Department) to expand the existing Juniper Ridge Landfill (JRL) located in Old Town, Maine. The approximately 9.35million cubic yard expansion will be located directly north of the existing facility and will be located on State-owned land. A plan depicting the proposed expansion area is attached as Figure 1. This preliminary notice of BGS's and NEWSME's intent to file the expansion application is provided to the Department and to the municipal officers of the City of Old Town and the Town of Alton at least 60 days prior to the submittal of the expansion application to the MEDEP.

The municipal officers of a municipality in which a proposed solid waste facility is to be located, in this case Old Town, have a right to apply for "municipal intervenor status" and to receive 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 862-4200 ext. 224, or Don Meagher at ext. 230.

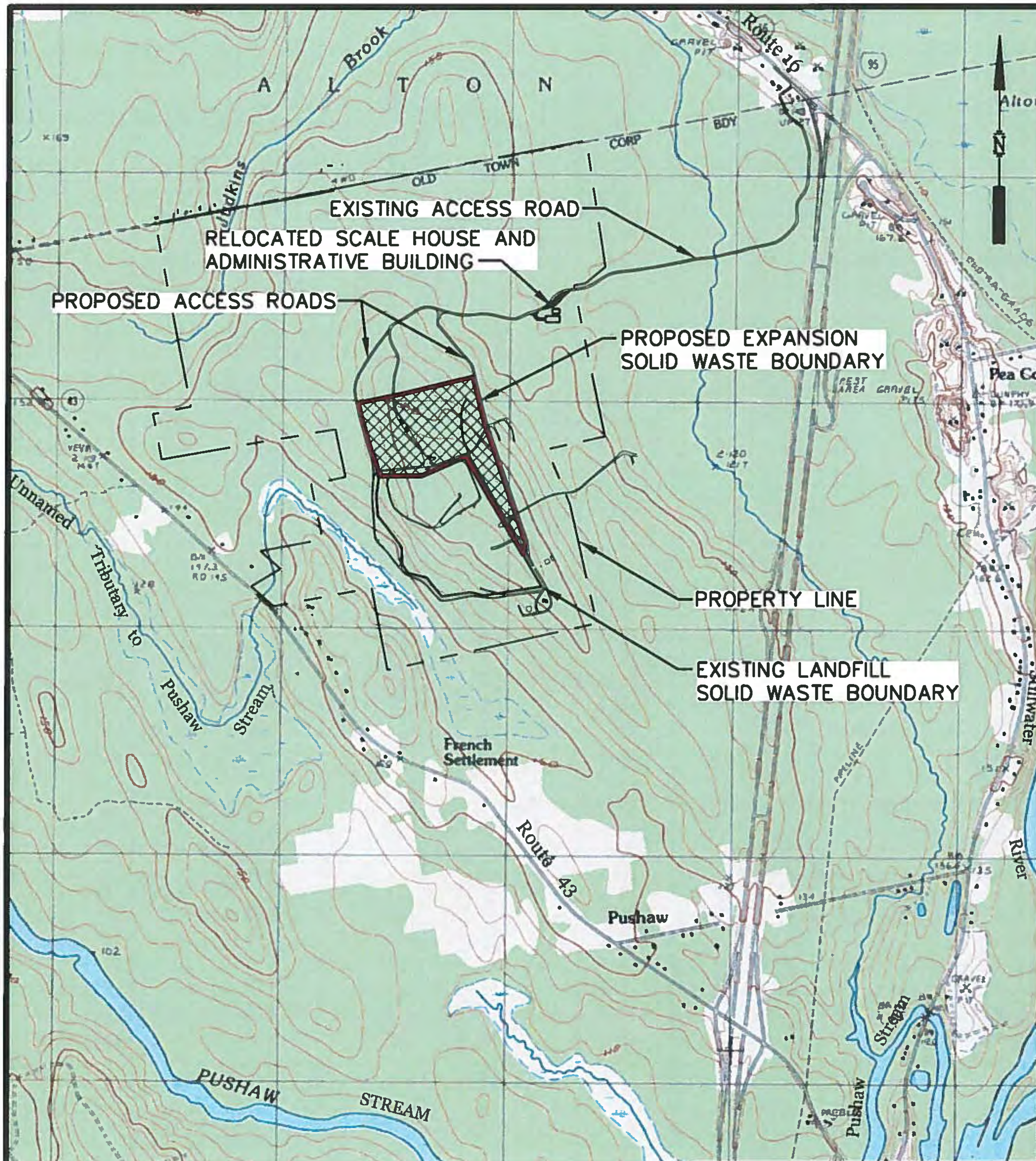
Sincerely,

Wayne Boyd

Wayne Boyd
NEWSME Landfill Operations, LLC

cc: Mike Barden, BGS
Mike Parker, MDEP
Cyndi Darling, MDEP

Enc.



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE:
OLD TOWN, MAINE–1988

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

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: SITELOC LMN: SITELOC CTB: SITELOC REV: 3/10/2015

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Restricted Delivery Fee (Endorsement Required)		$0.00
Total Postage & Fees	$	$6.70

0444

03

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05/01/2015

Sent To CITY COUNCIL CITY of OLD TOWN

Street, Apt. No.; or PO Box No. 265 MAIN STREET

City, State, ZIP+4 OLD TOWN, 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:

CITY COUNCIL
CITY of OLD TOWN
265 MAIN STREET
OLD TOWN, MAINE
04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
x Karen Dunton ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) Karen Dunton

C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
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4. Restricted Delivery? *(Extra Fee)* ☐ Yes

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PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

JUNIPER RIDGE LANDFILL

Operated By
NEWSME Landfill Operations, LLC

May 1, 2015

Town of Alton Board of Selectmen
3352 Bennoch Road
Alton, Maine 04468

Dear Board of Selectmen:

Preliminary Notice to Municipal Officials
Juniper Ridge Landfill Expansion Application

The Bureau of General Services (BGS), having an address of Department of Economic and Community Development, State House Station #59, Augusta, Maine 04333-0059, and NEWSME Landfill Operations LLC (NEWSME), having an address of 358 Emerson Mill Road, Hampden, Maine 04444, are preparing to file an application with the Maine Department of Environmental Protection (MEDEP/Department) to expand the existing Juniper Ridge Landfill (JRL) located in Old Town, Maine. The approximately 9.35 million cubic yard expansion will be located directly north of the existing facility and will be located on State-owned land. A plan depicting the proposed expansion area is attached as Figure 1. This preliminary notice of BGS's and NEWSME's intent to file the expansion application is provided to the Department and to the municipal officers of the City of Old Town and the Town of Alton at least 60 days prior to the submittal of the expansion application to the MEDEP.

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. Pursuant to Resolves 2005, Chapter 74, the Town of Alton will be granted automatic intervenor status if the BGS and NEWSME file for an expansion application related to JRL and the Town requests such intervenor status.[1] 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. BGS and NEWSME note, however, that application by the Town of Alton for the municipal intervenor grant would conflict with the Community Benefits Agreement ("Agreement") dated October 6, 2005 after the enactment of the Resolve, between State Planning Office (which preceded BGS as the owner of the JRL), NEWSME and the Town, which provides in Paragraph 1.d that the payments set forth in the Agreement "shall be the exclusive payment obligations from the State, Casella, and

[1] The Resolve is silent as to whether Alton is entitled to seek a municipal intervenor grant under 38 MRS §1310-S(4) or whether the Landfill expansion is or will be located in Alton, BGS and NEWSME reserve their right to argue that the Landfill expansion is and will not be not located in Alton and that Alton is not entitled to seek a municipal intervenor grant.

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."

Should you have any questions about this project, please do not hesitate to call me at 862-4200 ext. 224, or Don Meagher at ext. 230.

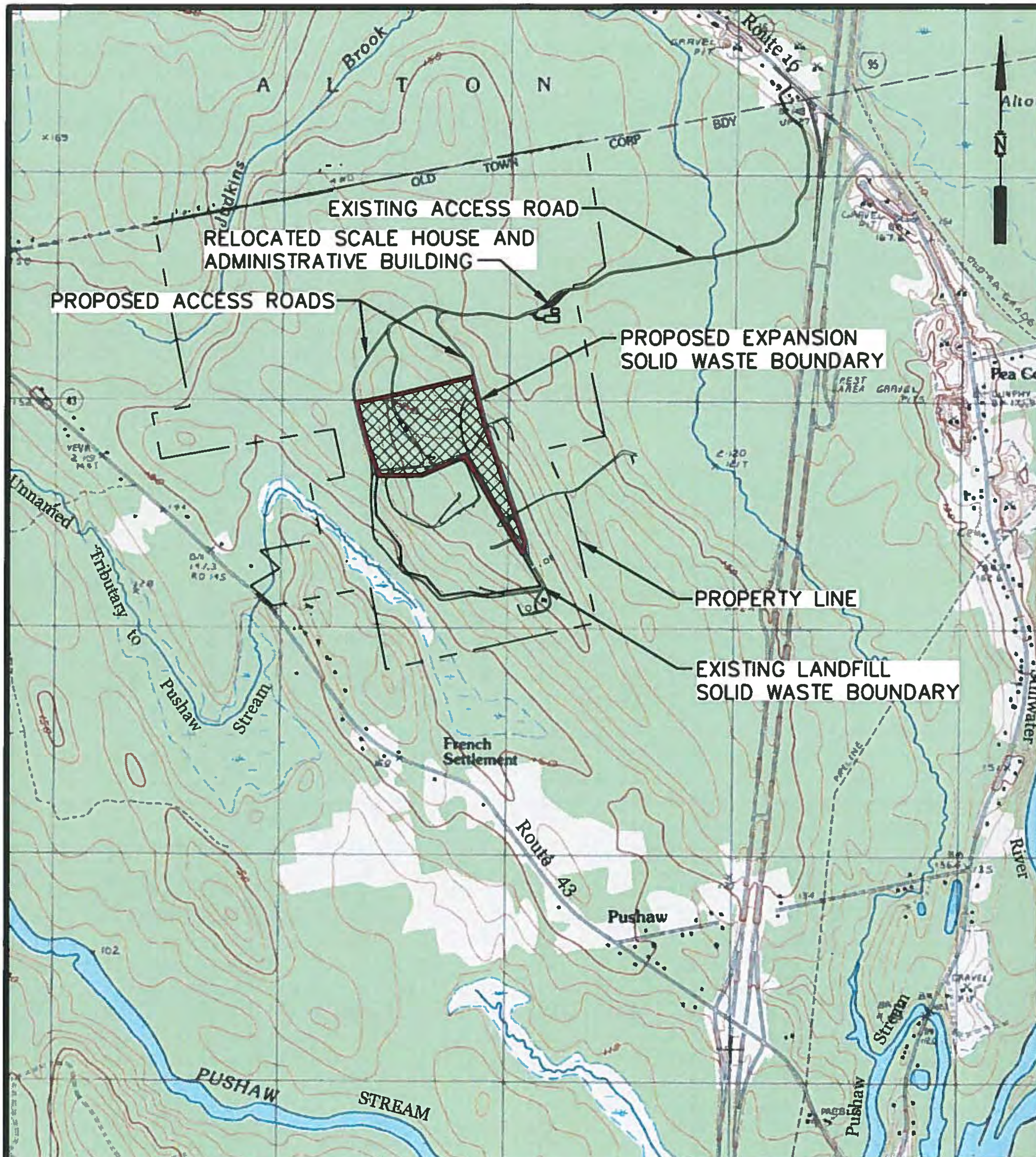
Sincerely,

Wayne Boyd

Wayne Boyd
NEWSME Landfill Operations, LLC

cc: Mike Barden, BGS
Cyndi Darling, MDEP
Michael Parker, MDEP

Enc.



BASE MAP ADAPTED FROM 7.5 MIN USGS TOPOGRAPHIC QUADRANGLE: OLD TOWN, MAINE–1988

1000 0 2000 4000 FEET

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

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: SITELOC LMN: SITELOC CTB: SITELOC REV: 3/10/2015

\\Nserver\cfs\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Acad\Figures\SITELOC.dwg, 4/17/2015 11:03:16 AM, paf

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OLD TOWN ME 04468

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Return Receipt Fee (Endorsement Required)	$2.70	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $6.70	05/01/2015

HAMPDEN, ME 04444 MAY 1 2015 U.S.P.S.

Sent To: TOWN of ALTON BOARD of SELECTMEN
Street, Apt. No.; or PO Box No.: 3352 BENNOCH RD.
City, State, ZIP+4: 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
BOARD of SELECTMEN
3352 BENNOCH RD.
ALTON, ME 04468

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Ronald F Boyd ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) RONALD F BOYD
C. Date of Delivery 5/15/15

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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4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Transfer from service label)* 7011 1150 0001 3946 8173

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

APPENDIX A-5

PUBLIC INFORMATION MEETING DOCUMENTATION

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 June 3, 2015 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 35 members of the public attended the Public Informational 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	NEWSME LANDFILL OPERATIONS, LLC
By:	By:
Its: Manager State-Owned Landfills	Its: Vice President
Date: 7/7/15	Date: 7/8/15

{W4929884.2}

EXHIBIT A

RESPONSES TO ANY SIGNIFICANT ISSUES RELEVANT TO LICENSING CRITERIA THAT WERE RAISED AT THE JUNE 3, 2015 PUBLIC INFORMATIONAL MEETING FOR THE JUNIPER RIDGE LANDFILL EXPANSION

Significant issues raised at the meeting that are relevant to licensing criteria and the applicants' responses are set forth below.

1. How often is water tested?

   Response: Groundwater is tested three times per year and storm water is tested quarterly.

2. What would happen if the water quality is found to be poor?

   Response: We would investigate and correct problems.

3. In which direction does groundwater flow?

   Response: There is a groundwater divide underlying the landfill expansion site; a portion of the groundwater flows to the east, while another portion flows to the west. This is explained in greater detail in the application that will be filed.

4. Do the EPA's recently-published regulations on Clean Water Act jurisdiction affect the application?

   Response: Since virtually all wetlands in Maine have been "jurisdictional" (i.e., within the Army Corp's Section 404 Clean Water Act jurisdiction) for some time, and we are assuming all wetlands delineated on this site are jurisdictional, the regulation is not expected to impact this project. We are proceeding on the basis that the wetlands are within the jurisdiction of the Army Corps.

5. Where will the storm water ponds be located?

   Response: The locations of the ponds are shown on a site plan that was available at the meeting and were pointed out by Sevee & Maher engineer Mike Booth. These will also be clearly shown on plans submitted with the application.

6. What happens if you have a liner leak and the cell is full?

Response: It all depends on where the leak is. We would dig up the cell, if the leak is accessible, and take necessary action to minimize the impact from the leak to the maximum extent possible.

7. What portion of the expanded landfill is below the water table?

   Response: The Applicants' representative highlighted the approximately 12-acre area where an underdrain will be located to manage groundwater during construction. This is very similar to the way in which a portion of the existing Juniper Ridge Landfill was constructed.

8. Have leaks been discovered in existing Juniper Ridge Landfill?

   Response: No leaks have been discovered at Juniper Ridge Landfill. NEWSME's representative explained how plastic liners are tested for leaks (e.g., holes or tears) after installation and how this type of quality assurance and quality control ensure that the possibility of leaks is minimized to the maximum extent possible.

9. Who's in charge of testing the water?

   Response: The Applicants hire independent consultants, in this case Sevee and Maher, to collect the water quality samples. They are sent off site to an independent certified laboratory for analysis. In response to a question, yes, we would allow others to observe the sampling. Existing JRL has a very rigorous sampling regimen, which includes sample collection, analysis, and evaluation on a routine basis. MEDEP is actively involved in this process. The expansion will have a similar sampling regimen.

10. What percent methane is in the landfill gas?

    Response: Approximately 40-50%.

11. What will be the size of the landfill gas-to-energy plant that is proposed?

    Response: Approximately 5 megawatts, but this facility will be licensed separate from the expansion itself.

12. One attendee noted a very recent odor near Exit 199. What was the issue?

    Response: We experienced a brief issue and shutdown of the new Thiopaq system during some diagnostic testing due to high carbon tank pressure.

13. One attendee asked about odors generally. How are they monitored and addressed?

    Response: NEWSME's representative noted that JRL experienced a spike in odors in January and February of 2015, primarily related to the start-up of a new gas treatment system that took the team a few months to address the complete start-up process. NEWSME understands that odor can be an issue and it intends to address it. Its goal is to have zero odor complaints. There are four odor monitoring locations, one to the northeast, one to the northwest, one to the west, and one to the south. The DEP receives all data from these odor monitors, which are all automated and are sent to a central location. The DEP's engineer for the landfill is Amanda Wade, and interested persons may wish to speak with her about odor issues as well. It was also noted that atmospheric conditions can affect odors, including temperature inversions and low pressure. NEWSME continually makes improvements and will continue to do so with the expansion. Although there may be occasional hiccups and NEWSME learns from them, it is working towards zero odor complaints. It also was stressed that NEWSME will be closing out cells from existing JRL as expansion cells are constructed and become operational. This is all part of managing potential odors.

14. What landfill gases do we test for and how often?

    Response: Methane, carbon dioxide, oxygen, balance gas, hydrogen sulfide, and Total Reduced Sulfur (TRS). NEWSME currently tests twice a month for hydrogen sulfide and TRS, and once per month for methane, carbon dioxide, oxygen, and balance gas.

15. What will be done to help reduce and eliminate methane?

    Response: Our primary goal is to reduce greenhouse gas emissions and we will either burn it for energy or flare it. We also will be using daily cover and geomembrane covers.

16. Does gas escape?

    Response: NEWSME measures emissions with surface scans every year and reports the results to EPA.

17. In the expansion, how much exposed area will there be at any one time?

    Response: The typical working uncovered phase is usually less than an acre. We will follow DEP requirements in this area, as in all others.

18. What will be the sources of waste we receive?

    Response: The sources are based on what's happening in the marketplace, but all waste will be waste generated in the State of Maine, as defined by and required by Maine law. The 700,000 tons per year is an estimate, but based on past waste acceptance rates. Future market conditions will dictate if it's less than or more than 700,000 tons per year.

19. What is the expected life of the landfill?

Response: The expected life is 10-12 years, with start of construction in 2018 and start of use in 2019, which means it will be filled in 2031 or 2032 at a disposal rate of 700,000 tons per year.

20. If daily cover is incinerator ash, won't that cause a dust problem?

Response: Incinerator ash used as daily cover is wet when received at the facility, so it is not typically dusty. The dryer ashes are used to bulk materials such as sludges.

21. What about biomedical waste?

Response: Although treated biomedical waste is licensed to be disposed in the facility, and would be in the expansion, the Pittsfield biomedical waste autoclave facility is now closed. All such biomedical waste is now understood to be sent out of state.

22. Will this expansion build out the site?

Response: Not necessarily. The original proposed expansion was for 22 million cubic yards. That amount would have filled out the entire suitable area.

23. If we wanted to receive a public notice, even if you are not required to send us one, can we request that?

Response: NEWSME agreed to send notices to people who request it, even if not required to. It also suggested that it would likely place notice of the intent to file the application in the Penobscot Times, in addition to the Bangor Daily News.

24. Do you weigh the trucks that enter the facility?

Response: Yes. NEWSME also has a "3 strikes you're out" policy in place for overweight trucks. We keep a tally of total trucks and overweight trucks.

25. Approximately how many tons of waste are received from the ReEnergy processing facility in Lewiston?

Response: Approximately 150,000 tons annually of fines used for daily cover and bulky waste from ReEnergy are accepted at the JRL facility currently.

26. Is the State considering another location for a landfill?

Response: BGS's represenative responded that the State is not considering additional capacity elsewhere beyond Juniper Ridge at this time. Carpenter

Ridge is licensed, but requires legislative approval to be constructed, and it is a relatively small site in any event. There is the Dolby landfill between Millinocket and East Millinocket, although its remaining capacity is small, it is distant from waste generators, and it is slated for closure. The Crossroads landfill has some capacity left until the early 2020's, but it is a commercially-owned landfill, not a State-owned landfill.

27. Why don't more trucks use Exit 199 on I-95, rather than coming up Route 16 to avoid the weigh station?

    Response: JRL has a policy of advising and encouraging drivers to use I-95, rather than alternate routes. It will continue this policy for the expansion.

28. For the unavoidable wetland impacts that will occur, how much compensation are you proposing?

    Response: Over 166 acres.

29. Who is doing your wetland and bat work?

    Response: Stantec.

30. Has the Penobscot Indian Nation been notified of the public informational meeting?

    Response: Yes, and they were invited to each of the four pre-application milestone meetings and participated in at least one. The PIN's John Banks was sent notification of the PIM.

31. If DEP raises its surface water quality standards, will it affect this project?

    Response: Since we do not intend to impact or discharge to any surface waters, there will be no impact if DEP were to change its water quality standards.

32. How stable is the soil under the wetlands?

    Response: We look at stability of the soil very carefully and these soils are very stable and suitable for construction of a landfill. This is just one of several reasons this site was originally selected for a landfill.

33. What are you doing to address potential noises?

    Response: We will comply with the applicable DEP standards for protected locations. In addition, we have already installed special quieter backup alarms on vehicular equipment, rather than the typical tonal alarms, in response to public comments received at one of the pre-application milestone meeting.

34. Are there any aquifers in the area?

Response: There are no significant sand and gravel aquifers inside the site area. We evaluated groundwater movement and flow very extensively. There is a mapped sand and gravel aquifer approximately one mile east of the site, easterly on Route 16, but it is isolated from the site area.

35. What is the schedule for filing of the application?

Response: We are targeting a submittal for some time in early July.

JUNIPER RIDGE LANDFILLL EXPANSION
OLD TOWN, MAINE
PUBLIC INFORMATIONAL MEETING
JUNE 3, 2015

PROJECT OVERVIEW

The project (known as the Expansion) is an expansion of the existing Juniper Ridge Landfill (JRL) in Old Town proposed by 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 Bureau of General Services, as depicted on the attached figure. The Expansion's solid waste footprint will be about 54 acres, with the total facility site, including the landfill and supporting site infrastructure (e.g., access roads and stormwater management ponds) being approximately 74 acres. The development of the Expansion will be phased in a manner similar to the existing facility, with a total of six landfill cells, built one by one, as needed. The first expansion cell will need to be constructed during the 2018 construction season to be available for use in 2019.

The Expansion will provide approximately 9.35 million cubic yards of disposal capacity as approved in the Maine Department of Environmental Protection (MDEP) Public Benefit Determination on January 31, 2012 (#S-020700-WS-AU-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 clay 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 12.7 acres of the Expansion where the landfill base is located below the site's water table. The Expansion's final waste elevation is 390 NVGD, which is equal to the maximum 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 in a phased fashion over an anticipated 10-12-year life span, and will have six operational cells, each having about 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, front-end process residue, municipal solid waste ash, wood biomass ash, sludges, contaminated soil, oversized bulky waste, by-passed municipal solid waste, and other special wastes. The Expansion will only accept waste materials generated in the State of Maine.

Required State, Local, and Federal Licenses/Permits

The permits/authorizations listed below are likely required to construct the Expansion:

- A Solid Waste Facility License from the MDEP pursuant to 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 and permit-by-rule Natural Resources Protection Act permits from the MDEP pursuant to 38 M.R.S. §§ 480-A to 480-FF and 06-096 CMR 310 and 335.
- A Section 401 Water Quality Certification from the MDEP 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 38 M.R.S. § 413 and 06-096 CMR 529(2)(a)(2)(i).
- Solid Waste Permit Pursuant to City of Old Town Ordinance, Solid Waste Landfill Licensing Ordinance Chapter 24.
- HHE-2000 Septic System Design for Relocated Office Building

ENVIROMENTAL SITING CRITERIA

Traffic. The total truck traffic associated with the operation of the Expansion is expected to average about 203 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 will have a policy that promotes the use of I-95. 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	2,400 feet
Property boundary	300 feet	420 feet
Nearest residence	1,000 feet	2,100 feet
Stratified sand and gravel deposit	100 feet	> 500 feet
Classified surface water body	100 feet	950 feet
Water supply spring or well	1000 feet	2,100 feet
Performance Standards		
Airport	10,000 feet	13,000 feet

Existing Uses and Scenic Character

Noise. Estimates of the Project's future noise levels for a future operating condition based on measured sound levels from mobile sources at the existing landfill and manufacturer's data for equipment at the proposed LFGTE facility were calculated using the Cadna/A noise calculation software package which uses the ISO 9613-2 international standard for sound propagation. The day time and night time hourly sound level standards of 60 dBA and 50 dBA 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. Further, no significant viewing locations from which the public in general could view the landfill exist within 6 miles of the site. Vehicular views that may have visual connection to the landfill are not regarded by DEP standards as "public viewing areas." Those vehicles that do have views, most notably from Rt. 43, are either visually screened and buffered, or, as with Rt. 16, are 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 be either combusted at the facility flare or used by a landfill gas-to-energy plant planned for the site. Both these facilities will be 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 within the covered 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: stormwater detention basins, low velocity ditches, and stone check dams within on-site ditches.

Natural Resources. Despite efforts to avoid and minimize wetland impacts, the Expansion will fill approximately 2.04 acres of primarily forested wetlands. The wetland fills will occur in four different wetlands located within the landfill footprint and perimeter dike footprint. These wetlands are not designated as Wetlands of Special Significance, as defined by the NRPA. The

Expansion will also result in about 0.10 acre of clearing wetland impacts as a result of clearing required for a relocated electrical line and perimeter fence.

A total of 14 vernal pools were identified within and adjacent to the expansion area, one vernal pool, located outside the Expansion's solid waste footprint, met the criteria to be considered a Significant Vernal Pool (SVP). This SVP will not be directly impacted by the project, but clearing for the proposed relocated power line and fence will occur within the 250-foot critical terrestrial habitat surrounding this pool. This activity is covered by the Permit-by-Rule standards of the NRPA

Of the 14 vernal pools, 12 met the definition of a vernal pool as provided by the Army Corps' Maine GP, but not as defined in Chapter 335 of the NRPA. The 94 acres of vernal pool management area impacts, as defined by the Corps, associated with these vernal pools will be addressed in the project's mitigation plan. The mitigation plan will exceed the criteria established by the MEDEP and Corps to compensate for wetland and vernal pool 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, 2003). 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 erosional forces, 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 JRL. Therefore, the 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 outside the southeast side of the Expansion at greater than 100 feet from the proposed 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 site investigations. It is not coterminous with the previously described mapped sand and gravel aquifer and is not mapped by MGS as a regional stratified sand and gravel deposit. However, the potential for the Expansion to impact this sandy zone was evaluated along with the bedrock underlying the closest adjoining properties. These evaluations demonstrate that the Expansion, with its imported underlying clay layer, 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 buildings, and at the current office building, will continue to be used by on-site landfill personnel. With the development of Landfill Cell 12, the scales and office building will be relocated to the east of the Expansion along the existing site access road and this facility will be served by a well and on-site disposal system designed and installed as part of that development. 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. Leachate generated by the Expansion will continue to be treated at the Expera Specialty Solution Mill in Old Town or at the City of Brewer wastewater plant. 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, a portion of this line will be relocated. The Expansion pump stations also will require three-phase, 480-volt power, which will be supplied to each pump station via on-site electrical cables that will run along the site access roads.

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.

Juniper Ridge Landfill Expansion Public Informational Meeting

June 3, 2015 Old Town City Hall

ATTENDANCE SHEET

Tom Dunn
Chip Laite
Mike Sapiel
[illegible]
Kathy [illegible]
[illegible]
[illegible]
[illegible]
Ed [illegible]
[illegible]
Paul Schroeder
Peter Dufour
Pamela Bell
No Mount Trashmore!
Laurent Beauregard
Ev Wallace (Tylridge)
Gregg P. Wallace
Toni King
Jeremy Labbe
Bill Lippincott
Julie Graf

Chuck Leithiser
Cheryl Spencer
Laura Sanborn
Ted Shina
Scott Tash
Wayne Boyd
[illegible]
BDN
Alan Clemence
Brendan Fahey
Mary Dolan
[illegible]
Bob Wengrzynek
Linda Swackhamer
Karen Bertolino

Legal Notices

NOTICE OF PUBLIC INFORMATIONAL MEETING

Please take notice that the Bureau of General Services ("BGS"), c/o Department of Economic and Community Development, State House Station #59, Augusta, Maine 04333-0059 (tel. 207-624-7436), and NEWSME Landfill Operations LLC ("NEWSME"), 358 Emerson Mill Road, Hampden, Maine 04444, will hold a public informational meeting on June 3, 2015 at 6 p.m. at the 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 and to seek public questions on 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 54 acres on BGS-owned land, and (2) a Tier 3 wetlands alteration application for filling approximately 2.04 acres of wetland in connection with the proposal to expand the landfill. The applicants will discuss the project's anticipated environmental impacts and inform the public about opportunities for public comment. 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-480-HH, and regulations promulgated under that Act, 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 call NEWSME's Don Meagher at 862-4200, ext 230.

May 22, 2015

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Challis Randall
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Old Town, ME 4468

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Dana Snowman
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Alton, ME 4468

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Laura Sanbom
2845 Bennoch Road
Alton, ME 4468

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Bill Mayo City Manager
City of Old Town
265 Main Street
Old Town, ME 4468

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Return Receipt Fee (Endorsement Required)	$1.35	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $5.14	05/22/2015

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To

Street, Apt. No.; or PO Box No.

City, State, ZIP+4

Ralph Leonard
96 Sargent Drive
Old Town, ME 4468

PS Form 3800, August 2006 — See Reverse for Instructions

7014 2120 0004 5723 7881

U.S. Postal Service™

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OFFICIAL USE

OLD TOWN ME 04468

Postage	$ $0.49	0021
Certified Fee	$3.30	02
Return Receipt Fee (Endorsement Required)	$1.35	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $5.14	05/22/2015

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To

Street & Apt. No., or PO Box No.

City, State, ZIP+4

Bill Thompson Chair
Landfill Advisory Committee
12 Wabanaki Way
Indian Island, ME 4468

PS Form 3800, July 2014 — See Reverse for Instructions

7012 1010 0002 1040 6935

U.S. Postal Service™

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OFFICIAL USE

OLD TOWN ME 04468

Postage	$ $0.49	0021
Certified Fee	$3.30	02
Return Receipt Fee (Endorsement Required)	$1.35	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $5.14	05/22/2015

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To

Street, Apt. No.; or PO Box No.

City, State, ZIP+4

Chuck Leithiser
394 Fourth Street
Old Town, ME 4468

PS Form 3800, August 2006 — See Reverse for Instructions

7014 2120 0004 5723 7898

U.S. Postal Service™

CERTIFIED MAIL® RECEIPT

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OFFICIAL USE

BREWER ME 04412

Postage	$ $0.49	0021
Certified Fee	$3.30	02
Return Receipt Fee (Endorsement Required)	$1.35	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $5.14	05/22/2015

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To

Street & Apt. No., or PO Box No.

City, State, ZIP+4

Laurent J. and Barbara L. Beauregard
273 Washington Street
Brewer, ME 4412

PS Form 3800, July 2014 — See Reverse for Instructions

7012 1010 0002 1040 6928

U.S. Postal Service™

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(Domestic Mail Only; No Insurance Coverage Provided)

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OFFICIAL USE

OLD TOWN ME 04468

Postage	$ $0.49	0021
Certified Fee	$3.30	02
Return Receipt Fee (Endorsement Required)	$1.35	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $5.14	05/22/2015

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To

Street, Apt. No.; or PO Box No.

City, State, ZIP+4

David Russell
City of Old Town
265 Main Street
Old Town, ME 4468

PS Form 3800, August 2006 — See Reverse for Instructions

7014 2120 0004 5723 7850

U.S. Postal Service
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OFFICIAL USE

Postage	$ .49
Certified Fee	3.30
Return Receipt Fee (Endorsement Required)	1.35
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 5.14

Postmark Here

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To
Street & Apt. No., or PO Box No.
City, State, ZIP+4

Town of Alton
3352 Bennoch Road
Alton, ME 4468

PS Form 3800, July 2014 See Reverse for Instructions

7014 2120 0004 5723 7911

CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $0.49
Certified Fee	$3.30
Return Receipt Fee (Endorsement Required)	$1.35
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $5.14

0021 02 Postmark Here 05/22/2015

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To
Street & Apt. No., or PO Box No.
City, State, ZIP+4

Thomas Dunn and Karen Bertolino
579 West Old Town Road
Old Town, ME 4468

PS Form 3800, July 2014 See Reverse for Instructions

7014 2120 0004 5723 7867

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
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For delivery information, visit our website at www.usps.com®.

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $0.49
Certified Fee	$3.30
Return Receipt Fee (Endorsement Required)	$1.35
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $5.14

0021 02 Postmark Here 05/22/2015

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To
Street & Apt. No., or PO Box No.
City, State, ZIP+4

Town of Old Town
265 Main Street
Old Town, ME 4468

PS Form 3800, July 2014 See Reverse for Instructions

7014 2120 0004 5723 7904

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $0.49
Certified Fee	$3.30
Return Receipt Fee (Endorsement Required)	$1.35
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $5.14

0021 02 Postmark Here 05/22/2015

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To
Street & Apt. No., or PO Box No.
City, State, ZIP+4

Robert W. and Wendy Hall
631 West Old Town Road
Old Town, ME 4468

PS Form 3800, July 2014 See Reverse for Instructions

7014 2120 0004 5723 7928

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
Domestic Mail Only

For delivery information, visit our website at www.usps.com®.

HOLBROOK MA 02343 OFFICIAL USE

Postage	$ $0.49
Certified Fee	$3.30
Return Receipt Fee (Endorsement Required)	$1.35
Restricted Delivery Fee (Endorsement Required)	$0.00
Total Postage & Fees	$ $5.14

0021 02 Postmark Here 05/22/2015

CUMBERLAND CENTER MAY 22 2015 ME-USPS-04021

Sent To
Street & Apt. No., or PO Box No.
City, State, ZIP+4

Lawrence Steeves Heirs
216 Sycamore Street
Holbrook, MA 2343

PS Form 3800, July 2014 See Reverse for Instructions

Legal Notices

BANGOR SYMPHONY ORCHESTRA'S ANNUAL MEETING OF THE CORPORATION

Tuesday, June 16, 2015
5:30 p.m.
G. Clifton Eames Learning Center,
203 Maine Avenue, Bangor, ME
Light appetizers provided by
Izzy's Catering.
Please R.S.V.P. by Thursday, June 11
to Sarah S. P. McCarthy,
Director of Development at
sarah@bangorsymphony.org or
942-5555, ext. 2.

May 22, 2015

Legal Notices

CITY OF BANGOR
NOTICE OF HEARING:

Nuisance or Dangerous Building, 44 Patten Street, Bangor, ME. Hearings to be held in City Hall Council Chambers on June 2, 2015 at 5:15 and June 8, 2015 at 7:30. MAY RESULT IN DEMOLITION OF BUILDING.

May 15, 22, 29, 2015

Legal Notices

FORM OF PUBLISHED NOTICE
NOTICE OF PROPOSED BANK MERGER

Notice is hereby given that **Camden National Bank**, 2 Elm Street, Camden, Maine 04843, filed an application on May 15, 2015 with the **Office of the Comptroller of the Currency ("OCC")** seeking written consent to merge with **The Bank of Maine**, 2 Canal Plaza, Portland, Maine 04101, with Camden National Bank as the surviving entity (the "Merger"). The Merger will be consummated in connection with the merger of The Bank of Maine's parent company, SBM Financial, Inc., with a wholly-owned subsidiary of Camden National Bank's parent company, Camden National Corporation.

It is currently contemplated that all of the offices of both Camden National Bank and The Bank of Maine will continue to operate as offices of Camden National Bank after the Merger, except that the following Camden National Bank branches will be relocated to, and consolidated with, existing branch offices of The Bank of Maine due to the close proximity of the branches to one another:

Camden National Bank Location *To be relocated from*	**The Bank of Maine Location** *To be relocated to*
192 Water Street Gardiner, ME 04345	190 Water Street Gardiner, ME 04345
127 Community Drive, Suite 101 Augusta, ME 04330	130 Community Drive Augusta, ME 04330
38 Bangor Street Augusta, ME 04330	66 Eastern Ave Augusta, ME 04330
108 Lafayette Center Kennebunk, ME 04043	36 Portland Road Kennebunk, ME 04043

This notice is published pursuant to 12 U.S.C. § 1828(c) and 12 C.F.R. § 5.33. Any person wishing to comment on this application may file his or her comments in writing to the Director of District Licensing, Northeastern District, Office of the Comptroller of the Currency, 340 Madison Avenue, 5th Floor, New York, New York 10173, or NE.Licensing@occ.treas.gov no later than June 15, 2015.

The non-confidential portion of the application is on file and available for public inspection in that OCC district office during regular business hours. Written requests for a copy of the non-confidential portion of the application should be sent to the Director of District Licensing.

May 15, 2015 Camden National Bank Camden, Maine
The Bank of Maine Portland, Maine

May 15, 22, 2015

Legal Notices

NOTICE OF PUBLIC SALE PURSUANT TO TITLE 14 M.R.S.A. § 6323

On January 23, 2015, a Judgment of Foreclosure and Order of Sale was entered on the docket of the Aroostook County Superior Court in an action bearing Docket Number RE-14-69 brought by Mechanics Savings Bank against Troy R. Coty and Amy C. Kennard for the foreclosure of a certain mortgage granted to Mechanics Savings Bank by Troy R. Coty and Amy C. Kennard on August 27, 2007, and recorded in the Aroostook County Registry of Deeds in Book 4487, Page 209. The 90-day redemption period has now elapsed without redemption; therefore, Mechanics Savings Bank shall sell the mortgaged property at a public sale, which shall be held at the law offices of Phillips, Olore, Dunlavey & York, P.A., KeyBank Building, 480 Main Street, Presque Isle, Maine, on June 10, 2015 at 10:00 a.m.

The mortgaged property consists of land and buildings located at 7 Coty Lane a/k/a Fords Lane in Mapleton, Aroostook County, Maine.

Mechanics Savings Bank shall sell the mortgaged property to the highest bidder and shall convey such property to such bidder by quitclaim deed without covenant. The property shall be sold on an "AS IS, WHERE IS" basis, subject to utility easements and rights-of-way of record and utility easements and rights-of-way that are visible on the face of the earth, and subject to all real and personal property taxes assessed by or due and payable to the Town of Mapleton, any water and/or sewerage assessments, any road maintenance fees, and all interests superior to that of Mechanics Savings Bank.

Prior to the public sale, all bidders, with the exception of Mechanics Savings Bank, shall deposit with the auctioneer cash in the amount of $5,000.00 or a certified check, made payable to Mechanics Savings Bank, in the same amount. The deposit of the highest bidder shall be nonrefundable. Mechanics Savings Bank may bid all or part of the amount due to it pursuant to the mortgage, including the unpaid principal balance, accrued interest, expenses of foreclosure, expenses of sale, and other incidental expenses. All other terms of sale shall be announced at the commencement of the public sale.

At the conclusion of the public sale, the highest bidder shall execute a Purchase and Sale Agreement with Mechanics Savings Bank, which shall provide for payment of the balance of the purchase price in cash or by certified check within 30 days of the auction. In the event the highest bidder fails to pay the balance of the purchase price within such time, Mechanics Savings Bank shall retain his or her $5,000.00 deposit as liquidated damages and may offer the mortgaged property to the next highest bidder on the same terms.

Dated at Auburn, Maine this 28th day of April, 2015.

LINNELL, CHOATE & WEBBER, LLP
Attorneys for Mechanics Savings Bank
83 Pleasant Street, P. O. Box 190
Auburn, ME 04212-0190
(207) 784-4563

By:__________/s/________________
Sonia J. Buck, Esq., Bar #9847

May 8,15 and 22, 2015

Legal Notices

NOTICE OF PUBLIC SALE OF REAL ESTATE

By virtue of and in execution of an Agreed Order of Foreclosure and Sale entered in the Penobscot County Superior Court, on January 13, 2014, in Civil Action, Docket No. RE-11--212 brought by The Bank of New York Mellon fka The Bank of New York as Trustee for the Certificateholders of CWABS, Inc., Asset-Backed, Series 2004-BC4 against Candace L. Doucette for the foreclosure of a mortgage recorded in the Penobscot County Registry of Deeds in Book 9461, Page 326, the statutory ninety (90) day period of redemption having expired without redemption, notice is hereby given that there will be a public sale on June 09, 2015 at 4:00 PM at 2 Gorges Road, Kittery, ME 03904 all and singular the premises described in said mortgage and being a certain lot of land with the buildings thereon, situated in the town of Bangor, County of Penobscot, and State of Maine, described in said mortgage as being located at 117 Grove Street.
TERMS OF SALE The property will be sold to the highest bidder at the sale, who shall pay a deposit of Ten Thousand and No/100 Dollars ($10,000.00) in cash, certified check or funds acceptable to mortgagee at the time and place of sale. The successful bidder shall be required to execute a Purchase and Sale Agreement with said The Bank of New York Mellon fka The Bank of New York as Trustee for the Certificateholders of CWABS, Inc., Asset-Backed, Series 2004-BC4 with the aforesaid Ten Thousand and No/100 Dollars ($10,000.00), as a non-refundable and non-interest bearing deposit thereon providing for a closing within thirty (30) days of the date of the public sale, at which time the balance of the bid price will be due and payable in cash or certified funds payable to The Bank of New York Mellon fka The Bank of New York as Trustee for the Certificateholders of CWABS, Inc., Asset-Backed, Series 2004-BC4 as aforesaid, which will then deliver a duly executed quitclaim deed. The sale shall be made subject to: (a) any condition which a title search would reveal, (b) any unpaid taxes or assessments due to the Municipality of Bangor, and (c) any facts which an accurate survey of the premises might show. The property shall be sold "as is" and "where is" without any warranties whatsoever expressed, implied or otherwise. Other terms will be announced at the sale.
Dated: May 4, 2015 S/John A. Doonan, Esq., Bar No. 3250 Jenai J. Cormier, Esq., Bar No. 4682 Attorneys for The Bank of New York Mellon fka The Bank of New York as Trustee for the Certificateholders of CWABS, Inc., Asset-Backed, Series 2004-BC4 Doonan, Graves & Longoria, LLC 100 Cummings Center Suite 225D Beverly, Massachusetts 01915 (978) 921-2670
TS#: 1008.40/ . DOUCETTE FEI # 1078.00225 05/08/2015, 05/15/2015, 05/22/2015

Legal Notices

Notice of PUBLIC HEARING IN AUGUSTA

To Review Findings and Receive Comments on the Final Draft of MaineDOT Strategic Transit Plan 2025

Friday, May 29, 2015
AT 9:00 A.M.
IN CONFERENCE ROOM 216
AT MaineDOT Headquarters Building
ON CHILD STREET, AUGUSTA, MAINE

Please join MaineDOT at a public hearing to discuss the final draft of the MaineDOT Strategic Transit Plan 2025.

Representatives of the Maine Department of Transportation and its contractors will be present on Friday, May 29, 2015 at 9:00 A.M. to review findings, and receive comments. Anyone with an interest is invited to attend and participate in the meeting.

Accommodations will be made for persons with disabilities. Auxiliary aids will be provided upon advance request.

Any inquiries regarding this hearing may be directed to the attention of Susan Moreau, Manager, Multimodal Planning & Operations MaineDOT, 16 State House Station, Augusta, Maine 04333-0016. Telephone: 207.624.3239. Email: Susan.Moreau@maine.gov

TTY Telephone (888) 516-9364

May 22, 23, 25, 2015

Legal Notices

NOTICE OF PUBLIC INFORMATIONAL MEETING

Please take notice that the Bureau of General Services ("BGS"), c/o Department of Economic and Community Development, State House Station #59, Augusta, Maine 04333-0059 (tel. 207-624-7436), and NEWSME Landfill Operations LLC ("NEWSME"), 358 Emerson Mill Road, Hampden, Maine 04444, will hold a public informational meeting on June 3, 2015 at 6 p.m. at the 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 and to seek public questions on 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 54 acres on BGS-owned land, and (2) a Tier 3 wetlands alteration application for filling approximately 2.04 acres of wetland in connection with the proposal to expand the landfill. The applicants will discuss the project's anticipated environmental impacts and inform the public about opportunities for public comment. 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-480-HH, and regulations promulgated under that Act, 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 call NEWSME's Don Meagher at 862-4200, ext 230.

May 22, 2015

Legal Notices

PUBLIC NOTICE

City of Bangor

5-Year Consolidated Housing and Community Development Plan and 2015 Annual Action Plan

The City of Bangor has prepared and provided to HUD its 5-Year Consolidated Housing and Community Development Plan and 2015 Annual Action Plan. The public is invited to review this Plan which is available during regular business hours at the following locations: Community & Economic Development Office, City Hall, 73 Harlow Street; Reference Desk, Bangor Public Library, 145 Harlow Street; and Health & Community Services Department, 103 Texas Avenue, Bangor, Maine. For additional information, call Tanya Emery, Director of Community & Economic Development at 992-4280.

May 22, 2015

Legal Notices

NOTICE OF PUBLIC SALE

Notice is hereby given that in accordance with the Judgment of Foreclosure and Sale entered September 26, 2014, as affected by an Amended Judgment of Foreclosure and Sale entered on April 23, 2015, and further affected by an Order on Plaintiff's Motion to Extend Deadlines entered on April 16, 2015, in the action entitled Wells Fargo Bank, National Association, as Trustee for the Pooling and Servicing Agreement dated as of June 1, 2006 Securitized Asset Backed Receivables LLC Trust 2006-FR2 Mortgage Pass-Through Certificates, Series 2006-FR2 v. Richard Bridges, Personal Representative for the Estate of John W. Rouse et al., by the Maine District Court, Division of Bangor, Docket No.: RE-12-41, wherein the Court adjudged the foreclosure of a mortgage granted by John W. Rouse to Mortgage Electronic Registration Systems, Inc acting solely as a nominee for Fremont Investment & Loan, its successors and/or assigns dated January 9, 2006 and recorded in the Penobscot County Registry of Deeds in Book 10270, Page 278, should the period of redemption have expired without redemption of the property by the mortgagor(s), a public sale of the property described in the mortgage will be conducted on

June 9, 2015 commencing at 10:30 AM at 45 Court Street, Houlton, Maine

.
The property is located at 291 Brunswick Street, Old Town, Penobscot County, Maine, reference as described in said mortgage.

The sale will be by public auction. All bidders for the property will be required to make a deposit of $5,000.00 in cash, certified or bank check at the time of the public sale made payable to Shechtman Halperin Savage, LLP, which deposit is non-refundable as to the highest bidder. The balance of the purchase price shall be paid within thirty (30) days of the public sale. In the event a representative of Wells Fargo Bank, National Association, as Trustee for the Pooling and Servicing Agreement dated as of June 1, 2006 Securitized Asset Backed Receivables LLC Trust 2006-FR2 Mortgage Pass-Through Certificates, Series 2006-FR2 is not present at the time and place stated in this notice, no sale shall be deemed to have occurred and all rights to reschedule a subsequent sale are reserved.

Additional terms will be announced at the public sale.

Wells Fargo Bank, National Association, as Trustee
for the Pooling and Servicing Agreement dated as
of June 1, 2006 Securitized Asset Backed
Receivables LLC Trust 2006-FR2 Mortgage Pass-
Through Certificates, Series 2006-FR2,
by its attorneys, Shechtman Halperin Savage, LLP
Jennifer L. Maynard, Esq.
James M. Garnet, Esq.
1080 Main Street, Pawtucket, RI 02860
(401) 272-1400

May 8,15 and 22, 2015

Legal Notices

NOTICE OF PUBLIC SALE

Notice is hereby given that in accordance with the Judgment of Foreclosure and Sale entered March 26, 2014, as affected by an Order on Plaintiff's Motion to Extend Deadlines entered on April 8, 2015 in the action entitled *Bank of America, N.A., as successor by merger to BAC Home Loans Servicing, LP f/k/a Countrywide Home Loans Servicing, LP v. Joey M. Rudge et al.*, by the Maine District Court, Division of Millinocket, Docket No. RE-12-036, wherein the Court adjudged the foreclosure of a mortgage granted by Joey M. Rudge and Renee B. Rudge to Mortgage Electronic Registration Systems, Inc., acting solely as nominee for Countrywide Home Loans, Inc., its successors and/or assigns dated March 21, 2006 and recorded in the Penobscot County Registry of Deeds in Book 10356, Page 22, should the period of redemption have expired without redemption of the property by the mortgagor(s), a public sale of the property described in the mortgage will be conducted on

June 24, 2015 commencing at 11:30 a.m.
at 45 Court Street, Houlton, Maine

The property is located at 127 Minuteman Drive, Millinocket, Penobscot County, Maine, reference as described in said mortgage.

The sale will be by public auction. All bidders for the property will be required to make a deposit of $5,000.00 in cash, certified or bank check at the time of the public sale made payable to Shechtman Halperin Savage, LLP, which deposit is non-refundable as to the highest bidder. The balance of the purchase price shall be paid within thirty (30) days of the public sale. In the event a representative of Bank of America, N.A., as successor by merger to BAC Home Loans Servicing, LP f/k/a Countrywide Home Loans Servicing, LP is not present at the time and place stated in this notice, no sale shall be deemed to have occurred and all rights to reschedule a subsequent sale are reserved.

Additional terms will be announced at the public sale.

Bank of America, N.A., as successor by merger to BAC
Home Loans Servicing, LP f/k/a Countrywide Home Loans
Servicing, LP
by its attorneys, Shechtman Halperin Savage, LLP
Jennifer L. Maynard, Esq.
James M. Garnet, Esq.
1080 Main Street, Pawtucket, RI 02860.
(401) 272-1400.

May 22, 29 and June 5, 2015

Legal Notices

NOTICE OF PUBLIC SALE

Notice is hereby given that in accordance with the Judgment of Foreclosure and Sale entered June 03, 2014, as affected by an Order on Plaintiff's Motion to Extend Deadlines entered on April 6, 2015 in the action entitled Deutsche Bank National Trust Company, as Trustee for Morgan Stanley ABS Capital Inc. Trust 2004-NC8, Mortgage Pass-Through Certificates, Series 2004-NC8 v. William C. Rand et al., by the Maine District Court, Division of Bangor, Docket No.: RE-13-37, wherein the Court adjudged the foreclosure of a mortgage granted by William C. Rand and Jacqlyn M. Rand to New Century Mortgage Corporation dated June 18, 2004 and recorded in the Penobscot County Registry of Deeds in Book 9406, Page 38, should the period of redemption have expired without redemption of the property by the mortgagor(s), a public sale of the property described in the mortgage will be conducted on

June 9, 2015 commencing at 11:00 AM at 45 Court Street, Houlton, Maine

The property is located at 10 Main Street, Bradley, Penobscot County, Maine, reference as described in said mortgage.

The sale will be by public auction. All bidders for the property will be required to make a deposit of $5,000.00 in cash, certified or bank check at the time of the public sale made payable to Shechtman Halperin Savage, LLP, which deposit is non-refundable as to the highest bidder. The balance of the purchase price shall be paid within thirty (30) days of the public sale. In the event a representative of Deutsche Bank National Trust Company, as Trustee for Morgan Stanley ABS Capital Inc. Trust 2004-NC8, Mortgage Pass-Through Certificates, Series 2004-NC8 is not present at the time and place stated in this notice, no sale shall be deemed to have occurred and all rights to reschedule a subsequent sale are reserved.

Additional terms will be announced at the public sale.

Deutsche Bank National Trust Company, as Trustee
for Morgan Stanley ABS Capital Inc. Trust 2004-
NC8, Mortgage Pass-Through Certificates, Series
2004-NC8,
by its attorneys, Shechtman Halperin Savage, LLP
Jennifer L. Maynard, Esq.
James M. Garnet, Esq.
1080 Main Street, Pawtucket, RI 02860
(401) 272-1400

May 8,15 and 22, 2015

Legal Notices

NOTICE OF PUBLIC SALE

Notice is hereby given that in accordance with the Judgment of Foreclosure and Sale entered January 28, 2015 in the action entitled Wells Fargo Bank, N.A., as Trustee for Option One Mortgage Loan Trust 2006-2, Asset-Backed Certificates, Series 2006-2 v. Matthew Allen Niquette, a/k/a et al., by the Maine District Court, Division of Lincoln, Docket No.: LINDC-RE-2013-00045, wherein the Court adjudged the foreclosure of a mortgage granted by Matthew Allen Niquette to Option One Mortgage Corporation, a California Corporation dated May 12, 2006 and recorded in the Penobscot County Registry of Deeds in Book 10431, Page 105, should the period of redemption have expired without redemption of the property by the mortgagor(s), a public sale of the property described in the mortgage will be conducted on

June 9, 2015 commencing at 10:00 AM at 45 Court Street, Houlton, Maine

The property is located at 28 Wassau Street, Millinocket, Penobscot County, Maine, reference as described in said mortgage.

The sale will be by public auction. All bidders for the property will be required to make a deposit of $5,000.00 in cash, certified or bank check at the time of the public sale made payable to Shechtman Halperin Savage, LLP, which deposit is non-refundable as to the highest bidder. The balance of the purchase price shall be paid within thirty (30) days of the public sale. In the event a representative of Wells Fargo Bank, N.A., as Trustee for Option One Mortgage Loan Trust 2006-2, Asset-Backed Certificates, Series 2006-2 is not present at the time and place stated in this notice, no sale shall be deemed to have occurred and all rights to reschedule a subsequent sale are reserved.

Additional terms will be announced at the public sale.

Wells Fargo Bank, N.A., as Trustee for Option One
Mortgage Loan Trust 2006-2, Asset-Backed
Certificates, Series 2006-2,
by its attorneys, Shechtman Halperin Savage, LLP
Jennifer L. Maynard, Esq.
James M. Garnet, Esq.
1080 Main Street, Pawtucket, RI 02860
(401) 272-1400

May 8,15 and 22, 2015

Legal Notices

NOTICE OF PUBLIC SALE

Notice is hereby given that in accordance with the Judgment of Foreclosure and Sale entered April 3, 2014, as affected by an Order entered on April 28, 2015 in the action entitled *U.S. Bank National Association, as Trustee to American General Mortgage Loan Trust 2010-1 American General Mortgage Pass-Through Certificates, Series 2010-1 v. Shawn G. Frederick, et al.*, by the Maine District Court, Division of Bangor, Docket No. RE-13-068, wherein the Court adjudged the foreclosure of a mortgage granted by Shawn G. Frederick and Maralee M. Frederick a/k/a Maralee M. Jernigan to Mortgage Electronic Registration Systems, Inc., as nominee for Wilmington Finance, Inc., its successors and/or assigns dated April 5, 2006 and recorded in the Penobscot County Registry of Deeds in Book 10384, Page 114, should the period of redemption have expired without redemption of the property by the mortgagor(s), a public sale of the property described in the mortgage will be conducted on

June 24, 2015 commencing at 10:30 a.m.
at 45 Court Street, Houlton, Maine

The property is located at 73 Monument Drive, Eddington, Penobscot County, Maine, reference as described in said mortgage.

The sale will be by public auction. All bidders for the property will be required to make a deposit of $5,000.00 in cash, certified or bank check at the time of the public sale made payable to Shechtman Halperin Savage, LLP, which deposit is non-refundable as to the highest bidder. The balance of the purchase price shall be paid within thirty (30) days of the public sale. In the event a representative of U.S. Bank National Association, as Trustee to American General Mortgage Loan Trust 2010-1 American General Mortgage Pass-Through Certificates, Series 2010-1 is not present at the time and place stated in this notice, no sale shall be deemed to have occurred and all rights to reschedule a subsequent sale are reserved.

Additional terms will be announced at the public sale.

U.S. Bank National Association, as Trustee to
American General Mortgage Loan Trust 2010-1
American General Mortgage Pass-Through
Certificates, Series 2010-1,
by its attorneys, Shechtman Halperin Savage, LLP
James M. Garnet, Esq.
Jennifer L. Maynard, Esq.
1080 Main Street, Pawtucket, RI 02860
(401) 272-1400

May 22, 29, June 5, 2015

Legal Notices

NOTICE OF PUBLIC SALE

Notice is hereby given that in accordance with the Judgment of Foreclosure and Sale entered May 15, 2014; as affected by an Order on Plaintiff's Motion to Substitute Plaintiff Nunc Pro Tunc entered on September 17, 2014; as further affected by an Order on Plaintiff's Second Motion to Substitute Nunc Pro Tunc and to Extend Deadline to Publish entered on April 28, 2015, in the action entitled *U.S. Bank Trust, N.A., as Trustee for LSF9 Master Participation Trust v. Dallas O. Wilson, Jr. et al.*, by the Maine District Court, Division of Bangor, Docket No. RE-13-87, wherein the Court adjudged the foreclosure of a mortgage granted by Dallas O. Wilson, Jr. to Mortgage Electronic Registration Systems, Inc. solely as nominee for United Wholesale Mortgage, its successors and/or assigns dated October 22, 2010 and recorded in the Penobscot County Registry of Deeds in Book 12298, Page 256, should the period of redemption have expired without redemption of the property by the mortgagor(s), a public sale of the property described in the mortgage will be conducted on

June 24, 2015 commencing at 12:00 Noon
at 45 Court Street, Houlton, Maine

The property is located at 9 Tannery Road, Orrington, Penobscot County, Maine, reference as described in said mortgage.

The sale will be by public auction. All bidders for the property will be required to make a deposit of $5,000.00 in cash, certified or bank check at the time of the public sale made payable to Shechtman Halperin Savage, LLP, which deposit is non-refundable as to the highest bidder. The balance of the purchase price shall be paid within thirty (30) days of the public sale. In the event a representative of U.S. Bank Trust, N.A., as Trustee for LSF9 Master Participation Trust is not present at the time and place stated in this notice, no sale shall be deemed to have occurred and all rights to reschedule a subsequent sale are reserved.

Additional terms will be announced at the public sale.

U.S. Bank Trust, N.A., as Trustee for LSF9 Master
Participation Trust ,
by its attorneys, Shechtman Halperin Savage, LLP
Jennifer L. Maynard, Esq.
James M. Garnet, Esq.
1080 Main Street, Pawtucket, RI 02860.
(401) 272-1400.

May 22,29 and June 5, 2015

APPENDIX A-6

PUBLIC NOTICE OF INTENT TO FILE APPLICATION

PUBLIC NOTICE OF INTENT TO FILE

Please take notice that the Bureau of General Services ("BGS"), c/o Department of Economic and Community Development, State House Station #59, Augusta, Maine 04333-0059 (tel. 207-624-7436), as owner, and NEWSME Landfill Operations, LLC ("NEWSME"), 358 Emerson Mill Road, Hampden, Maine 04444 (tel. 207 862-4200), as operator, are intending to file the following applications with the Maine Department of Environmental Protection (DEP) on or about July 20, 2015: (1) a Solid Waste Facility License Application pursuant to Maine's Waste Management Act, 38 M.R.S. §§ 1301 et seq., and regulations promulgated thereunder, and (2) a Tier 3 wetlands alteration application pursuant to Maine's Natural Resources Protection Act ("NRPA"), 38 M.R.S. §§ 480-A-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's Chapter 2 Rules Concerning the Processing of Applications.

The applications are for an expansion of the Juniper Ridge Landfill located in Old Town, Maine on BGS-owned land and for filling approximately 2.04 acres of wetland 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 Department's Augusta office, during normal working hours. A copy of the applications and supporting documentation may also be seen at the municipal offices in Old Town and Alton, Maine and at the Penobscot Indian Nation.

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.

{

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 Michael Parker at (Michael.T.Parker@maine.gov) or by regular mail to: Maine Department of Environmental Protection, Solid Waste Program, 17 State House Station, Augusta, Maine 04333-0017, Tel: (207-287-2851 or 1-800-452-1942). Send all correspondence pertaining to the NRPA application by email to Lynn Caron at (lynn.a.caron@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 or 1-888-769-1137).

July 9, 2015

{

Legal Notices

PUBLIC NOTICE OF INTENT TO FILE

Please take notice that the Bureau of General Services ("BGS"), c/o Department of Economic and Community Development, State House Station #59, Augusta, Maine 04333-0059 (tel. 207-624-7436), as owner, and NEWSME Landfill Operations, LLC ("NEWSME"), 358 Emerson Mill Road, Hampden, Maine 04444 (tel. 207 862-4200), as operator, are intending to file the following applications with the Maine Department of Environmental Protection (DEP) on or about July 20, 2015: (1) a Solid Waste Facility License Application pursuant to Maine's Waste Management Act, 38 M.R.S. §§ 1301 et seq., and regulations promulgated thereunder, and (2) a Tier 3 wetlands alteration application pursuant to Maine's Natural Resources Protection Act ("NRPA"), 38 M.R.S. §§ 480-A-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's Chapter 2 Rules Concerning the Processing of Applications.

The applications are for an expansion of the Juniper Ridge Landfill located in Old Town, Maine on BGS-owned land and for filling approximately 2.04 acres of wetland 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.

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July 9, 2015

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Alton, ME 04468

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Charles Tringale III
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Jesse Pekkala
PO Box 471
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Karl Held
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Dallas, GA 30132

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To:

Robyn Emmons
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Old Town, ME 04468

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PO Box 85A 4 Blanchard Road
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To:

New England Waste Services of Maine
358 Emerson Mill Road
Hampden, ME 04444

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From:

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To:

Gregg P. and Evlynn Wallace
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Old Town, ME 04468

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To:

Herbert A. Robertson, Jr.
163 Clewleyville Road
Eddington, ME 04428

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Sevee & Maher Engineers, Inc.
PO Box 85A 4 Blanchard Road
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To:

United Cerebral Palsy
700 Mount Hope Avenue
Suite 320
Bangor, ME 04401

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From:

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PO Box 85A 4 Blanchard Road
Cumberland, ME 04021

To:

Angela D. Cyr
449 West Old Town Road
Old Town, ME 04468

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Sevee & Maher Engineers, Inc.
PO Box 85A 4 Blanchard Road
Cumberland, ME 04021

To:

NEWSME Landfill Operations LLC
282 Bennoch Road
Alton, ME 04468

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To:

Scott E. Bergquist
474 South 2550 West
Springville, UT 84663

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Sevee & Maher Engineers, Inc.
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To:

University of Maine System
107 Maine Avenue
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Sevee & Maher Engineers, Inc.
PO Box 85A 4 Blanchard Road
Cumberland, ME 04021

To:

Raymond A. Perkins
55 Old Brooklyn Turnpike
Windham, CT 06280

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To:

Lawrence Steeves Heirs
216 Sycamore Street
Holbrook, MA 02343

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To:

Robert W. and Wendy Hall
631 West Old Town Road
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AMOUNT
$1.35
00089600-05

UNITED STATES POSTAL SERVICE®

Certificate of Mailing

This Certificate of Mailing provides evidence that mail has been presented to USPS® for mailing.
This form may be used for domestic and international mail.

From:

Sevee & Maher Engineers, Inc.
PO Box 85A 4 Blanchard Road
Cumberland, ME 04021

To:

Thomas Dunn and Karen Bertolino
579 West Old Town Road
Old Town, ME 04468

PS Form **3817**, April 2007 PSN 7530-02-000-9065

U.S. POSTAGE
PAID
CUMBERLAND CENT,ME
04021
JUL 09, 15
AMOUNT
$1.35
00089600-05

UNITED STATES POSTAL SERVICE

1000

UNITED STATES POSTAL SERVICE®

Certificate Of Mailing

This Certificate of Mailing provides evidence that mail has been presented to USPS® for mailing.
This form may be used for domestic and international mail.

From:

Sevee & Maher Engineers, Inc.
PO Box 85A 4 Blanchard Road
Cumberland, ME 04021

To:

Laurent J. and Barbara L. Beauregard
273 Washington Street
Brewer, ME 04412

PS Form **3817**, April 2007 PSN 7530-02-000-9065

U.S. POSTAGE
PAID
CUMBERLAND CENT,ME
04021
JUL 09, 15
AMOUNT
$1.35
00089600-05

UNITED STATES POSTAL SERVICE

1000

UNITED STATES POSTAL SERVICE®

Certificate of Mailing

This Certificate of Mailing provides evidence that mail has been presented to USPS® for mail
This form may be used for domestic and international mail.

From:

Sevee & Maher Engineers, Inc.
PO Box 85A 4 Blanchard Rd.
Cumberland, ME 04021

ME - USPS - 04021
JUL 17 2015
CUMBERLAND CENTER

To:

Ruth Dalton
206 Old Stagecoach Road
Alton, ME 04468

PS Form **3817**, April 2007 PSN 7530-02-000-9065

UNITED STATES POSTAL SERVICE
1000
U.S. POSTAGE
PAID
CUMBERLAND CENT,ME
04021
JUL 17, 15
AMOUNT
$1.35
00089600-03

UNITED STATES POSTAL SERVICE®

Certificate of Mailing

This Certificate of Mailing provides evidence that mail has been presented to USPS® for mailing.
This form may be used for domestic and international mail.

From:

Sevee & Maher Engineers, Inc.
PO Box 85A 4 Blanchard Rd.
Cumberland, ME 04021

ME - USPS - 04021
JUL 17 2015
CUMBERLAND CENTER

To:

Mary St. Louis/Cynthia and Anthony Brown
P.O. Box 394
Stillwater, ME 04489

PS Form **3817**, April 2007 PSN 7530-02-000-9065

U.S. POSTAGE
PAID
CUMBERLAND CENT,ME
04021
JUL 17, 15
AMOUNT
$1.35
00089600-03
UNITED STATES POSTAL SERVICE
1000

7012 1010 0002 1040 7154

U.S. Postal Service™
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For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
Total Postage & Fees	$ $0.49 $3.94	07/09/2015

CUMBERLAND CENTER ME JUL 09 2015 USPS

Sent To
Chuck Leithiser
Street, Apt. No.; or PO Box No.
394 Fourth Street
City, State, ZIP+4
Old Town, ME 04468

PS Form 3800, August 2006 — See Reverse for Instructions

7012 1010 0002 1040 7185

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
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For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
Total Postage & Fees	$ $0.49 $3.94	07/09/2015

CUMBERLAND CENTER ME 04021 JUL 09 2015 USPS

Sent To
Peter Dufour
Street, Apt. No.; or PO Box No.
230 West Old Town Road
City, State, ZIP+4
Old Town, ME 04468

PS Form 3800, August 2006 — See Reverse for Instructions

7012 1010 0002 1040 7130

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
Total Postage & Fees	$ $0.49 $3.94	07/09/2015

CUMBERLAND CENTER ME 04021 JUL 09 2015 USPS

Sent To
Ralph Leonard
Street, Apt. No.; or PO Box No.
96 Sargent Drive
City, State, ZIP+4
Old Town, ME 04468

PS Form 3800, August 2006 — See Reverse for Instructions

7012 1010 0002 1040 7123

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
Total Postage & Fees	$ $0.49 $3.94	07/09/2015

CUMBERLAND CENTER ME 04021 JUL 09 2015 USPS

Sent To
Clyde Grant
Street, Apt. No.; or PO Box No.
181 Oak Street
City, State, ZIP+4
Old Town, ME 04468

PS Form 3800, August 2006 — See Reverse for Instructions

7012 1010 0002 1040 7147

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
Total Postage & Fees	$ $0.49 $3.94	07/09/2015

CUMBERLAND CENTER ME 04021 JUL 09 2015 USPS

Sent To
Ted Shina
Street, Apt. No.; or PO Box No.
769 West Old Town Road
City, State, ZIP+4
Old Town, ME 04468

PS Form 3800, August 2006 — See Reverse for Instructions

7012 1010 0002 1040 7161

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
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For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
Total Postage & Fees	$ $0.49 $3.94	07/09/2015

CUMBERLAND CENTER ME 04021 JUL 09 2015 USPS

Sent To
Bill Mayo City Manager
City of Old Town
Street, Apt. No.; or PO Box No.
265 Main Street
City, State, ZIP+4
Old Town, ME 04468

PS Form 3800, August 2006 — See Reverse for Instructions

7012 1010 0002 1040 7178

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
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For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
	$0.49	07/09/2015
Total Postage & Fees	$ $3.94	

CUMBERLAND CENTER ME 04021 JUL 09 2015 USPS

Sent To
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

David Russell
City of Old Town
265 Main Street
Old Town, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

7012 1010 0002 1040 7093

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
	$0.49	07/09/2015
Total Postage & Fees	$ $3.94	

CUMBERLAND CENTER ME 04021 JUL 09 2015 USPS

Sent To
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

Bill Thompson Chair
Landfill Advisory Committee
12 Wabanaki Way
Indian Island, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

7012 1010 0002 1040 7109

U.S. Postal Service™
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For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
	$0.49	07/09/2015
Total Postage & Fees	$ $3.94	

CUMBERLAND CENTER ME 04021 JUL 09 2015 USPS

Sent To
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

Dana Snowman
120 Old Stagecoach Road
Alton, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

7012 1010 0002 1040 7116

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
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For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
	$0.49	07/09/2015
Total Postage & Fees	$ $3.94	

Sent To
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

Laura Sanborn
2845 Bennoch Road
Alton, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

7012 1010 0002 1040 7086

U.S. Postal Service™
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For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	JUL 09 2015
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
Total Postage & Fees	$ $0.49 $3.94	07/09/2015

CUMBERLAND CENTER ME 04021 USPS

Sent To
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

City of Old Town
265 Main Street
Old Town, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

7012 1010 0002 1040 7079

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	JUL 09 2015
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
Total Postage & Fees	$ $0.49 $3.94	07/09/2015

CUMBERLAND CENTER ME 04021 USPS

Sent To
Street, Apt. No.; or PO Box No.
City, State, ZIP+4

Town of Alton
3352 Bennoch Road
Alton, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

7012 1010 0002 1040 7215

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OLD TOWN ME 04468 OFFICIAL USE

Postage	$ $3.45	0021
Certified Fee	$0.00	05 Postmark Here
Return Receipt Fee (Endorsement Required)	$0.00 $0.00	JUL 09 2015
Restricted Delivery Fee (Endorsement Required)	N/A N/A	
Total Postage & Fees	$ $0.49 $3.94	07/09/2015

CUMBERLAND CENTER ME 04021 USPS

Sent To Penobscot Indian Nation
Street, Apt. No.; or PO Box No. 12 Wabanaki Way
City, State, ZIP+4 Indian Island, ME 04468

PS Form 3800, August 2006 See Reverse for Instructions

INDIAN ISLAND ME 04468-1254 Zone-2 $0.48
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407093
*** Return Receipt (Electronic) $1.40
Use label # 70121010000210407093 for inquiry on Return Receipt (Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

ALTON ME 04468-4333 Zone-2 $0.48
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407109
*** Return Receipt (Electronic) $1.40
Use label # 70121010000210407109 for inquiry on Return Receipt (Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

ALTON ME 04468-4200 Zone-2 $0.48
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407116
*** Return Receipt (Electronic) $1.40
Use label # 70121010000210407116 for inquiry on Return Receipt (Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

OLD TOWN ME 04468-1632 Zone-2 $0.48
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407123
*** Return Receipt (Electronic) $1.40
Use label # 70121010000210407123 for inquiry on Return Receipt (Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

CUMBERLAND CENTER MPO
CUMBERLAND CENTER, Maine
040219998
2269030021-0099
07/09/2015 (207)829-3661 01:30:27 PM

Sales Receipt

Product Description	Sale Qty	Unit Price	Final Price

INDIAN ISLAND ME 04468-1254 Zone-2 $0.48
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407215
*** Return Receipt (Electronic) $1.40
Use label # 70121010000210407215 for inquiry on Return Receipt (Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

ALTON ME 04468-4224 Zone-2 $0.48
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407079
*** Return Receipt (Electronic) $1.40
Use label # 70121010000210407079 for inquiry on Return Receipt (Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

OLD TOWN ME 04468-1530 Zone-2 $0.48
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407086
*** Return Receipt (Electronic) $1.40
Use label # 70121010000210407086 for inquiry on Return Receipt (Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

OLD TOWN ME 04468-1236 $0.48
Zone-2
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407130
*** Return Receipt $1.40
(Electronic)
Use label # 70121010000210407130
for inquiry on Return Receipt
(Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

OLD TOWN ME 04468-5717 $0.48
Zone-2
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407147
*** Return Receipt $1.40
(Electronic)
Use label # 70121010000210407147
for inquiry on Return Receipt
(Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

OLD TOWN ME 04468-1652 $0.48
Zone-2
First-Class Mail Letter
0.60 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407154
*** Return Receipt $1.40
(Electronic)
Use label # 70121010000210407154
for inquiry on Return Receipt
(Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

OLD TOWN ME 04468-1530 $0.48
Zone-2
First-Class Mail Letter
0.60 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407161
*** Return Receipt $1.40
(Electronic)
Use label # 70121010000210407161
for inquiry on Return Receipt
(Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

OLD TOWN ME 04468-1530 $0.48
Zone-2
First-Class Mail Letter
0.50 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407178
*** Return Receipt $1.40
(Electronic)
Use label # 70121010000210407178
for inquiry on Return Receipt
(Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

OLD TOWN ME 04468-5704 $0.48
Zone-2
First-Class Mail Letter
0.60 oz.
Expected Delivery: Sat 07/11/15
@@ Certified Mail $3.45
USPS Certified Mail #:
70121010000210407185
*** Return Receipt $1.40
(Electronic)
Use label # 70121010000210407185
for inquiry on Return Receipt
(Electronic).
Customer Postage -$3.94
Subtotal: $1.39
========
Issue Postage: $1.39

Total: $18.07

UNITED STATES
POSTAL SERVICE

Date: July 14, 2015

Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407079. The delivery record shows that this item was delivered on July 14, 2015 at 12:03 pm in OLD TOWN, ME 04468. There is no delivery signature on file for this item.

Thank you for selecting the Postal Service for your mailing needs. If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

UNITED STATES POSTAL SERVICE

Date: July 13, 2015

Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407086. The delivery record shows that this item was delivered on July 13, 2015 at 12:24 pm in OLD TOWN, ME 04468. There is no delivery signature on file for this item.

Thank you for selecting the Postal Service for your mailing needs. If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

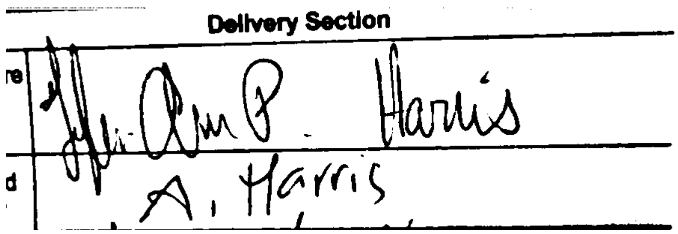
UNITED STATES POSTAL SERVICE

Date: July 13, 2015

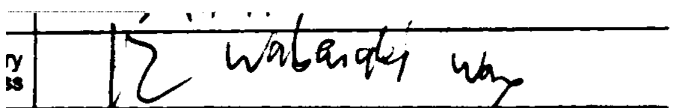
Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407093. The delivery record shows that this item was delivered on July 13, 2015 at 12:55 pm in OLD TOWN, ME 04468. The scanned image of the recipient information is provided below.

Signature of Recipient :



Address of Recipient :



Thank you for selecting the Postal Service for your mailing needs.

If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

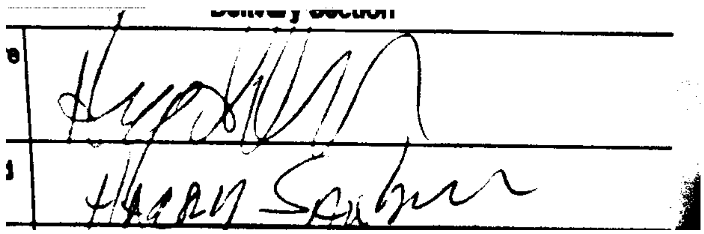
UNITED STATES
POSTAL SERVICE

Date: July 11, 2015

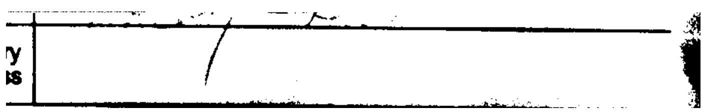
Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407116. The delivery record shows that this item was delivered on July 11, 2015 at 10:52 am in OLD TOWN, ME 04468. The scanned image of the recipient information is provided below.

Signature of Recipient :



Address of Recipient :



Thank you for selecting the Postal Service for your mailing needs.

If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

Date: July 11, 2015

Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407123. The delivery record shows that this item was delivered on July 11, 2015 at 11:14 am in OLD TOWN, ME 04468. There is no delivery signature on file for this item.

Thank you for selecting the Postal Service for your mailing needs. If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

UNITED STATES
POSTAL SERVICE

Date: July 11, 2015

Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407130. The delivery record shows that this item was delivered on July 11, 2015 at 12:31 pm in OLD TOWN, ME 04468. There is no delivery signature on file for this item.

Thank you for selecting the Postal Service for your mailing needs. If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

Date: July 11, 2015

Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407147. The delivery record shows that this item was delivered on July 11, 2015 at 12:58 pm in OLD TOWN, ME 04468. There is no delivery signature on file for this item.

Thank you for selecting the Postal Service for your mailing needs. If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

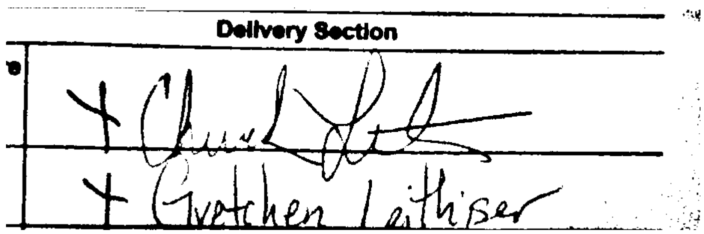
UNITED STATES POSTAL SERVICE

Date: July 11, 2015

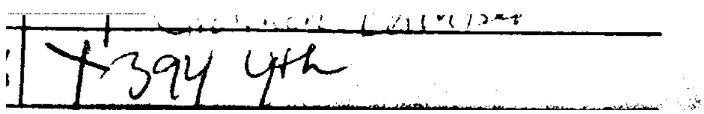
Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407154. The delivery record shows that this item was delivered on July 11, 2015 at 9:01 am in OLD TOWN, ME 04468. The scanned image of the recipient information is provided below.

Signature of Recipient :



Address of Recipient :



Thank you for selecting the Postal Service for your mailing needs.

If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

UNITED STATES POSTAL SERVICE

Date: July 13, 2015

Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407161. The delivery record shows that this item was delivered on July 13, 2015 at 12:24 pm in OLD TOWN, ME 04468. There is no delivery signature on file for this item.

Thank you for selecting the Postal Service for your mailing needs. If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

UNITED STATES POSTAL SERVICE

Date: July 13, 2015

Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407178. The delivery record shows that this item was delivered on July 13, 2015 at 12:24 pm in OLD TOWN, ME 04468. There is no delivery signature on file for this item.

Thank you for selecting the Postal Service for your mailing needs. If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

Date: July 11, 2015

Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407185. The delivery record shows that this item was delivered on July 11, 2015 at 1:30 pm in OLD TOWN, ME 04468. There is no delivery signature on file for this item.

Thank you for selecting the Postal Service for your mailing needs. If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

UNITED STATES POSTAL SERVICE

Date: July 13, 2015

Sevee and Maher:

The following is in response to your July 9, 2015 request for delivery information on your Certified Mail™ item number 70121010000210407215. The delivery record shows that this item was delivered on July 13, 2015 at 12:55 pm in OLD TOWN, ME 04468. There is no delivery signature on file for this item.

Thank you for selecting the Postal Service for your mailing needs. If you require additional assistance, please contact your local Post Office or postal representative.

Sincerely,
United States Postal Service

Aaron Smith

From: 942047 <info@generalcourier.com>
Sent: Monday, July 20, 2015 1:53 PM
To: Aaron Smith
Subject: Delivery Notification for Order 942047

Order 942047 was delivered at 07/20/15 1:53 PM.
Signed for by: Dee Love

Order placed by: Fax

Origin

Sevee & Maher
4 Blanchard Rd
Cumberland ME 04021

Destination

Penobscot Indian Nation
12 Wabanaki Way
Old Town ME 04468

Details

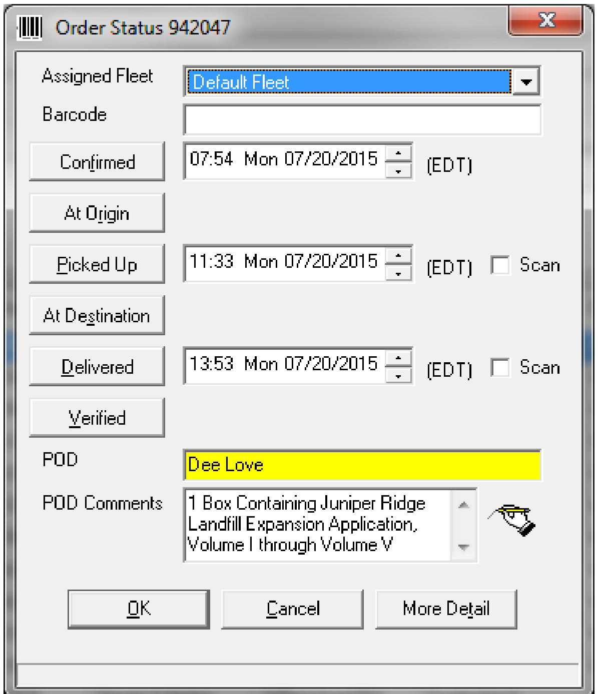
Pieces:
Weight:
Reference1: 2nd stop charge near oldtown
Reference2: pring higher due to deadline
Ready for pickup: 07/20/15 7:52 AM
Due: 07/20/15 8:47 AM

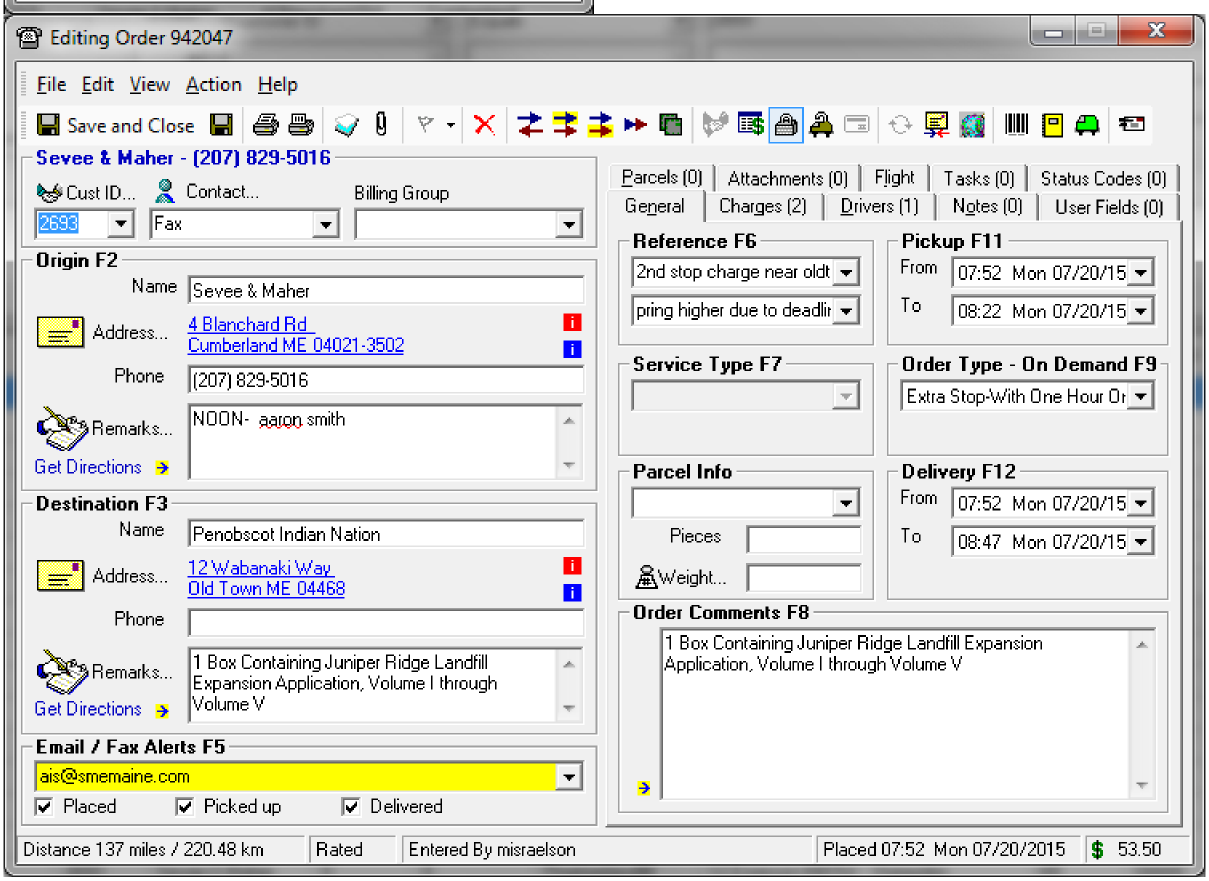
Please contact us at info@generalcourier.com or

Call 1-800-698-5035 or 767-6004 if you have any questions.

Aaron Smith

From: Mike Israelson <MIsraelson@generalcourier.com>
Sent: Tuesday, July 21, 2015 8:15 AM
To: Aaron Smith
Subject: Gc ticket





Aaron Smith

From: 942046 <info@generalcourier.com>
Sent: Monday, July 20, 2015 2:04 PM
To: Aaron Smith
Subject: Delivery Notification for Order 942046

Order 942046 was delivered at 07/20/15 2:03 PM.
Signed for by: K Dunton

Order placed by: Fax

Origin

Sevee & Maher
4 Blanchard Rd
Cumberland ME 04021

Destination

City Of Old Town
265 Main St
Old Town ME 04468

Details

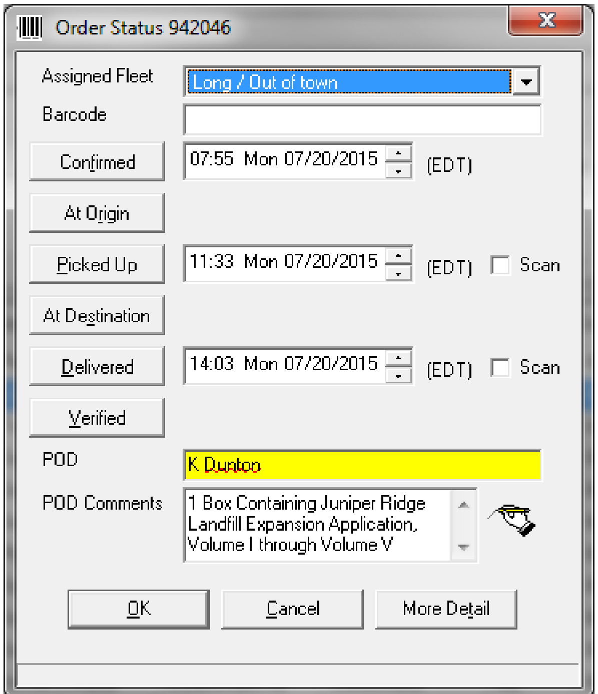
Pieces:
Weight:
Reference1:
Reference2: pring higher due to deadline Ready for pickup: 07/20/15 7:52 AM
Due: 07/20/15 9:52 AM

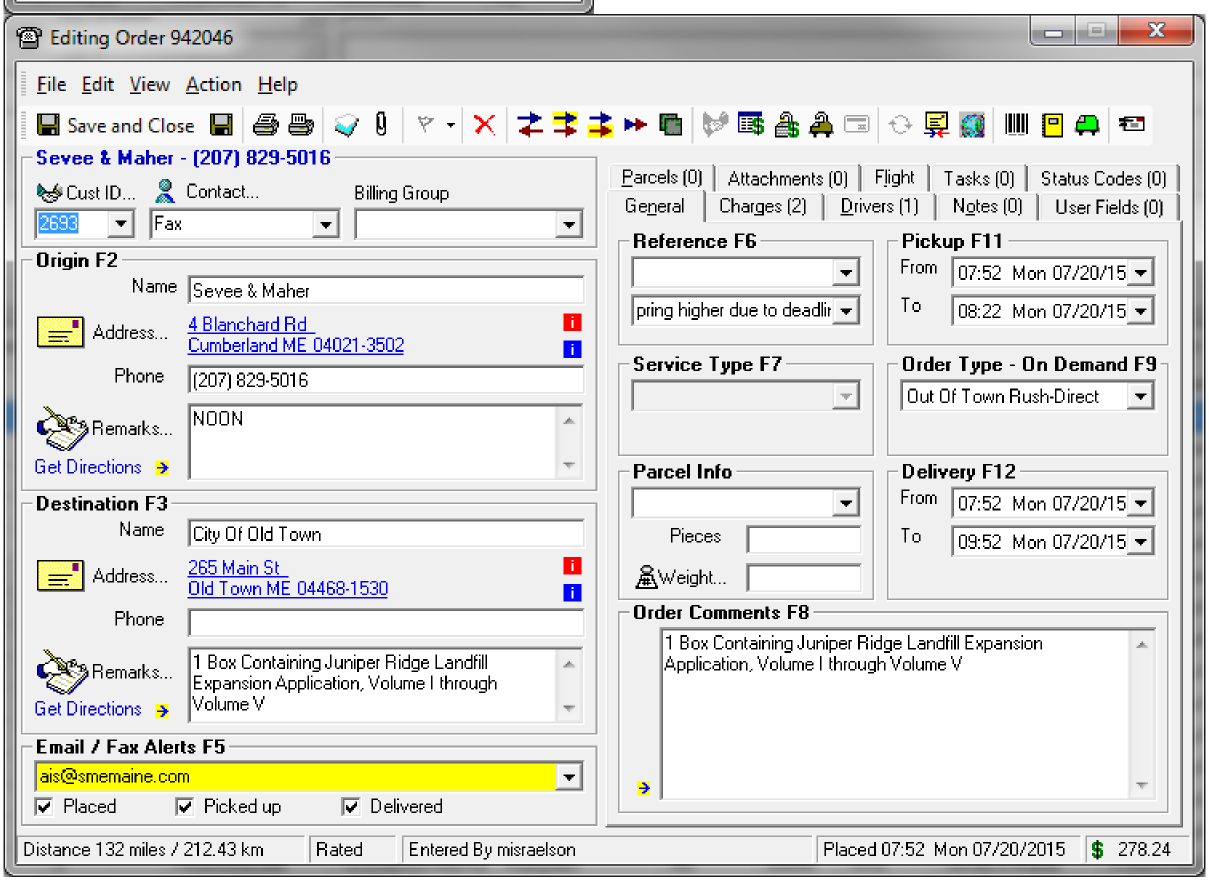
Please contact us at info@generalcourier.com or

Call 1-800-698-5035 or 767-6004 if you have any questions.

Aaron Smith

From: Mike Israelson <MIsraelson@generalcourier.com>
Sent: Tuesday, July 21, 2015 8:16 AM
To: Aaron Smith
Subject: More job tickets





Aaron Smith

From: 942045 <info@generalcourier.com>
Sent: Tuesday, July 21, 2015 9:30 AM
To: Aaron Smith
Subject: Delivery Notification for Order 942045

Order 942045 was delivered at 07/21/15 9:29 AM.
Signed for by: Paulette Borja

Order placed by: Fax

Origin

Sevee & Maher
4 Blanchard Rd
Cumberland ME 04021

Destination

Town Of Alton
3352 Bennoch Rd
Alton ME 04468

Details

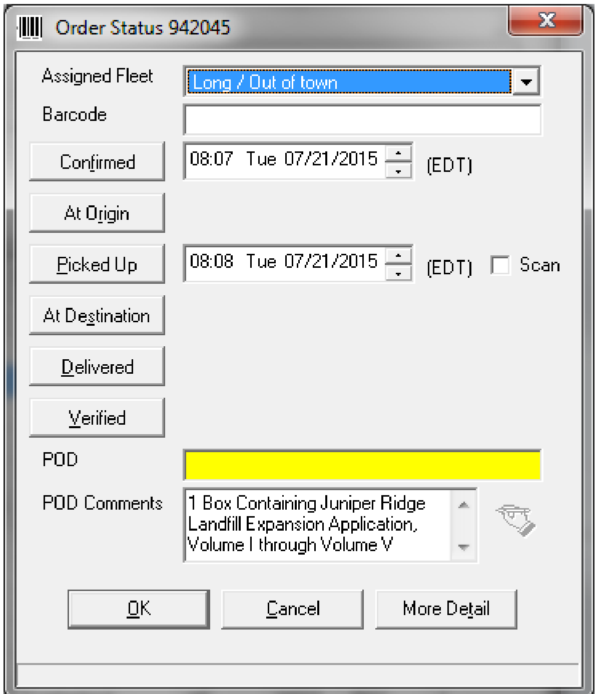
Pieces:
Weight:
Reference1:
Reference2: pring higher due to deadline Ready for pickup: 07/20/15 7:50 AM
Due: 07/21/15 5:50 PM

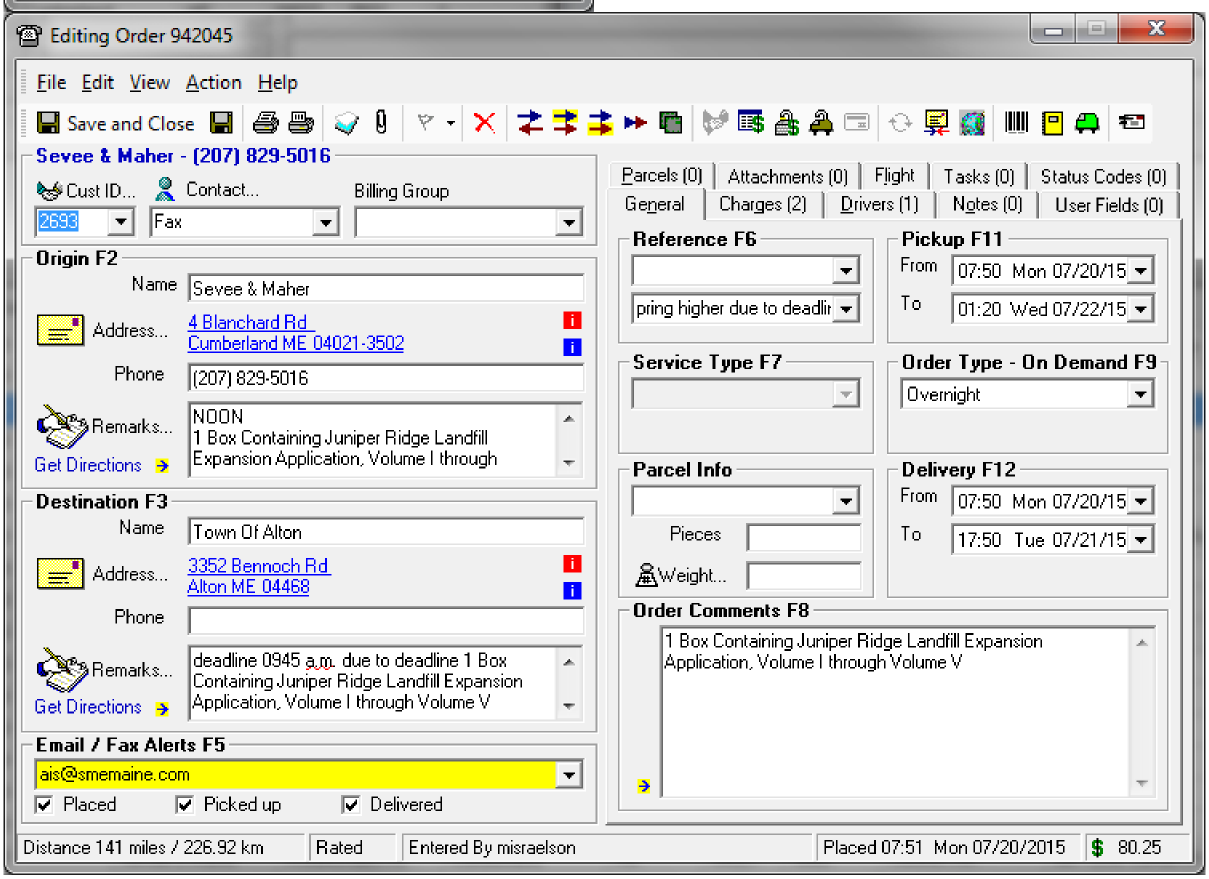
Please contact us at info@generalcourier.com or

Call 1-800-698-5035 or 767-6004 if you have any questions.

Aaron Smith

From: Mike Israelson <MIsraelson@generalcourier.com>
Sent: Tuesday, July 21, 2015 8:17 AM
To: Aaron Smith
Subject: Job ticket





APPENDIX A-7

CERTIFICATE OF GOOD CORPORATE STANDING, AND AGENT AUTHORIZATION

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 reports of formation, amendment and cancellation of articles of organization 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 articles of organization 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 twenty-third day of June 2015.

Matthew Dunlap
Secretary of State

STATE OF MAINE
DEPARTMENT OF ADMINISTRATIVE & FINANCIAL SERVICES
BUREAU OF GENERAL SERVICES
BURTON M. CROSS BUILDING
4TH FLOOR, 77 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0077

PAUL R. LEPAGE
GOVERNOR

H. SAWIN MILLETT, JR
COMMISSIONER

DONALD L. McCORMACK
DIRECTOR

August 24, 2012

Ms. Cynthia W. Darling
Division of Solid Waste Management
Bureau of Remediation and Waste Management
Maine Department of Environmental Protection
106 Hogan Road
Bangor, Maine 04401

Re: Applications related to the Juniper Ridge Landfill

Dear Ms. Darling:

Please accept this letter as authorization for the Maine Department of Environmental Protection (the "Department") to accept NEWSME Landfill Operations, LLC, as the agent for the Bureau of General Services with regard to all applications submitted to the Department related to the Juniper Ridge Landfill. The contact at NEWSME is Don Meagher, whose home number is 207-862-4200 ext. 230 and mailing address is Pine Tree & Juniper Ridge Landfills, Casella Waste Systems, 358 Emerson Mill Road, Hampden, Maine 04444.

Please call 207-624-7314 if you have any questions regarding this letter.

Sincerely,

Donald L. McCormack, Director
Bureau of General Services

PHONE: (207) 624-7314 E-mail Donald.McCormack@Maine.gov FAX: (207) 287-4039

STATE OF MAINE
DEPARTMENT OF ADMINISTRATIVE & FINANCIAL SERVICES
BUREAU OF GENERAL SERVICES
BURTON M. CROSS BUILDING
4TH FLOOR, 77 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0077

PAUL R. LEPAGE
GOVERNOR

RICHARD W. ROSEN
COMMISSIONER

EDWARD A. DAHL
DIRECTOR

June 19, 2015

Michael Parker, Project Manager
Division of Solid Waste Management
Bureau of Remediation and Waste Management
Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

Re: Juniper Ridge Landfill Expansion Application

Dear Michael:

The Bureau of General Services ("BGS"), as owner, and NEWSME Landfill Operations, LLC ("NEWSME"), as operator, are co-applicants for the Juniper Ridge Landfill ("JRL") expansion application. The August 24, 2012 letter (attached) from Bureau of General Services ("BGS"), specifying NEWSME Landfill Operations, LLC ("NEWSME") as agent for BGS, still applies.

Under Section 4 of the Operating Services Agreement ("OSA") between Casella and the State, Casella (operating JRL through NEWSME) is responsible for preparing the JRL expansion application. In doing so, NEWSME has utilized Sevee and Maher Engineers ("SME") as its principal consultant. NEWSME will continue to use SME during the expansion application review process.

SME has engaged sub-consultants to conduct studies and prepare reports which are included in the expansion application:

- Traffic: Gorrill Palmer Associates.
- Visual: SMRT.
- Noise: Epsilon Associates, Inc.
- Landfill Gas: Sanborn Head Associates.
- Wetlands, vernal pools and wildlife: Stantec.

Please accept this letter as authorization for the Maine Department of Environmental Protection (the "Department") to accept SME and the sub-consultants listed above as agents for the Bureau of General Services ("BGS") and NEWSME Landfill Operations, LLC ("NEWSME"), with regard to the Juniper Ridge Landfill expansion application. The contact for BGS is Michael Barden, Department of Economic and Community Development, State House Station #59, Augusta, Maine 04333-0059 (tel. 207-624-7436). The contact for NEWSME is Donald Meagher, 358 Emerson Mill Road, Hampden, Maine 04444 (tel. 207 862-4200).

Sincerely,

Edward A. Dahl

Edward A. Dahl, Director
Bureau of General Services

Brian Oliver
NEWSME Landfill Operations, LLC

APPENDIX A-8

PUBLIC BENEFIT DEPARTMENT ORDER

Copy - Sevee & Maher Engineers

RECEIVED FEB 03 2012

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

DEPARTMENT ORDER

IN THE MATTER OF

STATE OF MAINE, ACTING THROUGH THE	)	PUBLIC BENEFIT
STATE PLANNING OFFICE	)	DETERMINATION
OLD TOWN, PENOBSCOT COUNTY, MAINE	)	
JUNIPER RIDGE LANDFILL EXPANSION	)	
#S-020700-W5-AU-N	)	PARTIAL APPROVAL
(APPROVAL WITH CONDITIONS)	)	

Pursuant to the provisions of the *Maine Hazardous Waste, Septage and Solid Waste Management Act,* 38 M.R.S.A. §§1301 to 1319-Y; and the *Solid Waste Management Rules: General Provisions,* 06-096 CMR 400 (last amended July 20, 2010) and *Landfill Siting, Design and Operation*, 06-096 CMR 401 (last amended July 20, 2010), the Commissioner of the Department of Environmental Protection ("Department") has considered the application of THE STATE OF MAINE, ACTING THROUGH THE STATE PLANNING OFFICE ("SPO") with its supportive data, staff review comments, and other related materials on file and FINDS THE FOLLOWING FACTS:

1. APPLICATION SUMMARY

A. Application: The applicant has applied for a determination of public benefit for the proposed Juniper Ridge Landfill Expansion ("the expansion"), located in Old Town, Maine. The expansion is proposed to accept the same waste types as are currently disposed in the Juniper Ridge Landfill: special wastes, construction and demolition debris ("CDD"), miscellaneous non-special wastes, and municipal solid waste ("MSW") bypass from Maine's 4 MSW incinerators. The expansion is proposed to provide 21.9 million cubic yards of additional capacity at the facility. SPO states that the expansion will provide capacity for approximately 20 years based on disposal needs projected in the latest *State of Maine Waste Management and Recycling Plan* dated January 2009 ("State Plan") and the *Solid Waste Generation and Disposal Capacity Report for Calendar Year 2009*, dated January 2011 ("Capacity Report"), both prepared by SPO. To allow for the Department's periodic review of an affirmative determination of public benefit, the applicant divided the proposed expansion into 3 phases.

B. History: On October 21, 2003, the Department issued conditional approval for the transfer of licenses for the West Old Town Landfill, developed and operated by Georgia-Pacific Corporation, to the SPO (Department licenses #S-020700-

WR-M-T and #L-019015-TH-C-T); the transfer became effective when the sale of the landfill to SPO occurred on February 5, 2004. On February 5, 2004, SPO also finalized an Operating Services Agreement ("OSA") with Casella Waste Systems, Inc. ("Casella"), for the operation of the WOTL. On April 9, 2004, the Department approved the amendment application (Department license #S-020700-WD-N-A) for a vertical increase in the final elevation of the landfill and the disposal of additional waste streams ("the amendment license"). The West Old Town Landfill is now known as the Juniper Ridge Landfill. Solid waste is currently disposed in cells 6 and 7 of the landfill; cells 8 through 11 will be constructed and operated in the future.

On November 19, 2009, SPO filed an application for a determination of public benefit for the same capacity requested in this application. On January 5, 2010, the Department issued a draft denial of that application. On January 13, 2010, the applicant withdrew the application prior to finalization of the denial decision.

2. APPLICABLE LAW

The applicable law for a determination of substantial public benefit is 38 M.R.S.A. §1310-AA, which establishes the process and standards to be used in determining whether proposed new solid waste disposal capacity provides a substantial public benefit. In the first regular session of the 124th Legislature, 38 M.R.S.A. §1310-AA was amended to extend applicability to new state-owned facilities or expansions to existing state-owned facilities.

38 M.R.S.A. §1310-AA(3) reads as follows:

Standards for determination. The commissioner shall find that the proposed facility under subsection 1 or the acceptance of waste that is not generated within the State under subsection 1-A provides a substantial public benefit if the applicant demonstrates to the commissioner that the proposed facility or the acceptance of waste that is not generated within the State:

A. Meets immediate, short-term or long-term capacity needs of the State;

B. Except for expansion of a commercial solid waste disposal facility that accepts only special waste for landfilling, is consistent with the state waste management and recycling plan;

C. Is not inconsistent with local, regional or state waste collection, storage, transportation, processing or disposal; and

D. For a determination of public benefit under subsection 1-A only, facilitates the operation of a solid waste disposal facility and the operation of that solid waste disposal facility would be precluded or significantly impaired if the waste is not accepted.

The law further provides that "[i]n making the determination of whether the facility under subsection 1 or the acceptance of waste that is not generated within the State under subsection 1-A provides a substantial public benefit, the commissioner shall consider the state plan, written information submitted in support of the application and any other written information the commissioner considers relevant." [1]

3. PUBLIC PARTICIPATION

As provided in 38 M.R.S.A. § 1310-AA, the Department accepted written public comments on the application for at least 20 days following receipt of the complete application on September 15, 2011. The Department received numerous comments on the application, both orally and in writing. Those that commented in opposition to the application primarily focused on the following issues: the need for an "audit" of solid wastes handled by Casella at its Maine facilities, the source and types of wastes disposed at Juniper Ridge Landfill, the acceptance of excess residuals from the processing of CDD known as "fines", the lack of a statutory or regulatory definition of "immediate", "short-term" or "long-term" capacity, and the effect legislative decisions on several solid waste legislative documents ("LDs") held over from the last legislative session may have on the State's solid waste disposal capacity needs and operation of the Juniper Ridge Landfill. Those that commented in support of the application primarily focused on the following issues: the need businesses and municipalities in Maine have for predictable and reliable long-term landfill capacity for their solid wastes that cannot be handled other than in landfills, the commentors' knowledge of the operation of Juniper Ridge Landfill, and the business expertise and reputation of Casella. Also, some comments were neither for nor against the project; these commentors' provided questions about the project and

[1] 38 M.R.S.A. §1310-AA(2)

recommendations for changes to the existing operation or licenses for Juniper Ridge Landfill.

The Commissioner concluded that a public informational meeting would be held on the application, and notice of the meeting was provided to interested parties. On October 24, 2011, in accordance with the above statute, the Department held a public informational meeting on the application in the vicinity of the proposed project. The meeting was recorded, and an audio tape of the meeting is also part of the project record.

Comments received that pertained to the determination of public benefit criteria provided in Finding of Fact #2, above, are addressed throughout this determination.

4. DESCRIPTION OF SPO/CASELLA RELATIONSHIP

As described in Finding of Fact #1.B., above, the SPO is the owner of the Juniper Ridge Landfill and the proposed expansion, and is the applicant for this application. Casella is the long-term operator of the landfill. Actual operations are by NEWSME Landfill Operations LLC ("NEWSME"), a company in which a Casella subsidiary holds the sole membership interest. The terms and conditions of NEWSME Operations' operation of the landfill are established by the OSA between SPO and Casella, dated February 5, 2004, and amended on July 24, 2006 and November 2, 2006.

While SPO retains ownership of the landfill, in accordance with the Resolve 2003, Chapter 93 and the OSA, Casella/NEWSME Operations 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/NEWSME Operations is required by the OSA to establish and maintain financial assurance for the landfill and the expansion sufficient to meet the closure and post-closure care provisions of the applicable solid waste management regulations, assume liability for the landfill and the proposed expansion under both the current (including past actions by Georgia-Pacific Corporation) 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.

Condition #6 of the license transferring the landfill licenses (Department license #S-020700-WR-M-T, dated October 21, 2003) from Georgia-Pacific Corporation to SPO requires that if Casella or a subsidiary of Casella is replaced as the operator, prior to finalization of a new OSA, SPO must submit to the Department for its review and approval information on the financial capacity of the new operator, information on the financial assurance to be provided by the new operator consistent with 38 M.R.S.A. §400.11 or successor regulations in effect at that time, and information on the technical ability of the new operator.

Casella has prepared an application to expand the Juniper Ridge Landfill in accordance with the terms of the OSA signed by SPO and Casella; the OSA requires that the expansion application be ready for submission by February 5, 2009, but leaves the decision as to when to submit the application to Casella. With the amendment of 38 M.R.S.A. §1310-AA to include expansions to existing state-owned facilities as being subject to the public benefit determination requirements, the Commissioner must determine that the proposed expansion of the Juniper Ridge Landfill will provide a public benefit before the expansion application can be submitted.

The Commissioner finds that the OSA is a contract between the State of Maine, acting by and through SPO, and Casella; the Department is not a party to the contract. Findings of fact and conclusions of law made by the Commissioner on this application are based on the standards and criteria set forth in the applicable law; see Finding of Fact #2, above. The Commissioner further finds that the Department is not bound by the capacity commitments in the OSA; instead, the Department has reviewed the capacity needs in the immediate, short and long term periods. The Commissioner also finds that reference to the applicant in this determination refers to both SPO and Casella/NEWSME Operations (or a successor operator).

5. CAPACITY NEEDS

To determine whether the proposed expansion provides a substantial public benefit, the Commissioner must determine, first, whether the applicant has demonstrated that the proposed increase in landfill capacity meets the immediate, short-term or long-term capacity needs of the State.

A. The Application: The applicant asserts that the proposed expansion is necessary to meet the long-term capacity needs of the State of Maine. The proposed expansion would provide approximately 21.9 million cubic yards of capacity, with an estimated 20 years of site life. The applicant proposes to develop the capacity in 3 phases: Phase I would have approximately 5.45 million cubic yards of capacity and a life of approximately 5 to 7 years; Phase II would have approximately 9.35 million cubic yards of capacity and a life of approximately 8 to 11 years; and Phase III would have approximately 7.08 million cubic yards of capacity and a life of approximately 7 to 9 years. The applicant proposes division of the expansion into phases in expectation that the Department will condition approval of the public benefit determination to require periodic checks on the use of landfill capacity before submittal of applications to develop additional capacity in the landfill expansion area.

The waste acceptance rates for the proposed expansion rely on the latest Capacity Report. The Capacity Report calculated available disposal capacity based on projected growth rates of zero, 1% and 2.8%, and compared the available capacity to that calculated at the 4% growth rate used in the latest State Plan. The applicant concluded available capacity at Juniper Ridge Landfill would be depleted in 2017 at a 2.8% growth rate, and in 2018 at a zero growth rate. For the calculations included in the application, a zero growth rate was used for 2010 and 2011, and a 2.8% annual growth rate was used for the subsequent years. Both the Capacity Report and the State Plan recognize the relationship between the economy and waste generation in Maine

The applicant asserts that, either as a direct customer or indirectly as the disposal facility for incineration residues, wastes from municipalities in every county in Maine are disposed at Juniper Ridge Landfill, with approximately 49% of the points of origin for the wastes currently disposed at Juniper Ridge Landfill located within 25 miles of the landfill.

The applicant estimates that the Crossroads Landfill in Norridgewock (owned by Waste Management Disposal Services of Maine), the only remaining commercial landfill in Maine, had approximately 12 to 14 years of remaining licensed capacity at the end of 2009, based on 2009 fill rates. The licensing of new commercial solid waste disposal facilities is prohibited by 38 M.R.S.A. §1310-X. The active municipal and quasi-municipal landfills in Maine each serve a limited regional need.

The Capacity Report estimate of existing permitted disposal capacity in Juniper Ridge Landfill, Crossroads Landfill and publicly owned landfills (other than the less than 6 acre CDD landfills) in Maine was approximately 17,568,810 cubic yards as of the end of 2009. The Capacity Report projects that an estimated 24.4 million cubic yards of landfill capacity will be required over the next 20 years, based on a predicted growth rate of 2.8%.

The application and the Capacity Report both emphasize the uncertainty of future waste generation rates. Overall, Maine waste generation rates have declined; however, the larger Maine MSW incinerators import MSW to meet their power contracts as Maine-generated MSW rates fall, so the incinerator residues requiring disposal have not appreciably declined. But, if Maine's economy improves, waste generation is expected to increase. The applicant also notes that many unexpected events could cause an increase in wastes requiring disposal, such as: wastes generated during a major storm event, wastes generated during cleanup of a major spill, or closure of a Maine incinerator.

B. <u>Department Review:</u> The Department thoroughly analyzed the information available in the various reports and other submittals provided to both the Department and SPO on an ongoing basis to determine the quantities of the various categories of wastes generated in Maine that are proposed to be disposed in the Juniper Ridge Landfill Expansion. This information included the volumes of wastes generated in Maine, the capacity of existing disposal facilities in Maine, reports on solid waste uncertainties and possible plans for the future in the Maine waste markets, the status of disposal facilities in New Hampshire and New Brunswick, and available information on future applications.

<u>Basis for Review of Capacity Needs</u>

In accordance with 38 M.R.S.A. §1310-AA, the Department considered the State Plan during its review of this application. In addition to the State Plan, the Department also reviewed the information provided in the most recent biennial Capacity Report (for calendar year 2009) prepared by SPO in accordance with 38 M.R.S.A. §2124-A.

The Department also considered data submitted to SPO and the Department in annual and monthly reports regarding solid waste generated in Maine and disposed in Maine's landfills.

As noted by commentors, neither statute nor regulation expressly define immediate, short-term or long-term capacity. 38 M.R.S.A. §2124-A requires that SPO submit a report to the Legislature, the Governor and the Department "setting forth information on statewide generation of solid waste, statewide recycling rates and available disposal capacity for solid waste. The report due on January 1, 2009 was required to analyze the solid waste disposal needs of the State for the next 3, 5 and 10 years. Based upon these time frames, a reading of the overall statutory scheme as a whole, and legislative intent, the Department has interpreted the solid waste laws to define immediate as 3 years, short-term as 5 years and long-term as 10 years for the purposes of evaluation of public benefit determination applications. The Department has historically used these time frames in its evaluation of all public benefit determination applications submitted to the Department, and has continued that practice with this application. However, to clarify the evaluation process, the Department considers, in general terms, the time involved from issuance of a positive determination of public benefit until the capacity considered in the public benefit determination application is available for disposal.

As described in Finding of Fact #4, above, findings of fact and conclusions of law made by the Commissioner on this application are based on the standards and criteria set forth in the applicable law. While the Department is cognizant of the terms of the OSA between SPO and Casella, the Department is not bound by the contractual agreements between SPO and Casella; in fact, the OSA references in various locations that neither party can guarantee the Department's approval of the applications required to be prepared by Casella and submitted for SPO.

<u>Relevant Waste Streams</u>

The wastes proposed to be disposed in the proposed expansion are special wastes, CDD, residues from the processing of CDD (the fines component of which is used as alternative daily cover), miscellaneous non-special wastes and MSW bypass. The Department's review examined data from both 2009 and 2010. According to the 2009 annual report, 528,622 tons of waste were disposed in the Juniper Ridge Landfill in 2009. According to the 2010 annual report, 708,198 tons of waste were disposed in the Juniper Ridge Landfill in 2010. (Department review of the monthly waste summary reports submitted by the applicants shows a total of 542,364 tons of waste disposed in 2009, and 712,125 tons of waste disposed in 2010. [2]A table created from the Department's *Juniper Ridge Landfill Waste Volume Summary"*, updated monthly, is provided as Attachment A of this determination.)

Overview of Current Licensed Capacity

According to the 2010 annual report, the remaining capacity of the Juniper Ridge Landfill as of December 31, 2010 is approximately 6,565,719 cubic yards. The 2010 annual report notes that this capacity is based upon the volume estimated for the landfill in the amendment application as being 10.28 million cubic yards. This volume is based on the landfill design approved in the amendment license, which included a mechanically-stabilized earthen ("MSE") berm along the western and southwestern sides of the landfill, and an enlarged earthen berm along the northern and eastern sides of the landfill. Casella has not constructed the MSE berm or the enlarged berms. In the public benefit application, the applicant notes that the proposed expansion will overlay the northern and eastern waste sideslopes of the currently licensed footprint. The need for the berms will be re-revaluated after this licensing decision. The construction of the berms is estimated to provide capacity for approximately 1 year.

The commercial Pine Tree Landfill in Hampden, owned by Casella, reached then licensed capacity and ceased accepting waste on December 31, 2009. The remaining commercial landfill in Maine licensed to accept many of the same waste types as Juniper Ridge Landfill is Waste Management Disposal Services of Maine's ("WMDSM") Crossroads Landfill in Norridgewock. As of December 2010, the remaining capacity for waste disposal at Crossroads Landfill was estimated by WMDSM to be approximately 3,907,064 cubic yards. In 2009, Crossroads accepted 265,047 tons of waste for disposal; of this, 79,778 tons of

[2] The difference between the monthly waste summary reports totals and the annual reports totals reflects that the monthly waste summary reports include everything that crosses the scales at the landfill, including construction materials that will not be disposed, whereas the annual reports totals include only the wastes disposed in the landfill.

waste were used as alternative daily cover. In 2010, Crossroads accepted 258,375 tons of waste for disposal; of this, 75,397 tons of waste were used as alternative daily cover.

There are 7 active municipally-owned landfills for the disposal of MSW. The Capacity Report states that these facilities have an estimated combined capacity of 4.9 million cubic yards (3.26 million tons). These landfills serve their immediate area. The Capacity Report notes that, while reaching capacity will be a significant concern to the region served by a landfill in this group, it will not result in a statewide capacity concern. Expansions approved at two landfills in northern Maine that serve about 50 communities will provide capacity for decades.

There are 2 publicly owned landfills for the disposal of residues from the processing/incineration of MSW. The Capacity Report states that these facilities have an estimated combined capacity of 6.2 million cubic yards (4.5 million tons). These landfills are expected to serve the ecomaine and the MMWAC incinerators for more than 20 years.

There are approximately 14 municipally-owned less than 6 acre non-secure landfills licensed for the disposal of wood waste and CDD. The Capacity Report assigns an estimated overall capacity for these facilities of 10 to 12 years. According to the annual reports filed by the facilities, a total of approximately 12,278 tons of waste was disposed in this group of landfills in 2009, and approximately 7,538 tons was disposed in 2010. The Marion Township CDD landfill in Washington County reached capacity in 2011, and the Marion Users Group is now transporting its CDD to Canada for disposal. The Marion Users Group had planned to license a new landfill, but concluded contracting with the Canadian landfill was a less expensive alternative.

The State also has licensed landfill capacity at the as yet undeveloped Carpenter Ridge Landfill located at T2 R8 (Department license # S-021372-WD-A-N, dated June 24, 1996); however, this capacity would require legislative authorization to be developed. This State-owned site has approximately 2 million cubic yards of licensed capacity for special wastes and other wastes. In 2011, the State also acquired the Dolby III Landfill facility in East Millinocket. The Dolby III landfill has only approximately 300,000 cubic yards of licensed capacity remaining, and the license transfer approved the disposal of only wastes generated at the Great Northern Paper Co., LLC (former Katahdin Paper) mills in Millinocket and East Millinocket. At this time *de minimus* quantities of waste from the East Millinocket mill are periodically disposed at Dolby III.

CDD Generated in Maine

According to the 2009 and 2010 annual reports filed with the Department and SPO, Maine municipalities and businesses reported generating approximately 397,636 tons of wood waste and CDD in 2009, and 490,274 tons of wood waste and CDD in 2010. Based on information from the annual reports filed with SPO and the Department, and the Department's general knowledge of waste generation in Maine, Attachment B was prepared to show how the wood waste and CDD was handled by recycling, processing or disposal.

As shown in Attachment B, the most significant change in CDD generation results from a significant increase in the amount of oversized bulky waste ("OBW") and fines, primarily from KTI in Lewiston, disposed at Juniper Ridge Landfill. KTI is a Casella subsidiary. The majority of the CDD accepted at KTI is imported from other states. 38 M.R.S.A. §1310-N(11) provides that, in part, 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 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." 38 M.R.S.A. §1303-C(1-C) defines bypass as "...any solid waste that is destined for disposal, processing or beneficial use at a solid waste facility but that cannot be disposed of, processed or beneficially used at the facility because of the facility's malfunction, insufficient capacity, inability to process or burn, downtime or any other comparable reason." OBW consists of large items that may be difficult to process, such as mattresses, furniture, appliances, and certain other components of demolition debris. The Department comments that KTI's inability to process certain components of the CDD delivered to the site has contributed to the large amounts of OBW delivered to Juniper Ridge Landfill. KTI received Department approval for major modifications to its facility on July 18, 2011. Construction and implementation of the infrastructure improvements to the facility have been substantially completed, and KTI expects to generate less OBW due to its ability to process and recycle more material from the CDD. The Department comments that OBW deliveries to Juniper Ridge Landfill in November and December 2011 were less than half the amount delivered in any month since May 2011.

The Department also compared the amount of fines used as alternative daily cover at Juniper Ridge Landfill to the amount of wastes used as alternative daily cover at the Crossroads Landfill in Norridgewock, and concluded that the two landfills used a similar amount of daily cover. The Department also comments that Juniper Ridge Landfill has consistently been found to be operating in conformance with the criteria in 06-096 CMR 401.4.C(8)(a); this subsection limits the depth of fines used as alternative daily cover to 9 inches. Juniper Ridge Landfill routinely covers highly putrescible wastes such as front-end process residues ("FEPR") and MSW bypass from the incinerators, and some sludges, immediately after deposit in the landfill to control the odor from these wastes. However, when comparisons were made considering only the amount of putrescible wastes accepted, the Department concluded Juniper Ridge Landfill used less alternative daily cover per ton of putrescible waste.

The applicant asserts that it predicted that additional residues from the processing of CDD would be disposed at Juniper Ridge Landfill after CDD processing capability was expanded. The Department comments that the increase from construction and operation of a CDD processing facility owned by Casella in Westbrook is no longer expected; the major modifications to KTI in Lewiston were licensed and completed rather than the development of new capacity at the Westbrook facility.

The Department further comments that implementation of changes to 38 M.R.S.A. §1310-N(5-A) which require, in part, the “maximum extent practicable” standard be met is ongoing. Regulations for implementing the statute were adopted on July 20, 2010. Facilities have filed their interim reports, and the first demonstration of compliance with the statute is required with the annual reports to be filed by February 28, 2012. The maximum extent practicable standard reads as follows:

"(2) "A solid waste processing facility that generates residue requiring disposal shall recycle or process into fuel for combustion all waste accepted at the facility to the maximum extent practicable, but in no case at a rate less than 50%. For purposes of this subsection, 'recycle' includes, but is not limited to, reuse of waste as shaping, grading or alternative daily cover materials at landfills; aggregate material in construction; and boiler fuel substitutes."[3]

Special Wastes Generated in Maine

A review of the Department's records indicates the disposal of approximately 480,541 tons in 2009 and 435,099 tons in 2010 of special waste (including FEPR) generated in Maine at commercial, municipally-owned, and state-owned landfills. Based on information from the annual reports filed with SPO and the Department, and the Department's general knowledge of waste generation in Maine, Attachment C was prepared to show how the special waste was disposed. Attachment C shows a significant decrease in the amount of special wastes disposed in these landfills.

Municipal transfer stations do not typically handle special wastes. Of Maine's 4 incinerators, only Maine Energy is licensed to accept special waste; it accepts only a negligible amount. While the Department is unaware of any Maine business generating large amounts of special waste that ships it out of state, Maine businesses are not required to directly report to SPO or the Department the amount of special waste generated.

The Department also licenses the beneficial use of special wastes (including agronomic utilization). A review of Department records indicates an estimated 324,065 tons in 2009 and 242,092 tons in 2010 of special wastes generated in Maine were beneficially used. This represents a significant decrease from the 1,385,552 tons estimated to have been beneficially used in 2008; however, the Department still does not expect Maine municipalities and businesses that

[3] 38 M.R.S.A. §1310-N(5-A)

currently beneficially use their special wastes to dispose of them in landfills in the future.

A review of the Department's records indicates approximately 463,612 cubic yards in 2009 and 639,719 cubic yards in 2010 of solid waste was disposed in the large, generator-owned landfills. These are landfills that are limited by 38 M.R.S.A.§1303-C(6)(E) to the disposal of not more than 15% solid waste accepted on an annual basis from sources other than the single entity that owns the landfill. The 15% from sources other than the generator must be accepted on a nonprofit basis. The generator-owned landfills serving the pulp and paper mills active in 2011 are expected to remain active through the short term, and either have licensed capacity for their wastes or have plans for new long-term capacity that do not include use of the Crossroads or Juniper Ridge landfills for their long-term capacity needs.

MSW Generated in Maine

The last significant category of solid waste currently being disposed in Maine is MSW (including MSW bypass from incinerators). A review of the Department's records indicates the disposal of approximately 661,638 tons in 2009 and 660,392 tons in 2010 of MSW generated in Maine. Based on information from the annual reports filed with SPO and the Department, and the Department's general knowledge of waste generation in Maine, Attachment D was prepared to show how the MSW was handled. Attachment D shows a decrease in the amount of MSW generated, although the percentages of MSW handled through the different options didn't change much except for a steady increase in the amount of MSW exported for disposal in other states and Canada.

The waste stream proposed by the applicant to be disposed in the expansion does not include MSW except for small amounts of MSW bypass from Maine's 4 incinerators and FEPR, which is reported as special waste, above. MSW bypass accounted for 4% in 2009 and 5.6% in 2010 of Juniper Ridge Landfill's waste streams. Conditions on the landfill's licenses limit the amount of MSW bypass Juniper Ridge Landfill may accept.

No changes to Maine Energy, owned by Casella and located in downtown Biddeford, resulted from the most recent series of discussions about options for operational changes or relocation of the Maine Energy incinerator. The Department comments that the condition on the amendment license for Juniper Ridge Landfill that limits the total amount of MSW that can be handled at both Maine Energy and Juniper Ridge Landfill to 310,000 tons per year, in combination with Maine Energy's standard practice of zeroing its tipping floor on a weekly basis, appears to have resulted in more MSW bypass coming to Juniper Ridge Landfill than would be the case without the limit. The Department recommends that the Juniper Ridge Landfill Expansion license limit only the amount of MSW bypass from Maine Energy that can be accepted at Juniper Ridge Landfill. 38 M.R.S.A. §1303-C(1-C) defines bypass as "...any solid waste that is destined for disposal, processing or beneficial use at a solid waste facility but that cannot be disposed of, processed or beneficially used at the facility because of the facility's malfunction, insufficient capacity, inability to process or burn, downtime or any other comparable reason." The Department comments that the contracts Maine Energy has with its customers also define bypass in similar terms, and that Maine Energy ensures that any MSW bypass transported to Juniper Ridge Landfill was generated in Maine.

Another significant unknown is future disposal of MSW currently disposed at the PERC incinerator in Orrington. As noted during review of the 2009 public benefit application, the current contracts with PERC for disposal of its residuals and bypass expire in 2018, concurrent with the end of the projected "life" of the PERC facility. The large group of Maine municipalities included in the Municipal Review Committee ("MRC") have been gradually buying into PERC for many years; the MRC municipalities currently own approximately 25% of PERC. The MRC has formed a group to plan for MSW disposal beyond 2018; reportedly, the group will be considering total ownership of PERC as well as other disposal options.

Miscellaneous Non-Special Wastes from Maine Routinely Disposed at Juniper Ridge Landfill

The last broad category of waste proposed to be disposed by the applicant, miscellaneous non-special waste, constituted less than 0.1% in 2009 and 0.4% in

2010 of Juniper Ridge Landfill's waste streams. Typical wastes included in this category include spoiled food waste from Maine industrial processing plants and businesses, carpet fiber and padding waste from Formed Fiber Technologies in Auburn, tire chips, and vegetable starch.

Historic Use of the Juniper Ridge Landfill

The Department reviewed specifically how the existing licensed Juniper Ridge Landfill capacity has been utilized since the State of Maine purchased the landfill. Using information provided by the applicant in its annual reports and in this public benefit determination application, a summary of the types and amounts of wastes disposed in the Juniper Ridge Landfill throughout its operation was prepared. This information is provided in Attachment E of this determination.

Evaluation of the data in Attachment E reveals that the amount of waste disposed in the Juniper Ridge Landfill exceeded the 540,000 tons per year estimate included in the 2003 amendment application in 2008, 2010 and 2011. The significant increases since the end of 2007 were in ash, FEPR, OBW, fines and MSW bypass. The incinerator residue and bypass increases were associated with the cessation of disposal of putrescible waste at Pine Tree Landfill, and the closure of Pine Tree Landfill. Some increase in MSW bypass in 2010 and 2011 is also attributable to the Department's encouragement of the use of MSW bypass in the soft layer of new base cells (14,911 tons were used for this purpose in 2010, and 5,301 were used in 2011). The Department routinely tracks the quantities of OBW and fines from KTI, and MSW bypass delivered to Juniper Ridge Landfill; see Attachment F for a tabulation of this information. As noted above, the Department recommends that the Maine Energy and Juniper Ridge landfill licenses be de-linked in the 9.35 million cubic yard expansion license to limit only the amount of MSW bypass that can be accepted in expansion. The Department suggests this would minimize the frequent deliveries of MSW bypass from Maine Energy (37,561 total tons in 2010, and 22,305 total tons in 2011).

The most significant increases in waste acceptance were seen with OBW and fines from the processing of CDD. OBW increased from 3.5% of the total waste acceptance in 2008 to 9.7% in 2009, 13.6% in 2010, and approximately 18.6% in 2011. Fines increased from 7.3% of the total waste acceptance in 2008 to 8.8% in

2009, 12.3% in 2010, and 17.7% in 2011. The Department concurs with the applicant that the increases are, at least in part, caused by the closure of Pine Tree Landfill and the subsequent increase in out-of-state CDD delivered to the KTI processing facility instead. As noted above, the Department's analysis indicated the fines delivered to Juniper Ridge Landfill are legitimately being used as alternative daily cover. However, the Department recommends limiting the amount of OBW delivered to Juniper Ridge Landfill by CDD processors that report in their annual reports generating substantive amounts of OBW to that amount that has been determined by the Department to have been generated as a result of recycling CDD "to the maximum extent practicable".

Disposal Capacity Unknowns

As described more fully throughout this determination, over the next few months there are several policy and legislative decisions that may significantly impact the ways solid waste is handled in Maine, and thus the need for disposal capacity for solid waste generated in Maine. It is not possible at this time to quantify these impacts and thus assess how they will affect solid waste capacity and capacity needs. The Department expects, however, they will impact solid waste capacity needs to some extent. The application also recognizes the potential impact of the listed issues. The outstanding solid waste management issues the Department refers to includes, but is not limited to:

* potential decreases in CDD processing residues requiring disposal as a result of full implementation of 38 M.R.S.A. §1310-N(5-A);
* observed changes in solid waste needing disposal;
* the potential sale of Juniper Ridge Landfill, as noted in the Capacity Report;
* potential development of disposal capacity at other landfills;
* extension of waste fees to residues from the processing of CDD; and
* potential statutory changes to the definition of "waste generated within the State"; and
* operation of PERC past 2018.

Maine Generated Waste Expected to be Disposed in Maine Landfills

The applicant notes that the projected annual fill rates provided in the 2003 amendment application did not include the closure of Pine Tree Landfill in Hampden at the end of 2009. However, as has been stated before, the closure of Pine Tree Landfill did not occur "early"; rather, Pine Tree Landfill reached its then licensed capacity. Apparently, the applicant assumed approval of increased capacity at Pine Tree Landfill for which Casella did not submit an application until August 2005. Casella subsequently withdrew its application for a revised public benefit determination associated with the increased capacity amendment application, and entered into the Schedule of Compliance that detailed the phased closure of Pine Tree Landfill. Closure of the landfill was completed in 2010.

Throughout Maine, disposal numbers have continued to be lower, as noted by MRC/PERC communities having trouble meeting their guaranteed annual tonnage of MSW delivered to the PERC incinerator. Both PERC and Maine Energy have imported additional MSW in recent years in order to meet their power contract obligations. The State Plan projected a 2007 annual fill rate at the Crossroads Landfill of 336,854 tons; in its July 2009 capacity update, WMDSM reported an average annual fill rate of 300,000 tons per year. Crossroads reported disposing of 265,047 tons of waste in 2009 and 258,375 tons in 2010. The State Plan estimated the remaining capacity life at Crossroads Landfill at the end of 2007 to be 3,900,000 cubic yards or 10 to 12 years; in its 2010 annual report, WMDSM reported having 4,202,973 cubic yards of remaining capacity (still approximately 12 years or more).

The estimates of capacity needed in the State Plan were calculated using a 4% annual increase, to reflect increases in economic activity and population. In the Capacity Report and the public benefit determination application, the applicant scaled the annual increase back to reflect the now expected lack of growth in economic activity and population for several years.

Finally, the Department notes that, as seen in Appendices A through E, there is considerable volatility in the solid waste arena. Overall, Maine's waste generation rate has decreased, and thus the existing disposal capacity needs have decreased. However, if the economy improves in the near term, the Department agrees with the applicant that waste generation is likely to increase. The Department also concurs that the landfill design and licensing process can be lengthy. It will take considerable time, from the date of this determination, before the first cell of the expansion is constructed and operational. The Department has taken this fact into account in its analysis of capacity needs. The public benefit determination application proposes the division of the expansion into 3 phases. Phase I is estimated to provide 5 to 7 years of capacity for approximately 4,687,000 tons of waste. Phase II is estimated to provide 8 to 11 years of capacity for approximately 8,041,000 tons of waste. Phase III is estimated to provide 7 to 9 years of capacity for approximately 6,089,000 tons of waste.

C. Commissioner Findings:

Based on the foregoing figures and analysis, the Commissioner finds that, in the absence of additional capacity at Juniper Ridge Landfill, there is sufficient disposal capacity currently available for the amounts of CDD, special wastes and other wastes known to be generated in Maine and expected to be disposed in Maine landfills both in the immediate (3 years) and short-term (5 years) periods. The Commissioner further finds there likely exists sufficient disposal capacity currently available for the amounts of CDD, special waste and other wastes known to be generated in Maine and expected to be disposed in Maine landfills in the long term (10 years) period, provided the existing solid waste disposal options remain available and waste generation rates remain depressed.

The Commissioner finds that the timing of an application to expand Juniper Ridge Landfill appears to be at least partly based upon the terms of the OSA. The Commissioner further finds that the provision in the 2nd amendment to the OSA that encourages Casella to import CDD to be processed into CDD fuel for biomass boilers is outdated given current circumstances. The applicant acknowledges that Casella has difficulty meeting the quality standards for CDD fuel. Further, the Commissioner finds that the biomass plant referenced in the OSA no longer burns CDD fuel. As also noted in Finding of Fact #6.C, below, the Department is not bound by the language in the OSA. In any event, the Commissioner recommends SPO and Casella amend the OSA to address the significant quantity of CDD imported into Maine under the terms of the OSA.

Based on the large, and to date annually increasing, volume of OBW disposed in Juniper Ridge Landfill, the Commissioner finds that it appears much of the CDD imported into Maine contains insufficient wood to justify efforts to process it into CDD fuel. Although 38 M.R.S.A. §1310-N(11) defines residues and bypass generated by incineration, processing and recycling facilities in Maine as Maine waste, some of the CDD delivered to KTI has little or no processing value, and therefore is ultimately disposed in a landfill, usually Juniper Ridge Landfill.

The Commissioner finds that it is necessary and appropriate to establish a limit on the tonnage of OBW disposed in the expansion. If, and when, a license is issued for the construction and operation of an expansion, the Department will establish such a limit. The limit will be based upon the results of annual demonstrations required pursuant to 06-096 CMR 409.2.C, that waste processing facilities that generate residue requiring disposal will "recycle or process into fuel for combustion all waste accepted at the facility to the maximum extent practicable, but in no case at a rate less than 50%", submitted by CDD processing facilities that send OBW to Juniper Ridge Landfill for disposal. Annually, the Department will reevaluate and may modify this limit.

In addition, the Commissioner finds that periodic independent third party audits of CDD processing operations that transport more than 10,000 tons of OBW to Juniper Ridge Landfill on an annual basis are necessary, in order to verify the results of the demonstrations required under the provisions of 06-096 CMR 409.2.C, are necessary in view of the significant volumes of OBW disposed in the state-owned Juniper Ridge Landfill in the past. The purpose of the audits will be to ensure that, by maximizing processing and recycling at CDD processing facilities, disposal of waste at Juniper Ridge Landfill is minimized, in conformance with the intent of 38 M.R.S.A. § 1310-N (5-A). The Commissioner therefore requires that periodic third party audits be conducted, focused on the nature and volume of processing residues being sent to Juniper Ridge Landfill for disposal. The first such audit(s) will occur prior to the disposal of OBW from processing facilities anticipated to transport more than 10,000 tons of OBW to the 9.35 million cubic yard expansion annually. Third party audits will be conducted by a qualified consultant selected by the Department in consultation with the affected processing facilities and Casella. Casella will reimburse the Department for the cost of the audits. Audits will be conducted at 2 year intervals, unless or until the Department approves their discontinuation.

The Commissioner further finds that the 310,000 ton annual limit placed on MSW handled at both Maine Energy and Juniper Ridge Landfill[4] results in more MSW bypass being disposed at Juniper Ridge Landfill than would a limit specific to Juniper Ridge Landfill. The 310,000 ton annual limit was negotiated with the Municipal Review Committee and Casella in 2002 to ensure that Maine Energy (a Casella-owned company) and Casella-owned or operated disposal facilities, did not garner an unfair advantage in the MSW market. It was carried into the amendment license in 2004. The Commissioner therefore, rather than continue the 310,000 ton annual limit, places a 25,000 ton annual limit on the amount of MSW bypass that the 9.35 million cubic yard expansion may accept for disposal during routine operations. If the 9.35 million cubic yard expansion is licensed, the license should include provisions for exceptions to this limit in emergencies or prolonged outages at Maine Energy.

The Commissioner finds it is reasonable to determine that the full 21.9 million cubic yards of disposal capacity sought by the applicant is not needed to meet the State's immediate, short-term or long-term capacity needs. The Commissioner finds that available data shows a current decrease in the amount of Maine waste needing disposal, and that whether the amount of waste needing disposal will decrease, level off or increase in the future is uncertain at this time. However, the Commissioner finds that it is reasonable and prudent to plan for an increase in capacity needs based upon an expected eventual improvement in the economy. Accordingly, to ensure the availability of adequate long-term capacity given current outstanding issues related to Maine's solid waste management system, and the difficulty in guaranteeing the time period from submission of an application for a new or expanded landfill through final appeals and construction, the Commissioner finds that the 9.35 million cubic yards of capacity estimated for Phase II of the expansion proposal would adequately ensure that Maine could meet its long-term disposal capacity needs. 38 M.R.S.A. §1310-AA requires that an applicant receive a positive determination of public benefit prior to submission of an application under 38 M.R.S.A. §1310-N for new or expanded disposal capacity. The Commissioner therefore determines a substantial public benefit

[4] see the amendment license- DEP #S-020700-WD-N-A. dated April 9, 2004

only for the 9.35 million cubic yards of capacity estimated for Phase II of the proposed landfill expansion. It is anticipated that the proposed landfill expansion footprint will be modified to reflect this partial approval.

6. CONSISTENCY WITH STATE WASTE MANAGEMENT PLAN

As part of the substantial public benefit review, 38 M.R.S.A. § 1310-AA(3) requires that the Commissioner determine whether the proposal for increased landfill capacity at the Juniper Ridge Landfill is consistent with the state plan.

A. The Application: The state plan, prepared by SPO in accordance with 38 M.R.S.A. § 2122, is based on the priorities and recycling goals established in 38 M.R.S.A. §§ 2101-2132, including the solid waste management waste hierarchy. In decreasing order of preference, the hierarchy for management of solid waste is reduction, reuse, recycling, composting, incineration and landfilling. The State Plan notes that landfilling is at the bottom of the waste management hierarchy.

The applicant notes the proposed expansion is consistent with the State Plan in that the proposed expansion is contemplated and incorporated into the plan as a central component in meeting the State's solid waste disposal capacity needs over the next 20 years. The applicant references 38 M.R.S.A. §2123-A(4) as its basis for use of 20 years as the long-term window for future disposal capacity.

In support of its application, the applicant describes how Casella is actively involved in source reduction, reuse, composting, toxics reduction, and recycling programs throughout the State and at Juniper Ridge Landfill, and concludes that these efforts reduce the risks related to waste handling and disposal at Juniper Ridge Landfill to the maximum practical extent. The initiatives detailed include: Zero Sort® (single stream) Recycling operations that are located at 4 Casella facilities in Maine, and in collection vehicles operated in 3 municipalities; standard recycling collection operations that serve many municipalities and many businesses in Maine; CDD and woodwaste processing operations in Maine; composting or beneficial reuse of large volumes of Maine's organic waste through Casella's New England Organics facilities; and 7 universal and electronic waste consolidation facilities in Maine. The applicant states that, in 2010, Casella facilities and programs recycled, beneficially used, or composted a total of 250, 227 tons of waste materials in Maine. The applicant also describes SPO's considerable efforts to promote recycling consistent with the State Plan.

The applicant asserts that the wastes currently disposed in Juniper Ridge Landfill and proposed for disposal in the expansion are primarily materials that cannot be reduced or recycled for one or more of the following reasons: the nature of the wastes precludes it; they are already residuals from recycling or source reduction activities; or the State or municipalities lack the recycling resources to handle the materials in an economic fashion.

The applicant notes that the State Plan identifies the management and disposal of CDD as an area of continuing difficulty in Maine, and states that Juniper Ridge Landfill received 145,488 tons of unprocessed CDD generated in Maine in 2010; 62% of this CDD is reported as being generated within 50 miles of the landfill. Landfill capacity for the waste is needed because it is not accepted at MSW incinerators, and cannot be recycled or reused without investment in equipment, labor, and sufficient land area for collection and processing of the CDD. The applicant also asserts that the 3 Casella CDD processing facilities in Maine all achieve no less than a 50% recycling rate, in compliance with 38 M.R.S.A. §1310-N(5-A). In 2010, the facilities produced approximately 106,000 tons of biomass fuels, recovered metal, aggregate, and alternative daily cover (used at Juniper Ridge Landfill) from the approximately 200,000 tons of woodwaste and CDD delivered to them. The applicant also notes that regulatory changes promulgated in 2006 to the CDD fuel quality standards resulted in an increase in the CDD residue generated by screening to obtain CDD wood fuel that met the standards; at KTI, only between 5 and 20% of the CDD processed can be converted to fuel grade wood chips.

B. Department Review: The Department comments that using the State Plan's recognition that an expansion of the Juniper Ridge Landfill is contemplated as justification for a positive determination of public benefit is inconsistent with the state's actual capacity needs, as explained in Finding of Fact #5, and is inconsistent with the waste management hierarchy. The Department also comments that the OSA sets an upper limit for tipping fees that can be assessed on wastes disposed at Juniper Ridge Landfill, to "act as a check on pricing for the disposal of similar materials at other solid waste facilities"[5]. The tipping fees, however, are lower than those charged by the remaining commercial landfill in Maine, and may contribute to increases in the disposal of some waste streams, such as CDD and wastewater treatment plant sludges, because the cost of disposal can be less than the cost of handling the wastes for processing, composting or agronomic utilization.

The Department comments that the applicant has demonstrated that both Casella and SPO play critical roles in source reduction, reuse, composting, toxics reduction, and recycling programs throughout the State, and that many of the waste streams disposed at Juniper Ridge Landfill cannot be handled other than by land disposal. However, as discussed more fully in Finding of Fact #5, above, the Department comments that inspections of the KTI facility indicate much of the incoming CDD has arrived pre-sorted with the wood and easily recyclable components removed. This has reduced the volume of materials recoverable for recycling or reuse at KTI, and has resulted in substantial amounts of fines and OBW being sent to Juniper Ridge Landfill[6]. Although the fines are used as alternative daily cover in compliance with the applicable standards, the Department recommends that the amount of OBW disposed at Juniper Ridge Landfill as processing residue be limited.

C. Commissioner Findings: The Commissioner finds that it is inadequate to rely on the circular reasoning that the State Plan, developed by SPO, relies on the development of expansion of the Juniper Ridge Landfill, owned by SPO, to provide disposal capacity for the next 20 years, which is a requirement of the OSA between SPO and Casella. Further, the Commissioner finds that both SPO and Casella understand that the Department is not bound by the language in the OSA, among other reasons, because the OSA specifically includes the following language: "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.[7]"

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[5] State Plan, page 42
[6] see Attachments B, E and F of this license
[7] OSA, section 4.1

The Commissioner further finds that the 20 year period referenced in 38 M.R.S.A. §2123-A(4), when taken in the context of the entire statute, is appropriately viewed as a general long-term planning horizon, rather than a directive that at all times landfill capacity be licensed and available for a 20 year future period.

The Commissioner also finds that the rate of CDD generated in Maine requiring disposal has in significant part increased because CDD that was imported for disposal at Pine Tree Landfill is now classified as waste generated in Maine under 38 M.R.S.A. § 1310-N (11) because it is handled at a Maine processing facility. The full implementation of 38 M.R.S.A. § 1310-N(5-A) and the limit on OBW included in this determination are expected to decrease the amount of processing facility residues handled at the Juniper Ridge Landfill. The Commissioner finds that while landfilling may be an unavoidable management option for some CDD, it should be employed only when all other options are unavailable and there is a demonstrated need for use of that landfill capacity.

The Commissioner further finds that, consistent with the goals of the State Plan and the statutory solid waste management hierarchy, the applicant should aggressively pursue in the course of its operation of the existing Juniper Ridge Landfill and the proposed expansion approaches that decrease the volumes of waste requiring disposal, and that the applicant does not adequately demonstrate that the proposed expansion advances the State's waste reduction, reuse and recycling goals.

Finally, the Commissioner finds that the applicant has not demonstrated that the proposal for the full 21.9 million cubic yards of increased landfill capacity at the Juniper Ridge Landfill, to be developed in 3 phases, is consistent with the state waste management and recycling plan. The Commissioner further finds, as explained more fully in Finding of Fact #5, above, that a number of outstanding questions, issues and potential changes in the way solid waste is handled in Maine, as well as recent decreases in solid waste generation, have altered the basis for certain assumptions made in the State Plan, and cause it to be imprudent for the Commissioner to approve at this time, the entire amount of disposal capacity requested. Instead, the Commissioner finds that the approximately 9.35

million cubic yards (8,041,000 tons) of disposal capacity planned by the applicant for the expansion will meet the intent of 38 M.R.S.A. §1310-AA(3).

7. CONSISTENCY WITH LOCAL, REGIONAL OR STATE WASTE MANAGEMENT

The third public benefit criterion is consistency with local, regional or state waste collection, storage, transportation, processing or disposal.

A. The Application: The applicant asserts that the proposed landfill expansion will provide needed landfill capacity for generators of solid waste, especially those in the area local to Juniper Ridge Landfill. The applicant notes that Juniper Ridge Landfill provides disposal capacity for, in addition to its regular contractual customers, unanticipated delivery of contaminated soils from Department-supervised remediations and cleanups, and debris generated during natural disasters such as hurricanes, floods or winter storms. In addition, the applicant asserts that the capacity proposed for the Juniper Ridge Landfill Expansion may be needed if the current waste flows to one or more of the Maine incinerators changes; in response to statutory or regulatory changes; if changes in operation at one or more of the existing generator-owned or municipally-owned landfills decrease the amount or types of wastes accepted; or in response to changes in technology.

B. Department Review: The Department concurs that all of the residues from the 2 largest incinerators in Maine are disposed in Juniper Ridge Landfill; that no other options are currently available for FEPR or MSW incinerator ash; and that the amount of residues from PERC and Maine Energy requiring disposal are unlikely to decrease until after 2018 because the facilities must acquire sufficient MSW to meet their power contracts; if Maine municipalities and businesses provide less waste than expected, the incinerators will seek out-of-state MSW to make up the difference. 38 M.R.S.A. §1310-N(11) defines residues from the incinerators as waste generated within the State.

The Department also concurs that Juniper Ridge Landfill currently provides needed capacity for CDD generated in the vicinity of the landfill, and that the proposed expansion would continue to meet area capacity needs. The Department is not aware of any new CDD landfills planned for the Old Town/greater Bangor area and expect a couple less than 6 acre landfills in the vicinity to close within the next 5 to10 years. However, the Department comments that the quantity of CDD delivered to Juniper Ridge Landfill from a 50 mile radius is a small part of the total CDD disposed at Juniper Ridge Landfill. If the amount of OBW from CDD processors is limited, as recommended in Findings of Fact #5 and #6, above, the capacity that could be provided by Phase II of the expansion, if approved and constructed, may be reasonably expected to meet local needs for the long-term.

The Department comments that no future large remediation projects have been identified; however, it is prudent to ensure the availability of sufficient landfill capacity for unexpected remediation or spill cleanups. When natural disasters occur, the Department typically implements procedures which allow short-term handling of debris in the local areas affected. Therefore, although it is unlikely the expansion would handle volumes of debris large enough to significantly affect landfill capacity, unexpected capacity needs from these types of activities could be accommodated within the 9.35 million cubic yards of capacity proposed for Phase II.

C. Commissioner Findings: As noted in Findings of Fact #5 and #6, above, the Commissioner finds that the additional 21.9 million cubic yards of landfill capacity that full expansion of the Juniper Ridge Landfill would provide is not needed to meet the State's needs in the immediate or short term, and a 9.35 million cubic yard expansion will be adequate to meet long-term disposal capacity needs. This determination is unchanged when reviewing local or regional waste management needs; no significant changes in the way current users of the Juniper Ridge Landfill access the facility is expected in the near future.

The Commissioner finds that a determination that the capacity provided by the estimated 9.35 million cubic yards of capacity in Phase II of the proposed expansion at the Juniper Ridge Landfill will not result in a gap in local, regional or state waste landfilling needs. The applicant has not demonstrated that the entire amount of proposed increased capacity from the landfill expansion is needed to provide special waste, CDD or other waste disposal needs in the local or regional area that Juniper Ridge and other facilities could not provide. Therefore, the Commissioner finds that the landfill capacity over and above the 9.35 million cubic yards proposed for Phase II is currently not needed, and approval of Phases I and III at this time would be inconsistent with local, regional or state waste collection, storage, transportation, processing or disposal as the additional capacity might undercut local, regional and state initiatives to encourage waste reduction, reuse and recycling.

BASED on the above Finding of Facts, the Commissioner makes the following CONCLUSIONS:

1. The proposed expansion of the Juniper Ridge Landfill in Old Town, Maine, will provide a substantial public benefit, provided the expansion is limited to the 9.35 million cubic yards associated with the Phase II area as described in the public benefit application, provided an annual limit on OBW disposal in the 9.35 million cubic yard expansion is established by the process described in Finding of Fact #5.C, and provided no more than 25,000 tons of MSW bypass from Maine Energy is delivered to the 9.35 million cubic yard expansion in any calendar year, unless authorized by specific conditions in a Department license for the 9.35 million cubic yard expansion.

2. The entire 21.9 million cubic yards of capacity proposed for expansion of the Juniper Ridge Landfill is not needed to meet the immediate or short-term solid waste disposal capacity needs of the State.

3. The 9.35 million cubic yards of capacity proposed for the Phase II area of the expansion of the Juniper Ridge Landfill is adequate to ensure the long-term disposal capacity needs of the State can be met.

4. The proposal for expansion of the Juniper Ridge Landfill is consistent with the State Plan, provided only the application for the capacity proposed for Phase II is submitted.

5. The estimated 9.35 million cubic yards of landfill capacity in Phase II only of the proposed Juniper Ridge Landfill expansion is consistent with local, regional or state waste storage, transportation, processing or disposal.

STATE OF MAINE, ACTING THROUGH THE .	29	PUBLIC BENEFIT
STATE PLANNING OFFICE	)	DETERMINATION
OLD TOWN, PENOBSCOT COUNTY, MAINE	)	
JUNIPER RIDGE LANDFILL EXPANSION	)	
#S-020700-W5-AU-N	)	PARTIAL APPROVAL
(APPROVAL WITH CONDITIONS)	)	

6. The Commissioner recommends SPO and Casella amend the OSA to address the significant quantity of CDD imported into Maine under the terms of the OSA, and the associated large volumes of processing residues delivered to the Juniper Ridge Landfill.

THEREFORE, the Commissioner APPROVES only the 9.35 million cubic yards of capacity estimated for the Phase II area as described in the noted application of the STATE OF MAINE, ACTING THROUGH THE STATE PLANNING OFFICE, SUBJECT TO THE ATTACHED 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 determination shall not affect the remainder of the provision or any other provisions. This determination shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

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 CMR 409.2.C, focused on the nature and volume of processing residues being sent to Juniper Ridge Landfill 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. .

STATE OF MAINE, ACTING THROUGH THE .	30	PUBLIC BENEFIT
STATE PLANNING OFFICE	)	DETERMINATION
OLD TOWN, PENOBSCOT COUNTY, MAINE	)	
JUNIPER RIDGE LANDFILL EXPANSION	)	
#S-020700-W5-AU-N	)	PARTIAL APPROVAL
(APPROVAL WITH CONDITIONS)	)	

5. No more than 25,000 tons of MSW bypass from Maine Energy shall be delivered to the 9.35 million cubic yard expansion in any calendar year, unless otherwise authorized by specific conditions in a Department license for the 9.35 million cubic yards expansion.

DONE AND DATED AT AUGUSTA, MAINE, THIS 31ST DAY

OF January, 2012.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Patricia W. Aho
Patricia W. Aho, Commissioner

Filed
JAN 31 2012
State of Maine
Board of Environmental Protection

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES.

Date of initial receipt of application: September 15, 2011
Date of application acceptance: September 23, 2011

Date filed with Board of Environmental Protection:

XCD73907/cwd

STATE OF MAINE, ACTING THROUGH THE . 31 PUBLIC BENEFIT
STATE PLANNING OFFICE) DETERMINATION
OLD TOWN, PENOBSCOT COUNTY, MAINE)
JUNIPER RIDGE LANDFILL EXPANSION)
#S-020700-W5-AU-N) PARTIAL APPROVAL
(APPROVAL WITH CONDITIONS))

ATTACHMENT A

TOTAL WASTE RECEIVED AT JUNIPER RIDGE LANDFILL
BY MONTH

YEAR	TOTAL WASTE RECEIVED (in tons)[8]												ANNUAL TOTALS
	Jan.	Feb.		April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
2004				5,254	6,103	7,089	6,544	6,219	5,904	4,274.	2,978	4,125	48,490
2005	4,504	7,589	10,257	15,555	22,365	26,081	17,775	25,789	24,060	28,189	28,219	34,985	245,368
2006	40,608	34,028	36,450	38,314	54,025	55,240	42,951	48,127	40,543	43,248	48,689	43,583	525,806
2007	35,804	26,081	32,769	29,772	35,780	43,334	40,869	41,092	39,801	57,791	47,379	37,171	472,643
2008	54,440	38,585	45,800	54,878	53,125	52,647	55,798	61,836	66,515	53,072	42,479	50,182	629,357
2009	41,602	34,955	44,419	43,780	45,909	44,833	41,275	43,424	40,001	58,271	53,242	50,653	542,364
2010	56,032	48,521	52,186	58,100	58,399	62,962	62,241	63,564	60,840	65,730	64,213	59,337	712,125
2011	47,688	43,708	56,031	54,945	57,209	64,365	59,235	69,824	63,068	68,383	62,862	59,136	706,452

[8] compiled by the Department from monthly reports submitted by the applicant

STATE OF MAINE, ACTING THROUGH THE . 32 PUBLIC BENEFIT
STATE PLANNING OFFICE) DETERMINATION
OLD TOWN, PENOBSCOT COUNTY, MAINE)
JUNIPER RIDGE LANDFILL EXPANSION)
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(APPROVAL WITH CONDITIONS))

ATTACHMENT B
WOOD WASTE AND CONSTRUCTION & DEMOLITION DEBRIS (CDD[9]) GENERATED IN MAINE

	2008	2009		2010	
:	% of total	% of total	tons	% of total	tons
disposed in Maine landfills		92.6	368,388	95.2	466,826
Juniper Ridge(in Old Town)	31.7	39.2	155,747[10]	49.5	242,866[11]
Crossroads (in Norridgewock)	24.2	17.1	68,075	14.2	69,737
Pine Tree (in Hampden)	2.6	7.1	28,264	-	(closed)
CDD fines used as alternative daily cover (ADC)	15.0	11.8	46,744	17.8	87,449
munic/quasi-municipal landfills	13.9	17.1	67,992	13.1	64,273
generator-owned landfills		0.4	1,566	0.5	2,501
fuel chips / energy (in ME, NH or Canada)	6.2	6.5	25,690	3.6	17,484
used as erosion control mix (in ME, NH & MA)	1.0			-	
exported to NH or Canada	1.1	0.1	198	1.0	5,000
stockpiled	4.0	-	5	-	
otherwise recycled, reused or beneficially used (in ME, NH or Canada)	0.3	0.4	1,510	-	-
otherwise disposed		0.5	1,850	0.2	964
total wood waste and CDD generated			397,641		490,274

9 CDD includes oversized bulky waste (OBW) from incinerators and processing facilities
10 includes 50,581 tons of OBW from KTI
11 includes 95,157 tons of OBW from KTI

STATE OF MAINE, ACTING THROUGH THE . 33 PUBLIC BENEFIT
STATE PLANNING OFFICE) DETERMINATION
OLD TOWN, PENOBSCOT COUNTY, MAINE)
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(APPROVAL WITH CONDITIONS))

ATTACHMENT C
DISPOSAL LOCATIONS FOR SPECIAL WASTES GENERATED IN MAINE

DISPOSAL FACILITY	**2008**		**2009**		**2010**	
:	**% of total**	**tons**	**% of total**	**tons**	**% of total**	**tons**
Juniper Ridge Landfill, Old Town	63.4		66.0	316,952	79.4	344,377
Crossroads Landfill, Norridgewock	16.9		2.3	11,123	3.8	16,572
ecomaine Landfill, Scarborough	7.7		10.3	49,714	10.8	47,066
Pine Tree Landfill, Hampden	6.2		16.2	77,829	-	(closed)
City of Lewiston Landfill	3.1		3.6	17,246	4.1	18,023
City of Rockland Quarry	2.3		0.2	1,139	0.2	866
Tri-Community Landfill, Fort Fairfield	0.2		0.6	3,116	0.7	3125
City of Presque Isle Landfill	0.1		0.5	2,400	0.6	2614
Hatch Hill Landfill, City of Augusta	<0.1		<0.1	176	0.1	625
City of Bath Landfill	<0.1		0.1	406	0.1	487
Town of Hartland Landfill	0.1		0.1	440	0.1	445
TOTAL DISPOSED		**593,966**		**480,541**		**435,099**

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STATE PLANNING OFFICE) DETERMINATION
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JUNIPER RIDGE LANDFILL EXPANSION)
#S-020700-W5-AU-N) PARTIAL APPROVAL
(APPROVAL WITH CONDITIONS))

ATTACHMENT D
MUNICIPAL SOLID WASTE (MSW) GENERATED IN MAINE[12]

DISPOSAL TYPE	2008 – % of total	2009		2010	
		% of total	tons	% of total	tons
Incinerated: Maine Energy, PERC, ecomaine & MMWAC	74.3	74.2	491,000	71.1	469,707
Municipal/Quasi-Municipal Landfills	12.5	10.9	71,894	10.6	69,713
Crossroads Landfill in Norridgewock	10.3	9.9	65,529	10.7	70,500
Exported to NH or NB	1.9	3.8	24,857	6.1	40,606
Generator-Owned Landfills	0.8	0.6	4,202	0.5	2,956
Incinerator Bypass to Juniper Ridge Landfill	0.2	0.6	4,156	1.0	6,910
total amount of MSW generated (in tons)	692,508		661,638		660,392

[12] FEPR amounts are reported in the special waste table

STATE OF MAINE, ACTING THROUGH THE.) 35 PUBLIC BENEFIT
STATE PLANNING OFFICE) DETERMINATION
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#S-020700-W5-AU-N) PARTIAL APPROVAL
(APPROVAL WITH CONDITIONS))

ATTACHMENT E
AMOUNT OF WASTE DISPOSED IN JUNIPER RIDGE LANDFILL,
AFTER PURCHASE BY STATE OF MAINE

WASTE STREAM	**2003 amendment application (estimate)**		**2003 (Oct-De (actual)**	**2004 (actual)**	**2005 (actual)**		**2006 (actual)**		**2007 (actual)**		**2008 (actual)**		**2009 (actual)**		**2010 (actual)**		**2011 (from monthly reports)**	
	(tons)	% of total	(tons)	(tons)	(tons)	% of total	(tons)	% of total	(tons)	% of total	(tons)	% of total	(tons)	% of total	(tons)	% o total	(tons)	% of total
ash related waste	70,000	13.0	5,744	20,880	58,269	23.1	86,474	16.4	91,999	19.5	159,159	25.8	131,132	24.8	131,187	18.5		
FEPR	120,000	22.2	0	393	45,644	18.1	105,139	20.0	74,763	15.8	117,118	19.0	84,727	16.0	125,250	17.7		
OBW	20,000	3.7	0	0	12,271	4.9	29,225	5.6	9,649	2.0	21,405	3.5	51,438	9.7	96,520	13.6		
CDD	190,000	35.2	0	493	76,088	30.2	163,581	31.1	143,453	30.4	125,790	20.4	104,309	19.7	145,488	20.5		
CDD fines/fines for cove			0	0	7,931	3.1	42,320	8.0	41,109	8.7	45,148	7.3	46,744	8.8	87,449	12.3		
Misc. special waste[13]	50,000	9.3	0	569	252	0.1	38,419	7.3	46,379	9.8	73,704	11.9	7,595	1.4	19,029	2.7		
Misc. non-special solid wastes			30	0	48	--	11,649	2.2	8,398	1.8	5,822	0.9	2,051	0.4	1,106	0.2		
Wood/bark/knots,			5,842	4,884	7,504	3.0	2,013	0.4	145	--	127	--	605	0.1	858	0.1		
Lime/slaker grit					6,936	2.7	5,784	1.1	4,402	0.9	3,130	0.5	6,205	1.2	3,229	0.5		
Treatment plant sludges	50,000	9.3	35,290	26,686	35,336	14.0	29,999	5.7	44,683	9.5	44,953	7.3	70,265	13.3	58,558	8.3		
MSW bypass	40,000	7.4	0	0	2,035	0.8	11,155	2.1	7,620	1.6	21,426	3.5	23,551	4.5	39,524	5.6		
TOTAL WASTE (tons)	**540,000**	100.1	**46,906**[14]	**53,905**[15]	**252,31**	100	**525,758**	99.9	**472,600**	100	**617,782**	100.1	**528,622**	99.9	**708,198**	100	**706,452**	
change from 2003 amendment application					47% of estimate		97% of estimate		88% of estimate		114% of estimate		98% of estimate		131% of estimate		131% of estimate	

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[13] Miscellaneous special wastes includes oil spill debris, sandblast grit, non-friable asbestos, leather scraps, grit screenings, etc.
[14] Sludge mixing program began
[15] Sludge mixing program ongoing; limited waste acceptance

STATE OF MAINE, ACTING THROUGH THE PUBLIC BENEFIT
STATE PLANNING OFFICE) DETERMINATION
OLD TOWN, PENOBSCOT COUNTY, MAINE)
JUNIPER RIDGE LANDFILL EXPANSION)
#S-020700-W5-AU-N) PARTIAL APPROVAL
(APPROVAL WITH CONDITIONS))

ATTACHMENT F (page 1 of 2)
OBW and FINES from KTI, and MERC & PERC BYPASS DISPOSED at
JUNIPER RIDGE LANDFILL (in tons)

	OBW - KTI	FINES - KTI	MSW BYPASS - MERC		MSW BYPASS - PERC	RDF - MERC
2008						
Jan.	1,618	4,483	0		0	0
Feb.	1,389	3,868	0		0	0
Mar.	1,696	4,301	0		0	0
April	1,703	3,502	1,897		0	0
May	1,855	2,717	5,466		0	0
June	1,541	4,281	1,673		0	0
July	2,025	861	1,352		0	0
Aug.	1,829	2,369	2,635		0	0
Sept.	1,956	3,184	3,008		0	0
Oct.	1,874	4,733	2,113		0	0
Nov.	1,758	3,183	170		0	0
Dec.	1,379	2,910	3,111		0	0
TOTAL	**20,623**	**40,392**	**21,425**		**0**	**0**
2009						
Jan.	1,590	3,259	0		0	0
Feb.	742	2,447	0		0	0
Mar.	1,445	3,209	0		0	0
April	1,441	1,535	1,889		0	0
May	1,838	0	5,817		10	1,064
June	1,960	6,134	2,978		341	245
July	3,050	4,608	2,767		472	0
Aug.	1,889	477	3,149		0	246
Sept.	1,753	1,627	1,606		0	219
Oct.	8,919	5,393	1,034		325	135
Nov.	14,514	2,330	653		0	83
Dec.	11,440	3,639	517		0	0
TOTAL	**50,581**	**38,952**	**20,410**		**1148**	**1,192**

STATE OF MAINE, ACTING THROUGH THE STATE PLANNING OFFICE) PUBLIC BENEFIT DETERMINATION
OLD TOWN, PENOBSCOT COUNTY, MAINE)
JUNIPER RIDGE LANDFILL EXPANSION)
#S-020700-W5-AU-N) PARTIAL APPROVAL
(APPROVAL WITH CONDITIONS))

ATTACHMENT F (page 2 of 2)
OBW and FINES from KTI, and MERC & PERC BYPASS DISPOSED at JUNIPER RIDGE LANDFILL (in tons)

	OBW - KTI	FINES - KTI	MSW BYPASS - MERC		MSW BYPASS - PERC	RDF - MERC
2010				(soft layer)		
Jan.	12,143	3,000	1,146		637	0
Feb.	7,601	3,117	1,592		1,347	351
Mar.	4,959	5,389	2,038		0	679
April	7,591	5,805	4,101		0	0
May	8,554	5,328	5,355		0	0
June	8,797	10,845	1,769		0	0
July	6,042	6,438	2,655		0	0
Aug.	8,561	6,417	2,784		0	0
Sept.	7,999	9,458	1,210	2,124	0	0
Oct.	7,978	17,022	0	5,035	0	0
Nov.	8,252	12,833	0	4,777	0	0
Dec.	6,680	10,735	0	2,975	0	0
TOTAL	**95,157**	**96,387**	**22,650**	**14,911**	**1,984**	**1,030**
2011						
Jan.	6,989	9,155	0	824	0	0
Feb.	5,581	8,364	0	589	0	0
Mar.	8,559	10,945	376	0	0	0
April	8,138	9,718	1,306	0	0	0
May	8,157	7,968	4,929	0	0	0
June	9,355	9,104	2,445	0	0	0
July	8,787	9,636	2,528	0	0	0
Aug.	12,645	11,882	2,372	0	0	0
Sept.	10,284	12,541	2,199	0	0	0
Oct.	10,623	13,849	849	649	0	0
Nov.	4,398	9,583	0	1,785	0	0
Dec.	4,228	12,260	0	1,454	0	0
TOTAL	**97,744**	**125,005**	**17,004**	**5,301**	**0**	**0**

Appendix A

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, 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 MRSA Chapter 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.

DEP INFORMATION SHEET

Appealing a Commissioner's Licensing Decision

Dated: January 2004 Contact: (207) 287-2811

SUMMARY

One of two methods is available to an aggrieved person for appealing a licensing decision made by the Department of Environmental Protection's ("DEP") Commissioner -- in an administrative process before the Board of Environmental Protection ("Board") or a judicial process before Maine's Superior Court. This FACT SHEET, in conjunction with consulting statutory and regulatory provisions referred to herein, will assist aggrieved persons with understanding their rights and obligations in filing an administrative or judicial appeals. A failure to file an appeal within the identified time periods will result in the Commissioner's decision becoming final.

I. ADMINISTRATIVE APPEALS TO THE BOARD

LEGAL REFERENCES

DEP's *General Laws*, 38 M.R.S.A. § 341-D(4), and its *Rules Concerning the Processing of Applications and Other Administrative Matters* (Chapter 2), 06-096 CMR 2.24.

HOW LONG YOU HAVE TO SUBMIT AN APPEAL TO THE BOARD

The Board must receive a written notice of appeal within 30 calendar days of the date on which the Commissioner's decision was filed with the Board.

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 and photocopies are not acceptable. The person appealing a licensing decision must also send the DEP's Commissioner and the applicant a copy of the documents. All 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

An appeal must contain the following information:

1. *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.
2. *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.
3. *The remedy sought.* This can range from reversal of the Commissioner's decision on the license or permit to changes in specific permit conditions.
4. *All the matters to be contested.* As part of the appeal, the Board will limit its consideration to those arguments specifically raised in the written notice of appeal.

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 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 as part of an appeal only when 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 show 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, Section 24(B)(5).

OTHER CONSIDERATIONS IN APPEALING A DECISION TO THE BOARD

1. *Be familiar with all relevant material in the DEP record.* A license file is public information 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.* An applicant proceeding with a project pending the outcome of an appeal 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 initiation of the appeals procedure, including the name of the DEP project manager assigned to the specific appeal, within 15 days of receiving a timely filing. The notice of appeal, all materials accepted by the Board Chair as additional evidence, and any materials submitted in response to the appeal will be sent to Board members along with a briefing and recommendation from DEP staff. Parties filing appeals and interested persons are notified in advance of the final 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. The Board will notify parties to an appeal and interested persons of its decision.

II. <u>APPEALS TO MAINE SUPERIOR COURT</u>

Maine law allows aggrieved persons to appeal final Commissioner licensing decisions to Maine's Superior Court, see 38 M.R.S.A. § 346(1); 06-096 CMR 2.26; 5 M.R.S.A. § 11001; & MRCivP 80C. Parties to the licensing decision must file a petition for review within 30 days after receipt of notice of the Commissioner's written decision. A petition for review by any other person aggrieved must be filed within 40-days from the date the written decision is rendered. The laws cited in this paragraph and other legal procedures govern the contents and processing of a Superior Court appeal.

ADDITIONAL INFORMATION

If you have questions or need additional information on the appeal process, contact the DEP's Director of Procedures and Enforcement at (207) 287-2811.

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.

APPENDIX B

COPY OF PROPERTY DEED

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: [signature]
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,

A. Claire Sherwood
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. Carpentler, 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
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

APPENDIX C

FINANCIAL ABILITY

APPENDIX C-1

LETTER OF CREDIT

Bank of America

May 21, 2015

Maine Department of Environmental Protection
Bureau of Remediation and Waste Management
17 State House Station
Augusta, ME 04333

RE: NEWSME Landfill Operations, LLC / Casella Waste Systems, Inc. Financial Capability

Dear Sir / Madam:

We understand that you require a bank reference for Casella Waste Systems, Inc (the “Company”) and its wholly owned subsidiary, NEWSME Landfill Operations, LLC.

The Company has maintained a banking relationship with us since 1995. It is well known to us and has maintained its relationship with us in a satisfactory manner.

In addition, Bank of America N.A. is the administrative agent for a secured credit facility of approximately $190 million provided to the company and its subsidiaries by a group of lenders (the “Credit Facility”). The amount available under the credit facility is currently approximately $38 million. The company may utilize the Credit Facility for direct borrowings and standby letters of credit subject to the conditions that (a) the Company may not be in default under the terms of the Credit Facility and (b) the Company’s representations and warranties contained in the agreement governing the Credit Facility be true and correct in all material aspects as of the date of the borrowing.

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., its affiliates or any of its or its affiliates’ directors, officers or employees. Bank of America, N.A. undertakes no responsibility to update the information set forth in this letter.

Very truly yours,

Bank of America, N.A.

Christopher M. O’Halloran
Senior Vice President

APPENDIX C-2

CLOSURE FUNDING AGREEMENT

CONTINUATION CERTIFICATE

The Evergreen National Indemnity Company, as Surety on bond number 853746, in the amount of, Eleven Million, Ninety-Four Thousand, Nine Hundred Forty-Three and 00/100 Dollars ($11,094,943.00), on behalf of NEWSME Landfill Operation, LLC, the Principal, in favor of the State of Maine Department of Environmental Protection, the Obligee, hereby continues the term of said bond in the amount of Eleven Million, Ninety-Four Thousand, Nine Hundred Forty-Three and 00/100 Dollars ($11,094,943.00), for the period beginning the 12th day of September, 2014, and ending the 12th day of September, 2015, subject to all covenants and conditions as set forth and expressed in said bond.

This Continuation Certificate is executed upon the express condition that the Company's liability under said bond and this and all Continuation Certificates issued in connection therewith shall not be cumulative and shall not in any event exceed the sum of the said bond in force at the time of default.

Signed and sealed this 18th day of September, 2014.

NEWSME Landfill Operation, LLC

By *John W. Casella*, Pres & Sec.
(Title) John W. Casella

(Corporate Seal)

Evergreen National Indemnity Company

By *Patricia A. Temple*
Patricia A. Temple, Attorney-In-Fact

(Corporate Seal)

EVERGREEN NATIONAL INDEMNITY COMPANY
MAYFIELD HEIGHTS, OH
POWER OF ATTORNEY

POWER 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:

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 **Eleven Million, Ninety-Four Thousand, Nine Hundred Forty-Three and 00/100 Dollars ($11,094,943.00).**

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 June, 2009.

EVERGREEN NATIONAL INDEMNITY COMPANY

EVERGREEN NATIONAL INDEMNITY COMPANY CORPORATE SEAL 1939 OHIO

By: Chas D. Hamm Jr.
Charles D. Hamm Jr , President

By David A. Canzone
David A. Canzone, CFO

Notary Public)
State of Ohio) SS:

On this 1st day of June, 2009, before the subscriber, a Notary for the State of Ohio, duly commissioned and qualified, personally came Charles D. Hamm, Jr. 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 Columbus, Ohio, the day and year above written.

NOTARIAL SEAL STATE OF OHIO
PENNY M BURNS NOTARY PUBLIC STATE OF OHIO Comm. Expires April 04, 2017

Penny M. Burns
Penny M. Burns, Notary Public
My Commission Expires April 4, 2017

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 this.

Signed and sealed in Mayfield Heights, Ohio this 18th day of September, 2014.

EVERGREEN NATIONAL INDEMNITY COMPANY CORPORATE SEAL 1939 OHIO

Wan Collier
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 **Six Million, Seven Hundred Forty-Nine Thousand, Four Hundred and 00/100 Dollars ($6,749,400.00),** on behalf of **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 be **Nine Million, Nine Hundred Seventy-Seven Thousand, Three Hundred and 00/100 Dollars ($9,977,300.00),** effective the 12th day of August, 2014.

All other items, limitations and conditions of said bond except as herein expressly modified shall remain unchanged.

Signed, sealed and dated this 11th day of August, 2014.

Principal: NEWSME Landfill Operation, LLC

By: ____________________, Pres & Sec
John W. Casella

Surety: Evergreen National Indemnity Company

By: ____________________
Patricia A. Temple, Attorney-In-Fact

EVERGREEN NATIONAL INDEMNITY COMPANY

MAYFIELD HEIGHTS, OH

POWER OF ATTORNEY

POWER 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:

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 **Nine Million, Nine Hundred Seventy-Seven Thousand, Three Hundred and 00/100 Dollars ($9,977,300.00).**

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 June, 2009.

EVERGREEN NATIONAL INDEMNITY COMPANY

EVERGREEN NATIONAL INDEMNITY COMPANY CORPORATE SEAL 1939 OHIO

By: Charles D. Hamm Jr.
Charles D. Hamm Jr , President

By
David A. Canzone, CFO

Notary Public)
State of Ohio) SS:

On this 1st day of June, 2009, before the subscriber, a Notary for the State of Ohio, duly commissioned and qualified, personally came Charles D. Hamm, Jr. 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 Columbus, Ohio, the day and year above written.

NOTARIAL SEAL STATE OF OHIO

PENNY M BURNS
NOTARY PUBLIC
STATE OF OHIO
Comm. Expires
April 04, 2017

Penny M. Burns
Penny M. Burns, Notary Public
My Commission Expires April 4, 2017

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 this.

Signed and sealed in Mayfield Heights, Ohio this 11th day of August, 2014.

EVERGREEN NATIONAL INDEMNITY COMPANY CORPORATE SEAL 1939 OHIO

Wan C. Collier
Wan C. Collier, Secretary

APPENDIX D

TECHNICAL ABILITY

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PATRICIA W. AHO
COMMISSIONER

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION ASSESSMENT TO THE FINANCE AUTHORITY OF MAINE (PURSUANT TO 10 M.R.S.A. § 1044(11))

JUNE 10, 2015

PROJECT APPLICANT / LOCATION

Casella Waste Systems, Inc.

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 funding various improvements including: a new zero-sort recycling facility, a thiopaq landfill gas treatment system, solid waste collection vehicles, solid waste collection containers, landfill construction and engineering, buildings improvements and other equipment, machinery and equipment replacements related to the Applicant's various facilities and operations in Maine, including:

- BBI Dayton
- BBI Old Orchard Beach
- Casella Recycling
- Hawk Ridge Composting
- Juniper Ridge Composting
- Juniper Ridge Landfill
- Lewiston MRF
- Old Town Transfer
- Pine Tree Arundel
- Pine Tree Bath C&D
- Pine Tree Bath Transfer
- Pine Tree Bethel
- Pine Tree Hampden
- Pine Tree Hermon
- Pine Tree Houlton
- Pine Tree Mars Hill
- Pine Tree Mechanic Falls
- Pine Tree Orient
- Pine Tree Portland (Scarborough)
- Pine Tree Smyrna
- Pine Tree Waterville
- Pine Tree Westbrook
- Pine Tree Weston

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
- Maine DEP records and staff – Bureau of Air Quality, Bureau of Land and 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.

Bureau of Land 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 summer). 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.

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.

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:

None.

PREPARED BY: MARK MARGERUM / DEP, OFFICE OF THE COMMISSIONER
DATE: JUNE 10, 2015

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

4 Blanchard Road, PO Box 85A, Cumberland Center, ME 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

MICHAEL S. BOOTH, P.E.

EDUCATION

University of Maine - B.S. in Civil Engineering, 1979
Special Courses:
Carbon Emission Trading – 2008, Financial Research Associates LLC
Landfill Gas Systems Engineering Design – 2006, CES Landtec Course
Geotechnical Aspects of Waste Disposal – 1987, University of Maine
Sanitary Landfill Gas and Leachate Management – 1985, University of Wisconsin
Geotechnical Aspects of Landfill Design – 1984, University of Wisconsin
Groundwater Pollution and Hydrology – 1984, Princeton University
Advanced Wastewater Treatment Systems – 1981, University of Maine

PROFESSIONAL REGISTRATION

Professional Engineer – Maine

AFFILIATIONS

American Society of Civil Engineers, Member
Solid Waste Association of North America, Member
U.S.EPA Landfill Methane Outreach Program, member

EMPLOYMENT HISTORY

1989 to currently - Sevee & Maher Engineers, Inc, Senior Project Manager/Project Engineer
1986 to 1989 - E.C. Jordan Co., Portland, Maine, Project Manager/Project Engineer
1980 to 1986 - Maine Department of Environmental Protection, Augusta, Maine, Engineer

PROFESSIONAL EXPERIENCE

Mr. Booth has over 32 years of experience with the design, permitting, and operation of environmental projects. As a Project Manager/Project Engineer with Sevee & Maher Engineers, Mr. Booth is responsible for both the technical and managerial aspects of multi-task projects including client relations, regulatory agency relations, detailed design, permitting, construction, and operation assistance principally focused on solid waste management issues.

Assignments in his various areas of expertise have included:

- Preparing Design and Permits for Commercial, Private and State Owned Landfills and Overseeing Landfill Construction - Mr. Booth has managed and acted as lead technical engineer on five landfill projects in the State of Maine. As the lead technical engineer Mr. Booth has been responsible for directing the detailed hydrogeologic investigations, evaluating siting issues such as odor, noise, visual, and wetland impacts, completing detail liner and leachate collection system designs, and preparing cell development and operational plans. Mr. Booth has also been responsible for preparing supporting permits for the projects and providing permit support during the permitting process. These landfills were designed to accept a number of different materials, including municipal solid waste, construction and demolition debris, and special wastes such as bottom and fly ash, and sludges. For these projects, Mr. Booth has been involved in the oversight of construction and provided operational assistance to the facilities;

- Providing Technical Design Services for a 68-acre Commercial Landfill - In this role, Mr. Booth has been responsible for managing and preparing a number of State and Local applications for both an expansion and closure of this facility since 1992. The facility handles a variety of waste streams, including MSW incinerator ash, other boiler ash, construction and demolition debris, municipal solid waste, and assorted special wastes. He has directed the design and construction of eight phases of landfill cell construction and three phases of final cover construction at the facility including the development of detailed design drawings, administrative contract documents, and operations manuals. For this site, he has also directed studies and designs relating to landfill liner and cover stability; landfill leachate collection and treatment; groundwater remediation; landfill gas collection and fugitive migration control. Recently he has been responsible for designing and permitting the leachate recirculation system for the site. This system is unique because it recirculates leachate in a waste mass with a large percentage of construction and demolition debris;

- Evaluating the performance of an Alternate Landfill Final Cover System in South Africa - Mr. Booth worked with a South African Paper Company to evaluate the performance of an alternate final cover system at a pulp and paper mill landfill in Springs, South Africa. The landfill received a number of process mill wastes, including pulping wastes, bottom and fly ash, and wastewater sludge. Prior to Mr. Booth's involvement, the company had performed initial laboratory and field tests to evaluated if its primary sludge could be used as a final landfill cover material. A test cell was constructed using the primary sludge and its performance was monitored over a several year period. The monitoring results indicated that the properties of the sludge cover were changing over time and the original assumptions on cover performance were no longer valid. Mr. Booth developed a program to characterize the current in-situ characteristics of the sludge cover and its hydraulic performance in the South African climate. Samples of the in situ sludge cover were collected and laboratory tests performed. From the tests results, Mr. Booth was able to characterize the cover degradation mechanisms and use this information to demonstrate the effectiveness of the cover in the South African climate. Recommendations were also provided on future cover designs using the sludge material;

- Assist client obtain a program approval for a Solid Waste Beneficial Use Permit - Mr. Booth prepared and permitted a program approval under the State of Maine Beneficial Use of Solid Waste Regulations to allow for the general distribution of patented biomass energy pellets to industrial, commercial and institutional biomass boilers for use as a fuel substitute. The pellets are manufactured using biomass and recycled plastics to produce a fuel that is high in BTU content and moisture resistant. Because the pellets contain recycled plastics, and are used as a boiler fuel an individual permit would be require for each boiler using the pellets. Mr. Booth designed a program approval program that allowed use of the pellets in solid fuel boilers without first receiving individual permit;

- Evaluate State Solid Waste Capacity Needs as it Relates to an Expansion of State of Maine Landfill - Mr. Booth prepared an application for the Public Benefit Determination for the Expansion of the State Owned Landfill in Old Town Maine. The application needed to demonstrate consistency with the State of Maine's Waste Management and Recycling Plan prepared for the State Planning Office. Through this effort Mr. Booth developed an in-depth working knowledge of the current waste management practices with the State and the implementation of the waste management hierarchy establishing priorities of waste handling of waste reduction, reuse, recycling, compositing, volume reduction by incineration, for energy recovery, and landfilling;

- Designing and Permitting of an Odor Control and Landfill Gas Treatment System for Commercial Landfill - Mr. Booth participated in the design and permitting of an active landfill gas collection and treatment system at a 57-acre commercial landfill. The main components of the system include gas collection and conveyance piping; a condensate handling system; a stationary flare with a rated capacity of 1,200 standard cubic feet per minute (SCFM) and 34 MMBTUs per hour and a gas conditioning system to remove sulfur compounds. Mr. Booth was responsible for providing technical oversight to the project, preparing the Title V air permit application, and the facility's Operations Manual. As part of the Operations Manual, Mr. Booth was involved in designing a data operation collections system to allow timely collection of operational data for the facility;

- Preparing and Evaluating the Feasibility of Renewable Energy Projects at a Municipal Landfill - Mr. Booth evaluated the feasibility of developing a renewable energy project for a small municipal landfill with an active gas collection system. The evaluation consisted of quantifying and projecting future landfill gas projections; identifying seven potential utilization projects and their components and performing an economic evaluation that defined project costs and revenues and a project life cycle analysis. The project evaluated included using the gas for power generation, on and off-site heating, and off-site cogeneration; and,
- Evaluating and Preparing Documentation of Carbon Credits Associated with an Active Landfill Gas Flaring Project - Mr. Booth assisted a municipal client with the monetization of emission reductions associated with a landfill gas flaring project. The emission reductions, associated with destroying methane gas, are eligible to be sold as monetized "carbon credits" under several different protocols established to provide a means to quantify and qualify projects that result in the reduction of greenhouse gas emissions. The first phase of the project was to evaluate the eligibility of the project under protocols set forth by the Voluntary Carbon Standard (VCS), the Chicago Climate Exchange (CCX), the Regional Greenhouse Gas Initiative (RGGI), and the Climate Action Reserve (CAR). Based on this evaluation the client elected to pursue carbon credits using the CAR protocol. Mr. Booth prepared the required project documentation to have this project listed and verified under the CAR Protocol. Another component of this project was to assist the client with compiling and managing the data required to verify this project.

PRESENTATIONS and PUBLICATIONS

- March 2009 Is it low tide? The saga of an odor control challenge at a small municipal landfill. Presented at SWANA Landfill Gas Symposium in Atlanta, Georgia. Coauthor.
- December 2008 A Small Landfill's Preliminary Evaluation of Carbon Credits and Renewable Energy Projects. Presented at U.S.EPA LMOP Landfill Gas Energy: A Sustainable Energy Source from Small Landfills in New England conference in Portland Maine.
- June 22, 1989, Closing Landfills, presented at one-day conference entitled "How to Deal With Your Solid Waste," sponsored by SMVTI.
- February 1987, Permitting a Landfill in the State of New York, presented at the New York North Western Region monthly TAPPI meeting.

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JOHN E. SEVEE, P.E., C.G.

EDUCATION

University of Vermont - B.S. in Civil Engineering, 1971
University of Vermont - M.S. in Geotechnical Engineering, 1973
University of Southern Maine - B.A. in Physics, 1994

PROFESSIONAL REGISTRATION

Professional Engineer - Maine, New Hampshire, Massachusetts, Florida, New Jersey, Ohio, North Carolina, South Carolina, Georgia, Connecticut, Pennsylvania, and Indiana
Certified Geologist - Maine

AFFILIATIONS

Association of Ground Water Scientists and Engineers, National Water Well Association, Member
American Society of Civil Engineers, Member
American Geophysical Union, Member
Formerly adjunct instructor at University of Southern Maine, in Engineering, Hydrogeology, and Contaminant Fate and Transport

EMPLOYMENT HISTORY

Currently from 1985 - Sevee & Maher Engineers, Inc. President

1985 from 1979 - E.C. Jordan Company, Portland, Maine, Manager of Earth Sciences and Geohydrologic Services

1979 from 1973 - Ardaman and Associates, Inc., Orlando, Florida, Project Geotechnical Engineer

EXPERIENCE

Specific expertise in the areas of geotechnical and hydrogeologic engineering. Responsible for projects involving geochemical analysis of groundwater, groundwater modeling studies, groundwater plume tracing, design of remediation systems, project permitting and expert testimony, regulatory negotiations, geotechnical design, and construction.

Directed a variety of hydrological, geohydrological, geochemical, geotechnical and hazardous waste investigations, at landfills, active industrial sites, and hazardous waste sites. These projects routinely have involved multidisciplinary efforts of laboratory analytical services, geotechnical engineers, solid and hazardous waste engineers, geophysicists, soil boring contractors, geochemists, monitoring well and piezometer installation contractors, geologists, structural engineers, architects, planners, water resource engineers, biologists, and/or waste water engineers. Managed a company with up to 30 geophysicists, soil scientists, geologists, geohydrologists, geotechnical engineers, and a geotechnical laboratory. Worked on projects located throughout the United States, and various parts of Canada, Russia, Middle East, Africa, and South America. Project budgets have ranged in excess of $30 million.

Typical projects in various areas of expertise include:

- responsible for field investigations and interpretation of geohydrologic data at uncontrolled hazardous waste sites where heavy metals, solvents, etchants, coal tars and other chemicals were improperly stored and disposed, including recommendations for cleanup,
- responsible for collection, review, and statistical analysis of water quality and soil quality data and assessment of environmental risk,
- use of stable isotopes to date groundwater and trace chemical plumes in groundwater,
- geochemical evaluation of natural and impacted other waters including geochemical modeling for compounds such as arsenic, mercury, and metals, including facilitated colloidal transport,
- design and construction of groundwater and soil remediation systems (including organic chemicals, such as VOCs, SVOCs, BETX, and metals such as mercury), including pump and treat, in situ biodegradation, and excavation,
- investigations and remediation of chlor-alkali facilities,
- hydrogeologic and contaminant assessments on fourteen Superfund sites, including Remediation investigations (RI) and Feasibility Studies (FS),
- groundwater resource studies requiring interpretation of the geologic setting, analysis of aquifer yield characteristics, fracture analysis, well-head protection, and saltwater intrusion,
- use and development of finite difference and finite element computer models for simulation of groundwater and chemical transport for landfills and chemical spills,
- land disposal and groundwater recharge investigation involving evaluation of impacts on surface water and groundwater,
- geohydrologic and geotechnical investigations for the siting, design, and license application of solid waste landfills for mining waste, municipal solid wastes, ash, hazardous wastes (including organic chemicals, such as VOCs, SVOCs, BETX, and metals such as mercury), and papermill wastes,
- a broad variety of geotechnical projects including foundation investigations for buildings, tanks, and heavy industrial facilities, design of earthen dams and retaining walls, and slope stability,
- slope stability, landfill foundation and waste stability, and dam stability analyses including seismic assessment,
- impact assessment on groundwater and surface water quality, mine dewatering analyses, injection well design, stability and settlement analyses,
- landfill cover design, including long-term monitoring of landfill cover systems for settlement and stability,
- design and construction of groundwater collection systems to remediate groundwater at landfills and hazardous waste sites,

- impact assessments for oily waste disposal areas and solid waste landfills,
- negotiations with state and federal regulatory agencies and permitting assistance,
- expert testimony.

PUBLICATIONS AND PRESENTATIONS

"Shear Strength Anisotropy in a Laminated Silt," Masters Thesis, University of Vermont, 1973.

"Silresim: A Hazardous Waste Case Study." Presented to the Management of Uncontrolled Hazardous Waste Sites Conference, November 29 - December 1, 1982, with John D. Tewhey.

"Cost-Effectiveness Studies of Ground-Water Clean-up at Hazardous Waste Sites." Presented to Conference on Ground-Water Investigations and Policy in Maine, Augusta Civic Center, 1983.

"Use of Computer Groundwater Modeling Techniques in the Design of a Monitoring Program at a Hazardous Waste Superfund Site." Presented to the Fourth National Symposium and Exposition on Aquifer Restoration and Ground Water Monitoring, May 23-25, 1984, with Ron A. Lewis.

"Groundwater Control During Construction of a Roadway Access on Uncontrolled Coal Tar Disposal Site." Presented to Eastern Regional Groundwater Conference, National Water Well Association, 1984, with Earl G. Hill.

"Economic Considerations for Siting Solid Waste Landfills." 1985 TAPPI National Convention, with Richard Saucier.

"Monitoring Wells-A Case History Anthology," Presented to the National Water Well Association Short Course on Ground Water and Unsaturated Zone Monitoring and Sampling, 1985, Portland, Maine.

"Geohydrologic Considerations of Large Wastewater Disposal Systems and High-Density Individual Systems," Presented to 1987 Annual Site Evaluators Meeting, Augusta Civic Center.

"Rehabilitation of Monitoring Wells on an Organic Chemical Spill Site." 1987 Symposium on Standards Development for Ground Water and Vadose Zone Monitoring Systems, ASTM Subcommittee D18.21, with Peter Maher.

"Sources of Groundwater Contamination," March 1988, Maine Section American Society of Civil Engineers, Maine Ground Water Issues.

“Methods and Procedures for Defining Aquifer Properties”, Chapter 10 in "Practical Handbook of Ground-Water Monitoring," Editor David Nielson, Lewis Publishers, Inc., 1991.

"Subdivision Review and Residential Development," Presented to Planners and State Employees of Maine working in areas of groundwater protection; sponsored by Southern Maine Regional Planning Commission, June 1990.

“Hydrogeology and Environmental Geology of the Gray Delta Complex,” 1996, with Andrew Tolman, Katherine Bither, Fred Beck, Martha Mixon, and Tom Weddle, presentation at New England Intercollegiate Geologic Conference.

"Groundwater Behavior in the Bedrock of Maine," in Bulletin 4, Selected papers on the Hydrogeology of Maine, Geological Society of Maine, 1996.

"An Analysis of Low-Flow Ground Water Sampling Methodology," with Carol White and David Maher, Ground Water Monitoring Review, Spring 2000.

"Predicting the Environmental Effects from Short Paper Fiber and Biosolids Use in Manufactured Topsoil," J. Sevee, P.E., C.G.; A.W. Thayer, C.G.; A. Duran, Ph.D.; E.R. Myers; and J.C. Brinck, November 2007.

"Effective Porosity Measurement of a Marine Clay," ASCE Journal of Environmental Engineering, Volume 136, No. 7, July 2010.

Information Tag: Scan for Vcard with smart phone (Get app at http://gettag.mobi).

Jacob Riley

Project Manager / Fisheries Biologist

Jake is a certified fisheries professional and certified ecologist and with over 12 years of fisheries research and project experience. His most recent professional work includes freshwater fish sampling, fisheries community and population assessments, salmonid spawning and rearing habitat surveys, , fish tissue collection, fisheries water quality data analysis and literature reviews, aquatic habitat surveys, and biological assessments and essential fish habitat preparation. Jake's prior research experience includes researching predation impediments for lake trout restoration in Lake Champlain and the Great Lakes. Jake also has broad ecological experience in natural resource assessments including endangered species act compliance, terrestrial RTE species surveys, dam removal and stream restoration construction monitoring, powerline environmental EPSC compliance assessments, stream restoration designs and monitoring, macroinvertebrate sampling, and conducting stream geomorphic and water quality assessments.

PROFESSIONAL EXPERIENCE

- Stantec Consulting. 2010-present. Project Scientist/Fisheries Biologist.
- VHB Pioneer, Inc. 2008-2010. Environmental Scientist III/Fluvial Geomorphologist.
- University of Vermont. 2005-2007. Graduate Research Assistant.
- Marin Municipal Water District, Corte Madera, CA. 2002-2004. Fisheries Watershed Aide.
- U.S. Forest Service, Fish and Aquatic Ecology Unit, Logan, UT. 2003-2004. Crew Leader and Habitat Technician.

EDUCATION

Backpack Electrofishing: Principles and Practices, Northwest Environmental Training Center, Fairfield, Maine, 2014

About Boating Safety, U.S. Coast Guard Auxiliary, Bath, Maine, 2015

B.A., Environmental Studies, Bates College, Lewiston, Maine, 2002

M.S., Aquatic Ecology and Watershed Science, University of Vermont, Burlington, Vermont, 2008

Using Fluvial Geomorphology in Watershed Assessment and Stream Restoration, Field Geology Services, Norwich, Vermont, 2008

Field Tour of Stream Restoration Projects in Western Maine, Field Geology Services, Newry, Phillips, and Rangeley, Maine, 2010

Fish and Aquatic Organism Passage through Culverts, Vermont Local Roads Program, Montpelier, Vermont, 2008

Heartsaver Pediatric First Aid, American Heart Association, Brunswick, Maine, 2014

Wilderness First Aid Certified, SOLO, Topsham, Maine, 2014

40-Hour Hazwoper Certified, OSHA, Topsham, Maine, 2014

REGISTRATIONS

Certified Ecologist, Ecological Society of America

Certified Fisheries Professional #3250, American Fisheries Society

MEMBERSHIPS

Member, Ecological Society of America

Member, American Fisheries Society

Jacob Riley

Project Manager / Fisheries Biologist

PROJECT EXPERIENCE

Fish and Fish Habitat Services

TransCanada Prince Rupert Gas Transmission Project, Smithers, British Columbia

Served as a fisheries field crew member and fisheries field crew lead during baseline fisheries inventories and aquatic habitat assessments in association with a comprehensive Environmental Assessment to evaluate the potential effect of proposed routing of a 750-km liquefied natural gas (LNG) pipeline originating at the Prince Rupert terminal facility. Responsibilities included conducting field surveys in accordance with TransCanada safe work practices, aquatic habitat assessments evaluating watercourse geomorphology, water quality, vegetation, and fish habitat suitability characterization, electrofishing surveys, minnow trapping, GPS navigation and data collection, daily reporting, and logistical coordination with local First Nations representatives and helicopter pilots.

Threatened Stonecat Surveys, Charlotte, Vermont

After consultation with state agencies, developed a protection plan for a Vermont state threatened Stonecat (Noturus flavus) fish species, which included conducting a population estimate electrofishing survey and in-stream exclusion and protection measures that were implemented during the repair of the bridge pier. Jake assisted with threatened and endangered species permitting and in doing so worked with University of Vermont Researchers, the Vermont Agency of Natural Resources and the Vermont Department of Fish and Wildlife to develop the protection plan. He assisted UVM researches with PIT tagging captured stonecats and led a small electrofishing crew for two nights of removal depletion methods within the reach encompassing the bridge.

Essential Fish Habitat Analysis, Hudson River, New York

Conducted a literature review to collect and review pertinent information and research on the project area and the 16 fisheries species and their various life stages that are designated by NMFS as EFH. Corresponded with NMFS representatives to solicit and incorporate their input regarding the Hudson River EFH assessment. Completed and presented an analysis of EFH potentially affected by the proposed dredging and capping remediation work and whether the designed species and their various life stages would be potentially impacted based on abiotic factors and each species temporal life cycles in a complex estuarine environment. The EFH report also included a discussion of the minimization of impacts to EFH that would be implemented by the project.

Aquatic Temperature and Fish Community Monitoring and Thermal Literature Review, New York

Developed and implemented a continuous temperature monitoring and fish community assessment study plan for a biological evaluation on the effects of thermal discharges on biotic communities in a fluvial environment. Conducted electrofishing and seine seasonal surveys of the creek's fish community using EPA RPB standardization methods in established habitat replicates. Researched and presented a literature review of thermal thresholds for coldwater and warmwater fish species. Based on meetings with state agency representatives, the study plan was designed to assess the thermal impacts of the discharge relative to ambient river temperature, tributary refuge inputs, and potential temperature stratification in a deep pool habitat supporting coldwater fish.

Jacob Riley

Project Manager / Fisheries Biologist

Stream Biological and Geomorphic Characterization and Baseline Survey, Placerville, Idaho

In support of an Environmental Assessment for the development of a mine near Placerville, Idaho, Jake assisted in negotiating a baseline sampling protocol for Fisheries and Aquatic Resources with the Idaho City Ranger District, United States Forest Service. He led a small team collecting benthic macroinvertebrates and surveyed fish habitat quality and channel and streambank conditions (e.g., cross section characteristics, channel and bed-form classification, substrate composition, bank stability, riparian vegetation structure and disturbance, large woody debris, pool habitat quality and quantity) from four stream reaches upstream and downstream from the proposed mining activities in accordance with the USFWS protocol. Results of the surveys were summarized in an extensive report compiling and presenting the abiotic and biotic data and statistics.

Aquatic Community Sampling, Delaware

Conducted off-site sampling for an ecological and human health risk assessment, including surface water quality, sediment, macroinvertebrates, and fish for polychlorinated biphenyl content analysis. Passive and active fish capture methods (gill-netting and electrofishing) were employed to sample various fish species and sizes at each sampling site located in different aquatic habitats. Replicate samples were processed with decontaminated gear in the field for laboratory analysis.

Taunton River Fish Impingement and Entrainment Impacts, Taunton, Massachusetts

Conducted egg and larval fish in-river and in-facility sampling to evaluate impingement and entrainment impacts of Massachusetts's first desalination facility. Fisheries sampling techniques include ichthyoplankton net tows and seining. Periodic scuba dive surveys were also conducted in the Taunton River to observe the efficacy of an in-river fish exclusion device.

Connecticut River Mussel Survey, Holyoke, Massachusetts

Assisted with collection of mussels during a multi-day dive survey downstream of the Holyoke Dam to determine the presence and abundance of common and threatened freshwater mussel species. Perpendicular in-river transects were established to determine mussel densities and record habitat characteristics. Mussels were collected, identified on-shore and marked.

Coldwater Fish Habitat Analysis, Maine

Utilizing vertical depth profiles of dissolved oxygen and temperatures in an impoundment, conducted data analysis to determine adequate temporal and spatial coldwater fish habitat based on established thresholds. Researched habitat constraint thresholds from a species specific literature review of laboratory and field results in similar lentic environments.

Salmonid Habitat and Spawner Survey, Maine

Conducted a spawning habitat assessment and spawner survey of a western Maine watershed documenting brook trout and landlock salmon redds and sensitive/prime habitat. Presented results to local stakeholders and federal agency representatives. Conducted a literature review of national and local buffer regulations/recommendations for logging practices effects on salmonid for a presentation to forest managers relative to a proposed harvest in the watershed.

Shortnose Sturgeon Protection Plan, Worker Training Presentation and Seine Relocations, Massachusetts

Prepared a protection plan for the federally listed shortnose sturgeon for a Bridge Reconstruction Project on the Taunton River in Massachusetts. Worked with the contractor and state and federal agencies to develop methods of relocating shortnose sturgeon and monitoring during construction. Conducted seine sturgeon relocation surveys. Presented the protection plan and construction worker shortnose sturgeon training program to contractors and state agency representatives. Obtained a collection permit from state agencies for shortnose sturgeon.

Section 316(b) Consultation and Section 308 Information Request for Paper Mill

Assisted Paper Mill with strategic guidance in preparing for a formal 316(b) consultation in response to a USEPA Section 308 Clean Water Act requirement. Collated and developed existing information regarding fish species, their life stages, and population estimates in the vicinity of the facility's cooling water intake structure (CWIS). Addressed the endangered species review in regard to the impacts of impingement on the federally endangered Atlantic Salmon (Salmo salar). Reviewed the facility's approach velocities within its CWIS traveling water screens.

** denotes projects completed with other firms*

Jacob Riley

Project Manager / Fisheries Biologist

Atlantic Salmon Habitat Survey, Spawner Survey, and Juvenile Data Analysis, New Brunswick, Canada

Conducted salmonid spawner surveys and report writing/data analysis of a watershed electrofishing community assessment. Surveyed potential Atlantic salmon spawning and juvenile rearing habitat in a 10-kilometer stretch of stream to determine the potential impacts of a proposed water withdraw. Installed pressure transducers and collected cross-sectional and stream bathymetric data to support habitat evaluation studies.

Lake Champlain and Lake Michigan Lake Trout Research*, Vermont and Wisconsin

Researched biological impediments for lake trout restoration: Identified freshwater fish predator community of lake trout fry in Lake Champlain and how predation rates vary seasonally and diurnally by conducting stomach analyses. Designed deep-water egg trap and tested techniques for assessing lake trout reproduction in Lake Michigan and Lake Champlain. Conducted data management/analysis and modeling, and presented results in thesis and professional oral presentations. Assisted in whitefish and sea lamprey surveys.

Geomorphic Stream Assessments*, Vermont

Conducted stream geomorphic and bridge and culvert assessments to determine impacts on channel processes and presented recommendations for stream restoration projects to stakeholders/clients. The stream assessments followed Vermont Agency of Natural Resource's Phase II Habitat and Geomorphic Assessments.

Stream Restoration Design and Monitoring*, Vermont

Designed the restoration plans for seven stream reaches within the Jay Peak Golf Course employing natural channel design principals and reference geomorphic surveys. Monitored the wetland and stream restoration construction to report weekly project updates to the ACOE and ensure compliance with the approved plans.

Homestead Dam Removal/Ashuelot River Restoration Construction Monitoring*, New Hampshire

Conducted construction monitoring of dam removal and river restoration to document project activities and to ensure all work complied with the approved design criteria and construction specifications, as well as with state (NHDES) and federal (ACOE) permits.

Marin County Salmonid Surveys*, California

Served as a fisheries watershed aid and conducted salmonid spawner and juvenile surveys using electrofishing and snorkeling methods for population estimates of coho salmon (Oncorhynchus kisutch), chinook salmon (Oncorhynchus tshawytscha), and steelhead trout (Oncorhynchus mykiss). Assisted in analyzing data and writing yearly population estimate reports. Conducted water quality sampling, erosion control monitoring, and aquatic habitat delineation and enhancement.

Natural Resource Services

Wind Farm Construction Compliance, Environmental Monitor, Massachusetts

Monitored construction activities for compliance with Massachusetts and federal permits for natural resource (streams, wetland and Rare/Threatened/Endangered species) protection and restoration. Worked with contractor, client representatives and client's environmental consultant to avoid or minimize temporary impacts during construction. Submitted weekly reports to Massachusetts state agency.

** denotes projects completed with other firms*

Jacob Riley

Project Manager / Fisheries Biologist

Biological Monitoring at Former Loring Air Force Base, Limestone, Maine

After the restoration and mitigation of 2.5 miles of high value brook trout stream and over 50 acres of wetlands following a sediment removal action, completed biological monitoring of the restored stream and surrounding ponds including extensive brook trout (Salvelinus fontinalis) tissue sampling to evaluate levels of PCBs, pesticides, and metals for human health and ecological risk modeling. Utilized backpack and boat electrofishing equipment to sample fish out of reference and restored streams and multiple ponds. Tissue samples were processed following QA/QC procedures for laboratory analysis, including chain of custody. Surface water and sediment samples were collected to further evaluate environmental health at sampling sites. Field-based studies included stream macroinvertebrate assessments, sediment sampling, and electro-fishing via boat (in ponds) and wading (in streams) for brook trout. Processed fish tissue and sediment samples and tracked and shipped samples to laboratories for analysis.

Wind Farm Development Surveys, Bingham, Maine

Conducted natural resource surveys for vernal pools, wetlands, and streams within a large potential commercial wind farm site. Results were used in planning, project layout, and permitting for impacts.

RTE Surveys and Environmental Compliance, Bakersfield, California

Conducted diurnal and nocturnal surveys on potential oil pads and access roads for five terrestrial rare, threatened, and endangered (RTE) species. RTE environmental compliance included implementing Best Management Practices to minimize impacts to the target species and their habitats.

VELCO Powerline Environmental Compliance*, Vermont

As Erosion Prevention/Sediment Control Specialist, monitored construction activities on three different remote powerline installations to ensure compliance with state (VTANR) and federal (ACOE) permits and right of way and archeology NOAs. Delineated aquatic natural resources including vernal pools, wetland and streams, and implemented appropriate EPSC measures to protect the aquatic natural resources.

Natural Resource Damage Assessment and Oil Spill Response

Natural Resource Advisor, Oil Spill in Gulf of Mexico

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).

Enbridge Northern Gateway Pipeline Project, British Columbia, Alberta

Stantec assisted Enbridge with regulatory processes associated with the proposed Northern Gateway Pipeline Project from British Columbia to Alberta. As part of this process, Jake assisted with a comprehensive literature review of case studies for ecological recovery from oil spills in northern temperate ecosystems. He critically reviewed and summarized the scientific literature regarding freshwater macroinvertebrates and fish recovery to oil spills of various sizes, localities, and types of petroleum product. Evidence from more than 50 case studies and 170 taxa groups were evaluated and presented in the report. Jake responded to formal undertakings requested by various participants in the hearings as well as informal data requests generated by the project team.

** denotes projects completed with other firms*

Jacob Riley

Project Manager / Fisheries Biologist

PUBLICATIONS

Riley, J.W and L. Diemer. Potential Thermal Impacts to Brook Trout from Climate and Land Use Changes in the Kezar Lake Watershed. *Presentation at the Northeast Association of Environmental Biologists. Attitash, New Hampshire*, 2015.

Riley, J.W. and P. Harris. Vermont Listed Stonecat (Noturus flavus) Electrofishing Surveys and Protection Measures Implemented for a Bridge Rehabilitation. *Poster Presentation at the Northeast and Transportation Conference, South Burlington, Vermont*, 2014.

Tetreau, D, F. Dibello, J. Riley, and K. Omland. Comparing Vernal Pool Productivity after Transmission Line Construction: Do Buffers Minimize the Effects of Habitat Fragmentation? Poster Presentation. *Presented at the New England Association of Environmental Biologists Annual Meeting*, 2013.

Marsden, J.E., K.P. Kelsey, J.W. Riley, J. Hatt. Evaluation of Calcein for Estimating Abundance of Lake Trout Alevins on a Spawning Reef. *North American Journal of Fisheries Management. 34: 270-275*, 2014.

Riley, J.W., N.F. Thompson, J.E. Marsden, and Janssen. Development of Two New Sampling Techniques for Assessing Lake Trout Reproduction in Deep Water. *North American Journal of Fisheries Management. 30: 1571-1581*, 2011.

Riley, J.W., J.E. Marsden, and J. Janssen. A New Sampling Technique for Assessing Lake Trout Egg Density in Deep Water. *Presented at the American Fisheries Society 141st Annual Meeting, Seattle, Washington*, 2011.

Riley, J.W., N.F. Thompson, J.E. Marsden, J. Janssen, and C. Houghton. A Deep-Water Electroshocker for Sampling Small Fishes and Invertebrates from Interstitial Spaces. *Presented at the American Fisheries Society 141st Annual Meeting, Seattle, Washington*, 2011.

Riley, J.W. and J.E. Marsden. Predation on emergent lake trout fry in Lake Champlain. *Journal of Great Lakes Research. 35: 175-181*, 2009.

Riley, J.W. and J.E. Marsden. Predation pressure on post-emergent lake trout fry in Lake Champlain. *Presented at the International Association for Great Lakes Research, 50th Annual Conference, State College, Pennsylvania*, 2007.

Riley, J.W. and J.E. Marsden. Predation on post-emergent lake trout fry at a shallow, artificial site in Lake Champlain. *Presented at the American Fisheries Society 137th Annual Meeting, San Francisco, California*, 2007.

Riley, J.W. and J.E. Marsden. Fate of Post-Emergent Lake Trout Fry in Lake Champlain. *Presented at the Great Lakes Fisheries Commission's Native Fish Workshop, Ypsilanti, Michigan*, 2006.

Bryan P. Emerson

Project Manager, Wetland Scientist

Bryan is a Project Manager and Wetland Scientist responsible for conducting and coordinating a variety of natural resource projects, including wetland delineations, vernal pool surveys, wetland mitigation planning and design, wildlife monitoring, wildlife habitat assessments, and invasive species management. These projects have involved data analysis, quality control review, and technical report writing. He has assisted clients in the preparation of federal, state, and local permit applications, and is experienced in designing wetland mitigation projects, preparing compensation plans, and conducting long-term monitoring of mitigation sites. Bryan has direct field experience in manual and chemical invasive species control and the development of invasive species management plans.

Prior experience includes designing, managing and installing wetland and stream restoration projects in Seattle, WA. Projects included native plant installation, invasive species control, stream channel modifications, bank and slope stabilization, and wetland creation and restoration. Bryan has led youth conservation crews in Vermont and has conducted field and laboratory studies on the impact to aquatic environments by non-native zebra mussels.

EDUCATION

Bachelor of Science, Environmental Science, Chemistry Minor, University of Vermont, Burlington, Vermont, 2000

Introduction to AutoCAD, Maine Technical Source, Yarmouth, Maine, 2011

Wilderness First Aid, SOLO, Topsham, Maine, 2012

Heartsaver CPR Certification, SOLO, Topsham, Maine, 2012

40-Hour Hazwoper Certification, OSHA, Topsham, Maine, 2012

REGISTRATIONS

Professional Wetland Scientist #2352, Society of Wetland Scientists

Certified Wetland Scientist #276, State of New Hampshire Board of Natural Scientists

Commercial Master Applicator #CMA44218/5 6D, Maine Board of Pesticides Control

MEMBERSHIPS

Member, Society of Wetland Scientists

Recognized Wetland Delineator, New Brunswick Department of Environment

Member, Association of State Wetland Managers

Member, Maine Association of Wetland Scientists

PROJECT EXPERIENCE

Natural Resource Services

Topsham Trails Natural Resource Surveys and Permitting, Topsham, Maine (Project Manager)

Managed all aspects of field surveys for a 1-mile bike path, including wetland delineation; vernal pool survey; and rare, threatened, and endangered species survey. Assisted the client in developing a preliminary design that would minimize natural resource impacts. Worked with state and federal regulators to navigate a complicated permitting process involving multiple amendments to existing permits and the preparation of new permit applications.

Bryan P. Emerson

Project Manager, Wetland Scientist

York Police Station Project, York, Maine (Project Manager)

Performed wetland delineation and function-value assessment for a proposed police station and associated access road. Conducted a mitigation site search, including field assessments of potential mitigation sites, and prepared a Wetland Compensation Plan to mitigate for the proposed wetland and vernal pool buffer impacts at the project site. Attended meetings with regulatory agencies to discuss the project, permitting, and proposed mitigation plan. Prepared applications and received a Tier 2 Natural Resource Protection Act permit and a U.S. Army Corps of Engineers Category 2 permit on behalf of the client.

Callahan Mine OU1 Remediation, Wetland Creation Plan, Brooksville, Maine (Project Manager)

Worked with Senior Scientists to develop a wetland creation plan to compensate for wetland impacts resulting from remedial actions to cleanup PCB and heavy metal contamination at a Superfund site. The plan included approximately 1 acre of wetland creation within a portion of the mine site where contaminant cleanup recently occurred. Creation of open water and emergent wetland areas was proposed through site grading and use of existing subsurface hydrology to establish conditions suitable for the establishment of wetland vegetation. This project was considered the first in a series of wetland compensation projects that will continue as cleanup of the mine progresses.

Vigo Captain Daviess Mine Wetland Mitigation Plan, Daviess County, Indiana (Project Scientist)

Assisted Project Manager and Senior Scientists with the development of a wetland mitigation plan to compensate for approximately 11 acres of impact to forested and emergent wetland associated with a proposed coal mine in southern Indiana. Developed a conceptual mitigation plan using regionally accepted mitigation ratios that included 22 acres of wetland creation in an existing agricultural field that is subject to periodic flooding from an adjacent river system. Creation of open water, emergent, and forested wetland areas was proposed through site grading and construction of a berm to trap flood waters and surface drainage to establish hydrology suitable for the establishment of wetland vegetation.

Hancock Wind Project, Hancock, Maine (Technical Lead)

Assisted Project Manager with many aspects of a proposed wind energy project in eastern Maine. Performed QA/QC and data management of natural resource survey data collected by field scientists and included in subsequent natural resource reports. Assisted Project Manager with preparation of Maine Site Location of Development Act permit application by coordinating completion of various application components, including wetland/wildlife reports, buffers and vegetation maintenance plans, and flooding, groundwater, and solid waste sections.

Rollins Wind Project Invasive Species Monitoring, Lincoln, Maine (Project Manager)

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. Identified invasive species, documented populations, and applied either chemical or manual control measures based on the presence of mapped natural resources and the criteria defined in the Vegetation Maintenance Plan. Prepared the final monitoring report documenting the presence of invasive species within the right-of-way and submitted the report to state and federal natural resource agencies.

Kennebec Estuary Land Trust Invasive Species Control (Project Manager)

Coordinated and conducted invasive species control at four land preserves. Developed different treatment plans to meet the requirements of the land trust and adjacent landowners, and to facilitate effective treatment of the target species. Control methods included manual control and herbicide application techniques such as broadcast spraying using a low-pressure backpack sprayer, targeted spot spraying with a hand-held sprayer, "cut and paint" treatments on large woody species, and "clip and drip" treatments on sensitive wetland species..

** denotes projects completed with other firms*

Bryan P. Emerson

Project Manager, Wetland Scientist

FedEx Ground Wetland Mitigation Site Monitoring, Saco, ME (Project Manager)

Performed mitigation monitoring at a 37,000 square foot wetland creation site to determine if the site was in compliance with the required performance standards. Met with state and federal regulatory agencies regarding the project and developed a modified mitigation monitoring plan to satisfy permit conditions. Performed associated invasive species control on the site as part of the mitigation monitoring efforts.

Oakfield Wind Project, Oakfield, Maine (Technical Lead)

Assisted Project Manager with many aspects of a proposed wind energy project in northern Maine. Prepared an alternatives analysis for the 60-mile transmission line associated with the project. Performed QA/QC of natural resource survey data collected by field scientists and included in subsequent natural resource reports. Prepared sections of state and federal permit applications, including buffers, vegetation maintenance plan, and invasive species management plan. Also performed wetland delineations in support of project design changes.

Conceptual Wetland Mitigation Design Plan, Lower Churchill River, Labrador, Canada (Project Scientist)

Assisted with the development of a conceptual design plan for the creation of marsh habitat as mitigation for anticipated wetland impacts associated with the construction of two proposed hydroelectric dams and the resulting reservoirs. Conducted an extensive review of scientific literature to identify projects or studies where similar marsh habitats were created adjacent to lakes or reservoirs in similar ecosystems. Worked with Senior Scientists to develop a matrix of proposed sites based on project-specific criteria and assisted with the preparation of a conceptual design report.

Invasive Species Management Plans, Wind Energy Projects, Maine (Project Scientist)

Developed management plans for the identification, control, and monitoring of invasive species along proposed collector and transmission lines associated with several wind energy projects in Maine. Management plans were developed to satisfy U.S. Army Corps of Engineers guidelines for Category 2 permit applications. Compiled data from natural resource surveys to determine known and potential invasive species presence in the project area.

Critical Issues Analysis, Wind Energy Project, Maine (Project Scientist)

Conducted field surveys and desktop analyses to support the development of a critical issues analysis for a large wind energy project in Maine. Tasks included analyses of mapped natural resources, Significant Wildlife Habitat, mapped cultural and historic resources, documented scenic resources, landowner issues (sound, shadow flicker, safety), and federal, state, and local permitting concerns. The data were synthesized into a technical report for the client that provided recommendations for project design and planning.

Aerial Bald Eagle Surveys, Wind Energy Projects, Maine (Field Lead)

Coordinated and conducted aerial surveys for bald eagle nests around proposed wind energy projects throughout Maine. Prior to flights, analyzed historic data and identified potential nesting habitat within the project areas in order to focus survey flights. Survey flights focused on identifying new nest locations and monitoring the status of known nest locations. Regularly coordinated with clients and state and federal regulators to modify survey protocols.

Natural Resource Surveys, Chester to TDR2 WELS, Maine (Project Manager)

Coordinated all field survey efforts for natural resource surveys along 68 miles of proposed transmission line. Performed vernal pool surveys and wetland delineations throughout various portions of the project. Conducted landscape analysis of significant wildlife habitat along the proposed line and presented these findings to state wildlife agencies. Served as the primary contact for surveyors, engineers, and the client for environmental issues, and assisted with aspects of the permitting process.

Granny Hole Natural Resource Surveys and Permitting, Topsham, Maine (Project Manager)

Performed a wetland delineation and function-value assessment for a proposed parking lot expansion associated with a new wellness center. Attended meetings with the client and state and federal regulatory agencies to develop a design that would minimize natural resource impacts. Assisted the client with preparing state and federal permit applications.

** denotes projects completed with other firms*

Bryan P. Emerson

Project Manager, Wetland Scientist

Pond 197, Stream Restoration Project*, Bellevue, Washington (Project Manager)

Managed all aspects of a stream restoration project, including coordination of the work crew and heavy equipment operators and consultation with city inspectors, on Valley Creek in Bellevue, WA. The crew excavated a side channel to route high flows through an existing wetland/pond, and installed stream gravel, log weirs, bank logs, and numerous other pieces of large woody debris in the stream. The project was intended to improve fish passage and high flow refuge for fish in the creek while improving water quality.

Valley Stream Restoration Project*, Bellevue, Washington (Project Technician)

Worked with a crew to install approximately 100 pieces of large woody debris in lower Valley Creek as log polygons, bank logs, and other structures, to stabilize the creek and provide fish habitat. No heavy equipment was allowed on the project site, and the logs were moved and installed using overhead lines, rigging, and hand labor.

Glacier NW Wetland Mitigation*, Everett, Washington (Project Manager)

Managed and assisted with the construction of the wetland and wetland buffer restoration and enhancement required as compensation for filling of wetlands done when Glacier NW created an Aggregate Sales Yard on the project site. Restoration included soil grading and amendment, planting over 1500 native trees and shrubs, and removing invasive plant species. Coordinated the design and installation of a six-zone overhead irrigation system over the 3-acre site to irrigate the installed shrubs and trees.

Stetson Wind Farm, Maine (Project Technician)

Performed wetland delineations, vernal pool surveys, and other natural resource mapping for a 38-turbine wind farm in eastern Maine.

Line 56 Transmission Line, Maine (Project Technician)

Performed wetland delineations, vernal pool surveys, and other natural resource mapping for transmission line in northern Maine. Assisted with permit preparation by coordinating wetland delineation and vernal pool survey results and processing them into a final report.

Wildlife Habitat Assessment, Leeds, Maine (Project Manager)

Conducted an assessment of mapped significant wildlife habitat, specifically Deer Wintering Area and Inland Waterfowl/Wading Bird Habitat. Surveys were performed to assist the landowner with settling a state permit violation. Met with state natural resource agencies to discuss results and coordinated with the agencies to resolve the issues by finding a solution that satisfied both the client and the state. Assisted the client with preparing state environmental permit.

Bald Eagle Monitoring, Skowhegan and Old Town, Maine (Project Manager and Field Lead)

Conducted aerial monitoring of bald eagle nests in two survey areas in Maine. Aerial surveys were performed to monitor breeding success and egg hatching. Performed ground surveys to retrieve unhatched bald eagle eggs from nests and assisted in processing the eggs to be shipped out for contaminant analysis. Coordinated all aspects of field and lab work and regularly corresponded with state agencies to adjust field survey efforts.

** denotes projects completed with other firms*

Bryan P. Emerson

Project Manager, Wetland Scientist

PUBLICATIONS

Emerson, B., D. Knapp, and G. Carpentier. Potential Alteration of Wetland Functions and Values from Dam Removal. *Poster presented at New England Water Environment Association 2010 Annual Conference, Boston, Massachusetts*, 2010.

Emerson, B., D. Knapp, J.D. DeGraaf, and G. Carpentier. Potential Impacts to Wetland Functions and Values from Dam Removal. *Poster presented at The Diadromous Species Restoration Research Network Science Meeting, University of Maine, Orono, Maine*, 2009.

Education
Bachelor of Landscape Architecture
Virginia Polytechnic Institute

Registration
Registered Landscape Architect: ME, NY

CLARB Certified
Landscape Architect

Mark G. Johnson, ASLA, CLARB, LEED AP

Landscape Architect

Mark Johnson has practiced landscape architecture for more than 30 years in New England and the Southeast with projects ranging as far away as the Middle East. Mark's collaborative abilities facilitate the provision of site planning and design services for educational, healthcare, municipal, institutional and commercial clients. His experience includes commissions ranging from the small-scale garden to the large-scale master plan; from project inception through regulatory permitting and construction.

Relevant Experience

MaineGeneral Medical Center, Alfond Center for Health
Augusta, ME
Landscape Architect for this new 640,000 s.f. consolidated hospital using building information modeling (BIM) and an integrated project delivery (IPD) process. Services included early site selection studies, master planning, design of the Harold Alfond Center for Cancer Care (on the same campus), and detailed site design.

Juniper Ridge Landfill Visual Assessment
Old Town, ME
Performed visual assessment study for NEWSME Landfill Operations, LLC, in support of State of Maine DEP permit condition compliance requirements for the Juniper Ridge landfill facility.

Maine Turnpike Authority Administration Building(LEED Certified)
Portland, ME
Site planning, design, and permitting for the new 55,000 s.f. office building for MTA and State Police personnel. The challenges of ledge, close proximity to a major regional water line, and location within an FAA governed runway protection zone for the nearby Portland International Jetport were met in a cohesive, functional, and attractive plan.

Veterans Memorial Bridge Replacement
Portland / South Portland, ME
Served as representative on public stakeholders committee in association with PACTS and MDOT planning efforts for the new bridge; then provided landscape and design services to the design-build team of Reed & Reed / T.Y. Lin including bridge aesthetic guidance, sculptural elements and accent lighting design, and detailed plaza design.

Town Facilities Assessment
Brunswick, ME
Comprehensive Municipal Facilities Audit for the Town of Brunswick that includes a physical and program audit, financial analysis, and a re-use analysis for the old Brunswick High School.

Town of Brunswick Municipal Facilities
Brunswick, ME
Site assessment in support of The Town of Brunswick in purchase of the former Times Record Publishing building to house their police, cable tv, public works and council chambers.

Town of Falmouth, Recreational Site Study
Falmouth, ME
Recreational resource planning study for the Town of Falmouth and Falmouth Public Schools to accommodate the expansion of the middle and high school athletic programs, on a limited number of playing fields.

ERIC S. STEINHAUSER, P.E., CPESC, CPSWQ
Vice President/Senior Associate Principal

Eric has over 28 years of design, permitting, and construction experience throughout New York, New England, and mid-Atlantic states, as well as Alabama, Iowa, Ohio, and California. For over 12 years, he has held a lead design, project management, or senior reviewer role for numerous solid waste, **landfill gas**, remediation, stormwater, and civil/geotechnical projects. In addition, Eric has published and presented papers, both nationally and internationally, on engineering topics including **LFG management**, innovative solid waste facility design and operations, stormwater management and erosion and sediment control, and bioreactor landfill design and operation. He also has extensive experience managing large, multi-discipline projects, developing contract documents, and managing construction quality assurance and contract administration.

KEY AREAS OF PRACTICE

Solid Waste and Landfill Gas Engineering

Stormwater Management and Erosion & Sediment Control

Civil and Geotechnical Engineering

Remediation Engineering

Project Management

Construction Quality Assurance (CQA)

EDUCATION

M.S., Civil Engineering, Syracuse University, 1987

B.S., Civil Engineering, Syracuse University, 1984

REGISTRATIONS / CERTIFICATIONS

Professional Engineer – AL, CT, DE, IA, ME, MD, NH, NJ, NY, OH, PA, RI, VT, VA, WV

Certified Professional in Erosion and Sediment Control

Certified Professional in Stormwater Quality

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers

ASTM International, Subcommittee D-35 on Geosynthetics

National Society of Professional Engineers

New York State Association for Solid Waste Management

Solid Waste Association of North America – Northern New England and New York State Chapters

International Erosion Control Association – Northeast Chapter

YEARS OF EXPERIENCE

Sanborn Head: 11

RELEVANT EXPERIENCE

Pine Tree Landfill LFGTE Facility, Hampden, ME

Mr. Steinhauser was the Principal-in-Charge/Project Manager/Engineer-of-Record for the design/permitting for LFG conveyance and condensate management system design for the facility. The LFG management system consists of over fifty vertical extraction wells, about twenty collection trenches, several condensate traps, two condensate knockouts, a LFG to energy facility, and a flare.

Juniper Ridge Landfill, Old Town, ME

Mr. Steinhauser is the Principal-in-Charge/Project Manager/Engineer-of-Record for the design/permitting of the active LFG extraction system for the facility. The LFG management system is being designed and constructed in stages as the landfill expands. The design incorporates vertical extraction wells, collection trenches, condensate traps, and a flare.

Crossroads Landfill, Norridgewock, ME

Mr. Steinhauser was the Principal-in-Charge/Project Manager/Engineer-of-Record for the design/permitting and CQA of the active LFG extraction system for the facility. The LFG management system was designed and constructed in stages as the landfill expands. The design incorporates vertical extraction wells, collection trenches, condensate traps and a flare

Crossroads Landfill LFGTE Facility, Norridgewock, ME

Mr. Steinhauser was the Project Manager/Engineer-of-Record for the design/permitting and CQA of the site plan approval and LFG conveyance and condensate management system design for the facility.

Lebanon Regional Landfill, Lebanon, NH

Mr. Steinhauser was the Principal-in-Charge for Sanborn Head's services related to designing and permitting a new, active landfill gas extraction system. Mr. Steinhauser will oversee the solid waste and air permitting efforts for the project as well as the design and CQA of the extraction system and flare.

Cullman Environmental Waste Management Center, Dodge City, AL

Mr. Steinhauser was the Principal-in-Charge for the design of a LFG extraction system for a landfill that previously had no gas control infrastructure. His specific role was to oversee and direct the project team charged with designing the extraction system, which involved above-grade gas conveyance pipes supported by pipe bridges, extraction wells and collection trenches, and condensate management that was incorporated into the landfill's existing leachate recirculation system. The above-grade pipe design was selected in order to reduce construction costs related to soil and waste excavation, and the pipe bridges allowed for a proactive means to verify and maintain the requisite pitch on the pipes.

Martone Sanitary Landfill, Barre, MA

Mr. Steinhauser was the Project Manager/Senior Reviewer for the design/permitting of a dewatering system for vertical extraction wells. The design involved supplying compressed air to over 20 wells to power submersible pumps and a discharge force main that was connected to the landfill's leachate collection system.

Fitchburg/Westminster Landfill, Westminster, MA

Mr. Steinhauser was the Senior Reviewer for the design/permitting of a dewatering system for vertical extraction wells. The design involved supplying compressed air to 40 wells to power submersible pumps and a discharge force main that was connected to the landfill's leachate collection system.

PUBLICATIONS / PRESENTATIONS

Maier, T.B., Steinhauser, E.S., Vasuki, N.C., and Pohland, F.G., "Integrated Leachate and Landfill Gas Management", proceedings of the Fifth International Landfill Symposium, Cagliari, Oct 1995, Vol. 1, pp. 53-66.

Steinhauser, E.S., "Potential Mechanisms and Mitigation of the Impact Landfill Gas on Groundwater", presented at 1998 National Conference on Environmental Engineering, Chicago, IL, Jun 1998.

Steinhauser, E.S., "Estimating Landfill Gas Extraction Coverage for Greenhouse Gas Emission Inventories", presented at the Federation of New York Solid Waste Associations Solid Waste/Recycling Conference and Trade Show, Bolton Landing, NY, May 2009.

Steinhauser, E.S., "Optimizing Landfill Airspace Through Operations", presented at the 13th Fall Conference, SWANA PA Keystone Chapter, Harrisburg, PA, Sept. 2011.

Steinhauser, E.S. and Saunier, P., "Innovative Approach to Landfill Gas Collection and Control," presented at the Federation of New York Solid Waste Associations Solid Waste/Recycling Conference and Trade Show, Bolton Landing, NY, May 2012.

Steinhauser, E.S., "Optimizing Landfill Airspace Through Operations," presented at the Federation of New York Solid Waste Associations Solid Waste/Recycling Conference and Trade Show, Bolton Landing, NY, May 2013.

Steinhauser, E.S., and Fourmont S., "Innovative Approach to Landfill Gas Collection and Control," accepted for publication and presentation at Geosyntheics 2015, Portland, OR, Feb. 2015.

Estabrooks, M.E., and Steinhauser, E.S., "Landfill Gas Collection and Control at the Lebanon Regional Solid Waste Facility," presented at the Federation of New York Solid Waste Associations Solid Waste/Recycling Conference and Trade Show, Bolton Landing, NY, May 2015.

RYAN L. CLAY, EIT
Senior Project Engineer

KEY AREAS OF PRACTICE

Solid Waste Engineering and Permitting

Drainage Design

EDUCATION

B.S., Civil Engineering, University of New Hampshire, 2008

REGISTRATIONS / CERTIFICATIONS

Engineer-in-Training – NH

OSHA 10-hour Construction Safety

OSHA 40-hour Hazardous Waste Site Worker

Management and Supervisor Training for Engineers & Scientists on Hazardous and/or Contaminated Sites

YEARS OF EXPERIENCE

Sanborn Head: 3

Total: 5

Ryan Clay is a senior project engineer who serves primarily in Sanborn Head's solid waste client service area from the Concord, NH office. Ryan has a Bachelor's degree in civil engineering from the University of New Hampshire (UNH), and began working for Sanborn Head in 2012.

Prior to working at Sanborn Head, Mr. Clay worked in the civil and structural engineering field on state and municipal bridge, roadway, and drainage design projects. Mr. Clay's responsibilities during these projects included a variety of design work, permitting, drafting, bid document preparation, and construction supervision.

RELEVANT EXPERIENCE

Phase II Stage I Landfill Gas System Expansion, Four Hills Landfill, City of Nashua, NH

Mr. Clay designed and prepared construction documents for the Phase II Stage I LFG system expansion at the Four Hills Landfill. The project included a new 12-inch diameter LFG header pipe, the replacement of four vertical extraction wells, and construction of new horizontal collection trenches in the active area of the landfill. Mr. Clay also prepared the opinion of cost and technical specifications for the project. This project began construction under Mr. Clay's field observation.

Phase 9 Landfill Gas System Design, Turnkey Recycling & Environmental Enterprise, Waste Management of New Hampshire, Inc., Rochester, NH (TREE)

Mr. Clay designed six stages of filling in Phase 9 at the TLR-III Refuse Disposal Facility. Mr. Clay's role included the layout of all gas header pipes, tie-ins, horizontal gas collection trenches, and placement of vertical gas extraction wells. He also analyzed truck access into the site around sharp corners, designed stormwater management, and designed tie-ins to existing landfill gas infrastructure.

Phase 7.3-7.4 LFG System Expansion, Southbridge, MA

Mr. Clay designed nine (9) stages of filling in Phases 7.3 and 7.4 for the Southbridge Recycling and Disposal Park, which when combined account for approximately three (3) million cubic yards of remaining capacity at the landfill. Mr. Clay's role included the layout of all gas header pipes, horizontal gas collection trenches, and placement of vertical gas extraction wells to provide standard coverage across the landfill.

Phase 9 LFG Construction, Rochester, NH (TREE)

Mr. Clay designed six (6) stages of filling in Phase 9 at the TLR-III Refuse Disposal Facility. Mr. Clay's role included the layout of all gas header pipes, horizontal gas collection trenches, and placement of vertical gas extraction wells. Mr. Clay also evaluated truck turning access into Phase 9, stormwater management, and tie-ins to existing landfill gas infrastructure.

Closure and Landfill Gas Management System Construction, Rochester, NH (TREE)

Mr. Clay has assisted with preparation of design, permitting, and construction documents for final closure of a portion of the Phases 3, 4, 5, and 6, of TLR-III Refuse Disposal Facility (TLR-III). The work includes modifications to the existing landfill gas management system of TLR-III in the vicinity of the work.

Cells 7 and 8 LFG System Expansion, Juniper Ridge Landfill, Old Town, ME (NEWSME Operations)

Mr. Clay is responsible for preparing construction drawings and layout coordinates for LFG extraction system expansion in Cells 7 and 8 of the Juniper Ridge Landfill.

ROBERT D. O'NEAL, CCM, INCE BD. CERT.

PRINCIPAL

EDUCATION

M.S., Atmospheric Science, Colorado State University, 1987
B.A., Engineering Science, Dartmouth College, 1983

REGISTRATIONS

Certified Consulting Meteorologist, #578
Institute of Noise Control Engineering, Board Certified

PROFESSIONAL SUMMARY

A Principal of the firm, Mr. O'Neal is Board Certified in Noise Control Engineering, as well as a Certified Consulting Meteorologist with over 25 years of experience in the areas of community noise impact assessments, meteorological data collection and analyses, and air quality modeling. Mr. O'Neal's noise impact evaluation experience includes design and implementation of sound level measurement programs, modeling of future impacts, conceptual mitigation analyses, and compliance testing. Rob has performed noise measurement and modeling assessments for wind energy and fossil-fuel power generation facilities in the Northeast, the Mid-Atlantic region, the Midwest, and the Southwestern U.S. Other industries served include hard rock quarries, aggregate handling, asphalt and concrete plants, C&D processing facilities, landfills, real estate development, and mobile sources. He has also provided expert witness testimony on noise impact studies and air pollution modeling in front of local boards, courts of law, and adjudicatory hearings.

PROFESSIONAL EXPERIENCE

Solid Waste Facilities

- *Berwick Iron & Metal Recycling Facility, Berwick, ME.* Prepared the Noise Impact Assessment for a proposed automobile shredder at an existing recycling facility in Berwick. Existing condition sound level measurements around the facility were collected. Sound level measurements of key sources were also made. Mitigation options were recommended to meet the State and local noise limits. Results of this work were presented in expert testimony at local hearings on the project. Post-construction sound level monitoring was done to determine compliance with the noise standards.

- *Confidential Client, ME.* Project manager for an ambient air quality monitoring plan submitted to ME DEP for two existing landfills as part of the landfill gas and odor management system. CALMET meteorological modeling and CALPUFF dispersion modeling were used to specify the continuous hydrogen sulfide (H_2S) monitoring locations and appropriate H_2S Action Levels.

- *Pine Tree Waste, Inc., Westbrook, ME.* Prepared a noise impact assessment for a proposed construction & demolition transfer station and processing facility. This project involved calculation of expected operational noise impacts from the processing equipment, a compliance evaluation with State and local noise regulations, and testimony before the local Planning Board.

- *Holliston Transfer Station, Holliston, MA*. Prepared a noise impact assessment for an existing C&D and MSW transfer station in Holliston, MA. This project involved ambient background noise monitoring at sensitive receptors around the site, a compliance evaluation with State and local noise regulations, and expert testimony before the Board of Health during the site assignment hearings.

- *Resource Recovery of Cape Cod, Sandwich, MA*. Prepared a noise impact and mitigation assessment for an existing 600-ton/day construction & demolition transfer station on Cape Cod. This project involved extensive ambient background noise monitoring at sensitive receptors around the site, calculation of expected operational noise impacts from the processing equipment, a compliance evaluation with State noise regulations, and mitigation calculations.

- *Valley Mill Corp., Pittsfield, MA*. Prepared a noise impact assessment for a proposed 250-ton/day C&D transfer station in Pittsfield. This project involved ambient background noise monitoring at sensitive receptors around the site, calculation of expected operational noise impacts from the processing equipment, and a compliance evaluation with State noise regulations.

- *WSI, Oxford, MA*. Prepared a noise impact assessment for a proposed 750-ton/day C&D and MSW transfer station in Oxford, MA. This project involved ambient background noise monitoring at sensitive receptors around the site, calculation of expected operational noise impacts from the processing equipment, a compliance evaluation with State noise regulations, and expert testimony before the Board of Health during the site assignment hearings.

Rock Quarries

- *A. Colarusso & Son., Inc., Hudson, NY.* A sound level impact analysis was performed for a proposed rock quarry expansion at a site in Columbia County in support of the NYS DEC Mined Land Reclamation Permit and SEQRA process. Ambient background sound level measurements were collected around the site. Project-specific impacts of the excavation and haul equipment were measured at an existing excavation site and were used to calculate future sound level impacts.

- *Aggregate Industries, Peabody, MA*. A Noise Management Plan was developed as part of the Special Permit requirements at this site. A method of correlating noise complaints with meteorological conditions were set-up. In addition, a series of Best Management Practices for noise reduction were implemented. An extensive community sound level monitoring program was developed and implemented. Mitigation measures to reduce noise from the quarry were designed and presented to city officials and the neighborhood.

- *Sour Mountain Realty, Inc., Fishkill, NY.* A sound level impact analysis was performed at the site of a proposed hard rock quarry in support of a NYS DEC Mined Land Reclamation Permit application in Dutchess County. Ambient background sound level measurements were collected around the site. Project-specific impacts of the excavation and processing equipment were measured at existing rock quarries and used to calculate future sound level impacts. Expert testimony on noise impacts was provided before a NYS Administrative Law Judge.

- *Paquette Pit, Center Harbor, NH.* A sound level impact analysis on rock-crushing and processing equipment, and electrical generators was conducted for a proposed quarry. The results were submitted to the Planning Board.

- *A.A. Wills Materials, Inc., Freetown, MA.* Ambient sound level measurements were conducted at residential locations around an existing 105-acre hard rock quarry along Route 140. Four days of continuous measurements were made with and without the quarry operating to determine the impact of the operations on ambient sound levels in the neighborhood.

Sand & Gravel Operations

- *Okemo Mountain Resort, Ludlow, VT.* A sound level impact analysis was performed for a proposed sand and gravel excavation site in Ludlow. Ambient background sound level measurements were collected around the site. Project-specific impacts of the excavation and haul equipment were used to model future sound levels from operation of gravel extraction. Expert testimony on noise impacts was presented before the Act 250 District Environmental Commission and the local review board.

- *Dalrymple Gravel & Contracting Co., Inc., Erwin, NY.* A sound level impact analysis was performed for a proposed sand and gravel excavation site ("Scudder Mine") at a site in Steuben County in support of the NYS DEC Mined Land Reclamation Permit and SEQRA process. Ambient background sound level measurements were collected around the site. Project-specific impacts of the excavation and haul equipment were measured at an existing excavation site and were used to calculate future sound level impacts. Expert testimony on noise impacts was presented before a NYS Administrative Law Judge.

- *Palumbo Block Co., Inc., Ancram, NY.* A sound level impact analysis was performed for a proposed sand and gravel excavation site ("Neer Mine") in Columbia County in support of the NYS DEC Mined Land Reclamation Permit process. Ambient background sound level measurements were collected around the site. Project-specific impacts of the excavation and haul equipment were measured at existing excavation sites and used to calculate future sound level impacts. Expert testimony on noise impacts was presented before a NYS Administrative Law Judge.

- *Newport Sand & Gravel, Goshen, NH.* A sound level impact analysis was performed for a proposed 68-acre sand and gravel excavation site along Route 10 in Goshen. Ambient background sound level measurements were collected around the site. Project-specific impacts of the excavation and haul equipment were measured at existing excavation sites and used to calculate future sound level impacts. The results of this work were presented to the local Zoning Board of Appeals.

- *Morse Sand & Gravel, Lakeville, MA.* A sound level impact analysis was performed for an existing concrete batch plant. Ambient background and operational sound level measurements were collected around the site. A mitigation program was designed and the effectiveness of various noise control options were tested. The results of this work were presented as expert witness testimony in Massachusetts Land Court in Boston.

- *Ambrose Brothers, Inc., Sandwich, NH.* A sound level measurement program was performed for an existing sand and gravel excavation site in Sandwich. A future sound level measurement program will be conducted upon the opening of a new phase of the operation to determine the sound level change due to equipment relocation.

- *Granite State Concrete, Inc., Lyndeborough/New Boston/Mont Vernon, NH.* A sound level impact analysis was performed for a proposed 39-acre expansion of an existing sand and gravel excavation site in Lyndeborough. Ambient background sound level measurements were collected around the site. Project-specific impacts of the excavation and haul equipment were measured at the existing excavation site and used to calculate future sound level impacts. The results of this work were presented to the local Zoning Board of Appeals.

- *P.J. Keating Co., Townsend, MA.* A sound level impact analysis was performed for a proposed sand and gravel excavation site. Ambient background sound level measurements were collected around the site. Project-specific impacts of the excavation and haul equipment were measured at existing excavation sites and used to calculate future sound level impacts. The results of this work were presented as expert witness testimony in Massachusetts Land Court in Boston.

Industrial/Commercial Projects

- *General Electric Company, Hudson River PCBs Superfund Site, Hudson River, NY.* Prepared the Noise Impact Assessment for dredging, processing, and construction activities associated with Phase 1 of the Final Design Report. Source-specific sound level measurements of key sources were also made. Sound level monitoring was done during Phase 1 dredging and processing of the sediment to determine compliance with the Quality of Life Performance Standards.

- *Former Coal Tar Gasification Facility, Island End River, Everett, MA.* Managed an extensive sound level measurement program prior to and during a dredging operation. An existing condition measurement program over multiple seasons was conducted for one-week intensive periods. A measurement program during a 10-day pilot study was carried out to determine key sources of dredge noise within the community. Sound level monitoring was also conducted throughout the remediation work program itself. This work was coordinated with the land-based and water-based parties on the remediation team.

- *Environmental Soil Management, Inc., Loudon, NH.* An extensive sound level measurement program was conducted for a thermal soil treatment plant in response to community noise complaints. Simultaneous overnight measurements were made at multiple locations with and without the plant operating to identify the possible sources of area noise. Digital audio tape recordings were collected and presented at the local zoning board meeting to demonstrate the low noise levels. Follow-up measurements were made to satisfy decibel limits imposed by the board in order to allow 24-hour per day operations.

- *The Stop & Shop Supermarket Company, Freetown, MA*. Noise impacts from loading dock activity, truck traffic, and rooftop mechanical equipment were analyzed as part of the local approval process for a 1,500,000 square foot regional distribution center in Freetown. The results of the study were presented to the neighborhood in a series of meetings.

Wind Energy Projects

- *Relight US Corp. -- Meridien Wind, Logan County, IL.* Developed an extensive sound level modeling program for a proposed 230 MW wind farm in Illinois. Various Noise Reduction Options (NROs) were incorporated to demonstrate compliance with the Illinois Pollution Control Board octave band sound levels limits. The results were presented as expert witness testimony during the County Commission public hearings.

- *Iberdrola Renewables – Groton Wind, Groton, NH.* Developed an extensive sound level measurement and modeling program for a proposed 48 MW wind farm near Plymouth, NH. Concurrent sound level data and meteorological data were collected and analyzed. The results were presented as expert witness testimony at community open houses and during the Site Evaluation Committee public hearings.

- *Massachusetts Clean Energy Center – Research Study on Wind Turbine Acoustics*. The study includes measuring sound emissions from a variety of operating wind turbines in the Commonwealth of Massachusetts. Fieldwork includes measuring both the level and quality of sound emissions from operating wind turbines under various wind regimes and topography. To better understand how wind speed and wind direction vary over the turbine height, meteorological data are collected using on-site meteorological towers and LiDAR systems. Acoustical data are measured at various distances from the wind turbines and include broadband, one-third octave band, low frequency and infrasound, and interior/exterior sound levels.

- *Eolian Renewable Energy -- Antrim Wind, Antrim, NH.* Developed an extensive sound level measurement and modeling program for a proposed 30 MW wind farm in Antrim, NH. Concurrent sound level data and meteorological data were collected and analyzed. The results were presented as expert witness testimony at community open houses and during the NH Site Evaluation Committee public hearings.

- *FPL Energy – Horse Hollow Wind Energy Center, Taylor County, TX*. Developed and executed an extensive sound level measurement program for a 735 MW wind farm in Taylor County, TX. Concurrent sound level data, meteorological data, and wind turbine power output data were collected and analyzed. The results were used in legal proceedings as part of expert witness testimony in the case.

- *Pioneer Green Energy – Great Bay Wind, Somerset County, MD.* Developed an extensive sound level measurement and modeling program for a proposed 99 MW wind farm on the eastern shore of Maryland. Concurrent sound level data and meteorological data were collected and analyzed. The results were used in the state-level permit applications.

- *FPL Energy – Wolf Ridge Wind Farm, Cooke County, TX.* Developed and executed an extensive sound level measurement and modeling program for a proposed wind farm in Cooke County, TX. Concurrent sound level data and meteorological data were collected and analyzed. The results were used in legal proceedings as part of expert witness testimony in the case.

- *John Deere Renewables –Michigan Thumb I Wind Farm, Huron County, MI.* Developed and executed a long-term sound level measurement program for an existing 69 MW wind farm in Michigan to determine compliance with the local noise ordinance. Concurrent sound level data and meteorological data were collected and analyzed.

- *NextEra Energy Resources (formerly FPL Energy) – Low Frequency & Infrasound Study, TX.* Developed and executed a sound level measurement program as part of a scientific study to determine low frequency and infrasound levels from two types of wind turbines. Both interior and exterior data were compared to independent impact criteria for audibility, vibration, rattle, and annoyance. The study results were published in the peer-reviewed Noise Control Engineering Journal.

- *NextEra Energy Resources (formerly FPL Energy) – Ashtabula Wind Farm, Barnes County, ND.* Developed and executed a sound level measurement program for an existing wind farm in North Dakota in response to noise complaints. Concurrent sound level data and meteorological data were collected and analyzed.

- *Gamesa Energy – Barton Chapel Wind Farm, Jack County, TX.* Developed an extensive sound level measurement and modeling program for a proposed 120 MW wind farm in Jack County, TX. Concurrent sound level data and meteorological data were collected and analyzed. The results were used in legal proceedings as part of expert witness testimony in the case.

- *Babcock & Brown – Allegheny Ridge Wind Farm, Portage, PA.* Developed and executed a sound level measurement program for an 80 MW wind farm in Cambria and Blair Counties, PA. Concurrent sound level data, meteorological data, and wind turbine power output data were collected and analyzed. The results were used to demonstrate compliance with the noise standard of the Development Agreement with the local Township.

- *State of New Hampshire, Office of the Attorney General -- Lempster Mountain Wind Power Project, Lempster, NH.* Performed an independent review of a proposed 24 MW wind turbine farm. The applicant's noise impact analysis was evaluated and comments provided to the State of NH.

Independent Power Projects

- *Braintree Electric Light Department – Thomas A. Watson Generating Station, Braintree, MA.* Conducted long-term continuous ambient sound level measurement program for a proposed 105 MW natural gas and oil-fired simple-cycle electric power generation facility. Acoustical modeling, including several rounds of mitigation, was performed to demonstrate compliance with the State noise policy.

- *Montgomery Energy Billerica Power Partners -- Billerica Energy Center, Billerica, MA.* Worked on noise aspects for a proposed 350 MW natural gas and oil-fired simple-cycle electric power generation facility. Acoustical modeling, including several rounds of mitigation, was performed to demonstrate compliance with the State noise policy. Expert testimony on noise issues was presented to the Energy Facilities Siting Board.

- *Advanced Power Services – Brockton Power, Brockton, MA.* Conducted a 168-hour continuous ambient sound level measurement program at multiple sites for a proposed 350 MW natural gas-fired combined-cycle electric power generation facility. Acoustical modeling, including mitigation, was performed to demonstrate compliance with the State noise policy. Expert testimony on noise issues was presented to the Energy Facilities Siting Board.

- *Besicorp-Empire Development Company – Rensselaer, NY.* Prepared interrogatory responses, and testimony for the Noise section of the Article X application for this proposed 505 MW combined-cycle gas-fired electric power generation facility, recycled newsprint manufacturing plant, and waste water treatment plant. Additional testimony was provided for Technical Conference hearings before a NYS DEC Administrative Law Judge.

- *Cornell University, Ithaca, NY.* Prepared a sound level impact assessment report for the NY SEQRA process and Article VII natural gas pipeline application for this proposed 30 MW combined heat and power generation facility.

- *Milford Power Co., LLC – Milford, CT.* Conducted post-construction ambient sound level measurements for a 544 MW combined-cycle gas-fired electric generating facility. The project utilizes two Alstom GT-24 combustion turbines, one steam turbine, and an 8-cell wet mechanical cooling tower. High-pressure steam blows and transformer noise were also measured during construction and assessed for community impacts.

- *FPL Energy – Jamaica Bay Peaking Facility, Far Rockaway, NY.* Managed the noise impact study as part of an Environmental Assessment for a 50 MW natural gas-fired peaking plant utilizing two P&W combustion turbines. A compliance demonstration with the local noise ordinance was done utilizing the ambient background data and acoustical modeling. Follow-up noise monitoring was done to evaluate vendor performance specifications.

- *FPL Energy – Bayswater Peaking Facility, Far Rockaway, NY.* Managed the noise impact study as part of an Environmental Assessment for a 55 MW natural gas-fired peaking plant utilizing two P&W combustion turbines. A compliance demonstration with the local noise ordinance was done utilizing the ambient background data and acoustical modeling.

- *Sithe Energies – Heritage Station, Oswego, NY.* Conducted ambient sound level measurements and performed sound level modeling at the 1000 MW Independence Station power plant in support of permitting a proposed 800 MW combined-cycle electric generation facility adjacent to the existing station in Oswego. The proposed project will utilize General Electric's new "H" System combustion turbine technology, and a 16-cell wet mechanical cooling tower. A compliance demonstration with the local noise ordinance was done utilizing the ambient background data and acoustical modeling. Mr. O'Neal prepared the Noise section of the

Article X Application in conjunction with the New York State Public Service Law as well as expert testimony on noise for the Article X public hearings.

- *Duke Energy Power Services, LLC -- OH, IN, IL, MO*. Conducted ambient sound level measurement programs and performed acoustical modeling for six proposed simple-cycle electric power generation facilities in the Midwest for Duke Energy. These 640 MW peaking stations were permitted for 8 GE 7EA combustion gas turbines. The results of the noise impact assessment were used to secure site plan approval from the local community.

- *Calpine Corporation – Ontelaunee Energy Center, Ontelaunee, PA*. Conducted 24-hour ambient sound level measurements at multiple sites for a proposed 543 MW natural gas-fired combined-cycle electric power generation facility utilizing two Westinghouse 501F combustion turbines. A compliance demonstration with the local noise ordinance was done utilizing the ambient background data and acoustical modeling. Post-construction sound level measurements were done on the turbines to confirm they met the vendor guaranteed noise limits.

Linear Siting and Transmission Projects

- *NSTAR 345 kV Transmission Reliability Project, Stoughton, Canton, Milton, Boston, MA*: Responsible for noise impact assessment for this proposed 18 mile multi-circuit underground 345 kV project. Construction noise impacts along the route and operational noise from substations in Hyde Park and South Boston were analyzed. Expert testimony before the EFSB was provided.

- *Weaver's Cove Energy, Fall River, MA*. Managed the implementation of an extensive existing condition sound level measurement program. Long-term continuous and short-term measurements were taken at multiple locations around a proposed liquefied natural gas (LNG) import terminal. Expected future sound level impacts from operation of the LNG import terminal were calculated. In addition, community sound level impacts from an associated 2.5 million yd^3 dredging project in the adjacent channel were evaluated. The FERC Resource Report 9 section on noise impacts was prepared.

Transportation Projects

- *Tren Liviano EIS, San Juan, Puerto Rico.* Developed an extensive sound level measurement and modeling program for a proposed 5.3 mile light rail system in Old San Juan. The analysis was done in accordance with EQB and US FTA procedures. Meetings were held with the Permit Management Office (OGPe) and City of San Juan officials to discuss the scope of study. In addition, Epsilon attended the DEIS public hearings in San Juan to answer noise-related questions.

- *Tren Caguas EIS, San Juan, Puerto Rico.* Developed an extensive sound level and vibration measurement and modeling program for a proposed 17 mile rapid transit rail system linking Caguas to San Juan. The analysis was done in accordance with EQB and US FTA procedures.

- *Town of Westwood, MA.* Independent technical reviewer for Town of Westwood government officials for noise-related issues associated with highway traffic noise from Interstate 95/Route 128 in Westwood, MA. Reviewed FHWA TNM modeling for interchange modifications and exit ramp widening impacts on residential neighborhoods, including barrier wall design analyses. In addition, Epsilon attended public hearings in Westwood to present the findings to concerned citizens and answer noise-related questions.

EXPERT TESTIMONY EXPERIENCE

Expert witness before the Environmental Review Tribunal, Ontario, Canada on noise issues for Grey Highlands Zero Emission People Wind Farm, Grey Highlands, Ontario [Case ERT 15-011, Dingeldein v. Director, Ministry of the Environment and Climate Change].

Prepared witness statement for the Environmental Review Tribunal, Ontario, Canada on noise issues for Niagara Region Wind Corporation, Haldimand County, Ontario [Case ERT 14-096, Mothers Against Wind Turbines, Inc. v. Director, Ministry of the Environment].

Expert witness before the Environmental Review Tribunal, Ontario, Canada on noise issues for SP Armow Wind Ontario GP Inc., Kincardine, Ontario [Case ERT 13-124 to 13-125, Kroeplin v. Director, Ministry of the Environment].

Expert witness before the Environmental Review Tribunal, Ontario, Canada on noise issues for Dufferin Wind Power, Melancthon, Ontario [Case ERT 13-070 to 13-075, Bovaird v. Director, Ministry of the Environment].

Expert witness before the Environmental Review Tribunal, Ontario, Canada on noise issues for K2 Wind Ontario, Inc., Ashfield-Colbourne-Wawanosh, Ontario [Case ERT 13-097 to 13-098, Drennan v. Director, Ministry of the Environment].

Expert witness before the NH Site Evaluation Committee on noise issues for the 30 MW Antrim Wind Project (2012); 48 MW Groton Wind project (2010).

Expert witness before the MA Energy Facilities Siting Board on noise issues for: 18-mile underground electric transmission line and substation project in the Boston Metropolitan area (2004-2005); Billerica Energy Center power plant (2007); Brockton Clean Energy (2008-2009).

Expert witness in Vermont Act 250 Land Use proceedings on noise issues for a proposed sand and gravel excavation site at Okemo Mountain (2007).

Expert witness in the 42nd District Court of Texas on noise issues for a 735 MW wind turbine farm (2006).

Expert witness before NY DEC Administrative Law Judge on noise issues for a hard rock quarry facility (1997), two sand and gravel excavation sites (2001; 2003), and a cogeneration power plant (2003).

Expert witness for site assignment hearings on noise issues from solid waste transfer stations in Lowell, MA (1998); Marshfield, MA (1999); Holliston, MA (2004); Oxford, MA (2006).

Expert witness in Massachusetts Land Court on noise issues for a proposed sand and gravel pit (1991), a proposed cross-dock distribution center (2002), and an existing concrete batch plant (2005).

Expert witness in Vermont Act 250 Land Use process for air quality impacts at ski areas (1991; 1992; 1997).

Expert witness before MA DEP Administrative Law Judge for an asphalt plant in Boston (1996).

Expert witness before municipal boards on issues of air pollution and noise impacts from local industries (many years).

Invited specialty speaker on noise impact assessments for Boston University's Masters of Urban Planning degree program (1994; 1996).

PROFESSIONAL ORGANIZATIONS

Institute of Noise Control Engineers (INCE), Board Certified Member, Board of Directors (2014-2015)
Acoustical Society of America
American Meteorological Society - Certified Consulting Meteorologist #578
Air and Waste Management Association

PUBLICATIONS

O'Neal, R.D., Hellweg, Jr., R.D. and R. M. Lampeter, 2011. Low frequency sound and infrasound from wind turbines. Noise Control Engineering Journal, **59** (2), 135-157.

O'Neal, R.D., and R.M. Lampeter, 2007: Sound Defense for a Wind Turbine Farm. North American Windpower, Zackin Publications, Volume 4, Number 4, May 2007.

O'Neal, R.D., 1991: Predicting potential sound levels: A case study in an urban area. Journal of the Air & Waste Management Association, **41**, 1355-1359.

McKee, T.B. and R.D. O'Neal, 1989: The role of valley geometry and energy budget in the formation of nocturnal valley winds. Journal of Applied Meteorology, **28**, 445-456.

CONFERENCE PRESENTATIONS

O'Neal, R.D., 2014. Wind Energy Sound Monitoring Under High Wind Shear Conditions. NOISE-CON 2014, Fort Lauderdale, FL.

O'Neal, R.D. Lampeter, R.M., Emil, C.B. and B.A. Gallant. Evaluating and controlling noise from a metal shredder system. Presented at INTER-NOISE 2012, NY, NY, August 19-22, 2012.

O'Neal, R.D., 2011. Wind Turbine sound Levels: The Michigan I, Huron County, MI Study. Presented at Great Lakes Wind Collaborative 4th Annual Meeting, Ypsilanti, MI.

O'Neal, R.D., Hellweg, Jr., R.D. and R. M. Lampeter, 2011. Low frequency sound and infrasound from wind turbines. Presented at WINDPOWER 2011, Anaheim, CA.

O'Neal, R.D., Hellweg, Jr., R.D. and R. M. Lampeter, 2010. Low frequency sound and infrasound from wind turbines – a status update. NOISE-CON 2010, Baltimore, MD.

O'Neal, R.D., 2010. Noise control evaluation for a concrete batch plant. NOISE-CON 2010, Baltimore, MD.

O'Neal, R.D., and R.M. Lampeter, 2009: Nuisance noise and the defense of a wind farm. INTER-NOISE 2009, Ottawa, Canada, August 23-26, 2009.

O'Neal, R.D., and R.M. Lampeter, 2009: Sound from Wind Turbines: A Key Factor in Siting a Wind Farm. 12th Annual Energy & Environment Conference – EUEC 2009, Phoenix, AZ, February 2, 2009.

O'Neal, R.D., 2001: The Impact of Ambient Sound Level Measurements on Power Plant Noise Control in Massachusetts: A Case Study. Proceedings of the Air & Waste Management Association 94th Annual Meeting and Exhibition, Orlando, FL, June 24-28.

Hendrick, E.M., and R.D. O'Neal, 2001: A Case Study of Class I Impacts Using CALPUFF Screen. Proceedings of the Air & Waste Management Association Guideline On Air Quality Models: A New Beginning, Newport, RI, April 2001.

O'Neal, R.D., 1994: Indoor air sampling techniques used to meet workplace and ambient air toxic detection requirements. Proceedings of the Air & Waste Management Association 87th Annual Meeting and Exhibition, Cincinnati, OH, June 19-24.

O'Neal, R.D., 1992: Estimating future noise levels from industrial noise sources. Acoustical Society of America 124th Meeting, New Orleans, LA, October 31 - November 4.

O'Neal, R.D., 1991: Temporal traffic fluctuations and their impact on modeled peak eight-hour carbon monoxide concentrations. Proceedings of the Air & Waste Management Association 84th Annual Meeting and Exhibition, Vancouver, B.C., June 16-21.

O'Neal, R.D., 1990: Noise barrier insertion loss: A case study in an urban area. Proceedings of the Air & Waste Management Association 83rd Annual Meeting and Exhibition, Pittsburgh, PA, June 24-29.

Thomas L. Gorrill

Professional Engineer | Co-founder

Education

- University of Maine: B.S. in Civil Engineering, 1978

Registrations and Certifications

- ME: #4614
- NH: #8708
- ITE: Certified by ITE as a Professional Traffic Operations Engineer (PTOE)

Affiliations

- New England ITE: Past President
- Maine Chapter ITE: Past President
- Maine Section, ASCE: Past President
- Maine Better Transportation Association: Past President

Activities

- Maine Appalachian Trail Club: Overseer of Baldpate District

Awards

- ITE New England Section 1998 Distinguished Service Award

Experience

- 34 years in private practice

Municipal Peer Review- Tom has conducted peer reviews for scores of projects located in both Maine and New Hampshire. He currently provides on call peer review services for traffic and parking studies in the Towns of Windham, Cumberland, Scarborough, and Gray in Maine. He has also completed reviews in Conway and Greenland, New Hampshire as well as in Leominister, Lancaster, and Blackstone New Hampshire.

Traffic Impact Studies-Tom has completed hundreds of traffic impact studies during his 36 year career,a sampling of which is presented below. These studies typically include an assessment of the traffic impacts, pedestrian and vehicular circulation as well as a determination of off-site mitigation requirements.

<u>Institutional</u>

- Two major expansions of Maine Medical Center in Portland as well as establishment of their Scarborough campus
- Classroom and dormitory expansions at the University Southern Maine
- Dormitory expansion at Bates College

<u>Municipal</u>

- Brunswick High School and Middle School
- Greely Middle School, Cumberland
- Hampden High School
- Scarborough High School
- Westbrook Middle School

<u>Private</u>

- Traffic/Truck impact of replacing Oil burner to woood-Public Service Company of New Hampshire, Schiller station, Portsmouth
- Major retail developments for WS Properties in North Hampton and Epping New Hampshire
- Dunkin Donuts in Wakefield, New Hampshire
- Skyline Estates in Wakefield, New Hampshire
- Trafton Properties industrial development in Waterville, Maine
- Redevelopment of over 500,000 sf of mill space in Downtown Biddeford
- Racino-Bangor
- 500,000 sf retail developments for Packard Development in Augusta and Biddeford
- Over a dozen projects for Hannaford Bros.
- Plum Creek major development in Greenville, Maine
- Several affordable housing projects for Avesta Housing
- Traffic study as part of the Environmental Assessment for the closure of the Brunswick Naval Air Station

Traffic Impact Studies-Tom has completed many parking studies for developments. Some of the more significant studies include the following:

- University of Southern Maine, Portland campus- Completed an assessment of on and off street parking and made recommendations as to the size of the parking garage. Have continued to monitor parking each year.
- University of Maine, Orono campus- Recently completed recommendations to improve parking management on campus.
- Bates College- completed an assessment of the parking needs associated with two proposed buildings. Also completed a campus wide parking plan and recommendations
- Maine Medical Center- completed an campus wide assessment of parking needs and developed a parking management plan

GORRILL PALMER

Randy Dunton

Professional Engineer I Senior Engineer

Education

- University of Maine: B.S. in Civil Engineering

Registrations and Certifications

- Maine # 8686
- New Hampshire #14676
- Certified by ITE as a Professional Traffic Operations Engineers #611

Affiliations

- Member/Past President, Maine Chapter, Institute of Transportation Engineers

Experience

- 6 years in public practice
- 17 years in private practice

Route 112 Corridor Study, Saco, Maine – Randy is the project manager for this two lane multi-use corridor. The corridor serves a variety of uses including residential housing, schools, commercial use, industrial use, and athletic fields. There is a good a mixture of pedestrian and bicycle accommodations along the corridor with some missing links, and the corridor includes both signalized and unsignalized intersections as well as serving as the primary access to I-95 and I-195 ramps. Evaluation of the corridor included signal warrant analysis, unsignalized / signalized capacity and queuing analysis, roundabout evaluation, center left turn lane evaluation, Interstate ramp evaluation, and geometric improvements. The potential mitigation for this project was categorized for the City into short and long term mitigation as well as identifying areas to be monitored for future potential mitigation.

Franklin Street, Portland, Maine – Randy is the project engineer for this project, responsible for all the modeling and capacity analysis for this corridor using the Synchro / SimTraffic computer modeling software. This corridor includes I-295 ramps at one end and extends to the waterfront at the opposite end. This corridor carries over 3,000 vehicles during the design hours on the busy end of the corridor. The computer modeling was created from scratch for the future no-build scenario to serve as a benchmark for evaluating potential alternatives and the preferred build condition. Randy is responsible for determining and then modeling all the corridor's physical improvements to address deficiencies. The modeling included unsignalized / signalized / roundabout intersections, as well as incorporating pedestrian accommodations and on-street parking. This project included close coordination and communication with the City, MaineDOT, and advisory committee. The end result is a "complete streets" design that will function better for all modes of transportation including vehicles, pedestrians, and bicycles.

Downtown Lewiston Transportation Study, Lewiston, Maine – As senior engineer for this project, Randy was responsible for overseeing the data collection efforts; study area in-field evaluations of pedestrian and bicycle accommodations, existing geometrics, roadway circulation and parking evaluation. Randy was also responsible for determining and evaluating mitigation to address identified deficiencies. This project evaluated one-way / two-way street conversions, roadway geometric improvements, signal warrant analysis, general circulation issues, way-finding improvements, and parking space modifications.

GORRILL PALMER

Randy Dunton

Professional Engineer | Senior Engineer

Biddeford / Saco Mill District, Maine – Randy was project engineer on this master plan project that evaluated the improvements that would be needed to accommodate the re-occupancy of over a million square feet of mill area in the downtown of the two adjacent Cities. Randy was responsible for overseeing collecting data, determining design hour volumes, and evaluating approximately 30 signalized intersections. Once the intersections were evaluated, Randy identified required mitigation to improve the intersections to local and state standards. Improvements include signal timing and phasing changes, roadway geometric changes, and possible circulation changes. The outcome of this study is to recommend an impact fee such that the identified improvements could be proportionally funded by the developments that contributed the traffic.

Route 1 Corridor Studies, Yarmouth, Maine – Randy served as project manager for the Route 1 Phase II & III studies. Randy oversaw the data collection effort; computer modeling of the corridor; evaluation of the corridors for vehicles, pedestrians, and bicycles; geometric changes to address high crash locations and areas of deficiencies. The management of this project included working closely with MaineDOT, the Town, and committee members as well as public presentations. Potential mitigation varied from low cost signing and striping, to medium costs roadway widening to higher cost roundabout alternatives. Mitigation was identified for the short term and long term conditions. Planning level opinions of costs were generated to guide the Town in their decision making.

York Beach Study, York, Maine - Randy was the senior engineer for this centralized beach area study in York. The area includes hotels, restaurants, beach area, retail establishments, Zoo access, as well as the local fire department hub. The purpose of this project was to evaluate ways in which local and visitor traffic, pedestrians, and emergency vehicles could co-exist. Randy was responsible for data collection efforts, computer modeling, in-field evaluations; mitigation recommendations, and prioritization of mitigation. Responsibilities also included report writing, and preliminary opinions of costs. Mitigation recommendations included changes to geometrics, one-way to two-way circulation, parking, striping, regulatory signing, and way finding signage.

APPENDIX E

TRAFFIC ASSESSMENT (Gorrill Palmer)

Relationships.
Responsiveness.
Results.

Traffic Assessment
Juniper Ridge
Landfill Expansion
Old Town, Maine

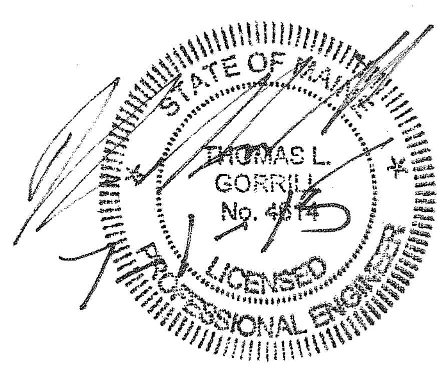
PREPARED FOR:
NEWSME Landfill
Operations, LLC

June 2015

SUBMITTED BY:
Gorrill Palmer
P.O. Box 1237
15 Shaker Road
Gray, ME 04039
207.657.6910

Traffic Assessment
Juniper Ridge Landfill Expansion
Old Town, Maine

Index



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). The JRL is located in Old Town just west of I-95 along Route 16. Access to the JRL will continue via the existing access road, which is located off of Route 16 just over the Alton municipal boundary line. The remainder of the JRL site is bounded by the Alton/Old Town line and Route 43.

The JRL is currently 68 acres and is proposed to be increased to 122 acres as part of the expansion. This increase will allow an expansion in the capacity of the landfill from 10 million to 19.35 million cubic yards. The facility accepted approximately 629,021 tons of material in 2014. The Expansion design is based on a disposal volume of 700,000 tons/year.

The intent of this study is to determine whether the future level of usage will be adequately accommodated by the transportation network. This assessment determined that, the roads and intersections in the vicinity of the Juniper Ridge Landfill will safely and conveniently handle the potential increased level of usage associated with the Expansion. In addition 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. GP obtained the 2011-2013 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.
2. The 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.
3. 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.
4. The weight limit on I-95 was increased from 80,000 to 100,000 lbs in 2011. This will allow 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.
5. The MaineDOT has two projects scheduled for 2015 on Route 16; one beginning 3.2 miles south of the Alton-Lagrange town line and extending southeasterly 5.89 miles past the site driveway; and the second beginning at the I-95 Northbound off ramp and extending southerly 5.74 miles.

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.

I. *Existing and Proposed Site*

The site is located in Old Town 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 site will continue from the driveway located just over the Alton town line along Route 16. As proposed, the project will result in an expansion from 68 acres to 122 acres.

The facility accepted approximately 629,021 tons of material for disposal in 2014. This Expansion is designed for approximately 700,000 tons of waste per year beginning in 2019, although 700,000 tons were received at the site in both 2010 and 2011. The intent of this study is to determine whether the transportation network can accommodate the increase in hauling. It should also be noted that there is a proposed gas to energy facility being proposed but is only forecast to generate a few employees per day.

II. *Background Traffic Conditions*

GP based the study on the following information:

- Crash History for 2011-2013 provided by the Maine Department of Transportation.
- Turning movement volumes collected by GP from 7:00 AM to 9:00 AM and from 3:30 PM to 6:00 PM on Tuesday September 30, 2014 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

Existing Traffic Volumes

Daily Volumes

Currently the Average Daily Truck Volumes based on data furnished by NEWSME is approximately 164 trucks (approximately 82 in and 82 out) with 128 or 78% using I-95 and 37 or 22% using Route 16. The 2011 AADT north of Route 16 (Southgate) recorded by MaineDOT was 1650 vehicles per day, thus the trucks associated with the current site represent approximately 2.2% of the traffic on Route 16.

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. The seasonal adjustment to reflect the 30th highest hour of traffic volume for roadway volumes collected at the beginning of September is three percent. This procedure has been employed in previous traffic impact studies reviewed and accepted by MaineDOT.

Annual Growth

The 2014 roadway volumes were increased by one percent per year to 2031to reflect the projected life span of the project. Based on MaineDOT historic counts, traffic in this area has varied between minor increases and minor declines.

Other Development

GP contacted Ron Harriman, 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 into this project's predevelopment volumes. Based on these conversations, it was determined that there are no other projects planned that would have a significant impact on the project area.

The raw volumes shown on Figure 2 of Appendix A were balanced (Figure 3) and adjusted seasonally to arrive at the "Balanced and Adjusted Volumes" shown on Figure 4. Those volumes were then adjusted for a yearly growth to yield 2031 predevelopment volumes, shown on Figure 5 for the AM and PM peak hours.

III. *Major Truck Routes*

Federal law changed in 2011 to increase the gross vehicle weight on I-95 from 80,000 to 100,000 pounds. Previously, vehicles over 80,000 pounds had to use the state and local roadways, which have a gross vehicle weight limit of 100,000 pounds. Thus, this change has reduced the traffic on local roadways by allowing trucks to utilize I-95 to Exit 199, followed by Route 16 to the site driveway.

The major truck route for this facility is shown on the location map in Appendix A. 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*, 7th Edition. However, as "landfill" is not a listed land use in that publication, our office based trip generation on the following sources of information:

- Turning movement counts completed at the site driveway on Tuesday, September 30, 2014.
- Truck logs provided for 2014.

Trip Generation Based on Turning Movement Counts

Based on the count completed at the landfill access road entrance, our office determined the following level of trip generation:

Existing Trip Generation for Juniper Ridge (September 30, 2014)

Trip Type	AM Peak Hour (7:00-8:00 AM)	PM Peak Hour (4:15-5:15 PM)
Non Truck	7	8
Truck	18	14
Total	**25**	**22**

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. For the purposes of completing this assessment, the monthly totals from the truck logs were reviewed from January 2014 to December 2014, 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 May 2014, with 60,116 tons and 2439 truck trip ends, with the second highest month being October 2014, with 59,120 tons and 2442 truck trip ends. The total tonnage in September 2014 was 53,173 with 2,212 truck trip ends. One trip end in plus one trip end out is equal to two trip ends, or one round trip. Using this information, our office increased the September 30, 2014 traffic counts above by 10% to yield the following peak hour truck traffic in trip ends.

2014 Peak Design Hour Trip Generation for Juniper Ridge

Trip Type	AM Peak Hour (7:00-8:00 AM)	PM Peak Hour (4:15-5:15 PM)
Non Truck	8	9
Truck	20	16
Total	**28**	**25**

The relevant portions of the truck logs are contained in Appendix C.

Increase in Traffic

NEWSME indicates that the facility is anticipated to increase from a disposal rate of approximately 629,021 tons in 2014 to approximately 700,000 tons per year, an increase of 11 percent resulting in the following peak hour traffic increases. It is noted that in 2010 and 2011similar tonnages were received on the site.

Increase in Trip Generation for Juniper Ridge

Trip Type	AM Peak Hour	PM Peak Hour	Daily
Non Truck	1	1	2
Truck	2	2	18
Total	**3**	**3**	**20**

Total Forecast Trip Generation for Juniper Ridge

Trip Type	AM Peak Hour	PM Peak Hour	Daily
Non Truck	9	10	20
Truck	22	18	183
Total	**31**	**28**	**203**[1]

1. Each trip represents on one way traffic either coming or going from the site so this value represent about 100 vehicles per day using the site.

V. *Trip Distribution*

GP has obtained the ratio of entering and exiting traffic from the existing site traffic. The trip distribution is as follows:

Weekday AM Peak Hour:	48% Enter, 52% Exit
Weekday PM Peak Hour:	23% Enter, 77% Exit

VI. *Trip Assignment*

Trip assignment has been based on counts completed at the study area intersections, the existing distribution at the driveway, and information provided by NEWSME. The trip distribution percentages and trip assignment are shown on Figure 6 of Appendix A for the AM and PM peak hours.

VII. *Postdevelopment Traffic*

The traffic associated with the expansion as shown on Figure 6 was combined with the predevelopment traffic shown on Figures 5 to yield the post development volumes shown on Figure 7 for both the AM and PM peak hours.

VIII. *Capacity Analyses*

GP completed AM and PM peak hour capacity analyses for the intersections listed in section II for the year 2031.

The intersections in the study area were evaluated with the Synchro/SimTraffic computer software package. 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 a level of service 'D', the intersection is further evaluated to determine if mitigation is needed. The following tables summarize the relationship between control delay and level of service for unsignalized intersections:

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.

Level of Service for Juniper Ridge Site Driveway and Route 16

Approach	AM Peak Hour				PM Peak Hour			
	Predevelopment		Postdevelopment		Predevelopment		Postdevelopment	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Route 16 EB	1	A	1	A	1	A	1	A
Route 16 WB	1	A	1	A	1	A	1	A
Juniper Ridge NB	2	A	2	A	1	A	1	A

Level of Service for Route 16 at I-95 Southbound Ramp

Approach	AM Peak Hour				PM Peak Hour			
	Predevelopment		Postdevelopment		Predevelopment		Postdevelopment	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Route 16 EB	2	A	2	A	2	A	2	A
Route 16 WB	2	A	2	A	1	A	1	A

Level of Service for Route 16 at I-95 Northbound Ramp

Approach	AM Peak Hour				PM Peak Hour			
	Predevelopment		Postdevelopment		Predevelopment		Postdevelopment	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Route 16 EB	1	A	1	A	1	A	1	A
Route 1 WB	1	A	1	A	1	A	1	A
I-95 NB	5	A	5	A	6	A	6	A

Based on the above tables, all of the approaches at each of the study area locations is anticipated to operate at a high level of service "A". The additional traffic generated by the site is anticipated to have minimal impacts to operations.

IX. *Queue Analysis*

Queuing exiting the driveway will not be significant at this location. Based on the capacity analysis, the 95th percentile queue is not anticipated to exceed 50 feet in length (two cars or one large truck) on the driveway approach.

X. *Site Access*

The landfill access road is currently on Route 16 and will continue to be utilized following the expansion. All approaches are single lane in nature, and will remain so; turning movements do not meet warrants for left or right turn lanes from Route 16.

XI. *Crash Data*

In order to evaluate whether a location has a crash problem, MaineDOT uses two criteria to define High Crash Locations (HCL). Both criteria must be met in order to be classified as an HCL.

1. A critical rate factor of 1.00 or more for a three-year period. (A Critical Rate Factor {CRF} compares the actual accident rate to the rate for similar intersections in the State. A CRF of less than 1.00 indicates a rate less than average) **and:**

2. A minimum of eight crashes over a three-year period.

Based on the published history, there are no locations within the study area that are considered High Crash Locations. However, the locations that have either 8 or more collisions or a CRF of 1.00 or more are listed below:

What follows is the listing of locations that satisfy either of these criteria:

MaineDOT Crash Data for 2011-2013: Intersections

Node	Intersection	# of Collisions	CRF	HCL?
38917	Bennoch (Rte 16) Rd/Gillman Falls Rd	6	2.59	No
39199-39200	Bennoch Rd-Alton Tannery Rd to Brown Brook	10	0.73	No
39199-41324	Bennoch Rd-Brown Brook to SB on ramp	9	0.79	No
40866-65216	W Old Town Rd-SB I-95 ramps to 0.21 miles west	4	1.64	No

Each of these locations are discussed below:

Bennoch Rd / Gillman Falls Rd-This intersection had 6 collisions over a three year period at this intersection. One of the collisions involved a truck over 10,000 pounds traveling southbound on Bennoch turning left onto Gilman Falls and pulled in front of an oncoming passenger car on Gillman Falls Road. The remaining collisions involved passenger vehicles on either approach on Bennoch pulling out into the path of an oncoming passenger car on Gillman Falls Road.

Bennoch Rd- Alton Tannery Rd to Brown Brook-There were 10 collisions along this 1.77 mile section of Bennoch Road during the three year period. Three of these were collisions with deer, one of these involving a truck over 10,000 pounds. Three of the collisions occurred in the winter during weather events, and three involved single vehicle collisions at night. The remaining collision involved a passenger vehicle avoiding an oncoming vehicle which was encroaching into their lane.

Bennoch Rd- Brown Brook to the SB ramp- This location had 9 collisions in the three year period over this 1.18 mile section of roadway. Of these, 4 collisions involved winter weather conditions and 4 were collisions with deer, moose or domestic animals. These collisions all involved passenger vehicles.

W Old Town Rd-SB I-95 ramps to 0.21 miles west-There were 4 collisions along this section of road all involving passenger vehicles. Two were on icy roads, one was a rear end collision with a vehicle stopped waiting to turn into a driveway and one involved a vehicle backing out of a driveway.

XII. *Sight Line Analysis*

The Maine Department of Transportation has issued the following guidelines for sight lines for standard roadways outside of the urban compact:

Maine DOT Standards for Sight Distance

Posted Speed (mph)	Sight Distance (Standard)	Sight Distance (Trucks)
25	200	300
30	250	375
35	305	460
40	360	540
45	425	640
50	495	745
55	570	855

Eaton Traffic Engineers evaluated the available sight lines at the existing driveway as part of the prior traffic study for this facility in accordance with MaineDOT standards.

The MaineDOT standards are as follows:

Driveway observation point: 10 feet off major street travel way
Height of eye at driveway: 3 ½ feet above ground
Height of approaching vehicle: 4 ¼ feet above road surface

The result of this sight line analysis exiting the site drive is summarized in the following table:

Driveway Sight Line Evaluation

Direction	Posted Travel Speed (mph)	Recomm. Std. Sight Line (ft)	Recomm. Truck Sight Line (ft)	Actual Sight Line (ft)
Exiting Site Driveway onto Route 16 Looking:				
Left	40	360	540	1,000+
Right	40	360	540	1,000+

As shown, the sight lines looking to the left and right significantly exceed Maine DOT requirements for standard vehicles as well as trucks. GP recommends that all plantings to 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 in association with construction should not interfere with sight lines. In addition, we recommend that during construction, when heavy equipment is entering and exiting the site, appropriate measures, such as signage and flag persons, be utilized in accordance with the Manual on Uniform Traffic Control Devices.

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. GP examined the 2011-2013 MaineDOT crash data to determine if any locations within the study area (Route 16 from the site drive to Route 43 and Route 43 from Route 16 to the I-95 ramps) are considered High Crash Locations (HCL's). Based on the MaineDOT data, no locations are considered HCL's, nor do any appear close to satisfying both criteria that define an HCL.

2. The 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 in association with construction, should not interfere with sight lines.

3. We recommend that JRL prepare a policy requiring all trucks including independent haulers to utilize the Interstate system and that this be monitored periodically on an annual basis to determine compliance.

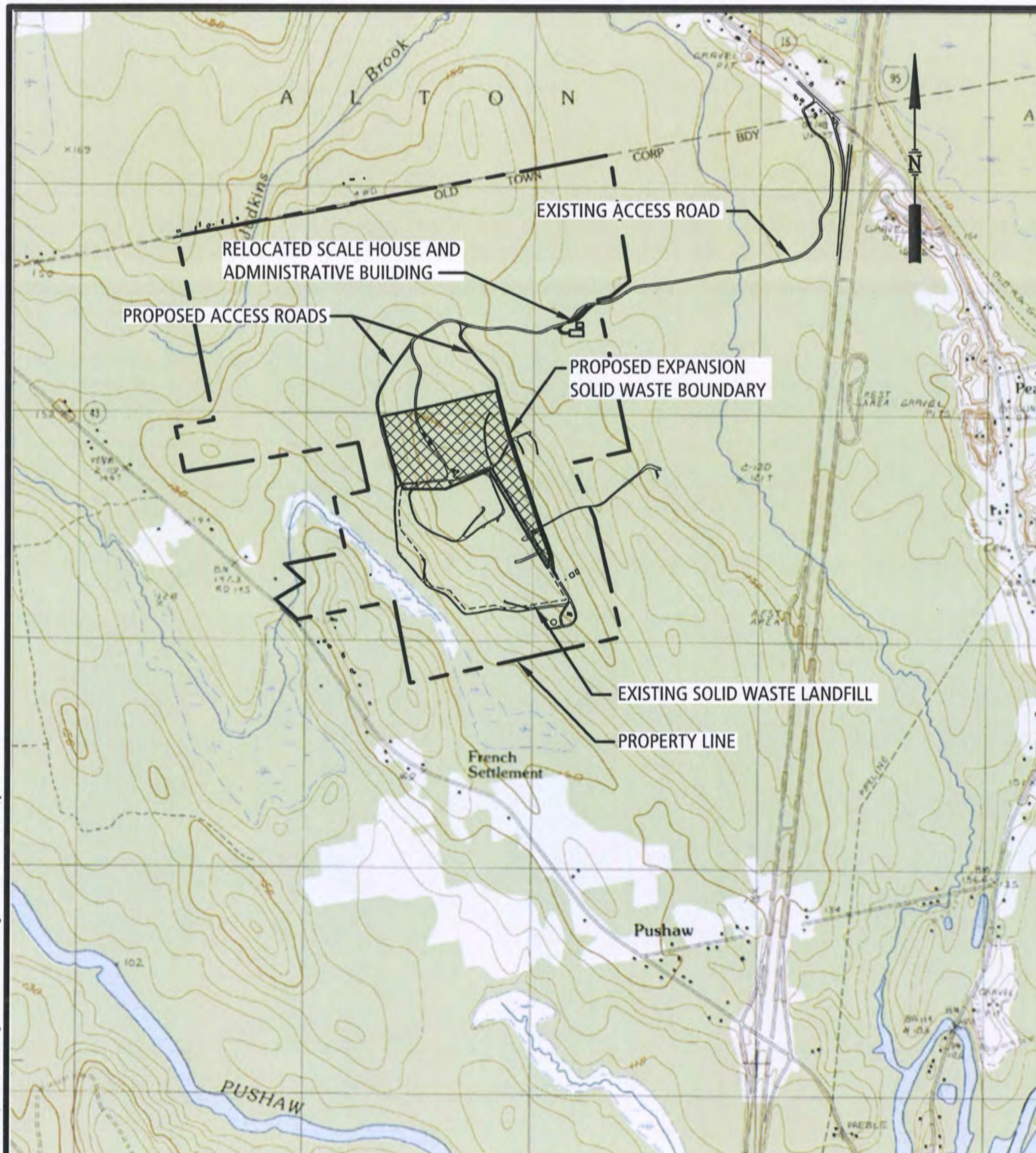
4. The weight limit on I-95 was increased from 80,000 to 100,000 lbs in 2011. This allows trucks hauling material to access the site by I-95 rather than from local roads. We understand that NEWSME has a policy to advise trucks to use I-95 which should continue through the expansion.

5. MaineDOT has two projects scheduled for 2015 on Route 16; one beginning 3.2 miles south of the Alton-Lagrange town line and extending southeasterly 5.89 miles past the site driveway; and the second beginning at the I-95 Northbound off ramp and extending southerly 5.74 miles.

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
Turning Movement Diagrams
Waste Haul Routes



SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

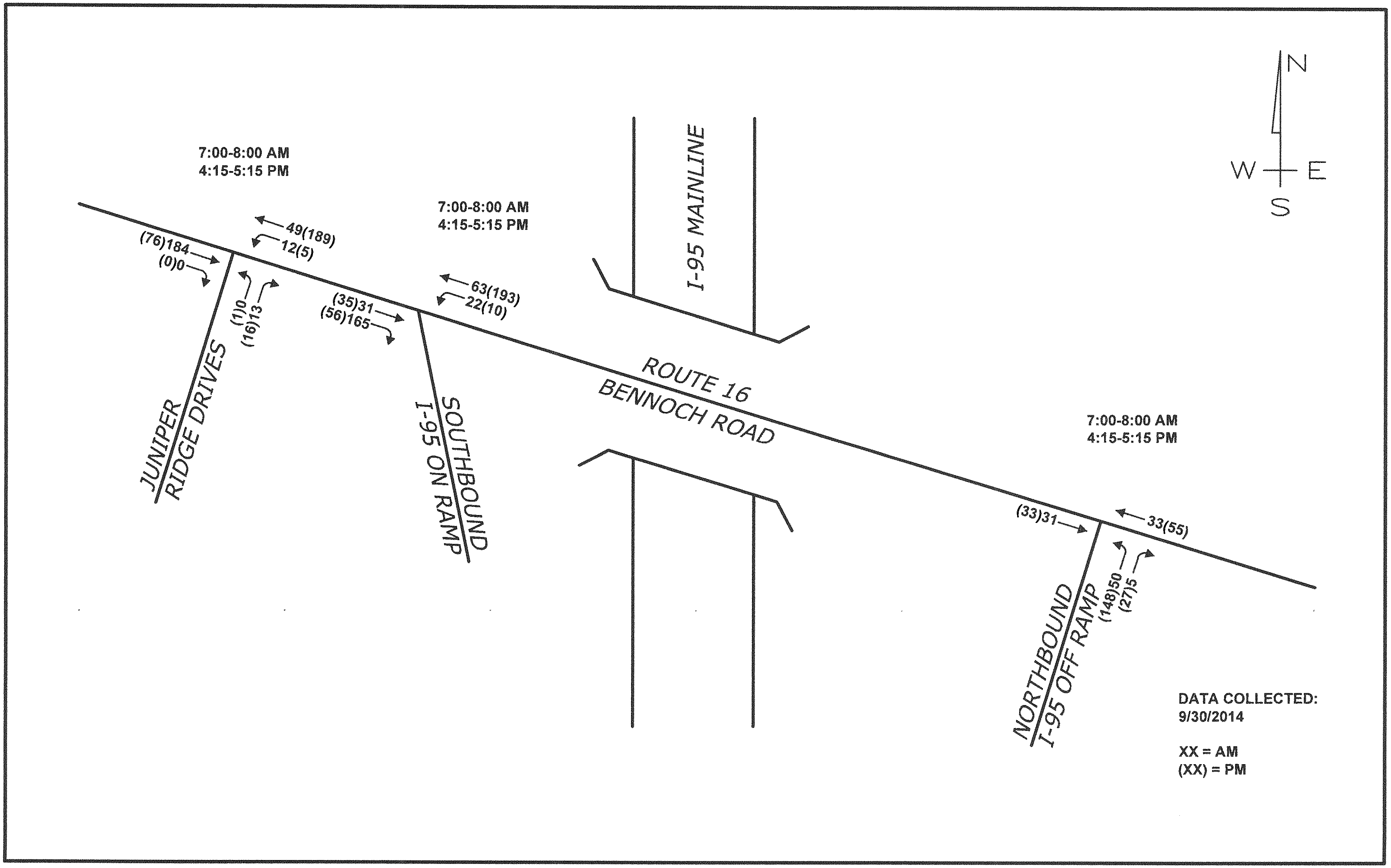
SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: PRESENTATION LMN: STANTEC CTB: SME-STD REV: 10/2/14

\\Nserver\cts\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Acad\Figures\Presentation.dwg, 10/2/2014 2:44:03 PM, jrl

Raw Volumes

Figure No. 2



BENNOCH ROAD (ROUTE 16), OLD TOWN, MAINE

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Draft:	DB	Date:	APR 2015
Checked:	-	File Name:	2071.01_TRAFF.dwg

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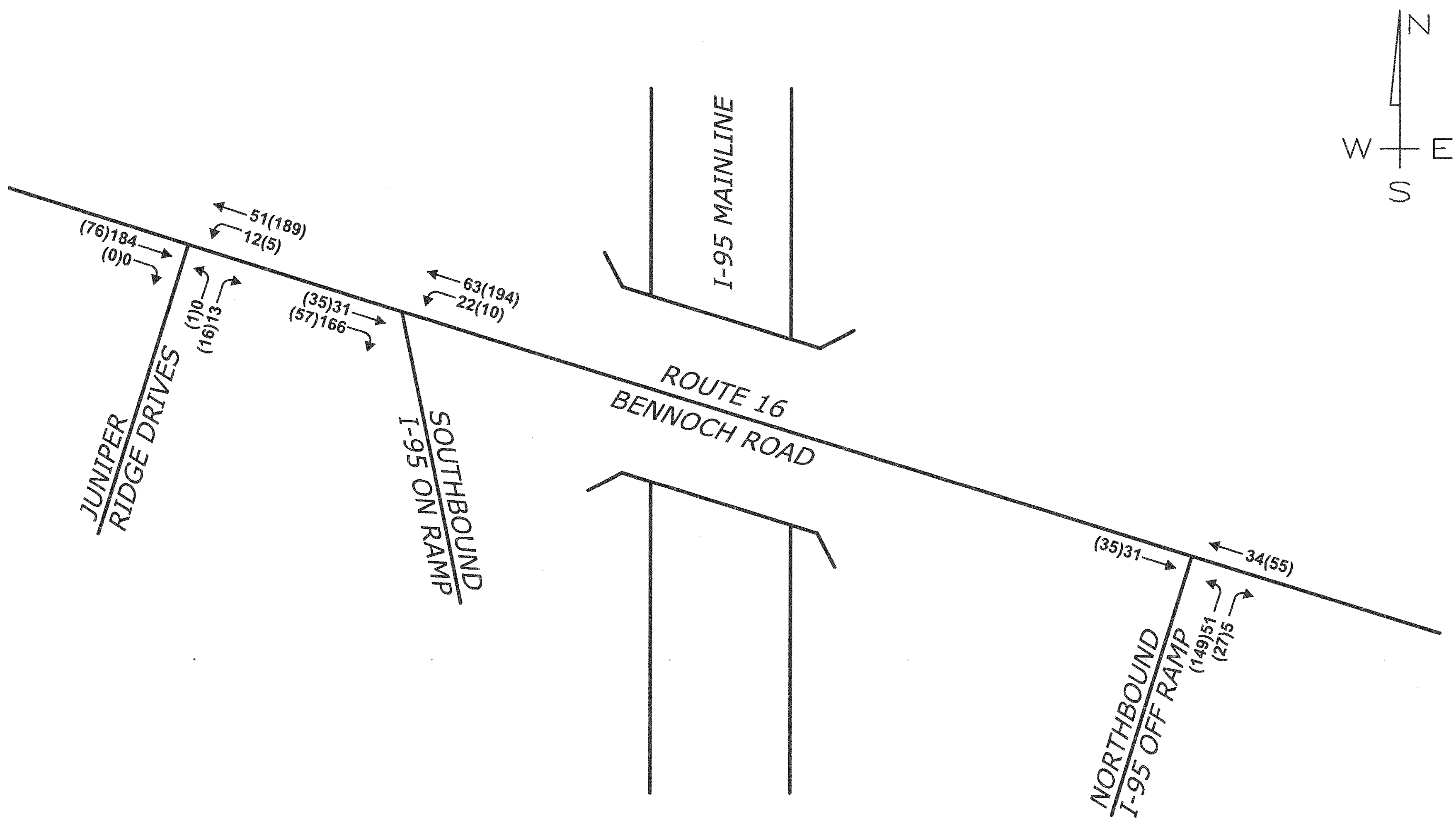
Balanced Volumes

Figure No. 3



BENNOCH ROAD (ROUTE 16), OLD TOWN, MAINE

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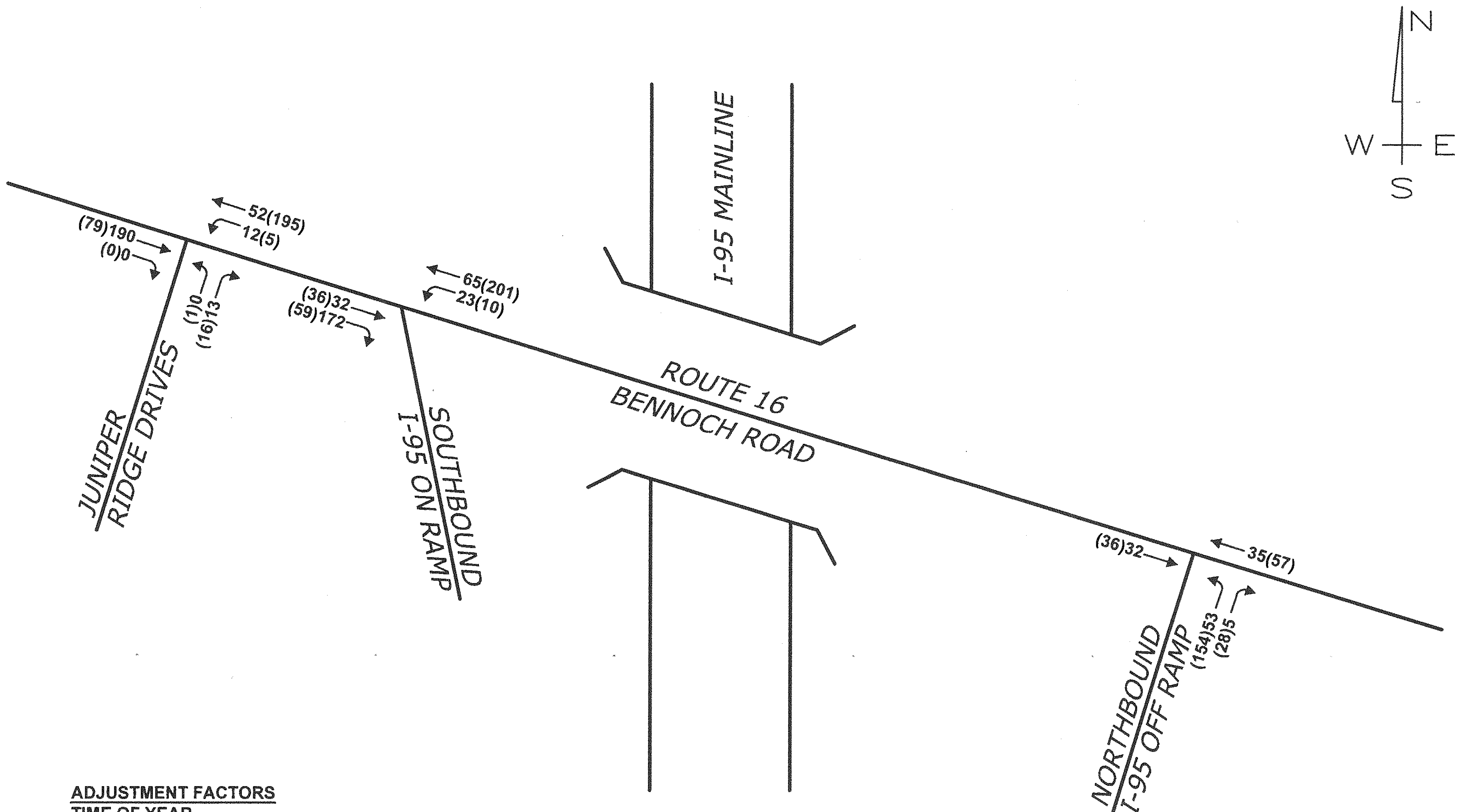
Balanced and Adjusted Volumes

Figure No. 4



ADJUSTMENT FACTORS
TIME OF YEAR
MAINEDOT WEEKLY GROUP MEAN FACTOR = $\frac{0.91}{0.88}$ = 1.034

XX = AM
(XX) = PM

BENNOCH ROAD (ROUTE 16), OLD TOWN, MAINE

Design: TLG
Draft: DB
Checked: -

Scale: NONE
Date: APR 2015
File Name: 2071.01_TRAFF.dwg

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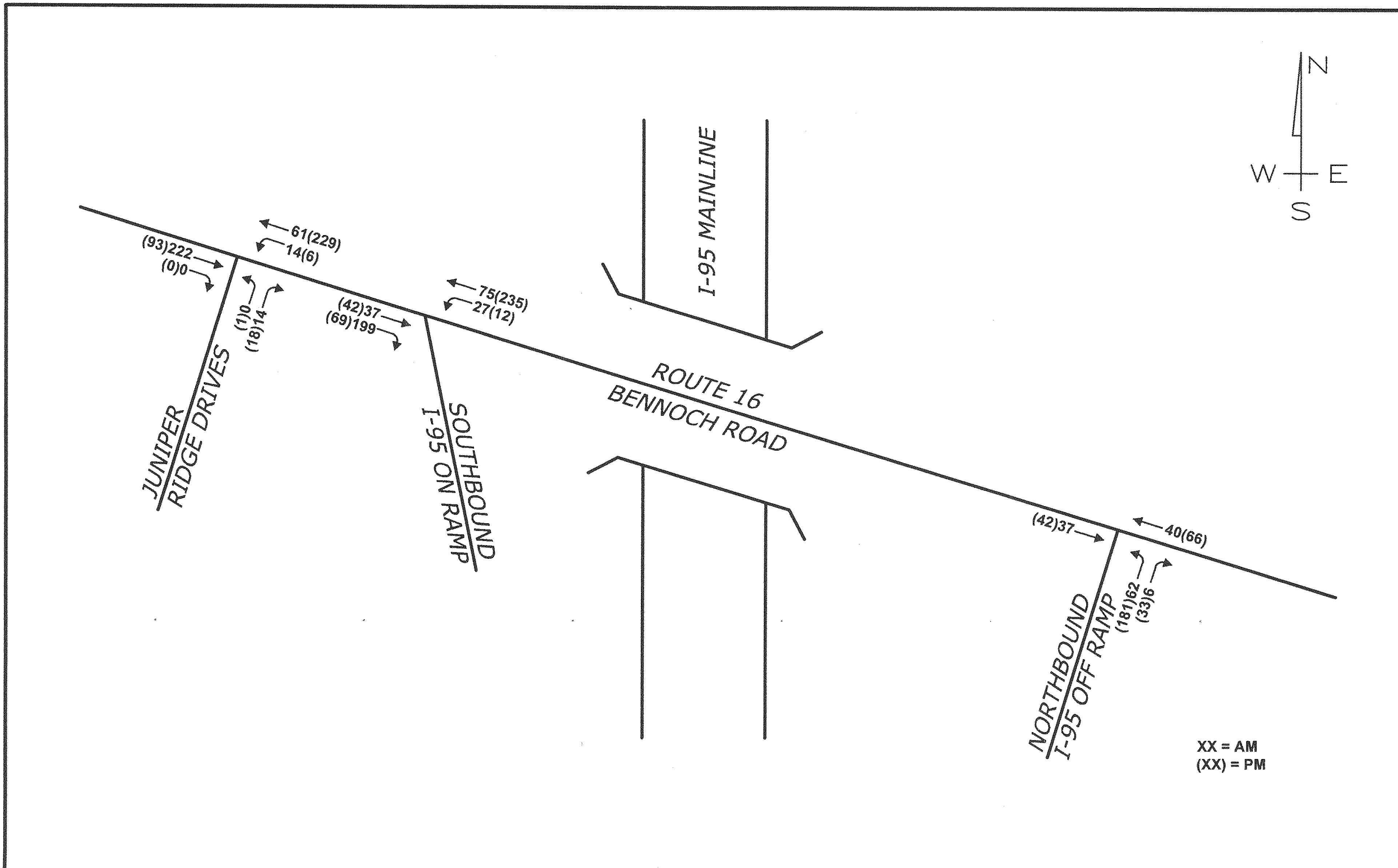
2031 Pre-Expansion Volumes

5



BENNOCH ROAD (ROUTE 16), OLD TOWN, MAINE

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Checked:	-	File Name:	2071.01_TRAFF.dwg

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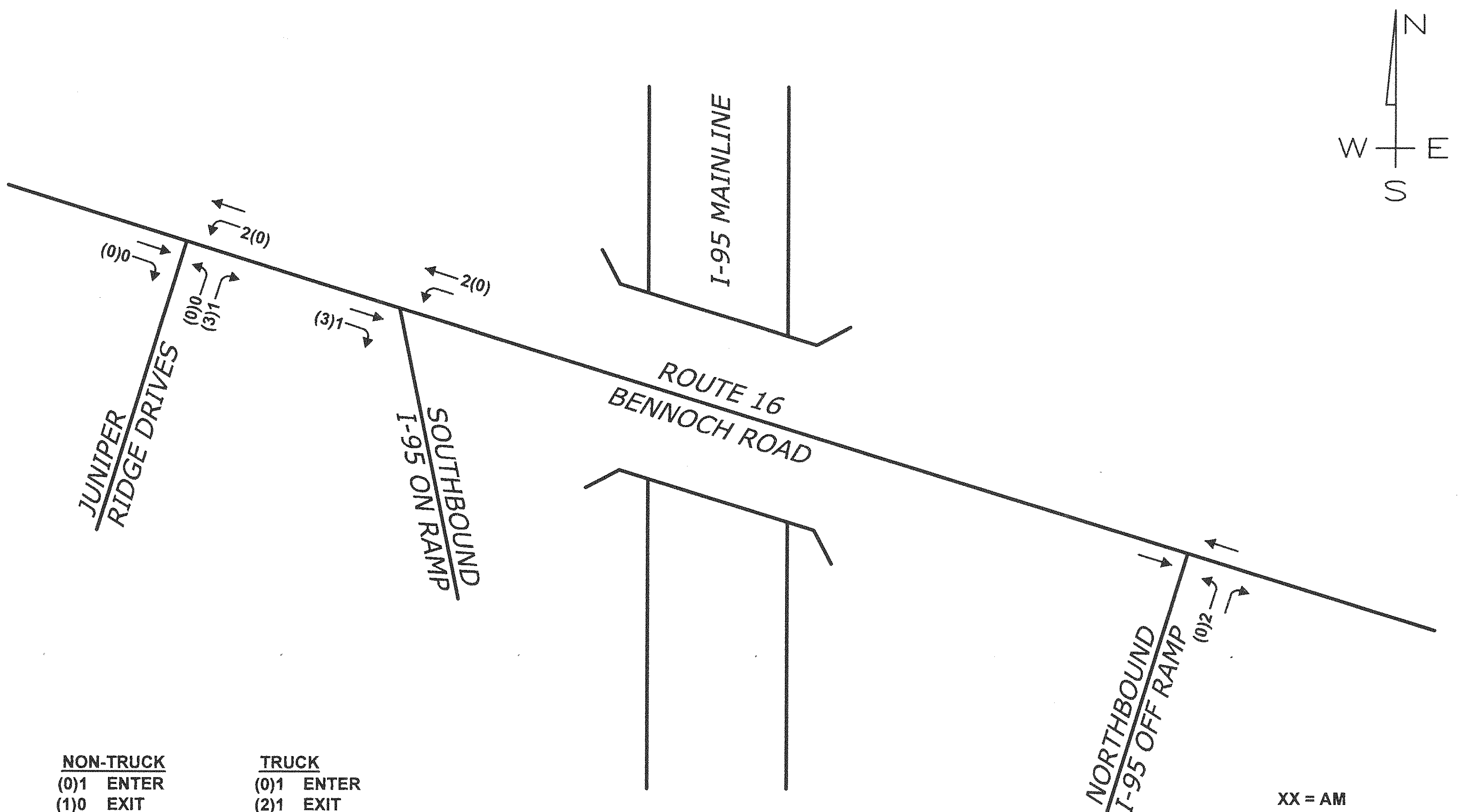
Expansion Traffic Volumes

Figure No. 6



NON-TRUCK		TRUCK	
(0)1	ENTER	(0)1	ENTER
(1)0	EXIT	(2)1	EXIT
(1)1	TOTAL	(2)2	TOTAL

XX = AM
(XX) = PM

BENNOCH ROAD (ROUTE 16), OLD TOWN, MAINE

Design: TLG
Draft: DB
Checked: -

Scale: NONE
Date: APR 2015
File Name: 2071.01_TRAFF.dwg

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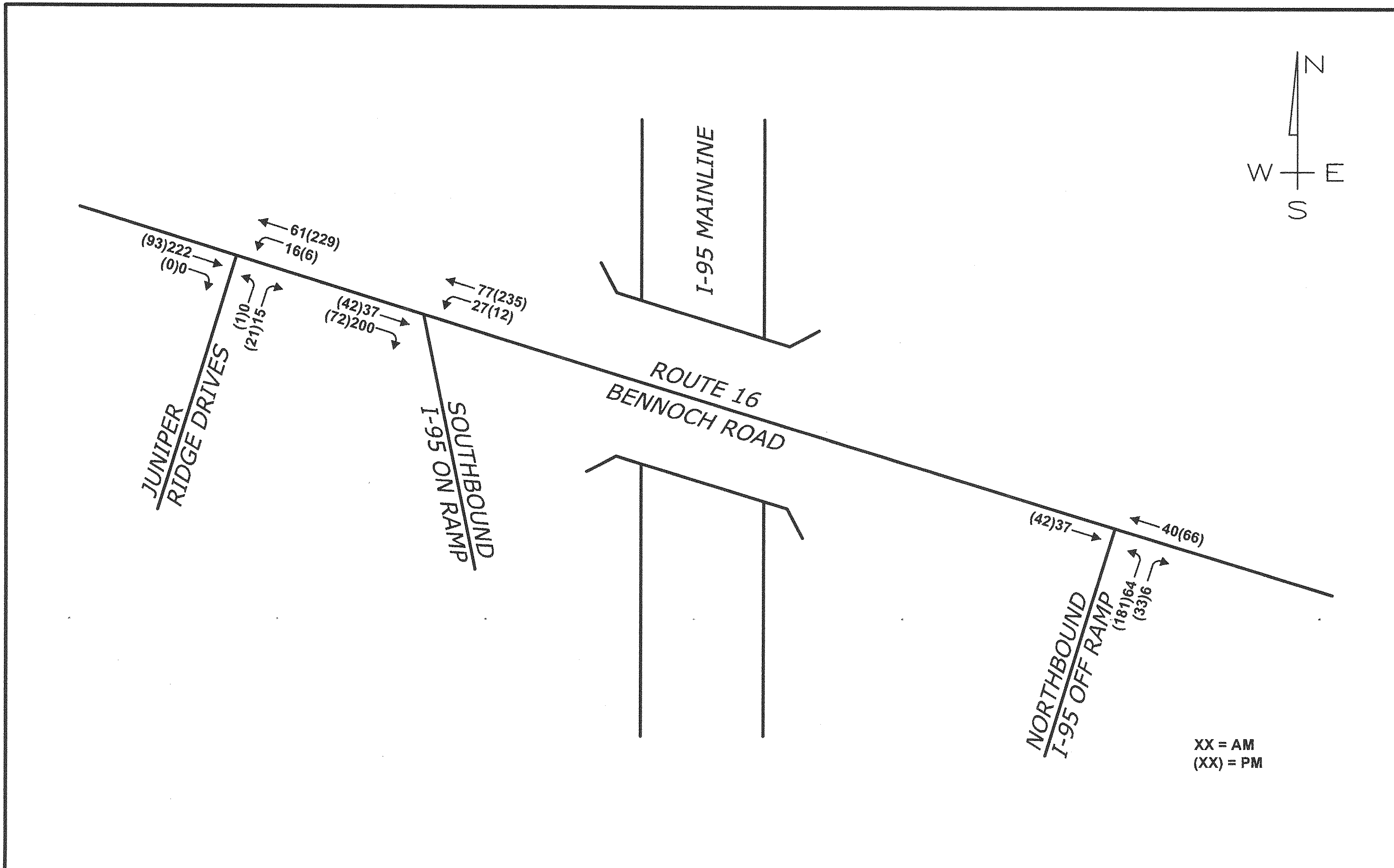
2031 Post-Expansion Volumes

Figure No. 7



BENNOCH ROAD (ROUTE 16), OLD TOWN, MAINE

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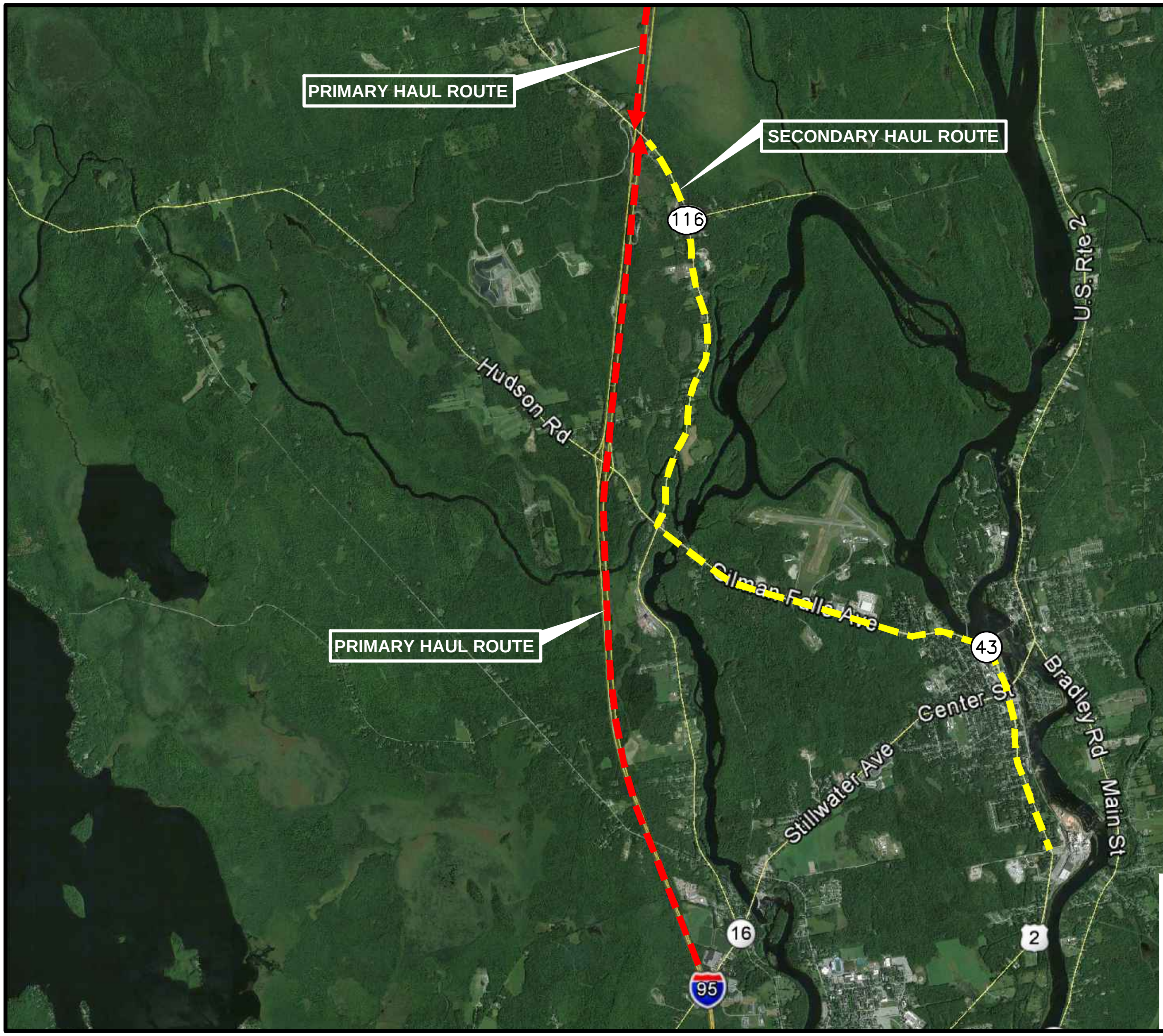
Waste Haul Routes

Figure No. 8



PRIMARY HAUL ROUTE I-95 CORRIDOR - USED BY THE MAJORITY OF TRUCK TRAFFIC CONSISTENT WITH NEW'S POLICY ADVISING TRUCKS TO USE I-95

SECONDARY HAUL ROUTE - LOCAL OLD TOWN MILL WASTE AND LEACHATE HAULING

BENNOCH ROAD (ROUTE 16), OLD TOWN, MAINE

Design:	TLG	Scale:	NONE
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Appendix B
Capacity Analyses Results

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	340	380	326	363	317	344
Vehs Exited	344	379	324	354	315	343
Starting Vehs	7	3	3	1	3	2
Ending Vehs	3	4	5	10	5	3
Travel Distance (mi)	102	114	94	111	95	103
Travel Time (hr)	4.2	4.7	3.9	4.5	4.0	4.3
Total Delay (hr)	0.3	0.3	0.3	0.3	0.3	0.3
Total Stops	86	94	92	92	84	89
Fuel Used (gal)	3.6	4.1	3.4	4.0	3.4	3.7

Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	340	380	326	363	317	344
Vehs Exited	344	379	324	354	315	343
Starting Vehs	7	3	3	1	3	2
Ending Vehs	3	4	5	10	5	3
Travel Distance (mi)	102	114	94	111	95	103
Travel Time (hr)	4.2	4.7	3.9	4.5	4.0	4.3
Total Delay (hr)	0.3	0.3	0.3	0.3	0.3	0.3
Total Stops	86	94	92	92	84	89
Fuel Used (gal)	3.6	4.1	3.4	4.0	3.4	3.7

3: Landfill Performance by approach

Approach	SE	NW	NE	All
Denied Del/Veh (s)	0.2	0.0	4.2	0.4
Total Del/Veh (s)	0.1	0.6	0.9	0.3

5: SB On Ramp & Bennoch Road Performance by approach

Approach	SE	NW	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	1.2	1.6	1.3

7: NB Off Ramp & Bennoch Road Performance by approach

Approach	SE	NW	NE	All
Denied Del/Veh (s)	0.0	0.1	0.5	0.3
Total Del/Veh (s)	0.3	0.1	4.8	2.3

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	2.7

Intersection: 3: Landfill

Movement	SE	NW
Directions Served	TR	LT
Maximum Queue (ft)	4	42
Average Queue (ft)	0	3
95th Queue (ft)	3	21
Link Distance (ft)	460	266
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: SB On Ramp & Bennoch Road

Movement	SE	NW
Directions Served	TR	LT
Maximum Queue (ft)	13	44
Average Queue (ft)	0	7
95th Queue (ft)	7	29
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	NE	NE
Directions Served	L	R
Maximum Queue (ft)	87	18
Average Queue (ft)	37	1
95th Queue (ft)	73	13
Link Distance (ft)	566	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		80
Storage Blk Time (%)	0	0
Queuing Penalty (veh)	0	0

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	397	402	394	392	396	395
Vehs Exited	399	396	389	392	392	395
Starting Vehs	7	5	7	7	2	5
Ending Vehs	5	11	12	7	6	6
Travel Distance (mi)	157	156	155	151	155	155
Travel Time (hr)	6.3	6.3	6.1	6.1	6.2	6.2
Total Delay (hr)	0.7	0.6	0.6	0.6	0.6	0.6
Total Stops	239	230	221	230	233	231
Fuel Used (gal)	5.5	5.4	5.3	5.3	5.2	5.3

Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	397	402	394	392	396	395
Vehs Exited	399	396	389	392	392	395
Starting Vehs	7	5	7	7	2	5
Ending Vehs	5	11	12	7	6	6
Travel Distance (mi)	157	156	155	151	155	155
Travel Time (hr)	6.3	6.3	6.1	6.1	6.2	6.2
Total Delay (hr)	0.7	0.6	0.6	0.6	0.6	0.6
Total Stops	239	230	221	230	233	231
Fuel Used (gal)	5.5	5.4	5.3	5.3	5.2	5.3

3: Landfill Performance by approach

Approach	SE	NW	NE	All
Denied Del/Veh (s)	0.1	0.0	4.1	0.3
Total Del/Veh (s)	0.1	0.2	1.1	0.2

5: SB On Ramp & Bennoch Road Performance by approach

Approach	SE	NW	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	1.6	1.0	1.2

7: NB Off Ramp & Bennoch Road Performance by approach

Approach	SE	NW	NE	All
Denied Del/Veh (s)	0.0	0.1	0.9	0.6
Total Del/Veh (s)	0.2	0.1	5.3	3.4

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	4.7

Intersection: 3: Landfill

Movement	NW	NE	NE
Directions Served	LT	L	R
Maximum Queue (ft)	16	5	27
Average Queue (ft)	1	0	1
95th Queue (ft)	10	4	16
Link Distance (ft)	266	462	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			100
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 5: SB On Ramp & Bennoch Road

Movement	NW
Directions Served	LT
Maximum Queue (ft)	35
Average Queue (ft)	3
95th Queue (ft)	18
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	NE
Directions Served	L
Maximum Queue (ft)	83
Average Queue (ft)	44
95th Queue (ft)	72
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	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	339	356	340	377	337	349
Vehs Exited	337	354	338	379	339	349
Starting Vehs	2	2	5	5	5	4
Ending Vehs	4	4	7	3	3	5
Travel Distance (mi)	99	110	104	118	101	106
Travel Time (hr)	4.1	4.5	4.2	4.8	4.2	4.4
Total Delay (hr)	0.3	0.3	0.3	0.3	0.3	0.3
Total Stops	93	97	99	97	92	94
Fuel Used (gal)	3.5	4.0	3.7	4.3	3.6	3.8

Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3

Volumes adjusted by Growth Factors.

No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	339	356	340	377	337	349
Vehs Exited	337	354	338	379	339	349
Starting Vehs	2	2	5	5	5	4
Ending Vehs	4	4	7	3	3	5
Travel Distance (mi)	99	110	104	118	101	106
Travel Time (hr)	4.1	4.5	4.2	4.8	4.2	4.4
Total Delay (hr)	0.3	0.3	0.3	0.3	0.3	0.3
Total Stops	93	97	99	97	92	94
Fuel Used (gal)	3.5	4.0	3.7	4.3	3.6	3.8

3: Landfill Performance by approach

Approach	SE	NW	NE	All
Denied Del/Veh (s)	0.2	0.0	4.2	0.3
Total Del/Veh (s)	0.1	0.7	1.1	0.3

5: SB On Ramp & Bennoch Road Performance by approach

Approach	SE	NW	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	1.2	1.7	1.3

7: NB Off Ramp & Bennoch Road Performance by approach

Approach	SE	NW	NE	All
Denied Del/Veh (s)	0.0	0.1	0.4	0.2
Total Del/Veh (s)	0.3	0.1	4.7	2.3

Total Network Performance

Denied Del/Veh (s)	0.4
Total Del/Veh (s)	2.8

Intersection: 3: Landfill

Movement	NW	NE
Directions Served	LT	R
Maximum Queue (ft)	71	23
Average Queue (ft)	6	1
95th Queue (ft)	35	12
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	NW
Directions Served	LT
Maximum Queue (ft)	60
Average Queue (ft)	9
95th Queue (ft)	38
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	NE	NE
Directions Served	L	R
Maximum Queue (ft)	86	20
Average Queue (ft)	38	1
95th Queue (ft)	73	20
Link Distance (ft)	566	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		80
Storage Blk Time (%)	0	0
Queuing Penalty (veh)	0	0

Network Summary

Network wide Queuing Penalty: 0

Summary of All Intervals

Run Number	1	2	3	4	5	Avg
Start Time	6:57	6:57	6:57	6:57	6:57	6:57
End Time	8:00	8:00	8:00	8:00	8:00	8:00
Total Time (min)	63	63	63	63	63	63
Time Recorded (min)	60	60	60	60	60	60
# of Intervals	2	2	2	2	2	2
# of Recorded Intervals	1	1	1	1	1	1
Vehs Entered	395	402	395	383	369	389
Vehs Exited	397	396	395	383	365	387
Starting Vehs	7	5	7	7	2	5
Ending Vehs	5	11	7	7	6	5
Travel Distance (mi)	157	157	157	152	144	153
Travel Time (hr)	6.3	6.3	6.2	6.1	5.7	6.1
Total Delay (hr)	0.7	0.6	0.6	0.6	0.5	0.6
Total Stops	242	229	226	217	207	223
Fuel Used (gal)	5.4	5.4	5.4	5.2	4.8	5.3

Interval #0 Information Seeding

Start Time	6:57
End Time	7:00
Total Time (min)	3

Volumes adjusted by Growth Factors.
No data recorded this interval.

Interval #1 Information Recording

Start Time	7:00
End Time	8:00
Total Time (min)	60

Volumes adjusted by Growth Factors.

Run Number	1	2	3	4	5	Avg
Vehs Entered	395	402	395	383	369	389
Vehs Exited	397	396	395	383	365	387
Starting Vehs	7	5	7	7	2	5
Ending Vehs	5	11	7	7	6	5
Travel Distance (mi)	157	157	157	152	144	153
Travel Time (hr)	6.3	6.3	6.2	6.1	5.7	6.1
Total Delay (hr)	0.7	0.6	0.6	0.6	0.5	0.6
Total Stops	242	229	226	217	207	223
Fuel Used (gal)	5.4	5.4	5.4	5.2	4.8	5.3

3: Landfill Performance by approach

Approach	SE	NW	NE	All
Denied Del/Veh (s)	0.1	0.0	4.1	0.3
Total Del/Veh (s)	0.1	0.2	1.0	0.2

5: SB On Ramp & Bennoch Road Performance by approach

Approach	SE	NW	All
Denied Del/Veh (s)	0.0	0.0	0.0
Total Del/Veh (s)	1.5	0.9	1.1

7: NB Off Ramp & Bennoch Road Performance by approach

Approach	SE	NW	NE	All
Denied Del/Veh (s)	0.0	0.1	0.9	0.6
Total Del/Veh (s)	0.2	0.1	5.3	3.5

Total Network Performance

Denied Del/Veh (s)	0.7
Total Del/Veh (s)	4.7

Intersection: 3: Landfill

Movement	NW	NE	NE
Directions Served	LT	L	R
Maximum Queue (ft)	12	5	27
Average Queue (ft)	0	0	1
95th Queue (ft)	6	4	14
Link Distance (ft)	266	462	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			100
Storage Blk Time (%)			0
Queuing Penalty (veh)			0

Intersection: 5: SB On Ramp & Bennoch Road

Movement	NW
Directions Served	LT
Maximum Queue (ft)	29
Average Queue (ft)	2
95th Queue (ft)	14
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	NE
Directions Served	L
Maximum Queue (ft)	85
Average Queue (ft)	45
95th Queue (ft)	73
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

Appendix C

MDOT Crash Data

Truck Logs

Annual Waste Acceptance Rates

Greenbush
Milford
Alton
Old Town
CARDVILLE RD
GREENFIELD RD
MAIN RD
SOUTHGATE RD
GROVE ST
BENNOCH RD
39200
ALTON TANNERY RD
39199
40471
41213
65214
65215
41324
64506
64507
36727
39198
HUDSON RD
W OLD TOWN
W OLD TOWN RD
W OLD TOWN RD
I 95
I 95 SB
COILEY RD
39197
41210
65223
65224
36730
40866
41321
65216
65217
41748
39196
38917
OLD TOWN RD
KIRKLAND RD
GILMAN FALLS AV
AIRPORT RD
BEAR RIDGE RD
WABANAKI WY
OAK HILL RD
DOWN ST
CALL RD
COUNTY RD
OVERLOOK DR
HEMLOCK LN
BEECHWOOD AV
LAKESIDE LN

Maine Department Of Transportation - Traffic Engineering, 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

Bennoch Rd area

REPORT PARAMETERS

Year 2011, Start Month 1 through Year 2013 End Month: 12

Route: **0016X**	Start Node: **39200**	Start Offset: **0**	☐ **Exclude First Node**
	End Node: **38917**	End Offset: **0**	☐ **Exclude Last Node**
Route: **0043X**	Start Node: **40866**	Start Offset: **0**	☐ **Exclude First Node**
	End Node: **38917**	End Offset: **0**	☑ **Exclude Last Node**

Crash Summary I

Nodes

Node	Route - MP	Node Description	U/R	Total Crashes	Injury Crashes K	Injury Crashes A	Injury Crashes B	Injury Crashes C	PD	Percent Injury	Annual M Ent-Veh	Crash Rate	Critical Rate	CRF
39200	0016X - 178.45	Int of ALTON TANNERY RD BENNOCH RD	1	0	0	0	0	0	0	0.0	0.889	0.00 Statewide Crash Rate:	0.45 0.11	0.00
39199	0016X - 180.22	BRG 5419, BENNOCH RD over BROWN BROOK	1	0	0	0	0	0	0	0.0	0.959	0.00 Statewide Crash Rate:	0.44 0.11	0.00
41324	0016X - 181.40	TL Alton Old Town	1	0	0	0	0	0	0	0.0	0.936	0.00 Statewide Crash Rate:	0.17 0.04	0.00
64506	0016X - 181.44	Int of BENNOCH RD RD INV 3201740	1	0	0	0	0	0	0	0.0	0.871	0.00 Statewide Crash Rate:	0.17 0.04	0.00
65215	0016X - 181.62	Int of BENNOCH RD RD INV 3201917	1	2	0	1	0	0	1	50.0	1.138	0.59 Statewide Crash Rate:	0.17 0.04	3.40
41213	0016X - 181.64	Int of BENNOCH RD RAMP OFF TO BENNOCH RD	1	0	0	0	0	0	0	0.0	0.624	0.00 Statewide Crash Rate:	0.15 0.04	0.00
36727	0016X - 181.85	Int of BENNOCH RD, UNNAMED 14	1	0	0	0	0	0	0	0.0	0.593	0.00 Statewide Crash Rate:	0.47 0.11	0.00
39198	0016X - 182.27	Int of BENNOCH RD SOUTHGATE RD	1	0	0	0	0	0	0	0.0	0.860	0.00 Statewide Crash Rate:	0.45 0.11	0.00
39197	0016X - 183.71	Int of BENNOCH RD COILEY RD	1	0	0	0	0	0	0	0.0	0.845	0.00 Statewide Crash Rate:	0.45 0.11	0.00
38917	0016X - 184.65	Int of BENNOCH RD GILMAN FALLS AV	1	6	0	0	0	2	4	33.3	2.075	0.96 Statewide Crash Rate:	0.37 0.11	2.59
40866	0043X - 98.73	Non Int OLD TOWN RD	1	0	0	0	0	0	0	0.0	0.770	0.00 Statewide Crash Rate:	0.46 0.11	0.00
65216	0043X - 98.94	Int of OLD TOWN RD RD INV 3201918	1	0	0	0	0	0	0	0.0	0.861	0.00 Statewide Crash Rate:	0.17 0.04	0.00
41321	0043X - 98.96	Int of OLD TOWN RD RAMP OFF TO GILMAN FALLS AV RC	1	0	0	0	0	0	0	0.0	0.992	0.00 Statewide Crash Rate:	0.17 0.04	0.00
41210	0043X - 99.12	Int of GILMAN FALLS AV OLD TOWN RD RAMP OFF TO GI	1	1	0	0	0	1	0	100.0	1.254	0.27 Statewide Crash Rate:	0.17 0.04	1.54
65224	0043X - 99.14	Int of GILMAN FALLS AV RD INV 3201920	1	0	0	0	0	0	0	0.0	1.583	0.00 Statewide Crash Rate:	0.17 0.04	0.00
39196	0043X - 99.49	Int of GILMAN FALLS AV UNNAMED 13	1	0	0	0	0	0	0	0.0	1.299	0.00 Statewide Crash Rate:	0.41 0.11	0.00
Study Years: 3.00		**NODE TOTALS:**		9	0	1	0	3	5	44.4	16.549	0.18	0.17	1.10

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary I

Sections

Start Node	End Node	Element	Offset Begin - End	Route - MP	Section Length	U/R	Total Crashes	K	A	B	C	PD	Percent Injury	Annual HMVM	Crash Rate	Critical Rate	CRF
39199	39200	3121074	0 - 1.77	0016X - 178.45	1.77	1	10	0	0	1	2	7	30.0	0.01561	213.56	294.02	0.00
BRG 5419, BENNOCH RD over BROWN BROOK				ST RTE 16											Statewide Crash Rate: 156.01		
39199	41324	3121670	0 - 1.18	0016X - 180.22	1.18	1	9	0	0	1	0	8	11.1	0.01224	245.17	310.32	0.00
BRG 5419, BENNOCH RD over BROWN BROOK				ST RTE 16											Statewide Crash Rate: 156.01		
64506	41324	3118661	0 - 0.04	0016X - 181.40	0.04	1	0	0	0	0	0	0	0.0	0.00033	0.00	673.46	0.00
Int of BENNOCH RD RD INV 3201740				ST RTE 16											Statewide Crash Rate: 156.01		
65215	64506	3123292	0 - 0.18	0016X - 181.44	0.18	1	2	0	0	0	1	1	50.0	0.00163	408.34	513.67	0.00
Int of BENNOCH RD RD INV 3201917				ST RTE 16											Statewide Crash Rate: 156.01		
41213	65215	3130297	0 - 0.02	0016X - 181.62	0.02	1	0	0	0	0	0	0	0.0	0.00010	0.00	369.78	0.00
Int of BENNOCH RD RAMP OFF TO BENNOCH RD				ST RTE 16											Statewide Crash Rate: 156.01		
36727	41213	3121657	0 - 0.21	0016X - 181.64	0.21	1	0	0	0	0	0	0	0.0	0.00123	0.00	550.48	0.00
Int of BENNOCH RD, UNNAMED 14				ST RTE 16											Statewide Crash Rate: 156.01		
36727	39198	3121671	0 - 0.42	0016X - 181.85	0.42	1	0	0	0	0	0	0	0.0	0.00248	0.00	461.59	0.00
Int of BENNOCH RD, UNNAMED 14				ST RTE 16											Statewide Crash Rate: 156.01		
39197	39198	3120421	0 - 1.44	0016X - 182.27	1.44	1	4	0	0	1	1	2	50.0	0.01327	100.51	304.73	0.00
Int of BENNOCH RD COILEY RD				ST RTE 16											Statewide Crash Rate: 156.01		
38917	39197	3129837	0 - 0.94	0016X - 183.71	0.94	1	6	0	0	0	1	5	16.7	0.00659	303.45	359.54	0.00
Int of BENNOCH RD GILMAN FALLS AV				ST RTE 16											Statewide Crash Rate: 156.01		
40866	65216	3121556	0 - 0.21	0043X - 98.73	0.21	1	4	0	0	1	1	2	50.0	0.00157	848.95	518.63	1.64
Non Int OLD TOWN RD				ST RTE 43											Statewide Crash Rate: 156.01		
65216	41321	3139761	0 - 0.02	0043X - 98.94	0.02	1	0	0	0	0	0	0	0.0	0.00015	0.00	567.87	0.00
Int of OLD TOWN RD RD INV 3201918				ST RTE 43											Statewide Crash Rate: 156.01		
41210	41321	3116488	0 - 0.16	0043X - 98.96	0.16	1	0	0	0	0	0	0	0.0	0.00153	0.00	521.84	0.00
Int of GILMAN FALLS AV OLD TOWN RD RAMP OFF TO GILMAN FALLS RD ROUTE 43 RAMP				ST RTE 43											Statewide Crash Rate: 156.01		
65224	41210	3121557	0 - 0.02	0043X - 99.12	0.02	1	0	0	0	0	0	0	0.0	0.00021	0.00	641.06	0.00
Int of GILMAN FALLS AV RD INV 3201920				ST RTE 43											Statewide Crash Rate: 156.01		
39196	65224	3129767	0 - 0.35	0043X - 99.14	0.35	1	0	0	0	0	0	0	0.0	0.00450	0.00	395.82	0.00
Int of GILMAN FALLS AV UNNAMED 13				ST RTE 43											Statewide Crash Rate: 156.01		
38917	39196	3121055	0 - 0.18	0043X - 99.49	0.18	1	2	0	0	0	1	1	50.0	0.00234	285.43	469.03	0.00
Int of BENNOCH RD GILMAN FALLS AV				ST RTE 43											Statewide Crash Rate: 156.01		
Study Years: 3.00				**Section Totals:**	7.14		37	0	0	4	7	26	29.7	0.06378	193.36	226.95	0.85
				Grand Totals:	7.14		46	0	1	4	10	31	32.6	0.06378	240.40	261.19	0.92

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
39199	39200	3121074	0 - 1.77	0016X - 178.45	10	0	0	1	2	7	2013-33059	12/12/2013	178.63	PD
											2013-3558	02/07/2013	178.82	PD
											2011-6313C	03/29/2011	179.12	PD
											2012-23775	02/29/2012	179.19	PD
											2012-1063	01/13/2012	179.23	B
											2012-1062	01/13/2012	179.23	PD
											2012-544	01/08/2012	179.68	C
											2013-30789	12/01/2013	179.93	C
											2012-24651	03/14/2012	180.06	PD
											2012-26562	04/09/2012	180.10	PD
39199	41324	3121670	0 - 1.18	0016X - 180.22	9	0	0	1	0	8	2012-25142	03/24/2012	180.25	B
											2013-33216	12/13/2013	180.45	PD
											2012-29646	05/31/2012	180.67	PD
											2013-27760	10/29/2013	180.79	PD
											2012-22619	02/23/2012	180.80	PD
											2011-6031C	03/22/2011	180.81	PD
											2011-1233	05/10/2011	180.98	PD
											2013-26060	10/17/2013	181.01	PD
											2012-23115	03/03/2012	181.33	PD
64506	41324	3118661	0 - 0.04	0016X - 181.40	0	0	0	0	0	0				
65215	64506	3123292	0 - 0.18	0016X - 181.44	2	0	0	0	1	1	2011-5777C	03/14/2011	181.50	PD
											2011-19758	12/19/2011	181.56	C
41213	65215	3130297	0 - 0.02	0016X - 181.62	0	0	0	0	0	0				
36727	41213	3121657	0 - 0.21	0016X - 181.64	0	0	0	0	0	0				
36727	39198	3121671	0 - 0.42	0016X - 181.85	0	0	0	0	0	0				
39197	39198	3120421	0 - 1.44	0016X - 182.27	4	0	0	1	1	2	2013-26437	10/21/2013	182.72	PD
											2011-17555	11/23/2011	183.04	PD
											2011-15174	10/23/2011	183.36	C
											2012-40154	09/30/2012	183.52	B

Crash Summary

Section Details

Start Node	End Node	Element	Offset Begin - End	Route - MP	Total Crashes	K	A	B	C	PD	Crash Report	Crash Date	Crash Mile Point	Injury Degree
38917	39197	3129837	0 - 0.94	0016X - 183.71	6	0	0	0	1	5	2013-31396	12/02/2013	183.80	PD
											2012-42747	10/30/2012	184.20	PD
											2013-34927	12/23/2013	184.33	C
											2011-1296C	01/22/2011	184.46	PD
											2012-28976	05/05/2012	184.59	PD
											2011-21585	12/23/2011	184.61	PD
40866	65216	3121556	0 - 0.21	0043X - 98.73	4	0	0	1	1	2	2013-25330	10/03/2013	98.75	C
											2013-35224	12/26/2013	98.75	PD
											2012-47156	12/09/2012	98.78	PD
											2012-49260	12/08/2012	98.84	B
65216	41321	3139761	0 - 0.02	0043X - 98.94	0	0	0	0	0	0				
41210	41321	3116488	0 - 0.16	0043X - 98.96	0	0	0	0	0	0				
65224	41210	3121557	0 - 0.02	0043X - 99.12	0	0	0	0	0	0				
39196	65224	3129767	0 - 0.35	0043X - 99.14	0	0	0	0	0	0				
38917	39196	3121055	0 - 0.18	0043X - 99.49	2	0	0	0	1	1	2013-28474	11/11/2013	99.51	PD
											2011-471C	01/01/2011	99.57	C
				Totals:	37	0	0	4	7	26				

Crash Summary II - Characteristics

Crashes by Day and Hour

	AM												Hour of Day					PM								
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	1	0	0	0	0	2	1	0	1	0	0	0	0	0	0	0	5
MONDAY	0	0	0	0	0	0	0	3	0	2	0	1	0	0	1	1	0	1	0	0	0	0	0	1	0	10
TUESDAY	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	6
WEDNESDAY	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	3
THURSDAY	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	0	2	0	1	0	8
FRIDAY	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	5
SATURDAY	0	1	0	0	0	0	1	0	1	0	1	1	0	1	0	1	1	0	1	0	0	0	0	0	0	9
Totals	1	1	0	0	0	0	3	4	1	4	2	2	1	2	4	3	5	4	1	3	1	2	0	2	0	**46**

Vehicle Counts by Type

Unit Type	Total	Unit Type	Total
1-Passenger Car	30	23-Bicyclist	0
2-(Sport) Utility Vehicle	13	24-Witness	4
3-Passenger Van	3	25-Other	1
4-Cargo Van (10K lbs or Less)	0	**Total**	**66**
5-Pickup	12		
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		

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	14	10	0	0	0	0	24
Ran Off Roadway	4	0	0	0	0	0	4
Failed to Yield Right-of-Way	5	1	0	0	0	0	6
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	2	1	0	0	0	0	3
Drove Too Fast For Conditions	8	0	0	0	0	0	8
Improper Turn	1	0	0	0	0	0	1
Improper Backing	1	0	0	0	0	0	1
Improper Passing	0	0	0	0	0	0	0
Wrong Way	0	0	0	0	0	0	0
Followed Too Closely	2	0	0	0	0	0	2
Failed to Keep in Proper Lane	0	0	0	0	0	0	0
Operated Motor Vehicle in Erratic, Reckless, Careless, Negligent or Aggressive Manner	0	1	0	0	0	0	1
Swerved or Avoided Due to Wind, Slippery Surface, Motor Vehicle, Object, Non-Motorist in Roadway	1	0	0	0	0	0	1
Over-Correcting/Over-Steering	2	0	0	0	0	0	2
Other Contributing Action	0	1	0	0	0	0	1
Unknown	1	0	0	0	0	0	1
Total	**41**	**14**	**0**	**0**	**0**	**0**	**55**

Crashes by Apparent Physical Condition And Driver

Apparent Physical Condition	Dr 1	Dr 2	Dr 3	Dr 4	Dr 5	Other	Total
Apparently Normal	46	14	0	0	0	0	60
Physically Impaired or Handicapped	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	1	0	0	0	0	1
Total	**46**	**15**	**0**	**0**	**0**	**0**	**61**

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	8	0	0	0	0	8
20-24	7	0	0	0	0	7
25-29	6	0	0	0	0	6
30-39	9	0	0	0	0	9
40-49	4	0	0	0	0	4
50-59	14	0	0	0	0	14
60-69	8	0	0	0	0	8
70-79	3	0	0	0	0	3
80-Over	2	0	0	0	0	2
Unknown	1	0	0	0	0	1
Total	**62**	**0**	**0**	**0**	**0**	**62**

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

Crash Summary II - Characteristics

Most Harmful Event

Most Harmful Event	Total
1-Overturn / Rollover	4
2-Fire / Explosion	0
3-Immersion	0
4-Jackknife	0
5-Cargo / Equipment Loss Or Shift	0
6-Fell / Jumped from Motor Vehicle	0
7-Thrown or Falling Object	0
8-Other Non-Collision	5
9-Pedestrian	0
10-Pedalcycle	0
11-Railway Vehicle - Train, Engine	0
12-Animal	8
13-Motor Vehicle in Transport	24
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	1
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	2
26-Embankment	2
27-Guardrail Face	1
28-Guardrail End	0
29-Concrete Traffic Barrier	0
30-Other Traffic Barrier	0
31-Tree (Standing)	6
32-Utility Pole / Light Support	0
33-Traffic Sign Support	0
34-Traffic Signal Support	0
35-Fence	0
36-Mailbox	1
37-Other Post Pole or Support	0
38-Other Fixed Object (wall, building, tunnel, etc.)	1
39-Unknown	0
40-Gate or Cable	0
41-Pressure Ridge	0
Total	**55**

Traffic Control Devices

Traffic Control Device	Total
1-Traffic Signals (Stop & Go)	0
2-Traffic Signals (Flashing)	5
3-Advisory/Warning Sign	0
4-Stop Signs - All Approaches	0
5-Stop Signs - Other	4
6-Yield Sign	0
7-Curve Warning Sign	4
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	3
13-None	30
14-Other	0
Total	**46**

Injury Data

Severity Code	Injury Crashes	Number Of Injuries
K	0	0
A	1	1
B	4	6
C	10	12
PD	31	0
Total	**46**	**19**

Road Character

Road Grade	Total
1-Level	36
2-On Grade	10
3-Top of Hill	0
4-Bottom of Hill	0
5-Other	0
Total	**46**

Light

Light Condition	Total
1-Daylight	27
2-Dawn	2
3-Dusk	1
4-Dark - Lighted	2
5-Dark - Not Lighted	14
6-Dark - Unknown Lighting	0
7-Unknown	0
Total	**46**

Crash Summary II - Characteristics

Crashes by Year and Month

Month	2011	2012	2013	Total
JANUARY	3	5	0	8
FEBRUARY	0	3	1	4
MARCH	3	3	0	6
APRIL	0	1	0	1
MAY	1	2	0	3
JUNE	0	2	1	3
JULY	0	0	0	0
AUGUST	0	1	0	1
SEPTEMBER	0	1	0	1
OCTOBER	1	1	4	6
NOVEMBER	2	0	1	3
DECEMBER	2	2	6	10
Total	**12**	**21**	**13**	**46**

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	Total
Object in Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rear End / Sideswipe	0	0	0	2	0	4	0	0	0	0	0	0	0	6
Head-on / Sideswipe	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Intersection Movement	0	0	2	5	0	2	0	0	0	0	0	0	0	9
Pedestrians	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
Went Off Road	12	7	0	0	0	0	0	0	0	0	0	0	0	19
All Other Animal	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Bicycle	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other	1	0	0	0	0	0	1	0	0	0	0	0	0	2
Jackknife	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
Fire	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Submersion	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
Bear	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Deer	5	2	0	0	0	0	0	0	0	0	0	0	0	7
Moose	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Turkey	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**21**	**9**	**2**	**7**	**0**	**6**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**46**

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	6	1	0	0	0	0	0	1	0	0	0	8
Dark - Unknown Lighting	0	0	0	0	0	0	0	0	0	0	0	0
Dawn	0	1	0	0	0	0	0	0	0	0	0	1
Daylight	12	2	0	0	0	0	0	0	0	0	0	14
Dusk	1	0	0	0	0	0	0	0	0	0	0	1
Unknown	0	0	0	0	0	0	0	0	0	0	0	0
Cloudy												
Dark - Lighted	0	1	0	0	0	0	0	0	0	0	0	1
Dark - Not Lighted	1	1	0	0	0	0	0	0	0	0	0	2
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	1	0	0	0	0	0	0	0	0	0	2	3
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

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

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	1	1
Daylight	0	0	0	0	0	0	0	0	0	0	3	3
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

Maine Department Of Transportation - Traffic Engineering, Crash Records Section

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	1	0	0	0	0	0	0	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
Snow												
Dark - Lighted	0	0	0	0	0	0	0	0	0	0	0	0
Dark - Not Lighted	0	2	0	0	0	0	0	1	0	0	1	4
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	1	5	0	0	0	6
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	**22**	**9**	**0**	**0**	**0**	**0**	**1**	**7**	**0**	**0**	**0**	**46**

COMPARISION OF WASTE QUANTITIES
RECIEVED AT JRL BETWEEN 2004 AND 2014 AND PROPOSED EXPANSION TONNAGES

Waste Category	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Application Tonnages based on 700,000 tons/year	
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Percent
WWTP and miscellaneous bio solids/sludge material	26,686	35,336	36,286	61,262	72,275	70,265	58,558	51,053	49,270	64,559	57,113	70,000	10.0%
Contaminated soils			31,712	8,451	43,910	2,585	6,407	17,526	2,615	11,017	6,385	30,000	4.3%
Front-end process residue	393	45,644	105,139	74,763	117,118	84,727	125,250	103,306	94,178	53,654	52,832	54,000	7.7%
Municipal Incinerator ash		58,269	34,087	30,029	94,350	101,262	104,865	105,526	101,276	57,435	54,162	58,000	8.3%
Biomass and fossil fuel combustion ash	20,880		52,385	61,968	64,809	29,870	26,322	12,855	7,785	8,715	23,506	35,000	5.0%
MSW bypass and soft layer material		2,035	11,155	7,620	21,426	39,524	39,524	22,355	729	7,326	39,616	25,000	3.6%
Construction and demolition debris		76,088	163,581	143,453	125,790	104,309	145,488	149,744	150,706	167,418	199,862	195,000	27.9%
Oversized bulky waste		12,271	29,225	9,649	21,405	51,438	96,520	98,888	64,689	54,353	43,868	60,000	8.6%
Miscellaneous Waste	5,453	14,740	19,868	34,295	11,551	13,871	17,815	17,326	13,884	28,862	17,782	35,000	5.0%
C&D process fines (used as daily cover)		7,931	42,320	41,109	45,148	46,744	87,449	125,301	152,171	152,915	122,732	138,000	19.7%
TOTAL	**53,412**	**252,314**	**525,758**	**472,599**	**617,782**	**544,595**	**708,198**	**703,880**	**637,303**	**606,254**	**617,858**	**700,000**	100.0%

1. Waste received in 2004 consists primarily of pulp and paper mill waste
2. The waste received in 2005 was limited by the sludge mixing program
3. The 2014 tons represent a straight line projection for twelve months based on the amount of tonnages received at the site through September of 2014

APPENDIX F

AGENCY CORRESPONDENCE AND PROTECTED NATURAL RESOURCES, RARE THREATENED AND ENDANGERED SPECIES

APPENDIX F-1

CORRESPONDENCE WITH AGENCIES

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

October 3, 2014 14101.00

Jeff Murphy
National Marine Fisheries Service
17 Godfrey Drive – Suite 1
Orono, Maine 04473

Subject: Essential Fish Habitat Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Mr. Murphy:

The purpose of this letter is to request information on any essential fish habitat associated with land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known or suspected essential fish habitat within, or in the vicinity of, the proposed project.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

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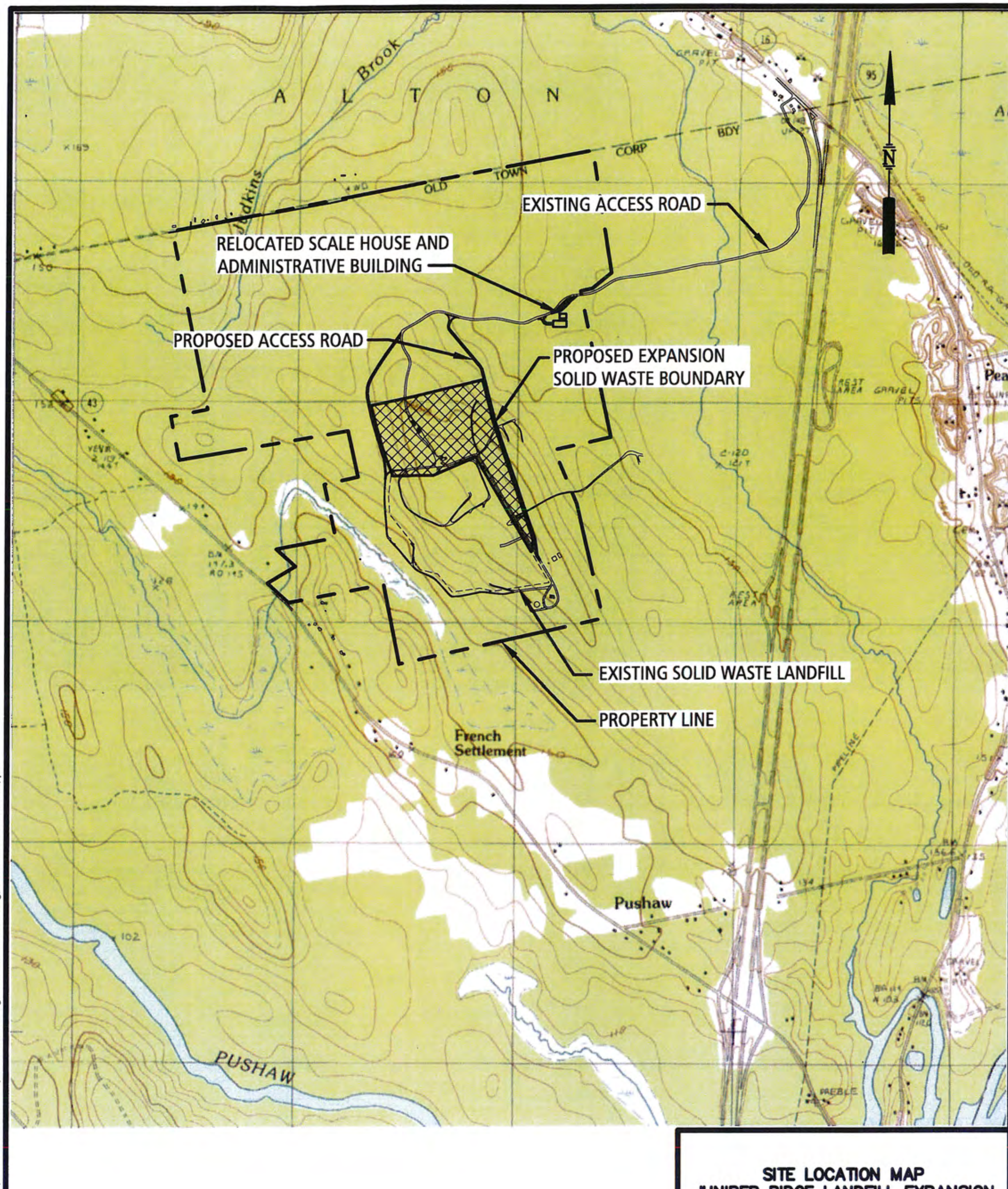
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021 • Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com



SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

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October 3, 2014 14101.00

Lisa St. Hilaire
Natural Areas Program
Maine Department of Conservation
93 State House Station
Augusta, Maine 04333

Subject: Rare and Exemplary Botanical Features Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Lisa:

The purpose of this letter is to request information on any rare and exemplary botanical features associated with land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known or suspected locations of rare, threatened, or endangered plants, exemplary natural communities, or Registered Critical Areas within, or in the vicinity of, the proposed project. For your convenience, the May 2008 review comments from your agency for the project area are attached.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

cc: John Perry, M.I.F.W.

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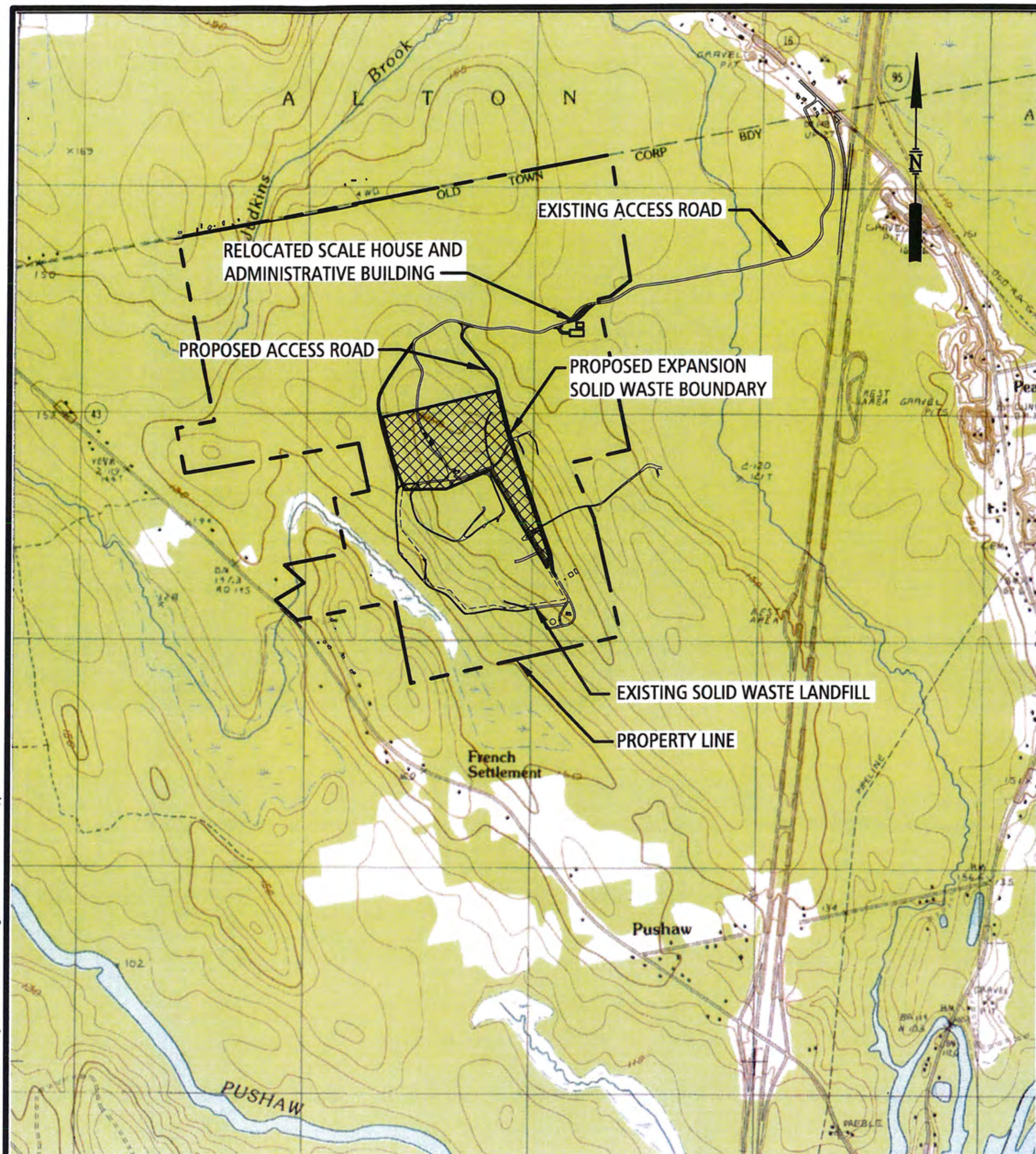

SITE LOCATION MAP
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OLD TOWN, MAINE

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STATE OF MAINE
DEPARTMENT OF CONSERVATION
93 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0093

JOHN ELIAS BALDACCI
GOVERNOR

PATRICK K. MCGOWAN
COMMISSIONER

May 28, 2008

Jessica Haider
Stantec Consulting
30 Park Drive
Topsham, ME 04086

Re: Rare and exemplary botanical features, Proposed Project, PN195600338, Old Town, Maine.

Dear Ms. Haider:

I have searched the Natural Areas Program's digital, manual and map files in response to your request of May 21 2008 for information on the presence of rare or unique botanical features documented from the vicinity of the project site in the Town of 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 Steve Timpano, Environmental Coordinator, 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 areas. 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 sites. 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.

MAINE NATURAL AREAS PROGRAM
MOLLY DOCHERTY, DIRECTOR

PHONE: (207) 287-8044
FAX: (207) 287-8040
TTY: (207) 287-2213

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 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.

The Natural Areas Program 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. The Natural Areas Program welcomes coordination with individuals or organizations proposing environmental alteration, or conducting environmental assessments. If, however, data provided by the Natural Areas Program are to be published in any form, the Program should be informed at the outset and credited as the source.

The 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 $75.00 for our services.

Thank you for using the Natural Areas Program 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,

Douglas Suitor
Associate Information Manager
Maine Natural Areas Program
207-287-8044
douglas.suitor@maine.gov

Enclosures

Rare and Exemplary Botanical Features in the Project Vicinity

5/28/2008

Documented within a Four-Mile Radius of the Proposed Project, PN195600338, Old Town, Maine.

Scientific Name Common Name	Last Seen	Global Rarity Rank	State Rarity Rank	State Protection Status	Habitat Description
Bluebell - balsam ragwort shoreline outcrop Rivershore Outcrop	1997-07-17	G3	S3		Low or steep circumneutral to calcareous rock outcrops along rivers with alluvial soil in the rock crevices. Vegetation sparse. Most are subject to annual flooding and/or ice scour.
Houstonia longifolia var. longifolia Long-leaved Bluet	1997-07-17	G4G5TNR	S2S3	SC	Slaty ledges or rivershore gravels, not strongly acidic.
Viola novae-angliae New England Violet	1990-05-29	G4Q	S2	SC	Gravels, wet rocks, shores and meadows.
Carex oronensis Orono Sedge	1997-07-17	G3	S3	T	Fields, meadows and clearings.
Carex oronensis Orono Sedge	1987-06-08	G3	S3	T	Fields, meadows and clearings.
Carex tenuiflora Sparse-flowered Sedge	1982-08-30	G5	S3	SC	Bogs and mossy woods or pond margins, usually higher pH.
Cyperus squarrosus Awned Sedge	1942-09-09	G5	S2	SC	Damp sands, silts and alluvium

Rare and Exemplary Botanical Features in the Project Vicinity

5/28/2008

Documented within a Four-Mile Radius of the Proposed Project, PN195600338, Old Town, Maine.

Scientific Name / Common Name	Last Seen	Global Rarity Rank	State Rarity Rank	State Protection Status	Habitat Description
Platanthera flava var. herbiola Pale Green Orchis	1933-07-06	G4T4Q	S2	SC	Swampy woods, bottomlands, swales, and wet shores.
Carex oronensis Orono Sedge	1988-07-05	G3	S3	T	Fields, meadows and clearings.
Spiranthes lucida Shining Ladies'-tresses	1946-07-08	G5	S1	T	Alluvial or damp rocky shores and slopes, rich damp thickets and meadows.
Cypripedium arietinum Ram's-head Lady's-slipper	1886-05-30	G3	S1	E	Damp or mossy woods or bogs.
Fimbristylis autumnalis Fall Fimbry	1899-09-18	G5	S2S3	T	Sandy or peaty shores and low ground.
Cyperus squarrosus Awned Sedge	1899-09-18	G5	S2	SC	Damp sands, silts and alluvium
Viola novae-angliae New England Violet	1934-10-24	G4Q	S2	SC	Gravels, wet rocks, shores and meadows.

Rare and Exemplary Botanical Features in the Project Vicinity

Documented within a Four-Mile Radius of the Proposed Project, PN195600338, Old Town, Maine.

Scientific Name / Common Name	Last Seen	Global Rarity Rank	State Rarity Rank	State Protection Status	Habitat Description
Cypripedium reginae Showy Lady's-slipper	1943-07-09	G4	S3	T	Circumneutral peatlands (often at edges) or sunlit openings of mossy woods.
Unpatterned fen ecosystem Unpatterned Fen Ecosystem	1988-06-30	GNR	S4		Peatlands fed by water carrying nutrients from adjacent uplands. Vegetation (with a large component of sedges, grasses, low shrubs, and sphagnum) is different and often more
Domed bog ecosystem Domed Bog	1999-08-25	GNR	S3		Raised bogs with concentrically patterned convex surfaces and concentric patterns. Vegetation zonation reflects the nutrient gradient from raised center to edge, with
Raised level bog ecosystem Raised Level Bog Ecosystem	2002	GNR	S4		Raised (but not concentrically patterned) peatlands in basins with mostly closed drainage. Sphagnum dominates the ground surface and is the main peat constituent.
Carex oronensis Orono Sedge	1916-07-01	G3	S3	T	Fields, meadows and clearings.
Carex adusta Swarthy Sedge	1916-07-01	G5	S2	E	Dry, open places.
Viola novae-angliae New England Violet	1916-07-01	G4Q	S2	SC	Gravels, wet rocks, shores and meadows.

STATE RARITY RANKS

S1	Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.
S2	Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
S3	Rare in Maine (20-100 occurrences).
S4	Apparently secure in Maine.
S5	Demonstrably secure in Maine.
SH	Known historically from the state, not verified in the past 20 years.
SX	Apparently extirpated from the state, loss of last known occurrence has been documented.
SU	Under consideration for assigning rarity status; more information needed on threats or distribution.
S#?	Current occurrence data suggests assigned rank, but lack of survey effort along with amount of potential habitat create uncertainty (e.g. S3?).

Note: State Rarity Ranks are determined by the Maine Natural Areas Program.

GLOBAL RARITY RANKS

G1	Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extinction.
G2	Globally imperiled because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
G3	Globally rare (20-100 occurrences).
G4	Apparently secure globally.
G5	Demonstrably secure globally.

Note: Global Ranks are determined by NatureServe.

STATE LEGAL STATUS

Note: State legal status is according to 5 M.R.S.A. § 13076-13079, which mandates the Department of Conservation to produce and biennially update the official list of Maine's Endangered and Threatened plants. The list is derived by a technical advisory committee of botanists who use data in the Natural Areas Program's database to recommend status changes to the Department of Conservation.

E	ENDANGERED; Rare and in danger of being lost from the state in the foreseeable future; or federally listed as Endangered.
T	THREATENED; Rare and, with further decline, could become endangered; or federally listed as Threatened.

NON-LEGAL STATUS

SC	SPECIAL CONCERN; Rare in Maine, based on available information, but not sufficiently rare to be considered Threatened or Endangered.
PE	Potentially Extirpated; Species has not been documented in Maine in past 20 years or loss of last known occurrence has been documented.

Visit our website for more information on rare, threatened, and endangered species!
http://www.mainenaturalareas.org/docs/rare_plants/factsheets.php

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October 3, 2014 14101.00

Mark Caron
Regional Biologist
Maine Department of Inland Fisheries and Wildlife, Region F
73 Cobb Road
Enfield, Maine 04493

Subject: Significant Wildlife Resources Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Mr. Caron:

The purpose of this letter is to request information on any significant wildlife resources associated with land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known or suspected essential significant wildlife resources within, or in the vicinity of, the proposed project. Please note that a request has also been sent to Nels Kramer for information on fisheries resources within the project area. For your convenience, the May 2008 review comments from your agency for the project area are attached.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

cc: John Perry, M.I.F.W.

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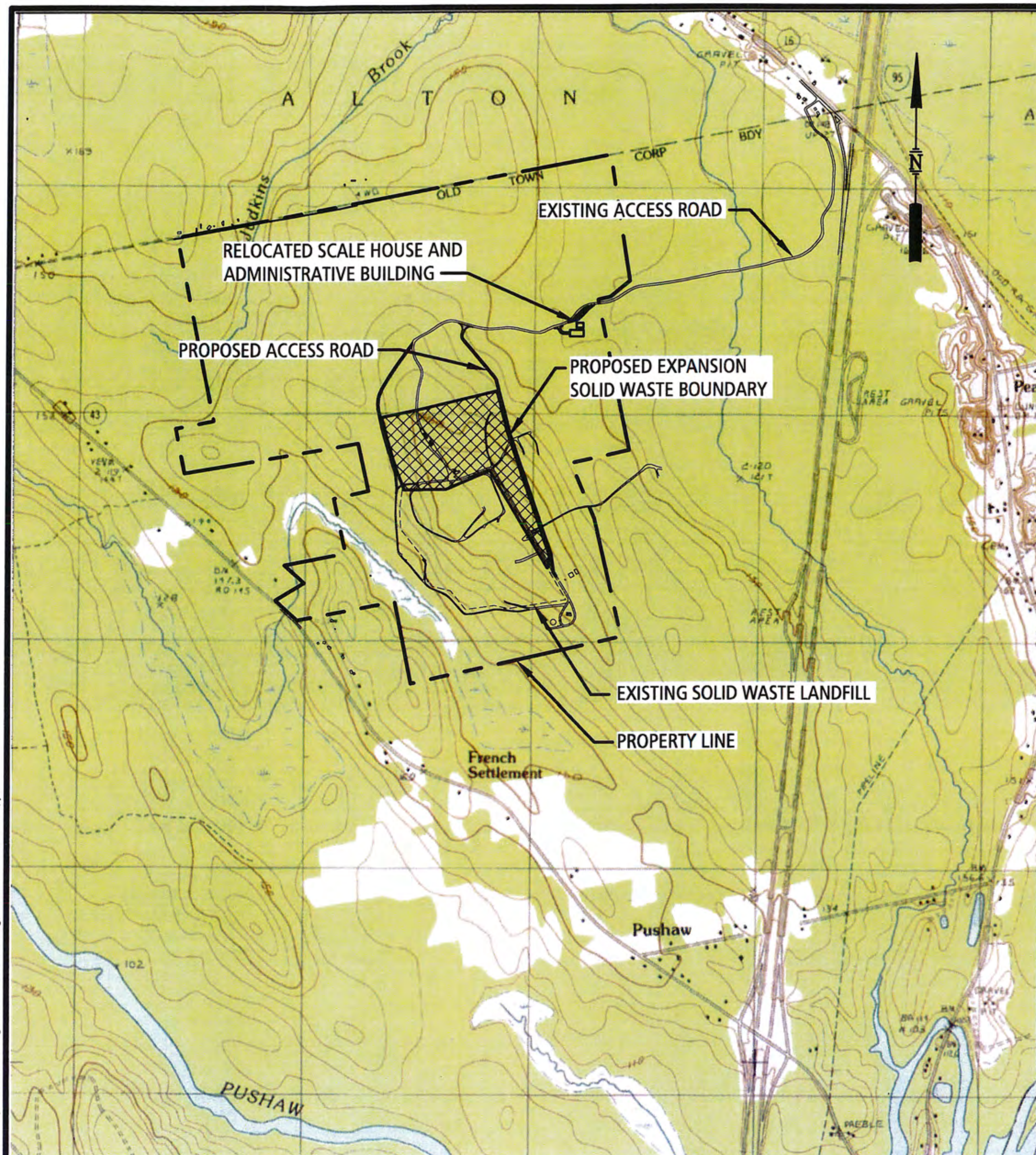

SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

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GOVERNOR
John E. Baldacci

COMMISSIONER
Roland D. Martin

Wildlife Division
73 Cobb Road
Enfield, ME 04493

May 28, 2008

Stantec Consulting
Attn: Jessica Haider
30 Park Drive
Topsham, ME 04086

Dear Jessica:

I have received your letters requesting Essential and Significant Habitat information for your project located in Old Town.

Essential Habitats:

Essential Habitats are defined as "areas currently or historically providing physical or biological features essential to the conservation of an endangered or threatened species in Maine and which may require special management considerations". Essential Habitat protection in Maine currently applies to bald eagle, roseate and least terns, and piping plover nest sites. Additional listed species may receive attention in the future.

According to MDIFW records, there are no Essential Habitats known to be associated with your project located in Old Town.

Significant Wildlife Habitats:

The Natural Resources Protection Act (NRPA), administered by the Maine Department of Environmental Protection (DEP), provides protection to certain natural resources including Significant Wildlife Habitats. Significant Wildlife Habitats are defined by the NRPA as:

> Habitat for state and federally listed endangered and threatened species.
>
> High and moderate value deer wintering areas (DWAs) and travel corridors.
>
> High and moderate value waterfowl and wading bird habitats (WWHs), including nesting and feeding areas.

Shorebird nesting, feeding, and staging areas.

Seabird nesting islands.

According to MDIFW records, there are several Significant Wildlife Habitats associated with your project located in Old Town. These include several Inland Waterfowl/Wadingbird Habitats. Please refer to the enclosed map.

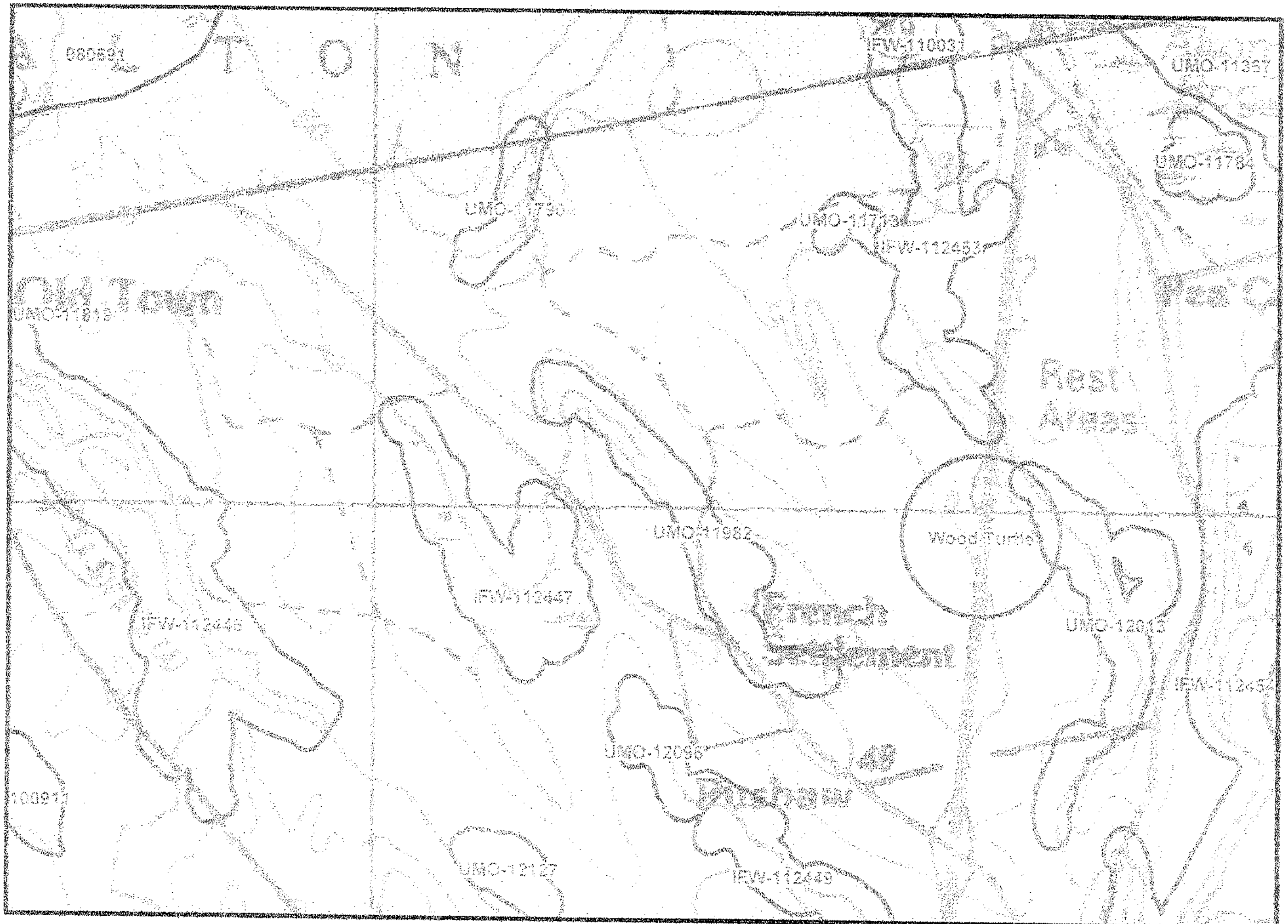
.Finally, MDIFW maintains a statewide database of endangered, threatened and special concern wildlife species and their habitats. There are no additional wildlife habitats of concern in this project area.

If you have any additional questions Jessica, feel free to give a call.

Sincerely,

Mark A. Caron
Regional Wildlife Biologist
Phone: 207-732-4132
Fax: 207-732-4405
E-Mail: mark.caron@maine.gov

Stantec-Old Town



Bald Eagle Nest Site

Piping Plover / Least Tern Nesting, Feeding, & Brood-rearing Area

Roseate Tern Nesting Area

Deer Winter Area

Inland Waterfowl / Wading Bird Habitat

Tidal Waterfowl / Wading Bird Habitat

Seabird Nesting Island

Shorebird Area

Biological Conservation Database Rare Species or Habitat Observation

Township Boundary

County

0 0.3 0.6 0.9 1.2 Miles

1:34,013

UTM Projection, Zone 19N, NAD83

N

73 Cobb Road
Enfield, ME 04493
Voice: (207) 732-4132
Fax: (207) 732-4405
May 27, 2008

Maine Department of Inland Fisheries & Wildlife
73 Cobb Road, Enfield, ME 04493
Phone: (207) 732-4132, FAX: (207) 732-4405

Site-Specific Search of Wildlife Observations and Habitat

SEARCH PARAMETERS

County:	Penobscot
IF&W Region:	F
Township(s):	Alton, Old Town
Search Center:	521292 east, 4980625 north (UTM NAD83 coordinates)
Search Area:	3.79 sq. miles
Date:	Wednesday, June 30, 2004

RESULTS

Essential Wildlife Habitats

BALD EAGLE NEST SITES
None Found

PIPING PLOVER / LEAST TERN NESTING, FEEDING, AND BROOD-REARING AREAS
None Found

ROSEATE TERN NESTING AREAS
None Found

Natural Resource Protection Act (NRPA) Habitats

Title 38, Chapter 3, Article 5-A, Section 480 of M.R.S.A. identifies habitats protected under the Natural Resources Protection Act (NRPA). Included in the definitions section (480-B) is "Significant Wildlife Habitat", which means areas that have been mapped by MDIFW or are within any other protected natural resource including habitat for listed endangered/threatened animal species; high/moderate value deer wintering areas; high/moderate value waterfowl/wading bird habitat; shorebird nesting, feeding, and staging areas; and seabird nesting islands. Although all of these habitats are mapped by MDIFW, to date only Seabird Nesting Islands have gone through the formal NRPA process. Specific deer wintering areas, inland and coastal *waterfowl/wading bird habitat, and shorebird areas have been designated "Candidate NRPA," indicating they meet the NRPA requirements but have not been formally zoned.*

SEABIRD NESTING ISLANDS
None Found

DEER WINTER AREAS
None Found

INLAND WATERFOWL/WADING BIRD HABITATS

Areas rated as high, moderate or indeterminate (see MDIFW: Significant Wildlife Habitat Protection Document, Waterfowl and Wading Bird Habitat - General, MDIFW, 12/22/93) qualify as Candidate NRPA habitats. The mapped boundary includes a 250-ft buffer adjacent to the wetland habitat used by waterfowl and wading birds. This data set was developed in accordance with NRPA and the Comprehensive Planning and Land Use Regulation Act (Growth Management).

Code	Type	Rating
112453	shrub swamp	moderate
	inland shallow fresh marsh	high
	inland shallow fresh marsh	high
112447	inland shallow fresh marsh	high

CODE = Unique identifier assigned by MDIFW to the polygon. Note: polygons without a code were identified by the University of Maine analysis of wetland habitats in 2002. These polygons do not have corresponding records in MDIFW's databases.
TYPE = Primary type of habitat
RATING = Inland waterfowl/wading bird habitats with a "high," "moderate," or "indeterminate" rating are considered as Candidate NRPA.

SHOREBIRD AREAS
None Found

COASTAL/TIDAL WATERFOWL/WADING BIRD HABITAT
None Found

Land Use Regulator Commission (LURC) Deer Winter Areas
None Found

Biological Conservation Database (BCD)

The Biological Conservation Database is an information management component of the Natural Heritage Program Network created by the Nature Conservancy. It is designed to track information on the status, life history, conservation needs, and *occurrences for rare species and natural communities. MDIFW is responsible for maintaining the zoological portion of the database, which contains information on approximately 1050 animal species native to the State.*

POINTS OBSERVATIONS BUFFERED BY 0.25 MILES

In the map, BCD points are surrounded by a 0.25-mile radius circle to represent the general area around the observation that should be considered for management. Ideally, the mapped polygon should show the extent of the important habitat(s) associated with the observation, but until a new landcover map of Maine becomes available, we are using simple circular buffers to approximate that area. This circular buffer is less appropriate for aquatic species for which the limit of the water body or a buffered stream segment may be more realistic. In all cases, an MDIFW biologist should investigate the habitat around a BCD observation to determine the most appropriate area for management consideration.

Classification of BCD observations as CONCERN = 'Y' or CONCERN = 'N' indicates whether the area around the observation should receive special management consideration based on the species involved (endangered, threatened, or rare), importance or rarity of the habitat, or whether the observation is recent or historical. Observations in BCD that are duplicated in other MDIFW datasets (e.g., Eagle Essential Wildlife Habitats) are classified here as CONCERN = 'N', not because they are unimportant but because they should already be flagged elsewhere in this report. Any questions regarding BCD observations should be directed to MDIFW's Endangered & Threatened Species Group.

Code	Common Name	Survey Area
ARAAD02020*041*ME	WOOD TURTLE	I-95

CODE = unique identifier of observation

MAPPED HABITAT POLYGONS

None Found

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October 3, 2014 14101.00

Nels Kramer
Regional Fisheries Biologist
Maine Department of Inland Fisheries and Wildlife, Region F
73 Cobb Road
Enfield, Maine 04493

Subject: Significant Fish or Fish Habitat Resources Associated with watercourses near the Juniper Ridge Landfill in Old Town, Maine

Dear Mr. Kramer:

The purpose of this letter is to request information on any significant fish or fish habitat resources associated with waterbodies near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known or suspected significant fish or fish habitat resources within, or in the vicinity of, the proposed project. Please note that a request has also been sent to Mark Caron for information on wildlife resources within the project area. For your convenience, the May 2008 review comments from your agency for the project area are attached.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

cc: John Perry, M.I.F.W.

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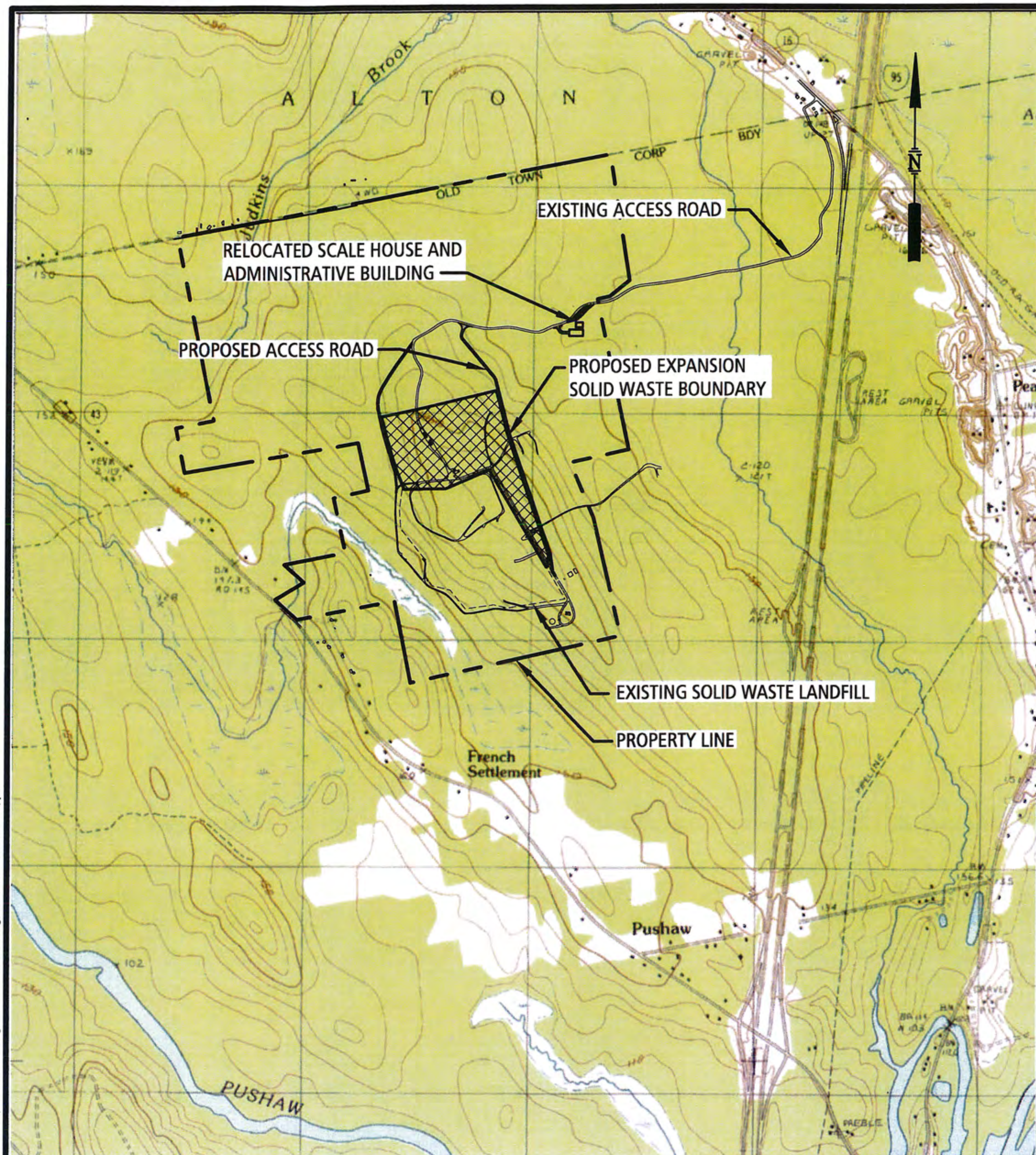

SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

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Comments - Environmental Project Review Maine Department of Inland Fisheries and Wildlife	
Fisheries Division Comments – Region F	
Applicant's Name: Stantec Consulting	
Project #: 195600338	Regulatory Agency:
Project Type: West Old Town Project	Project Manager: Jon Ryan; Asst. Jessica Haider
Comments Due Date:	Date Comments Sent: May 27, 2008
Project Location	
Town: West Old Town	County: Penobscot
Waterbody: Judkins Brook and unnamed streams	
Fisheries Biologist: Richard Dill	

After review of the application and consideration of the proposal's probable effect on the environment, and on our agencies programs and responsibilities, we provide the following comments:

I. Project Description/Resource Affected:
Significant fish or fish habitat resources in project area. Note: project type unspecified.

II. Comments/Recommended Considerations or Conditions:
<u>Fisheries Considerations:</u>
There are no lakes that fall within proposed project area.

Judkins Brook falls in the project area as well as two unnamed streams, on a small tributary to Pushaw Stream, the other a possible branch of Judkins Brook. It is possible that these streams have populations of Eastern brook trout, along with other native resident species of fish. I do not anticipate any significant impacts to fish and/or fish habit in these streams related to this project, but request a site visit at any proposed stream crossings in the project area before project plans are finalized.

<u>Wildlife Considerations:</u>
Will be responding separately.
[ ] Check if requesting copy of draft findings of fact and order.

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

October 3, 2014 14101.00

Ms. Robin Reed
State Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333

Subject: Known Structures of Historical Significance or Known Archaeological Sites Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Robin:

The purpose of this letter is to request information on any known structures of historical significance or known archaeological sites on land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known structures of historical significance within, or in the vicinity of, the proposed project. For convenience, the June and September 2008 review comments and correspondence from your agency for this project are attached.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

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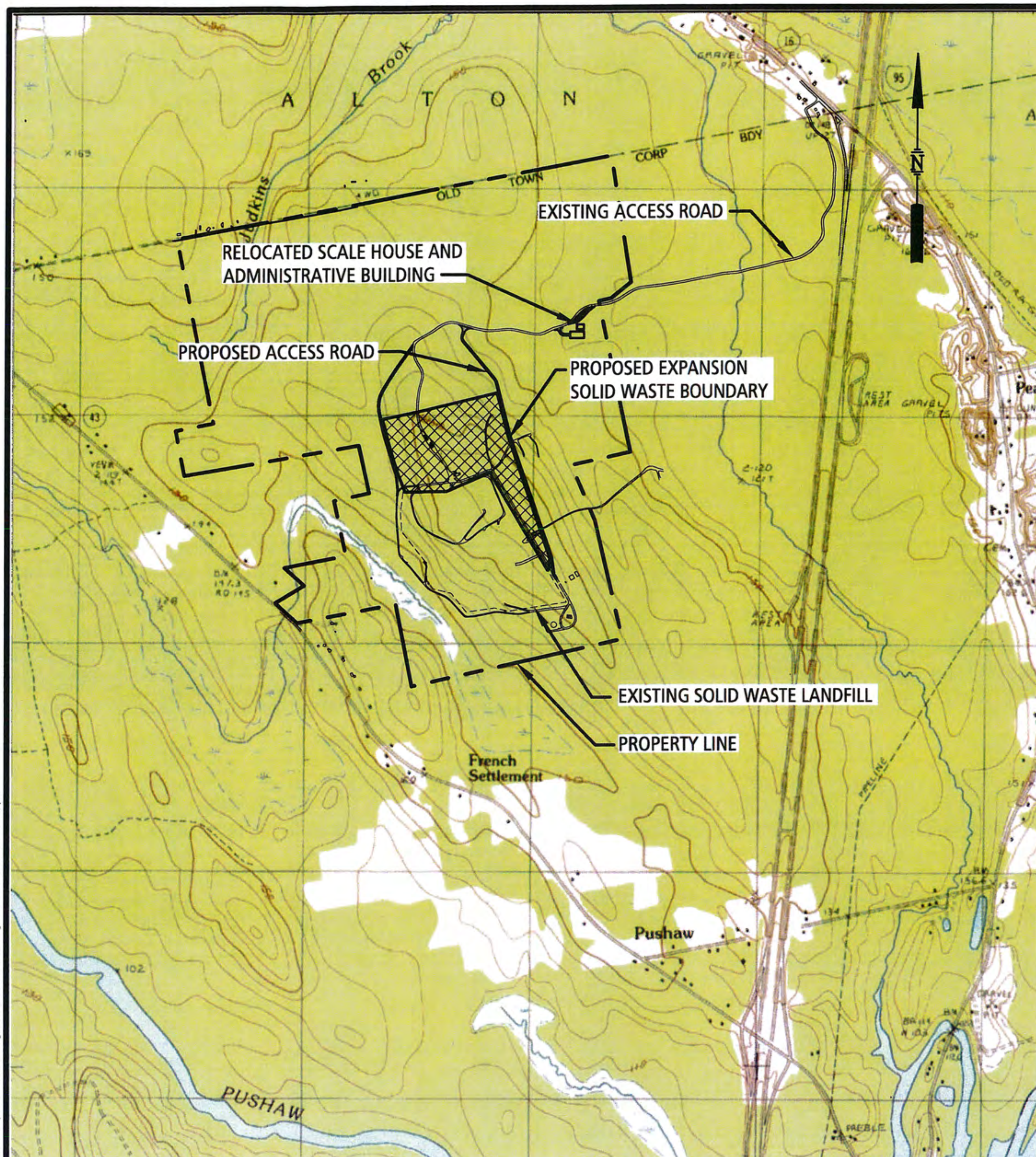

1000 0 2000 FEET

SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.

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DWG: PRESENTATION	LMN: STANTEC	CTB: SME-STD	REV: 10/2/14

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MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JOHN ELIAS BALDACCI
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

September 15, 2008

Mr. Steven E. Patch
Sevee & Mahar Engineers, Inc.
P. O. Box 85A
Cumberland Center, ME 04021

RE: 100 acre Juniper Ridge landfill expansion, West Old Town, MHPC #0895-08

Dear Mr. Patch:

Dr. Arthur Spiess of my staff has reviewed the additional information for this project (expansion boundary and detailed topographic map) that you supplied with your letter of September 3rd. We withdraw our request for archaeological survey and for further architectural information.

I find that there will be no historic or archaeological properties affected by the proposed undertaking.

Sincerely,

Kirk Mohney

Kirk Mohney
Assistant Director/Deputy SHPO

PHONE: (207) 287-2132

FAX: (207) 287-2335

SME

Sevee & Maher Engineers, Inc.
Waste Management and Hydrogeologic Consultants

September 3, 2008

08097.02
080903 mhpc.doc

Dr. Arthur Speiss
Maine Historic Preservation Commission
55 Capital Street
65 State House Station
Augusta, Maine 04333

Subject: MHPC #0895-08 – 100-Acre Project in West Old Town Maine
Stantec Project No. I95600338

Dear Dr. Speiss:

In May 2008, your office received correspondence from Ms. Jessica Haider of Stantec Consulting to initiate consultation on a landfill expansion project proposed for the Juniper Ridge Landfill. The Juniper Ridge Landfill is located on a 780-acre parcel located in Old Town, Maine. The parcel is owned by the State of Maine and administered by the State Planning Office (SPO).

A reply letter dated June 16, 2008 was sent by Mr. Kirk Mohney of your office, which discussed the potential need for a Phase I archaeological survey at the site. On July 16, 2008, I spoke briefly with you about Sevee & Maher Engineers, Inc. (SME) providing additional information regarding the location of the ground disturbance proposed for the expansion project. During our discussion, you indicated that the June 16, 2008 letter was a typical response letter sent to developers for commercial development and that it may not strictly apply to the development of a landfill expansion where the ground disturbance and increased level of human activity resulting from the proposed development is limited to the immediate area of the proposed expansion. You also indicated that if we could give you a better understanding of where the landfill and landfill infrastructure development will occur in relation to the segment of Judkins Brook that crosses the SPO parcel (i.e., the stream referenced in Mr. Mohney's June 16, 2008 letter), you could provide a more conclusive recommendation as to the need for a Phase I survey.

Attached are two figures that better define the location of the proposed landfill expansion project. As shown on the attached figures, the ground disturbance associated with the proposed landfill expansion development is approximately 1,500 linear feet (plus or

4 Blanchard Road P.O. Box 85A Cumberland Center, ME 04021 (207) 829-5016 FAX (207) 829-5692 www.smemaine.com

minus 500 meters) from Judkins Brook. The human activity associated with the proposed landfill expansion will also be limited to those areas within the limits of the landfill expansion footprint. As such, the proposed development will not disturb any ground within 50 meters of Judkins Brook or any prehistoric archaeological sites located near this segment of the Brook (if they do indeed exist).

Please call us if you have any questions or if you require any additional information regarding the proposed expansion project. Thank you again for taking time to reconsider the need for a Phase I archaeological survey for this project.

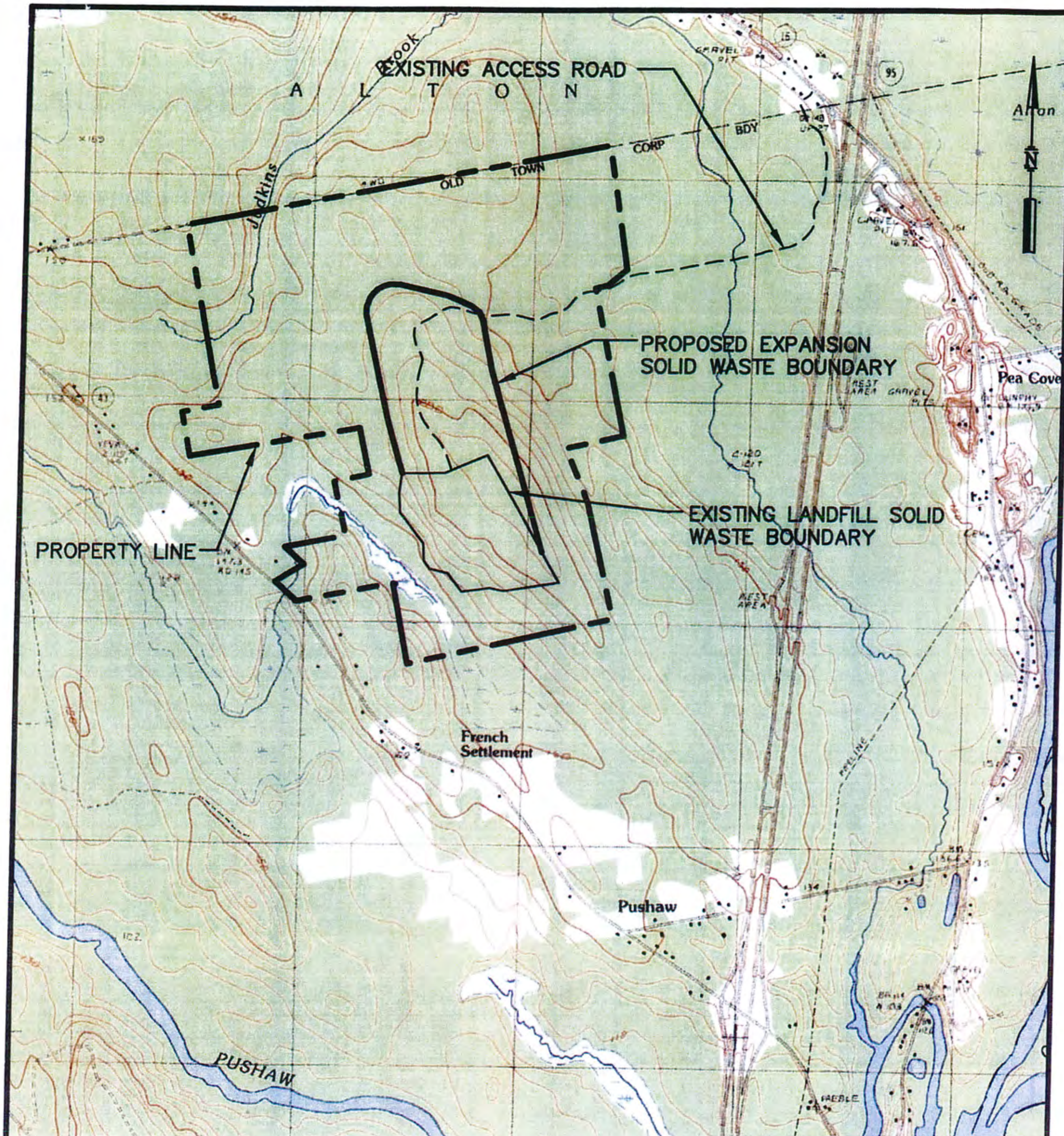
Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Steven E. Patch, P.E.
Project Engineer

Attachments

cc: Toni King, NEWSME Operations
Don Meagher, NEWSME Operations
George McDonald, State Planning Office
Jon Ryan, Stantec



NOTE:

BASE MAP ADAPTED FROM 7.5 MIN USGS TOPOGRAPHIC QUADRANGLE OLD TOWN, MAINE–1988

1000 0 2000 4000 FEET

DWG: SITELOC LMN:EXP–PL CTB: WATERSHED REV: 9/2/08

SITE LOCATION
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.

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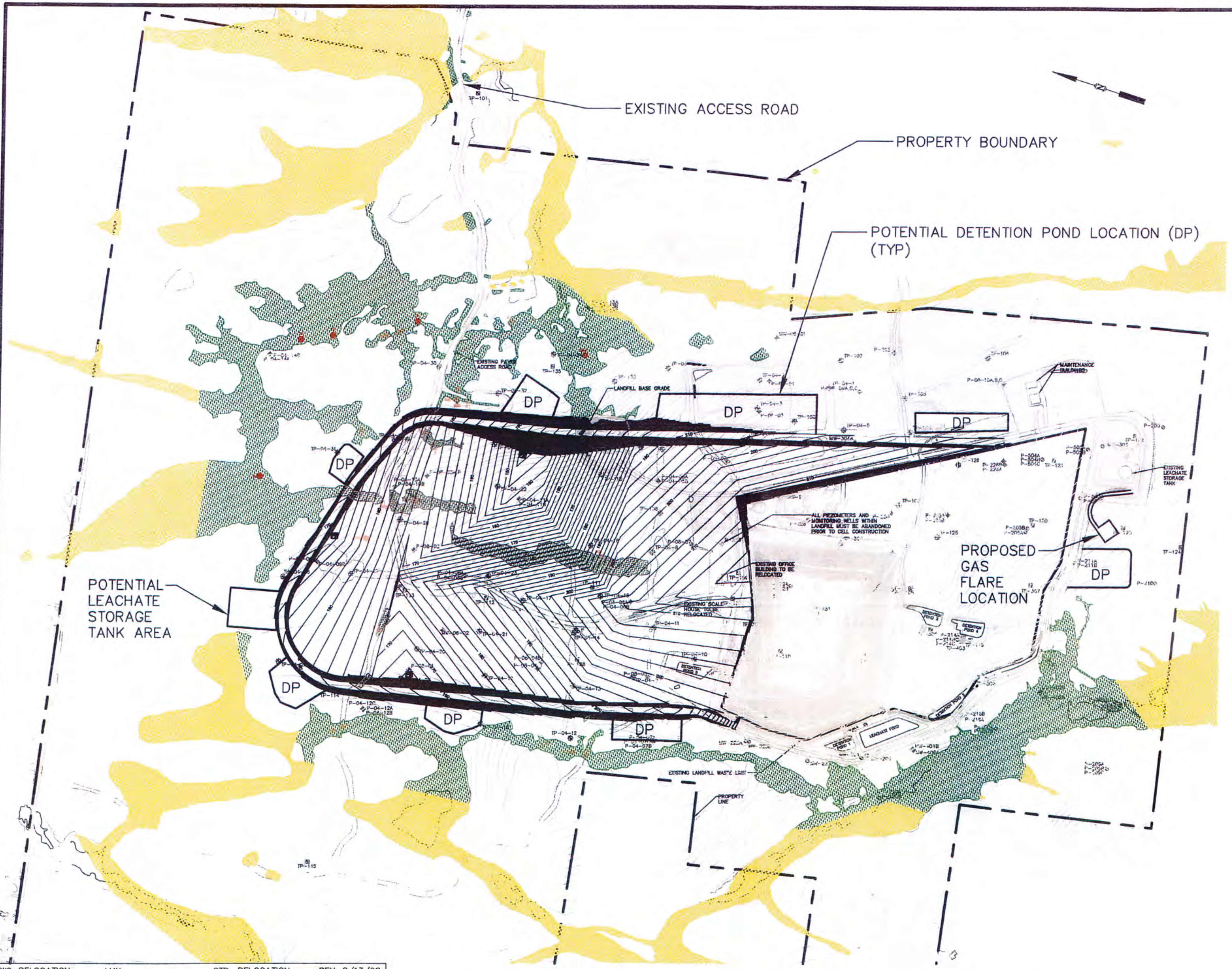

NOTES

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO, NORRIDGEWOCK, MAINE. PHOTO DATE MAY 2, 2008. VERTICAL DATUM BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM MAINE STATE COORDINATE SYSTEM EAST ZONE, NAD 83. GROUND CONTROL BY PLISGA & DAY, BANGOR, MAINE. STANDARD PRACTICE DICTATES THAT PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. OF TOPSHAM, MAINE IN 2004, 2005, 2006 & 2008.

3. PROPERTY BOUNDARY LOCATION IS 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. SIZE AND LOCATION OF STORM WATER DETENTION PONDS ARE SUBJECT TO CHANGE WITH FINAL DESIGN.

LEGEND

VERNAL POOL & DESIGNATION

SIGNIFICANT VERNAL POOL & DESIGNATION

WETLAND DELINEATED

WETLAND PHOTO INTERPRETED

DRAFT

ATTORNEY–CLIENT PRIVILEGED

300 0 600 FEET

JUNIPER RIDGE LANDFILL
PROPOSED EXPANSION
SITE PLAN

SME
Sevee & Maher Engineers, Inc.

DWG: RELOCATION LMN: CTB: RELOCATION REV: 8/13/08

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MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JOHN ELIAS BALDACCI
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

June 16, 2008

Ms. Jessica Haider
Project Assistant
Stantec Consulting
30 Park Drive
Topsham, ME 04086

Project: MHPC # 0895-08 - 100 acre project area in West Old Town; Stantec project # 195600338
Town: Old Town, ME

Dear Ms. Haider:

In response to your recent request, I have reviewed the information received May 22, 2008 to initiate consultation on the above referenced project.

Based on the information provided, I have concluded that the project area that is within 50 m of the stream is likely to contain one or more prehistoric archaeological sites based on our predictive model of archaeological site location. Therefore, Phase I archaeological survey is necessary for this parcel prior to any ground disturbance. A list of qualified prehistoric archaeologists is enclosed along with material explaining the Phase I/II/III approach to archaeological survey. This information can also be found on our website: www.maine.gov/mhpc/project_review This office must approve any proposal for archaeological fieldwork.

In order to determine whether historic above ground resources will be affected by the proposed undertaking, we are requesting photos of any buildings over fifty years of age on properties that are on, adjacent to, or across the street from the project site and any associated access roads. All photos should be keyed to a 7.5' U.S.G.S. quad map and submitted on the enclosed *Maine Historic Preservation Commission Historic Building/Structure Survey Form* with lines 3-5 filled out. If no such buildings exist, please indicate this in writing.

Once this information is received, we will forward a response regarding the results of our evaluation. Please contact Dr. Arthur Spiess of my staff regarding archaeology or Robin Stancampiano of my staff regarding architecture if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
Deputy State Historic Preservation Officer

enc.

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JOHN ELIAS BALDACCI
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

Prehistoric Archaeologists Approved List: Review and Compliance Consulting/Contracting (Active)

LEVEL 1

Ms Edna Feighner (207-879-9496)
NH Division of Historical Resources
PO Box 2043
Concord NH 03302-2043
Efeighner@NHDHR.state.nh.us

James A Clark (207-667-4055)
TRC/Northeast Cultural Resources
71 Oak St
Ellsworth ME 04605
clark.ja@gmail.com

Mr. Michael Brigham (207-778-7012)
Archaeology Research Center
University of Maine at Farmington
139 Quebec St
Farmington ME 04938
brigham@maine.edu

Richard P Corey (207-778-7012)
PO Box 68
E Wilton ME 04234-0068
rcorey@maine.edu

Edward Kitson (207-778-7012)
Archaeology Research Center
University of Maine at Farmington
139 Quebec St
Farmington ME 04938
kitson@maine.edu

Mr Brian Valimont (207-251-9467)
New England Archaeology Co LLC
117 Cat Mousam Rd
Kennebunk ME 04043
newarch1@verizon.net

Ms. Sarah Haugh (207-879-9496 x238)
Northern Ecological Associates
451 Presumpscot St
Portland ME 04103
shaugh@neamaine.com

LEVEL 2

Dr Richard Will (207-667-4055)
TRC/Northeast Cultural Resources
71 Oak St
Ellsworth ME 04605
FAX: 207-667-0485
willtrc@adelphia.net

Dr Jonathan Lothrop (412-856-6400)
GAI Consultants
570 Beatty Rd
Monroeville PA 15146
j.lothrop@gaiconsultants.com

Dr Stuart Eldridge (207-879-9496)
Northern Ecological Associates
451 Presumpscot St
Portland ME 04103
seldridge@neamaine.com

Dr Ellen Cowie (207-778-7012)
Archaeology Research Center
University of Maine at Farmington
139 Quebec St
Farmington ME 04938-1507
ecowie@maine.edu

Robert N Bartone
Archaeology Research Center
University of Maine at Farmington
139 Quebec St
Farmington ME 04938
b_bartone@maine.edu

Dr Victoria Bunker (603-776-4306)
PO Box 16
New Durham NH 03809-0016
vbi@worldpath.net

Dr Bruce J Bourque (207-287-3909)
Maine State Museum
83 State House Station
Augusta ME 04333-0083
bbourque@abacus.bates.edu

Dr Leslie Shaw (207-725-3815)
Dept of Sociology & Anthropology
Bowdoin College
Brunswick ME 04011
e-mail: lshaw@bowdoin.edu

David Putnam (207-762-5078)
47 Hilltop Rd
Chapman ME 04757
putnamd@umpi.edu

Dr Nathan Hamilton (207-780-5324)
Dept of Geography & Anthropology
University of Southern Maine
Gorham ME 04038

Dr William R Belcher
US Army CILHI
310 Worchester Ave Bldg 45
Hickam AFB HI 96853-5530
wbelcher@msn.com

Dr Steven L Cox (207-342-7790)
57 Ghent Rd
Searsmont ME 04973
stevencox@fairpoint.net

Geraldine Baldwin (914-271-0897)
John Milner Associates Inc
1 Croton Point Ave Ste B
Croton-on-Hudson NY 10520
FAX: 914-271-0898
GeraldineBaldwin@aol.com

Dr. Robert Goodby (603-446-2366)
Monadnock Archaeological Consulting
16 Fox Hill Rd
Stoddard NH 03464
MonadArch@surfglobal.net

Edward Moore
TRC/Northeast Cultural Resources
71 Oak St
Ellsworth ME 04605
FAX: 207-667-0485

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

ANGUS S. KING, JR
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

CONTRACT ARCHAEOLOGY GUIDELINES

June 10, 2002

This document is provided as background information to agencies, corporations, professional consultants or individuals needing contract archaeological services (also known as Cultural Resources Management archaeology) in Maine. These guidelines are based on state rules (94-089 Chapter 812).

Project Types

The vast majority of contract archaeology survey work falls into one of three categories. **Phase I** surveys are designed to determine whether or not archaeological sites exist on a particular piece of land. Such work involves checking records of previous archaeology in the area, walking over the landscape to inspect land forms and look for surface exposures of soil and possible archaeological material, and the excavation of shovel test pits in areas of high probability.
Phase II surveys are designed to focus on one or more sites that are already known to exist, find site limits by digging test pits, and determine site content and preservation. Information from Phase II survey work is used by the Maine Historic Preservation Commission (MHPC) to determine site significance (eligibility for listing in the National Register of Historic Places). **Phase III** archaeological work, often called data recovery, is careful excavation of a significant archaeological site to recover the artifacts and information it contains in advance of construction or other disturbance.

Archaeological sites are further divided into two broad categories of culture, **prehistoric** (or Native American), and **historic** (or European-American). Different archaeological specialists are usually needed for prehistoric or historic sites because the nature of content and preservation and site locations are quite different.

Scope of Work

In responding to a project submission, the MHPC may issue a letter specifying which type of archaeological survey is needed (prehistoric, historic or both) and at what level (Phase I, II, or III). Often the response letter contains further information, such as the suspected presence of an historic site of a certain age, or a statement that only a portion of the project parcel in question is sensitive for prehistoric sites and only that portion needs archaeological survey.

Once the project applicant has one or more scopes of work (proposals) from appropriate archaeologists (see below), the applicant should submit their preferred proposal *(without attached financial information or bid total)* to the MHPC for approval. MHPC will not comment upon cost, but will comment on the appropriateness of the scale and scope of the work. An approval from MHPC of the scope of work is the applicant's guarantee that, if the field and laboratory work are done according to the scope, and appropriately described in writing, the results will be accepted by MHPC.

The final written report on the project must also be submitted to MHPC for review and comment.

PHONE: (207) 287-2132

FAX: (207) 287-2335

Finding an Archaeologist

At the time that MHPC issues a letter requiring archaeological survey work, MHPC will also supply one (or more) lists of archaeologists (Levels 1 and/or 2, historic or prehistoric) appropriate to the type of work (Phase I, II, III, historic or prehistoric). Archaeologists on the Level 2 Approved Lists can do projects of any level, including Phase I archaeological survey projects. Level 1 archaeologists are restricted to doing Phase I surveys, and certain planning projects for municipal governments.

MHPC maintains lists of archaeologists interested in working in different geographic areas of Maine, and those who are qualified in different types of work. The archaeologists themselves indicate their availability (except for short-term absence) to MHPC on a periodic basis, so archaeologists on the list can be expected to respond to inquiries. The applicant should solicit proposals or bids for work from archaeologists whose names appear on the list supplied by MHPC.

These archaeologists' names are taken from lists of archaeologists approved for work in Maine by MHPC under a set of rules establishing minimal qualifications, such as previous supervisory experience in northern New England, and an appropriate graduate degree. *However, the inclusion of an archaeologist on one of these lists should not be interpreted as an endorsement by the MHPC beyond these limited qualification criteria. Moreover, the MHPC cannot recommend the services of an individual archaeologist.*

Project Final Report

Whatever the archaeological survey result, a final report on the project should be submitted by the applicant to the MHPC. The MHPC will review the report, and issue further guidance or issue a "clearance" letter for the project.

SURVEY MAP NO. ____
SURVEY MAP NAME ____

MHPC USE ONLY

INVENTORY NO.

MAINE HISTORIC PRESERVATION COMMISSION
Historic Building/Structure Survey Form

1. PROPERTY NAME (HISTORIC): ____
2. PROPERTY NAME (OTHER): ____
3. STREET ADDRESS: ____
4. TOWN: ____ 5. COUNTY: ____
6. DATE RECORDED: ____ 7. SURVEYOR: ____
8. OWNER NAME: ____ ADDRESS: ____
9. PRIMARY USE (PRESENT):
___ SINGLE FAMILY
___ MULTI-FAMILY
___ INDUSTRY
___ TRANSPORTATION
___ RECREATION/CULTURE
OTHER ____
___ AGRICULTURE
___ GOVERNMENTAL
___ RELIGIOUS
___ DEFENSE
___ UNKNOWN
___ COMMERCIAL/TRADE
___ EDUCATION
___ HOTEL
___ SUMMER COTTAGE/CAMP
___ FUNERARY
___ HEALTH CARE
___ LANDSCAPE
___ SOCIAL

10. CONDITION: ___ GOOD ___ FAIR ___ POOR ___ DESTROYED, DATE _/_/_

ARCHITECTURAL DATA

11. PRIMARY STYLISTIC CATEGORY:
___ COLONIAL
___ FEDERAL
___ GREEK REVIVAL
___ GOTHIC REVIVAL
___ ITALIANATE
___ SECOND EMPIRE
___ STICK STYLE
___ QUEEN ANNE
___ SHINGLE STYLE
___ R. ROMANESQUE
___ ROMANESQUE
___ HIGH VIC. GOTHIC
___ NEO-CLASSICAL REV.
___ RENAISSANCE REV.
___ 19*TH*/20*TH* C. REVIVAL
___ ARTS & CRAFTS
___ BUNGALOW
OTHER ____
___ FOUR SQUARE
___ ART DECO
___ INTERNATIONAL
___ RANCH
___ VERNACULAR

12. OTHER STYLISTIC CATEGORY:
___ COLONIAL
___ FEDERAL
___ GREEK REVIVAL
___ GOTHIC REVIVAL
___ ITALIANATE
___ SECOND EMPIRE
___ STICK STYLE
___ QUEEN ANNE
___ SHINGLE STYLE
___ R. ROMANESQUE
___ ROMANESQUE
___ HIGH VIC. GOTHIC
___ NEO-CLASSICAL REV.
___ RENAISSANCE REV.
___ 19*TH*/20*TH* C. REVIVAL
___ ARTS & CRAFTS
___ BUNGALOW
OTHER ____
___ FOUR SQUARE
___ ART DECO
___ INTERNATIONAL
___ RANCH
___ VERNACULAR

13. HEIGHT:
___ 1 STORY ___ 1 1/2 STORY ___ 2 STORY ___ 2 1/2 STORY ___ 3 STORY ___ 4 STORY
___ 5 STORY ___ OVER 5 (____)

14. PRIMARY FACADE WIDTH (MAIN BLOCK; USE GROUND FLOOR):
___ 1 BAY ___ 2 BAY ___ 3 BAY ___ 4 BAY ___ 5 BAY ___ MORE THAN 5 (___)

15. APPENDAGES: ___ SIDE ELL ___ REAR ELL ___ FRONT ___ ADDED STORIES ___ SHED
___ DORMERS ___ PORCH ___ TOWER ___ CUPOLA ___ BAY WINDOW

PHOTOGRAPH:

16. PORCH:
___ ATTACHED ___ ENGAGED ___ ONE STORY ___ MORE THAN ONE STORY
___ FULL WIDTH ___ WRAPAROUND ___ SLEEPING PORCH ___ SECONDARY PORCH

17. PLAN:
___ HALL AND PARLOR ___ 1/2 CAPE ___ CENTRAL HALL ___ SIDE HALL
___ BACK HALL ___ IRREGULAR ___ OTHER ______________________

18. PRIMARY STRUCTURAL SYSTEM:
___ TIMBER FRAME ___ BRACED FRAME ___ BRICK ___ STONE ___ BALLOON FRAME
___ CONCRETE ___ STEEL ___ LOG ___ PLANK WALL ___ PLATFORM FRAME
___ FRAME CONSTRUCTION - TYPE UNKNOWN ___ OTHER ______________________

19. CHIMNEY PLACEMENT:
___ INTERIOR ___ INTERIOR FRONT/REAR ___ CENTER ___ INTERIOR END ___ EXTERIOR
OTHER ______________________

20. ROOF CONFIGURATION:
___ GABLE SIDE ___ GABLE FRONT ___ HIP ___ MANSARD ___ FLAT
___ GAMBREL ___ PARAPET GABLE ___ SHED ___ CROSS ___ GABLE
___ COMPOUND ___ OTHER ______________________

21. ROOF MATERIAL: WOOD ___ METAL ___ TILE ___ SLATE ___ ASPHALT ___ ASBESTOS ___

22. EXTERIOR WALL MATERIALS:
___ CLAPBOARD ___ BRICK ___ FLUSH SHEATHING ___ WOOD SHINGLE ___ STONE
___ LOG ___ PRESSED METAL ___ CONCRETE ___ STUCCO ___ ASPHALT
___ GRANITE ___ ASBESTOS ___ TERRA COTTA ___ BOARD AND BATTEN ___ ALUMINUM/VINYL
OTHER ______________________

23. FOUNDATION MATERIAL:
___ FIELDSTONE ___ BRICK ___ WOOD ___ CONCRETE ___ GRANITE ___ ORNAMENTAL CONC. BLOCK
OTHER ______________________

24. OUTBUILDINGS/FEATURES:
___ CARRIAGE HOUSE ___ FENCE OR WALL ___ CEMETERY ___ BARN (CONNECTED)
___ BARN (DETACHED) ___ FORMAL GARDEN ___ LANDSCAPE/PLANT MAT. ___ ARCHAEOLOGICAL SITE
___ GARAGE ___ OTHER ______________________

HISTORICAL DATA

25. DOCUMENTED DATE OF CONSTRUCTION: ____________ 26. ESTIMATED DATE OF CONSTRUCTION: ____________

27. DATE MAJOR ADDITIONS/ALTERATIONS: ______________________

28. ARCHITECT: ____________ 29. CONTRACTOR: ____________

30. ORIGINAL OWNER: ______________________

31. SUBSEQUENT SIGNIFICANT OWNER: ______________________ DATES: ________

32. CULTURAL/ETHNIC AFFILIATION:
___ ENGLISH ___ FRENCH ACADIAN ___ NATIVE AMERICAN ___ SCOTTISH ___ FRENCH CANADIAN
___ EAST EUROPEAN ___ IRISH ___ OTHER ______________________

33. HISTORIC CONTEXT(S):
___ COMMERCE ___ INDUSTRY ___ TRANSPORTATION ___ AGRICULTURE ___ MILITARY
___ RELIGION ___ CIVIC AFFAIRS ___ RECREATION ___ HABITATION ___ EDUCATION
___ ART, LIT, SCIENCE ___ SOCIAL

34. COMMENTS/SOURCES: ______________________

35. HISTORICAL DRAWINGS EXIST: ___ YES ___ NO LOCATION: ______________________

ENVIRONMENTAL DATA

36. SITE INTEGRITY: ___ ORIGINAL ___ MOVED DATE MOVED ________
37. SETTING: ___ RURAL/UNDISTURBED ___ RURAL/BUILT UP ___ SMALL TOWN ___ URBAN ___ SUBURBAN
38. QUADRANGLE MAP USED: ____________ QUADRANGLE #: ____________
39. UTM NORTHING: ____________ 40. UTM EASTING: ____________
41. FACADE DIRECTION (CIRCLE ONE): N S E W NE NW SE SW

MHPC USE ONLY

DATE ENTERED IN INVENTORY: ____________ PHOTO FILE #: ____________
NR STATUS: L ___ HD ___ E ___ NE ___ ND ___ REVIEWER ____________
DATA SOURCE ___ HPI ___ CLG ___ R&C ___ STAFF ___ STATE SURVEY ___ OTHER ___ LEVEL OF SURVEY ___ R ___ I

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

October 3, 2014 14101.00

Thom Danielson
Maine Department of Environmental Protection
Division of Water Resource Regulations
State House Station 17
Augusta, Maine 04333

Subject: Significant Rivers and Streams Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Thom:

The purpose of this letter is to request information on any significant lakes, ponds, rivers, streams, or brooks associated with land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known significant waterbodies within, or in the vicinity of, the proposed project. For your convenience, the July 2004 review comments from your agency are attached.

Thank you for your assistance in obtaining this information.

Sincerely,

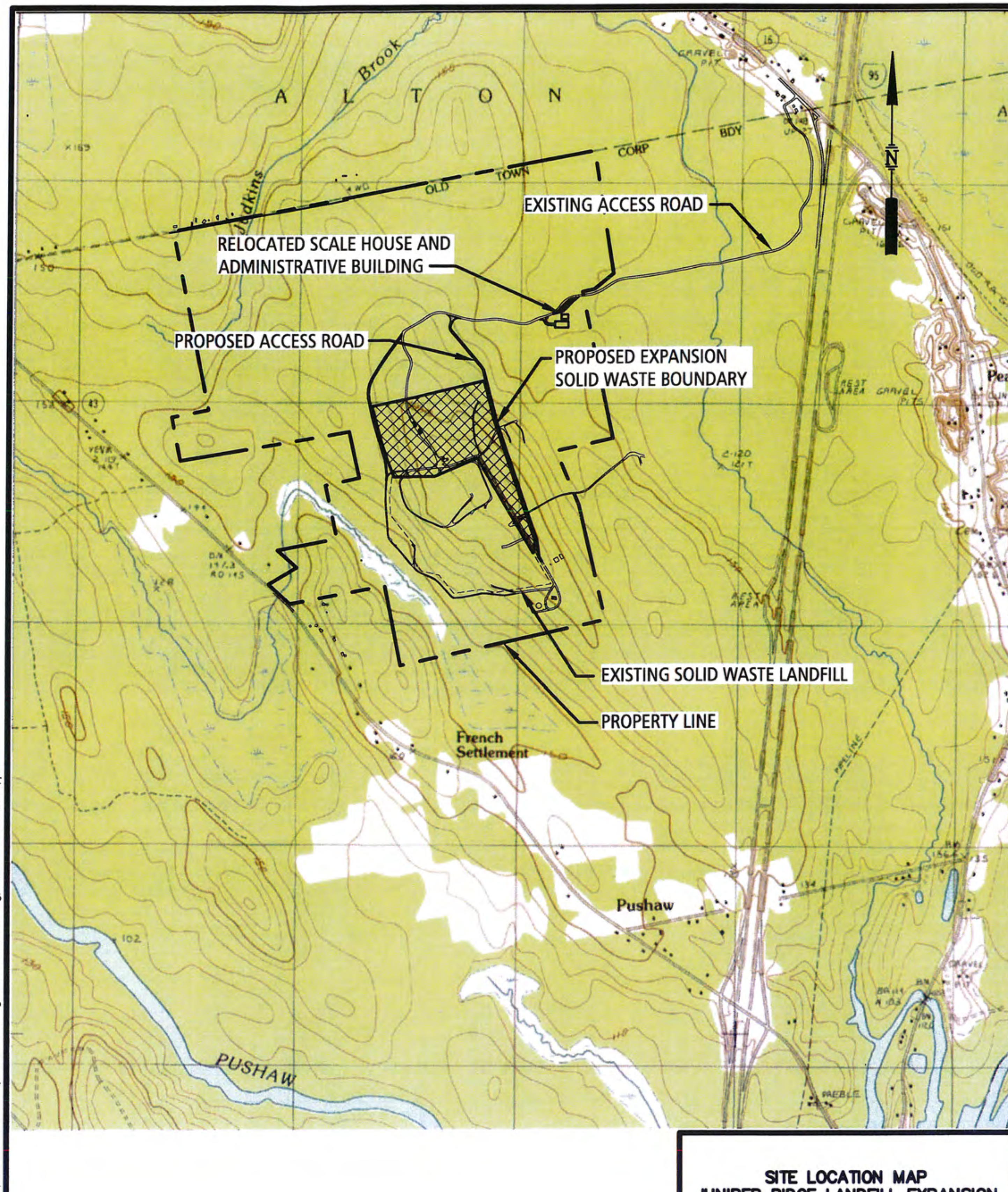
SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

Z:\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Docs\L\20141002misc_letters.docx

4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021 • Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com



SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: PRESENTATION LMN: STANTEC CTB: SME–STD REV: 10/2/14

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STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ıN ELIAS BALDACCI
GOVERNOR

DAWN R. GALLAGHER
COMMISSIONER

July 9, 2004

Jeffrey Simmons
Woodlot Alternatives, Inc.
30 Park Drive
Topsham, ME 04086

Re: Significant rivers and streams associated with 100-acre parcel in Old Town

Dear Jeffrey,

Several streams are located in the vicinity of the 100-acre parcel in Old Town. Judkins Brook and its tributaries drain the northern portion of the project area. An unnamed tributary of the Penobscot River drains the southeast corner of the project area. A tributary of Pushaw Stream drains the western portion of the project area. All of these streams are statutory class B. The USGS topo map appears to have errors on it. The project applicant should walk the above treams and locate and map streams within the project boundary. Alton Bog is an exceptional wetland located northeast of the proposed project. I recommend that you contact the Maine Natural Areas Program and Department of Inland Fisheries and Wildlife for information about Alton Bog. Other waterbodies in the vicinity include Penobscot Stream, Penobscot River, and a tributary of Pushaw Stream located to the southwest of the proposed project. They are all class B. The proposed project should minimize the risk of transporting pollutants to the above water bodies through surface water runoff or groundwater flow. If you have any questions, please contact me at 287-7728.

Sincerely,

Thomas J Danielson

Thomas J. Danielson

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

October 7, 2014 14101.00

Jim Beyer
Maine Department of Environmental Protection
Central Maine Regional Office
106 Hogan Road
Bangor, Maine 04401

Subject: Significant Natural Resources Information Request
Juniper Ridge Landfill in Old Town, Maine

Dear Jim:

The purpose of this letter is to request information on any significant natural resources associated with the location depicted on the attached figure, showing the Juniper Ridge Landfill expansion project in Old Town, Maine.

Please review the attached map and let me know if there are any known or suspected locations of rare, threatened, or endangered plants or listed wildlife species, exemplary natural communities, significant wildlife habitat, registered critical areas, or other significant natural resources within the outlined area associated with this potential development area. Should you have any questions, please feel free to contact me.

Thank you for your assistance in obtaining this information.

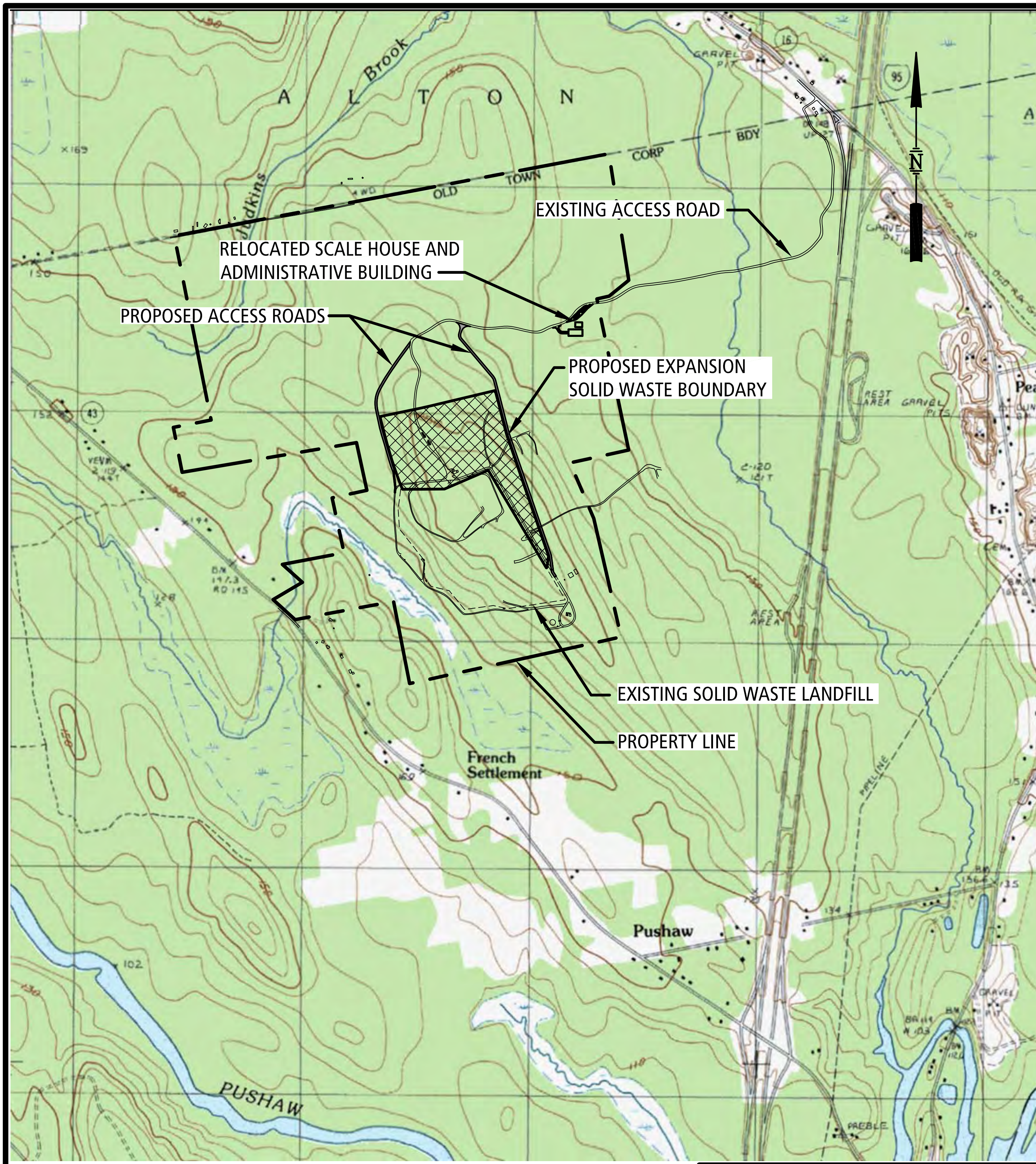
Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachment

Z:\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Docs\L\20141002misc_letters.docx



SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

1000 0 2000 FEET

DWG: PRESENTATION LMN: STANTEC CTB: SME–STD REV: 10/2/14

\\Nserver\cfs\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Acad\Figures\Presentation.dwg, 10/2/2014 2:44:03 PM, jrl

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Maine Ecological Services Field Office
17 GODFREY DRIVE, SUITE 2
ORONO, ME 4473
PHONE: (207)866-3344 FAX: (207)866-3351
URL: www.fws.gov/mainefieldoffice/index.html

Consultation Code: 05E1ME00-2015-SLI-0213 June 04, 2015
Event Code: 05E1ME00-2015-E-00272
Project Name: Juniper Ridge Expansion

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies the threatened, endangered, candidate, and proposed species and designated or proposed critical habitat that may occur within the boundary of your proposed project or may be affected by your proposed project. This 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 ECOS-IPaC Web site at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-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 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 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:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

This species list also identifies candidate species under review for listing and those species that the Service considers species of concern. Candidate species have no protection under the Act but are included for consideration because they could be listed prior to completion of your project. Species of concern are those taxa whose conservation status is of concern to the Service (i.e., species previously known as Category 2 candidates), but for which further information is needed.

If a proposed project may affect only candidate species or species of concern, you are not required to prepare a Biological Assessment or biological evaluation or to consult with the Service. However, the Service recommends minimizing effects to these species to prevent future conflicts. Therefore, if early evaluation indicates that a project will affect a candidate species or species of concern, you may wish to request technical assistance from this office to identify appropriate minimization measures.

Please be aware that bald and golden eagles are not protected under the Endangered Species Act but are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). Projects affecting these species may require development of an eagle conservation plan: http://www.fws.gov/windenergy/eagle_guidance.html Information on the location of bald eagle nests in Maine can be found on the Maine Field Office Web site:
http://www.fws.gov/mainefieldoffice/Project%20review4.html

Additionally, wind energy projects should follow the wind energy guidelines: http://www.fws.gov/windenergy/ for minimizing impacts to migratory birds and bats. Projects may require development of an avian and bat protection plan.

Migratory birds are also a Service trust resource. Under the Migratory Bird Treaty Act, construction activities in grassland, wetland, stream, woodland, and other habitats that would result in the take of migratory birds, eggs, young, or active nests should be avoided. Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm and at:

http://www.towerkill.com; and at:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html

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 Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

Official Species List

Provided by:

Maine Ecological Services Field Office
17 GODFREY DRIVE, SUITE 2
ORONO, ME 4473
(207) 866-3344
http://www.fws.gov/mainefieldoffice/index.html

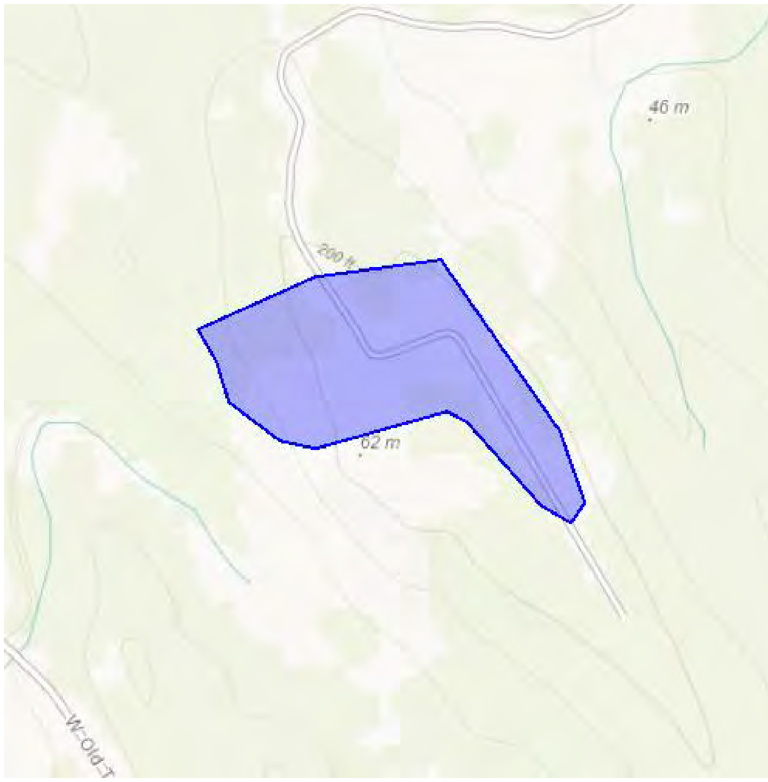
Consultation Code: 05E1ME00-2015-SLI-0213
Event Code: 05E1ME00-2015-E-00272

Project Type: Landfill

Project Name: Juniper Ridge Expansion
Project Description: 74 acre expansion in Old Town Maine to increase Landfill Capacity

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-68.71997594833374 44.980205778054916, -68.71935367584229 44.9789156244963, -68.71971845626831 44.97855134058888, -68.72044801712036 44.978854910672446, -68.72237920761108 44.980357558917945, -68.72287273406982 44.980554873439196, -68.72626304626465 44.979902215123424, -68.72720718383789 44.980023640488874, -68.72851610183716 44.980737009317664, -68.72881650924683 44.98148072481643, -68.72931003570557 44.98205747713286, -68.72626304626465 44.98302883634043, -68.7230658531189 44.98333238271767, -68.71997594833374 44.980205778054916)))

Project Counties: Penobscot, ME

United States Department of Interior
Fish and Wildlife Service

Project name: Juniper Ridge Expansion

Endangered Species Act Species List

There are a total of 2 threatened or endangered species on your 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. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Fishes	**Status**	**Has Critical Habitat**	**Condition(s)**
Atlantic salmon *(Salmo salar)* Population: Gulf of Maine DPS	Endangered	Final designated	
Mammals			
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

The following critical habitats lie fully or partially within your project area.

Fishes	Critical Habitat Type
Atlantic salmon *(Salmo salar)* Population: Gulf of Maine DPS	Final designated

Mike Booth

From:	Perry, John <John.Perry@maine.gov>
Sent:	Wednesday, November 05, 2014 9:20 AM
To:	Mike Booth
Subject:	Information Request--Juniper Hill Landfill Expansion
Attachments:	MDIFWResponse_ERid1069_ERVerID1120-FINAL.pdf; TopoMap_ERid1069_ERVerID1120.pdf

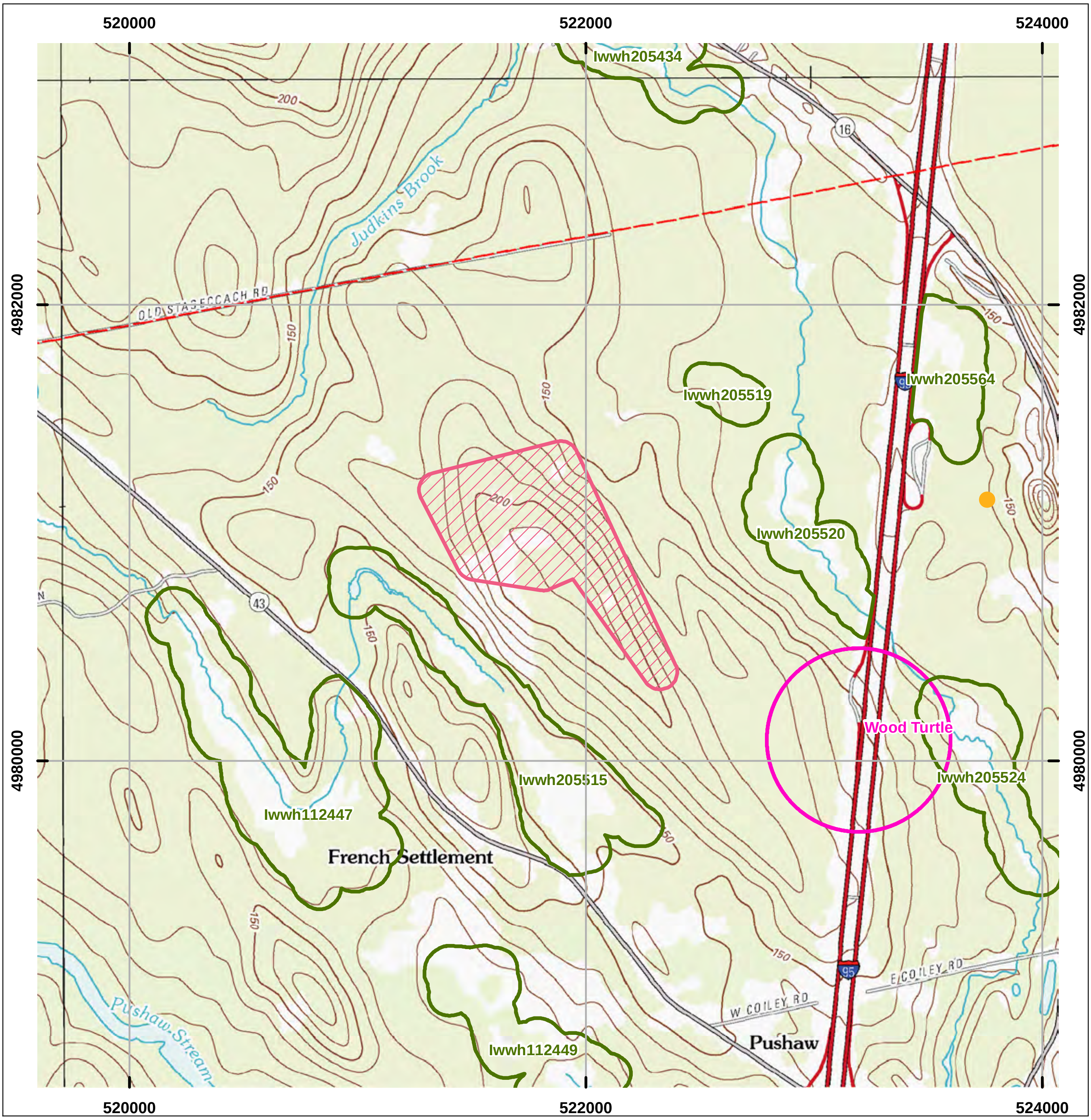
Hi Michael,

Attached is MDIFW's response to your request for information for the Juniper Hill Landfill Expansion Project. Please let me know if you need additional information.

Also, future information requests can be submitted electronically to IFWEnvironmentalreview@maine.gov

John

John Perry
Environmental Review Coordinator
Maine Department of Inland Fisheries and Wildlife
284 State Street, 41 SHS
Augusta, Maine 04333-0041
Tel (207) 287-5254; Cell (207) 446-5145
Fax (207) 287-6395
www.mefishwildlife.com



Environmental Review of Fish and Wildlife Observations and Priority Habitats

Project Name: Juniper Ridge - Old Town (Version 1)

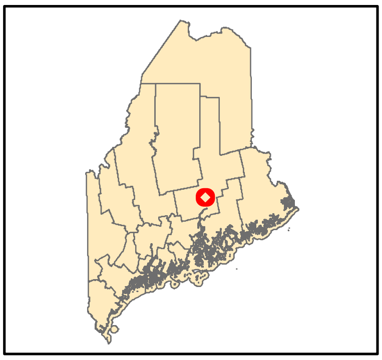
Maine Department of
Inland Fisheries and Wildlife

Miles
0 0.125 0.25 0.5 0.75 1

Projection: UTM, NAD83, Zone 19N

Date: 10/17/2014

- ProjectPoints
- ProjectLines
- ProjectPolys
- ProjectSearchAreas
- Deer Winter Area
- LURC p-fw
- Cooperative DWAs
- Seabird Nesting Islands
- Inland Waterfowl/Wading Bird
- Shoreland Zoning_Iwwh
- Tidal Waterfowl/Wading Bird
- Significant Vernal Pools
- Environmental Review Polygons
- Roseate Tern
- Piping Plover/Least Tern
- Aquatic ETSc (2.5 mi review)
- Rare Mussels (5 mi review)
- A and B List Ponds
- Arctic Charr Habitat
- E. Brook Trout Joint Venture Subwatershed Classification
- Redfin Pickerel/Swamp Darter Habitats (buffer100ft)
- Special Concern-occupied habitats(100ft buffer)
- Wild Lake Trout Habitats



STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
284 STATE STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

PAUL R. LEPAGE
GOVERNOR

CHANDLER E. WOODCOCK
COMMISSIONER

November 5, 2014

Michael Booth
Sevee & Maher Engineers, Inc.
4 Blanchard Road, P.O. Box 85A
Cumberland Center, ME 04021

RE: Information Request - Juniper Ridge Landfill Expansion, Old Town

Dear Michael:

Per your request received October 10, 2014, 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 fisheries habitat concerns within the vicinity of the *Juniper Ridge Landfill Expansion Project* in Old Town.

Our information indicates no locations of Endangered, Threatened, or Special Concern species within the project area. Additionally, our Department has not mapped any Essential Habitats that would be directly affected by your project.

Significant Wildlife Habitat

At this time, Significant Wildlife Habitat, which includes Waterfowl and Wading Bird Habitat, Deer Wintering Areas, Seabird Nesting Islands, Shorebird Areas and Significant Vernal Pools, has not been mapped within the project area. A comprehensive statewide inventory for Significant Vernal Pools, however, has not been completed. Surveys for vernal pools in the project boundary will need to be conducted prior to final project design to determine whether there are Significant Vernal Pools present. Once surveys are completed, our Department will need to verify vernal pool data sheets prior to final determination of significance.

Fisheries Habitat Concerns

Without details, it is difficult to know what impacts your project may have on the mapped streams within the search area. That being said, MDIFW makes the following general recommendations as they pertain to streams.

We recommend that a 100-foot undisturbed vegetated buffer be maintained along these streams. Buffers should be measured from the edge of stream or associated fringe and floodplain wetlands. Maintaining buffers along coldwater fisheries is critical to the protection of water temperatures, water quality, and inputs of coarse woody debris necessary to support conditions required by brook trout. Stream crossings should be avoided, but if a stream crossing is necessary it should be designed to provide adequate fish passage. Generally, MDIFW recommends that all new and replacement stream crossings be sized to span 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 not only providing habitat connectivity for fish but also for other aquatic organisms. We encourage you to contact our Region F Fisheries staff (207-732-4131) for crossing design recommendations that best maintain fish passage. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts to stream habitat. 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 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,

John Perry
Environmental Review Coordinator

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

PAUL R. LEPAGE
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

January 15, 2015

Mr. Michael Booth
Sevee & Maher Engineers, Inc.
P.O. Box 85A
Cumberland, ME 04021

Project: MHPC# 0017-15 – Juniper Ridge Landfill; Map 3 lot 1; 54 acres landfill expansion
Town: Old Town, ME

Dear Mr. Booth:

In response to your recent request, I have reviewed the information received January 7, 2015 to initiate consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Based on the information submitted, I have concluded that there will be **no historic properties affected** by this proposed undertaking, as defined by Section 106.

Please contact Robin Reed of our staff if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
Deputy State Historic Preservation Officer

PHONE: (207) 287-2132

Mike Booth

From: Reed, Robin K <robin.k.reed@maine.gov>
Sent: Friday, January 16, 2015 9:21 AM
To: Mike Booth
Subject: RE: Old Town landfill project - MHPC# 0017-15
Attachments: MHPC# 0017-15.pdf

MHPC# 0017-15

Mike:

Please find our consultation letter attached for your project.

No further review is required with our office.

Let me know if you need anything else.

Robin K. Reed
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333
phone: 207-287-2132 ext. 1
fax: 207-287-2335
robin.k.reed@maine.gov
http://www.maine.gov/mhpc

From: Mike Booth [mailto:msb@smemaine.com]
Sent: Wednesday, January 07, 2015 2:09 PM
To: Reed, Robin K
Subject: RE: Old Town landfill project - MHPC# 1488-14

great

From: Reed, Robin K [mailto:robin.k.reed@maine.gov]
Sent: Wednesday, January 07, 2015 1:42 PM
To: Mike Booth
Subject: RE: Old Town landfill project - MHPC# 1488-14

Mike:

Thank you – I will log your submittal in for review as of today.

Robin K. Reed
Maine Historic Preservation Commission

From: Mike Booth [mailto:msb@smemaine.com]
Sent: Wednesday, January 07, 2015 1:35 PM

To: Reed, Robin K
Subject: RE: Old Town landfill project - MHPC# 1488-14

Hi Robin
Thanks for getting back to me. The project you forwarded was not for the actual landfill project, rather it appears to be for a borrow pit, adjacent to the site that is being developed by the construction contractor who does most of the landfill construction work. I've attached the letter we sent out back in October which shows the boundary of the actual landfill expansion project we are currently preparing a permit application for, and some correspondences relating to a previous version of this project. Basically the current project is about half the size of the previous project. The smaller project is located within the same footprint as the larger project. The site is located on Old Town Tax Map 3 lot 1. Let me know if there is any other information you would need.
Thanks
Mike

Michael Booth P.E.
Sevee & Maher Engineers, Inc.
4 Blanchard Road
PO Box 85A
Cumberland, ME 04021
Phone 207.829.5016
Cell Phone 207-749-2867
Fax 207.829.5692

Sent: Wednesday, January 07, 2015 12:48 PM
To: Mike Booth
Subject: Old Town landfill project - MHPC# 1488-14

Michael:

Per your voice message yesterday, please see attached a letter about a landfill project in Old Town that was issued in Sept. 2014.

If this is not the project you are looking for, please give me more information including street address, map, lot, a topo map indicating the site etc. and I will search our files again.

Let me know, Robin

Robin K. Reed
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333
phone: 207-287-2132 ext. 1
fax: 207-287-2335
robin.k.reed@maine.gov
http://www.maine.gov/mhpc

Mike Booth

From:	Danielson, Thomas J <Thomas.J.Danielson@maine.gov>
Sent:	Tuesday, January 06, 2015 2:40 PM
To:	Mike Booth
Subject:	RE: Inquiry into Significant Rivers and Streams Associated with Landfil Near the Juniper Ridge Landfill in Old Town Maine

Hi Mike,
The attached letter from 2004 is still valid. Also, it is the responsibility of the applicant or qualified consultant to walk the property and identify and delineate any waterbodies that might be impacted by the project, including small streams or vernal pools that often are not shown on maps.
Best regards,
Tom

****

Tom Danielson, Biologist
Maine Department of Environmental Protection
17 State House Station
Augusta, ME 04333-0017
phone: (207) 441-7430
fax: (207) 287-7826
thomas.j.danielson@maine.gov

From: Mike Booth [mailto:msb@smemaine.com]
Sent: Tuesday, January 06, 2015 11:31 AM
To: Danielson, Thomas J
Subject: Inquiry into Significant Rivers and Streams Associated with Landfil Near the Juniper Ridge Landfill in Old Town Maine

Dear Tom
On October 3, 2014 we sent the Department the attached letter requesting any information on Significant Rivers and Streams associated with land near the Juniper Ridge Landfill in Old Town Maine, which is attached. Do date we haven't received a response and we are following up with this email. We are working on a permit for an expansion of this facility need this information as part of preparing this application. You had responded to a similar request for information back in 2004, which is attached to the letter and we are just checking to confirm the information contained in that letter is still valid. We would appreciate a response as soon as possible. If you have any questions please contact me via email or at 829-5016.
Thanks
Mike Booth

Michael Booth P.E.
Sevee & Maher Engineers, Inc.
4 Blanchard Road
PO Box 85A
Cumberland, ME 04021
Phone 207.829.5016
Cell Phone 207-749-2867

Fax 207.829.5692

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
93 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0093

PAUL R. LEPAGE
GOVERNOR

WALTER E. WHITCOMB
COMMISSIONER

October 7, 2014

Michael Booth
Sevee & Maher Engineers, Inc.
4 Blanchard Road
Cumberland Center, ME 04021

Re: Rare and exemplary botanical features in proximity to: Project #14101.00, Juniper Ridge Landfill, ~54-acre expansion, Old Town, Maine

Dear Mr. Booth:

I have searched the Natural Areas Program's Biological and Conservation Data System files in response to your request received October 6, 2014 for information on the presence of rare or unique botanical features documented from the vicinity of the project site 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.

MAINE NATURAL AREAS PROGRAM
MOLLY DOCHERTY, DIRECTOR

PHONE: (207) 287-8044
FAX: (207) 287-8040
TTY: (207) 287-2213

The Natural Areas Program 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. The Natural Areas Program welcomes coordination with individuals or organizations proposing environmental alteration, or conducting environmental assessments. If, however, data provided by the Natural Areas Program are to be published in any form, the Program should be informed at the outset and credited as the source.

The 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 the Natural Areas Program 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,

Don Cameron
Ecologist
Maine Natural Areas Program
207-287-8041
don.s.cameron@maine.gov

Rare & Exemplary Botanical Features within 4 miles of

Project: #14101.00, Juniper Ridge Landfill, ~54-acre expansion, Old Town, Maine

Scientific Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Bluebell - balsam ragwort shoreline outcrop	<null >	S2	G3	2010-07-13	1	Non-tidal rivershore (non-forested, seasonally wet)
Carex adusta	E	S2	G5	1916-07-01	1	Rocky coastal (non-forested, upland)
Carex bullata	SC	S2	G5	1983-08-12	1	<null>
Carex oronensis	T	S3	G3	2011-07-25	33	Old field/roadside (non-forested, wetland or upland)
Carex oronensis	T	S3	G3	1997-07-17	4	Old field/roadside (non-forested, wetland or upland)
Carex oronensis	T	S3	G3	1987-06-08	9	Old field/roadside (non-forested, wetland or upland)
Carex oronensis	T	S3	G3	1916-07-01	65	Old field/roadside (non-forested, wetland or upland)
Cyperus squarrosus	SC	S2	G5	1942-09-09	1	Non-tidal rivershore (non-forested, seasonally wet)
Cyperus squarrosus	SC	S2	G5	1899-09-18	7	Non-tidal rivershore (non-forested, seasonally wet)
Cypripedium arietinum	E	S1	G3	1886-05-30	5	Forested wetland
Cypripedium reginae	T	S3	G4	1943-07-09	22	Forested wetland
Domed bog ecosystem	<null >	S3	GNR	2012-09-12	6	Forested wetland

Project: #14101.00, Juniper Ridge Landfill, ~54-acre expansion, Old Town, Maine

Scientific Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Elymus macgregorii	SC	S2	GNR	2010-07-13	7	<null>
Fimbristylis autumnalis	T	S2S3	G5	1899-09-18	14	Open wetland, not coastal nor rivershore (non-forested, wetland)
Houstonia longifolia var. longifolia	SC	S2S3	G4G5TNR	2010-07-13	4	Non-tidal rivershore (non-forested, seasonally wet)
Platanthera flava var. herbiola	SC	S2	G4T4Q	1933-07-06	5	Non-tidal rivershore (non-forested, seasonally wet)
Raised level bog ecosystem	<null>	S4	GNR	2009-07-09	14	Forested wetland
Silver maple floodplain forest	<null>	S3	GNR	2010-07-13	37	Forested wetland
Spiranthes lucida	T	S1	G5	1946-07-08	8	Non-tidal rivershore (non-forested, seasonally wet)
Unpatterned fen ecosystem	<null>	S5	GNR	2009	8	Forested wetland
Viola novae-angliae	SC	S2	G4Q	2010-07-13	10	Non-tidal rivershore (non-forested, seasonally wet)
Viola novae-angliae	SC	S2	G4Q	1934-10-24	11	Non-tidal rivershore (non-forested, seasonally wet)
Viola novae-angliae	SC	S2	G4Q	1916-07-01	9	Non-tidal rivershore (non-forested, seasonally wet)

STATE RARITY RANKS

S1 Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.
S2 Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
S3 Rare in Maine (20-100 occurrences).
S4 Apparently secure in Maine.
S5 Demonstrably secure in Maine.
SU Under consideration for assigning rarity status; more information needed on threats or distribution.
SNR Not yet ranked.
SNA Rank not applicable.
S#? Current occurrence data suggests assigned rank, but lack of survey effort along with amount of potential habitat create uncertainty (e.g. S3?).

Note: **State Rarity Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines State Rarity Ranks for animals.

GLOBAL RARITY RANKS

G1 Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extinction.
G2 Globally imperiled because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
G3 Globally rare (20-100 occurrences).
G4 Apparently secure globally.
G5 Demonstrably secure globally.
GNR Not yet ranked.

Note: **Global Ranks** are determined by NatureServe.

STATE LEGAL STATUS

Note: State legal status is according to 5 M.R.S.A. § 13076-13079, which mandates the Department of Conservation to produce and biennially update the official list of Maine's **Endangered** and **Threatened** plants. The list is derived by a technical advisory committee of botanists who use data in the Natural Areas Program's database to recommend status changes to the Department of Conservation.

E ENDANGERED; Rare and in danger of being lost from the state in the foreseeable future; or federally listed as Endangered.
T THREATENED; Rare and, with further decline, could become endangered; or federally listed as Threatened.

NON-LEGAL STATUS

SC SPECIAL CONCERN; Rare in Maine, based on available information, but not sufficiently rare to be considered Threatened or Endangered.
PE Potentially Extirpated; Species has not been documented in Maine in past 20 years or loss of last known occurrence has been documented.

ELEMENT OCCURRENCE RANKS - EO RANKS

Element Occurrence ranks are used to describe the quality of a rare plant population or natural community based on three factors:

- **<u>Size</u>**: Size of community or population relative to other known examples in Maine. Community or population's viability, capability to maintain itself.
- **<u>Condition</u>**: For communities, condition includes presence of representative species, maturity of species, and evidence of human-caused disturbance. For plants, factors include species vigor and evidence of human-caused disturbance.
- **<u>Landscape context</u>**: Land uses and/or condition of natural communities surrounding the observed area. Ability of the observed community or population to be protected from effects of adjacent land uses.

These three factors are combined into an overall ranking of the feature of **A**, **B**, **C**, or **D**, where **A** indicates an **excellent** example of the community or population and **D** indicates a **poor** example of the community or population. A rank of **E** indicates that the community or population is **extant** but there is not enough data to assign a quality rank. The Maine Natural Areas Program tracks all occurrences of rare (S1-S3) plants and natural communities as well as A and B ranked common (S4-S5) natural communities.

Note: **Element Occurrence Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines Element Occurrence ranks for animals.

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
73 COBB ROAD
ENFIELD, ME 04493
TEL: 207-732-4132

PAUL R. LEPAGE
GOVERNOR

CHANDLER E. WOODCOCK
COMMISSIONER

October 6, 2014

Sevee & Maher
Attn: Michael Booth, P.E.
4 Blanchard Road, PO Box 85A
Cumberland Center, ME 04021

Dear Michael:

I have received your letter requesting Essential and Significant Habitat information for your project located in Old Town.

Essential Habitats:

Essential Habitats are defined as "areas currently or historically providing physical or biological features essential to the conservation of an endangered or threatened species in Maine and which may require special management considerations". Essential Habitat protection in Maine currently applies to roseate and least terns, and piping plover nest sites. Additional listed species may receive attention in the future.

According to MDIFW records, there are no Essential Habitats known to be associated with your project area located in

Significant Wildlife Habitats:

The Natural Resources Protection Act (NRPA), administered by the Maine Department of Environmental Protection (DEP), provides protection to certain natural resources including Significant Wildlife Habitats. Significant Wildlife Habitats are defined by the NRPA as:

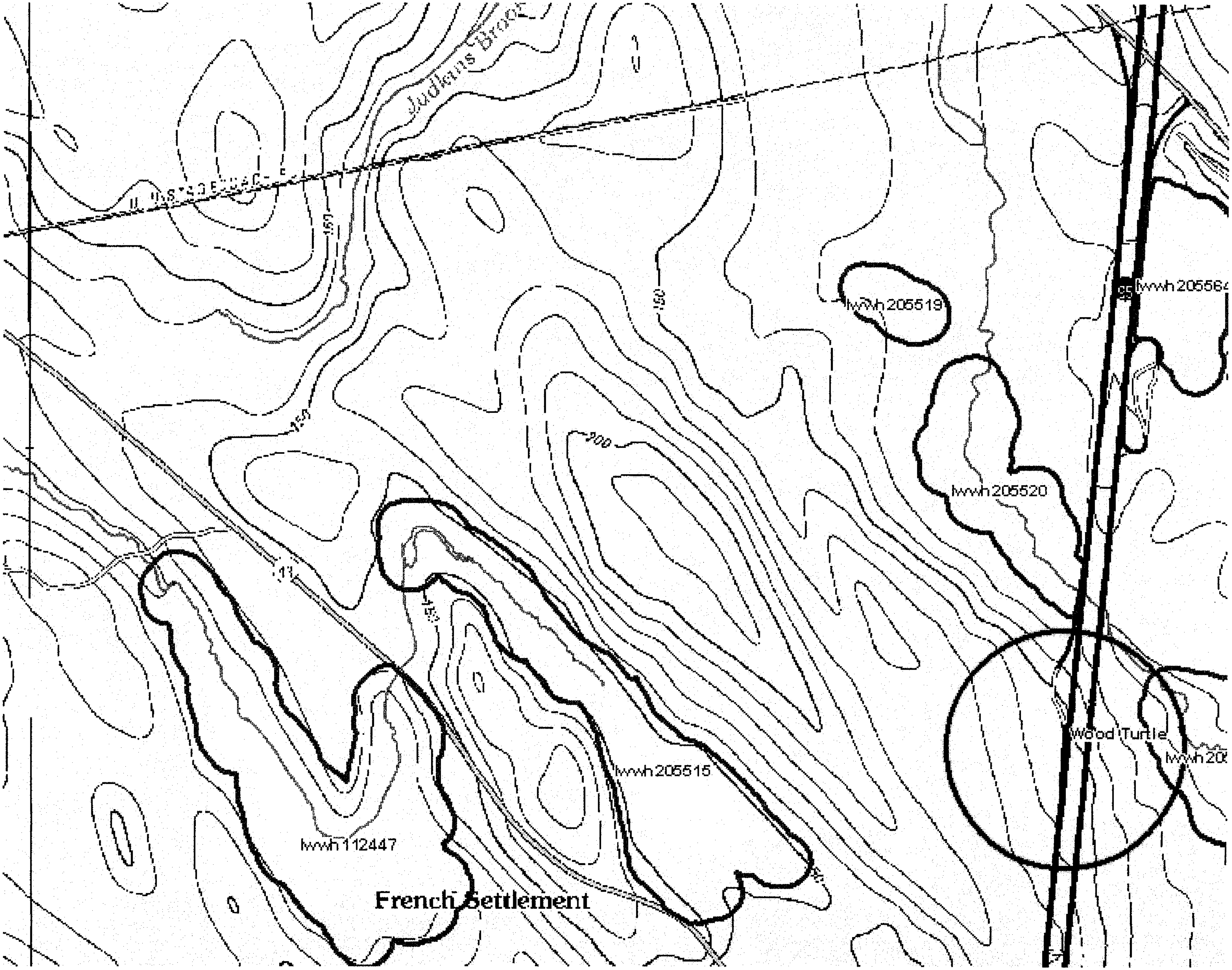
> Habitat for state and federally listed endangered and threatened species.
>
> High and moderate value deer wintering areas (DWAs) and travel corridors.
>
> High and moderate value waterfowl and wading bird habitats (WWHs), including:
>
> nesting and feeding areas.
>
> Shorebird nesting, feeding, and staging areas.
>
> Seabird nesting islands.

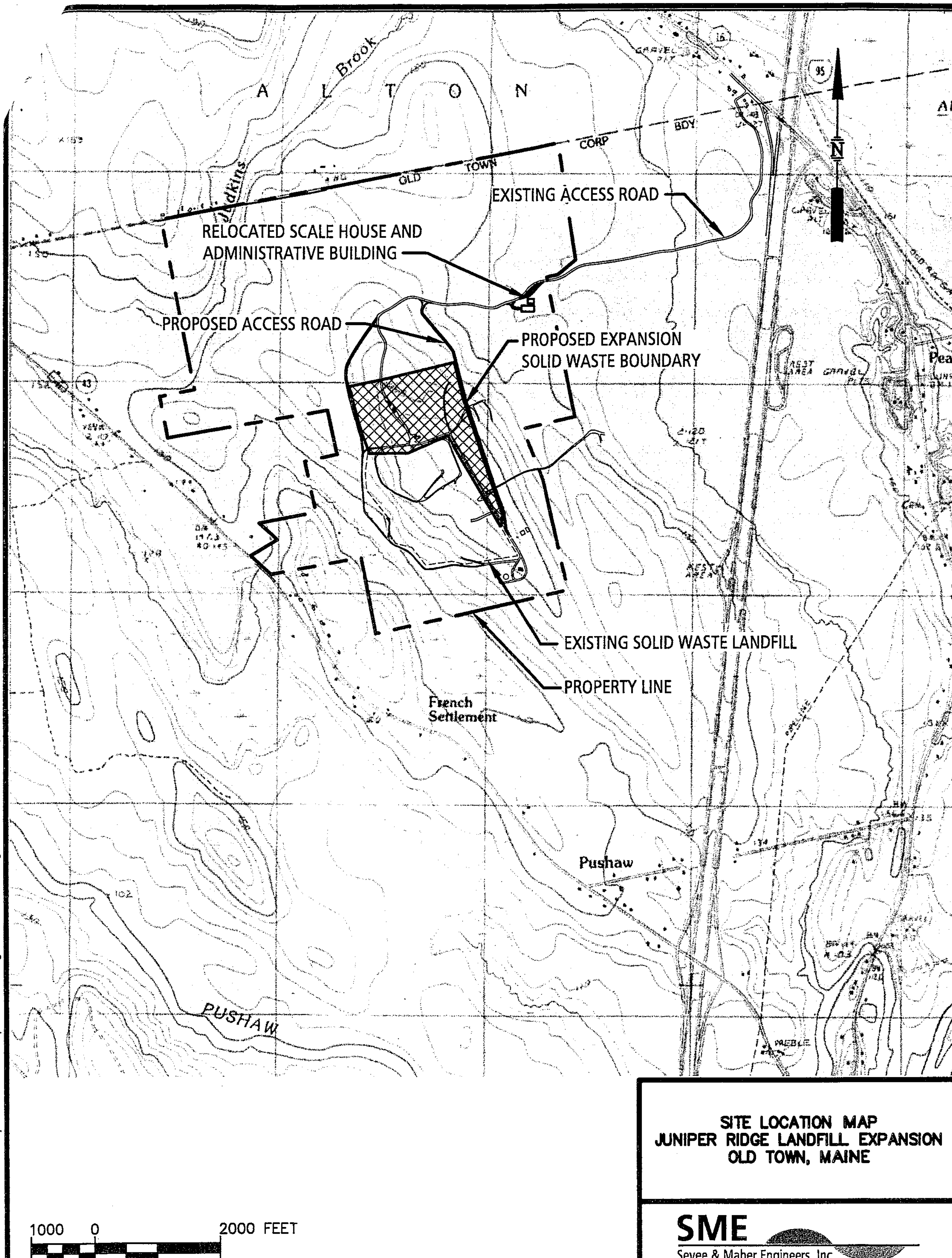
According to MDIFW records, there are three Significant Wildlife Habitats potentially associated with your project area located in Old Town. None appear to be within the proposed expansion area but are found within the ownership or bordering to, so I have included them for your consideration. These include three Inland Waterfowl/Wadingbird Habitats (IWWH). All three IWWHs (205515, 205519, and 205520 are rated as Moderate Value. Please refer to the enclosed map.

Finally, MDIFW maintains a statewide database of endangered, threatened and special concern wildlife species and their habitats. These include endangered and threatened species not included under Essential Habitat and species that are of special concern to MDIFW but for which sufficient data may be currently lacking. Review of department records indicate no such habitats associated within your project area.

Sincerely,

Mark A. Caron
Regional Wildlife Biologist
Phone: 207-732-4132 ext: 4008
Fax: 207-732-4405
E-Mail: mark.caron@maine.gov


Judkins Brook
150
200
lwwh 205519
lwwh 205564
lwwh 205520
lwwh 205515
lwwh 112447
Wood Turtle
French Settlement



SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL · CIVIL · GEOTECHNICAL · WATER · COMPLIANCE

DWG: PRESENTATION LMN: STANTEC CTB: SME-STD REV: 10/2/14

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APPENDIX F-2

STANTEC RARE, THREATENED, AND ENDANGERED SPECIES REPORT

Juniper Ridge Landfill Expansion Project: Rare, Threatened, and Endangered Species Report

Juniper Ridge Landfill
Old Town, Maine

Prepared for:
Bureau of General Services
77 State House Station
Augusta, ME 04333

And

NEWSME Landfill Operations LLC
358 Emerson Mill Road
Hampden, ME 04444

Prepared by:
Stantec Consulting Services Inc.
30 Park Drive
Topsham, ME 04086

July 2, 2015

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LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

In 2008, 2014, and 2015, Stantec Consulting Services Inc. (Stantec) completed field surveys and natural resource agency consultation to assess the potential presence of state or federally listed rare, threatened, or endangered (RTE) species and their associated habitats at a proposed expansion area of the Juniper Ridge Landfill. The approximately 74-acre proposed facility site, which includes the expanded landfill footprint, new access roads, scale and administration building, and stormwater structures, is located west of Interstate 95, south of Route 16, and north of Route 43 in Old Town, Maine (Figure 1 and 2). The 2014/2015 RTE survey area included proposed expansion area (i.e. the facility site and the relocated fence and electrical line) as shown on Figure 2. The RTE surveys and agency consultation were completed in order to support state and federal permitting efforts under the Maine Natural Resources Protection Act, the Solid Waste Management Act, Section 404 of the Clean Water Act, and the applicable rules under each Act.

This report summarizes the methods and results of RTE species field surveys and agency consultations conducted in 2008-2009 and 2014-2015. In summary, no flora or fauna RTE species, rare or exemplary botanical habitats, or Essential Habitats were observed or documented within the proposed expansion area. One Significant Vernal Pool was identified adjacent to and just outside the proposed expansion area, and its 250-foot critical terrestrial habitat represents the only Significant Wildlife Habitat in the proposed expansion area. The forested proposed expansion area is within the range of the northern long-eared bat (*Myotis septentrionalis*) (NLEB), which were recently listed as threatened by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA). In June 2015, an acoustic survey was conducted to determine the probable absence/presence of NLEB in the expansion area. The proposed expansion area also occurs within the mapped critical habitat for Atlantic salmon, which is protected under the final 2009 ruling issued by National Marine Fisheries Service (NMFS) and USFWS under the ESA.

2.0 METHODOLOGY

2.1 AGENCY COORDINATION

During preliminary project planning efforts in 2008-2009, the Maine Department of Inland Fisheries and Wildlife (MDIFW) and Maine Natural Areas Program (MNAP) were contacted to determine the presence of known RTE species and associated habitats within the vicinity of the proposed expansion area. In 2014-2015, due to the elapsed time since the initial 2008 contacts, follow-up consultation for the known presence of RTE species was made with MDIFW, MNAP, Maine Department of Environmental Protection (MDEP), NMFS, and USFWS. On October 29, 2014, representatives from NEWSME Landfill Operations, LLC and Stantec met with federal and state agencies (U.S. Army Corps of Engineers, MDEP, and USFWS) to discuss the potential expansion project. Based on agency consultation during this meeting, a NLEB acoustic survey was conducted in June 2015.

2.2 FIELD SURVEYS

In addition to the information provided by the MDIFW, USFWS, MDEP and MNAP, meander field surveys were completed by Stantec throughout the proposed expansion area in 2014 and 2015 to characterize the existing habitats present on site and assess the potential of the proposed project site to support RTE plant and wildlife species (Figure 2). Using aerial photography overlain with the proposed expansion area boundaries and a Global Positioning System (GPS) receiver with the proposed expansion area boundaries displayed, Stantec ecologists traversed each community type present within the survey area (Figure 2). Field data were collected on natural community species composition, landscape setting and context, past disturbances, and direct observations of RTE plant and/or wildlife species or potential habitats. Direct observations of RTE species and/or habitats (if present) were located using a Trimble® GeoExplorer6000 GPS unit. Representative photographs were taken as appropriate (Appendix A). During natural resource assessments in 2008, potential observations of the presence of RTE species were made in a much larger survey area extending well beyond the current footprint of the 2015 proposed expansion area.

Between June 10 and June 12, 2015, Stantec deployed three Anabat acoustic detectors in the vicinity of the survey area in accordance with the 2015 Rangewide Indiana Bat Summer Survey Guidelines. Please see the Acoustic NLEB Survey Summary Memo in Appendix D for specific details on the NLEB survey methodology.

3.0 RESULTS

3.1 AGENCY COORDINATION

Correspondence received from the MNAP in 2008 and 2014 indicated that there are no known rare botanical features within the 780-acre project site. Included with this correspondence, MNAP provided a list of rare botanical features within a 4-mile radius of the project site. Copies of the MNAP response letters are included in Appendix B.

Correspondence received from the MDIFW in 2008 and 2014 indicated that there are no known Significant Wildlife Habitats, Essential Habitats, or RTE wildlife species or their habitats present within the project site. The MDIFW noted that three Inland Waterfowl/Wading bird Habitats are present within the 780-acre project site, but south of the existing and proposed facility site and proposed expansion area.

Correspondence from USFWS in 2008 and 2015 indicated that there are no federally threatened or endangered species known to occur in the 780-acre project site. The USFWS online species locater process was completed in June 2015 within 90 days of submitting the federal and state permit applications and the official species list is included in Appendix B. Besides Atlantic salmon critical habitat and NLEB, no federally threatened or endangered species are known to occur in the proposed expansion area.

3.2 FIELD SURVEYS

Initial RTE field observations were completed concurrent with wetland and waterbody delineations in 2008, which also included the 2014 and 2015 survey areas (Figure 2 and Appendix C). RTE field surveys were completed in the survey area on September 25, 2014, and June 29, 2015 (Figure 2). No RTE plant or wildlife species were identified as a result of the field observations and surveys. The proposed expansion area consists of second-growth hardwood and mixed forested uplands and forested wetlands. Dominant tree species within upland areas include balsam fir (*Abies balsamea*), white pine (*Pinus strobus*), red maple (*Acer rubrum*), yellow birch (*Betula alleghaniensis*), eastern hemlock (*Tsuga canadensis*), American beech (*Fagus grandifolia*), and sugar maple (*Acer saccharum*). The understory is dominated by regenerating canopy species in the shrub and sapling strata. Common herbaceous plants include northern bracken fern (*Pteridium aquilinum*), hay-scented fern (*Dennstaedtia punctilobula*), whorled nodding-aster (*Oclemena acuminata*), Indian cucumber-root (*Medeola virginiana*), Allegheny blackberry (*Rubus allegheniensis*), Princess-pine (*Dendrolycopodium obscurum*), Canadian bunchberry (*Cornus canadensis*), evergreen wood fern (*Dryopteris intermedia*), northern long-awned wood grass (*Brachyelytrum aristosum*), and wild sarsaparilla (*Aralia nudicaulis*). Past and current forest harvesting activity is evident throughout the forested portions of the proposed expansion area. No RTE plant or rare wildlife species were observed within the upland portions of the proposed expansion area.

An approximately 2-acre forested wetland and four smaller wetlands are located within the proposed expansion area. The wetlands are dominated by red maple, balsam fir, and yellow birch trees. Understory species include regenerating canopy species, broad-leaf meadowsweet (*Spiraea latifolia*), bluejoint (*Calamagrostis canadensis*), star sedge (*Carex echinata*), Canadian bunchberry, cinnamon fern (*Osmundastrum cinnamomeum*), crested wood fern (*Dryopteris cristata*), greater bladder sedge (*Carex intumescens*), woodland horsetail (*Equisetum sylvaticum*), sensitive fern (*Onoclea sensibilis*), bristly dewberry (*Rubus hispidus*), dwarf red raspberry (*Rubus pubescens*), northern lady fern (*Athyrium angustum*), and three-leaf goldthread (*Coptis trifolia*). Past forest harvesting activity is evident within the wetlands. A further discussion of the wetlands present on site is included in the *Juniper Ridge Landfill Expansion Project: Wetland and Waterbody Delineation Report* (2015) as prepared by Stantec. No RTE plant or wildlife species were observed within the wetland portions of the survey area.

The proposed expansion area provides forested habitat potentially suitable for NLEB summer roosting and foraging activities. Five potential NLEB roost trees were identified within the proposed expansion area (Figure 2). For the purposes of the field assessment, potential high-quality roost trees were identified as trees with a predominance of cavities, crevices, and/or exfoliating bark and receive an abundance of solar exposure (e.g., located along forest edge or in the supercanopy stratum). The potential NLEB roost trees identified included dead or dying balsam fir, white pine, paper birch (*Betula papyrifera*), and eastern hemlock trees with exfoliating bark and/or cavities or crevices scattered throughout the survey area. Representative photographs of the roost trees and on-site habitat conditions are included in Appendix A.

Stantec analyzed the results of the June 2015 acoustic NLEB survey in accordance with the 2015 Rangewide Indiana Bat Summer Survey Guidelines and did not document the presence of NLEB in the proposed expansion area. Please see the Acoustic NLEB Survey Summary Memo in Attachment D for more details on the results of the NLEB survey.

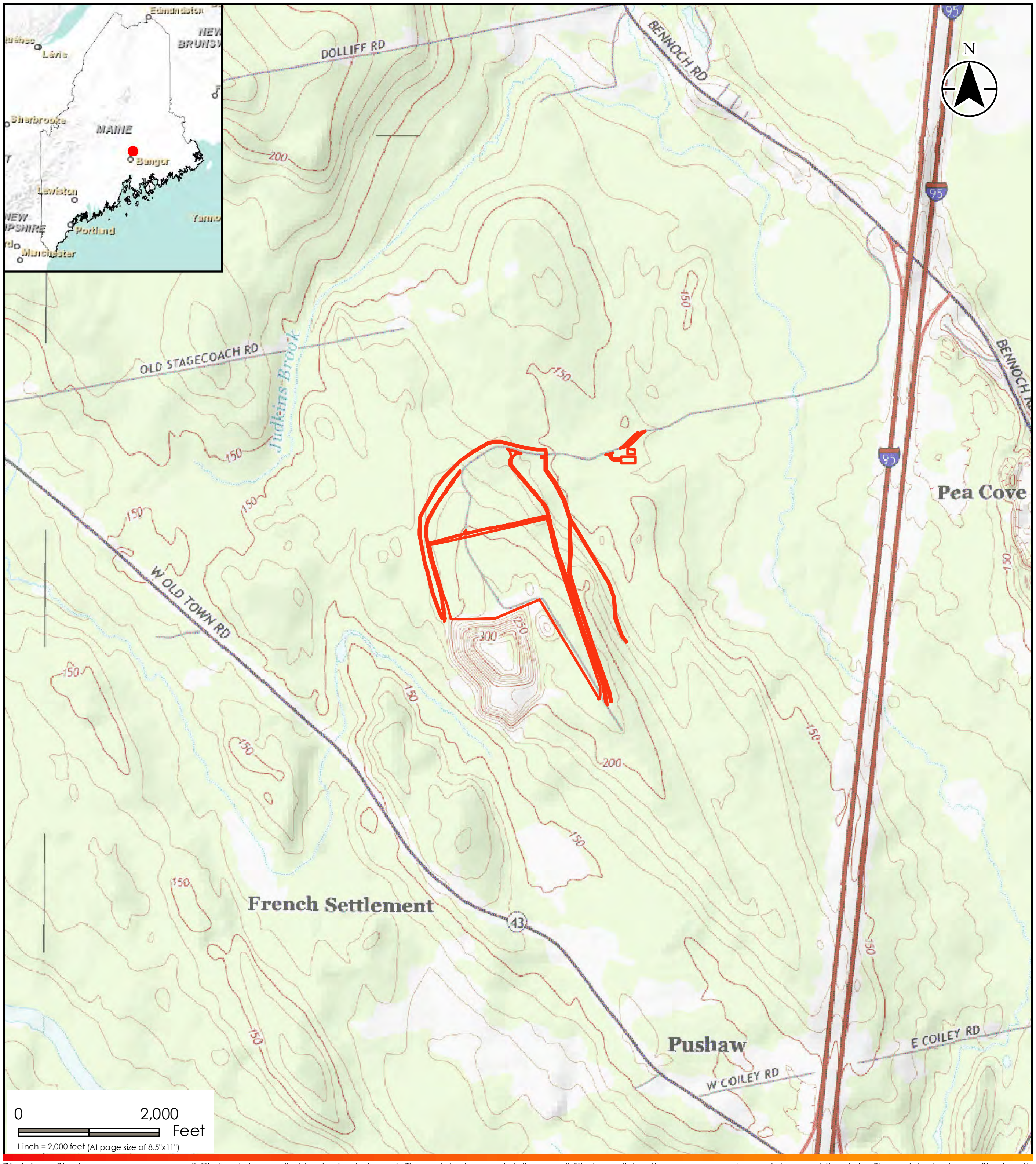
4.0 DISCUSSION

No direct observations of state or federally listed RTE plant or wildlife species were made during the 2008 natural resource assessments and 2014 and 2015 RTE field surveys and no Essential Habitats are present within the proposed expansion area (Figure 2). One Significant Vernal Pool was identified adjacent to and just outside the proposed expansion area, and the SVP 250-foot critical terrestrial habitat represents the only Significant Wildlife Habitat in the proposed expansion area. Due to past forest disturbances, landscape setting, and present species diversity, the on-site natural communities are not botanically significant. There is very limited potential for the proposed expansion area to support RTE plant species and most RTE wildlife species due to the common community types and past disturbances. Therefore, the proposed Juniper Ridge Expansion is unlikely to adversely affect RTE botanical resources or Essential Habitats. The northeast portion of the proposed expansion area falls within the mapped critical habitat for Atlantic salmon (*Salmo salar*) by the National Oceanic Atmospheric Association[1] (Figure 3). Stantec has surveyed the proposed expansion area for natural resources in 2008 and in 2014. Although isolated forested wetlands occur within the proposed expansion area and about 2 acres of these wetlands will be impacted by the expansion, there are no delineated or mapped streams in the 74-acre proposed facility site, nor is the expansion expected to result in impacts to mapped or delineated streams (Figures 1 and 2). Therefore, there are no expected impacts to Atlantic salmon or their critical habitat from the proposed expansion.

5.0 SUMMARY

In summary, the June 2015 bat acoustic survey did not document the presence of NLEB in the proposed expansion area following the USFWS Guidelines and the project-specific NLEB Sampling Plan. No state or federally listed RTE wildlife, botanical resources, or Essential Habitats were observed or documented during the field surveys and agency consultations conducted in 2008-2009 and 2014-2015.

[1] Accessed at: http://www.greateratlantic.fisheries.noaa.gov/prot_res/altsalmon/DPSMapBook/DPSPDFmaps/ATSMapBook.pdf



Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

195600983

Stantec

30 Park Drive
Topsham, ME USA 04086
Phone (207) 729-1199

Prepared by DLJ on 2015-04-13
Reviewed by KWH on 2015-04-13

00983_01_Locus.mxd

Legend

2015 Proposed Expansion Area (approx.)

Client/Project

NEWSME Landfill Operations LLC
Juniper Ridge Landfill Expansion
Old Town, Maine

Figure No.

1

Title

Site Location

5/29/2015

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195600983

Stantec

30 Park Drive
Topsham, ME USA 04086
Phone (207) 729-1199

Prepared by DLJ on 2015-01-29
Reviewed by JWR on 2015-06-25

00983_02_BatRoost.mxd

Legend

- Potential Northern Long-eared Bat Roost Tree
- 2014 and 2015 Delineated Wetland
- SVP Delineated Significant Vernal Pool
- 2014 and 2015 RTE Survey Area

Client/Project

NEWSME Landfill Operations LLC
Juniper Ridge Landfill Expansion
Old Town, Maine

Figure No.

2

Title

Potential Northern Long-eared Bat Roost Trees

6/25/2015

LEGEND

7	CELL IDENTIFICATION
	WETLAND DELINEATED
	WETLAND PHOTO INTERPRETED
	ATLANTIC SALMON CRITICAL HABITAT

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC., NORRIDGEWOCK, MAINE. PHOTO DATE 12/31/14. VERTICAL DATUM: BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY PLISGA & DAY LAND SURVEYORS, BANGOR, MAINE. STANDARD PRACTICE DICTATES THAT PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. SITE BENCHMARK INFORMATION:

   PLUG 1 IS A BRASS PLUG ON FORMER LEACHATE POND PUMP STATION LOCATED AT COORDINATES NORTHING 478242.05, EASTING 925376.35 ELEVATION 167.93

2. EXISTING PERMITTED LANDFILL BASE GRADES REPRESENT THE TOP OF THE 12-INCH UNDERDRAIN LAYER.
3. PROPOSED EXPANSION GRADES WITHIN THE PROPOSED SOLID WASTE LIMIT REPRESENT BASE GRADES PRIOR TO CONSTRUCTION OF THE LINER SYSTEM. THE PROPOSED GRADES SHOWN OUTSIDE THE PROPOSED SOLID WASTE LIMIT ARE THE SUBBASE ROAD GRADES.
4. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004 AND STANTEC CONSULTING SERVICES 2008, 2014 AND 2015.
5. BORINGS & TEST PIT LOCATIONS ARE APPROXIMATE AND BASED ON FIELD SURVEY BY SEVEE & MAHER ENGINEERS, INC., CUMBERLAND, MAINE.

REV.	BY	DATE	STATUS
		-	-

JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SITE DEVELOPMENT PLAN WITH ATLANTIC SALMON CRITICAL HABITAT

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DESIGN BY:	PCM
DRAWN BY:	SJM
DATE:	3/4/2015
CHECKED BY:	
LMN:	SITEDEV
CTB:	SME-STD

JOB NO. 14101.00 DWG FILE BASE

C-101

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Appendix A Representative Photographs

Photo 1. Representative mixed upland forested habitat. Stantec, September 25, 2014.

Photo 2. Forested wetland. Stantec, September 25, 2014.

Photo 3. Potential northern long-eared bat roost tree. Stantec, September 25, 2014.

Photo 4. Potential northern long-eared bat roost tree. Stantec, September 25, 2014.

Photo 5. Regenerating hardwood forest. Stantec, September 25, 2014.

Photo 6. Mixed forest. Stantec, September 25, 2014.

Photo 7. Potential northern long-eared bat roost tree. Stantec, September 25, 2014.

Photo 8. Representative mixed forested upland. Stantec, September 25, 2014.

Photo 9. Recently harvested forested uplands. Stantec, September 25, 2014.

Photo 10. Potential northern long-eared bat roost tree. Stantec, September 25, 2014.

Photo 11. Old road bed through forested wetland. Stantec, September 25, 2014.

Photo 12. Potential northern long-eared bat roost tree. Stantec, September 25, 2014.

Appendix B Agency Correspondence

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

October 3, 2014 14101.00

Jeff Murphy
National Marine Fisheries Service
17 Godfrey Drive – Suite 1
Orono, Maine 04473

Subject: Essential Fish Habitat Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Mr. Murphy:

The purpose of this letter is to request information on any essential fish habitat associated with land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known or suspected essential fish habitat within, or in the vicinity of, the proposed project.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

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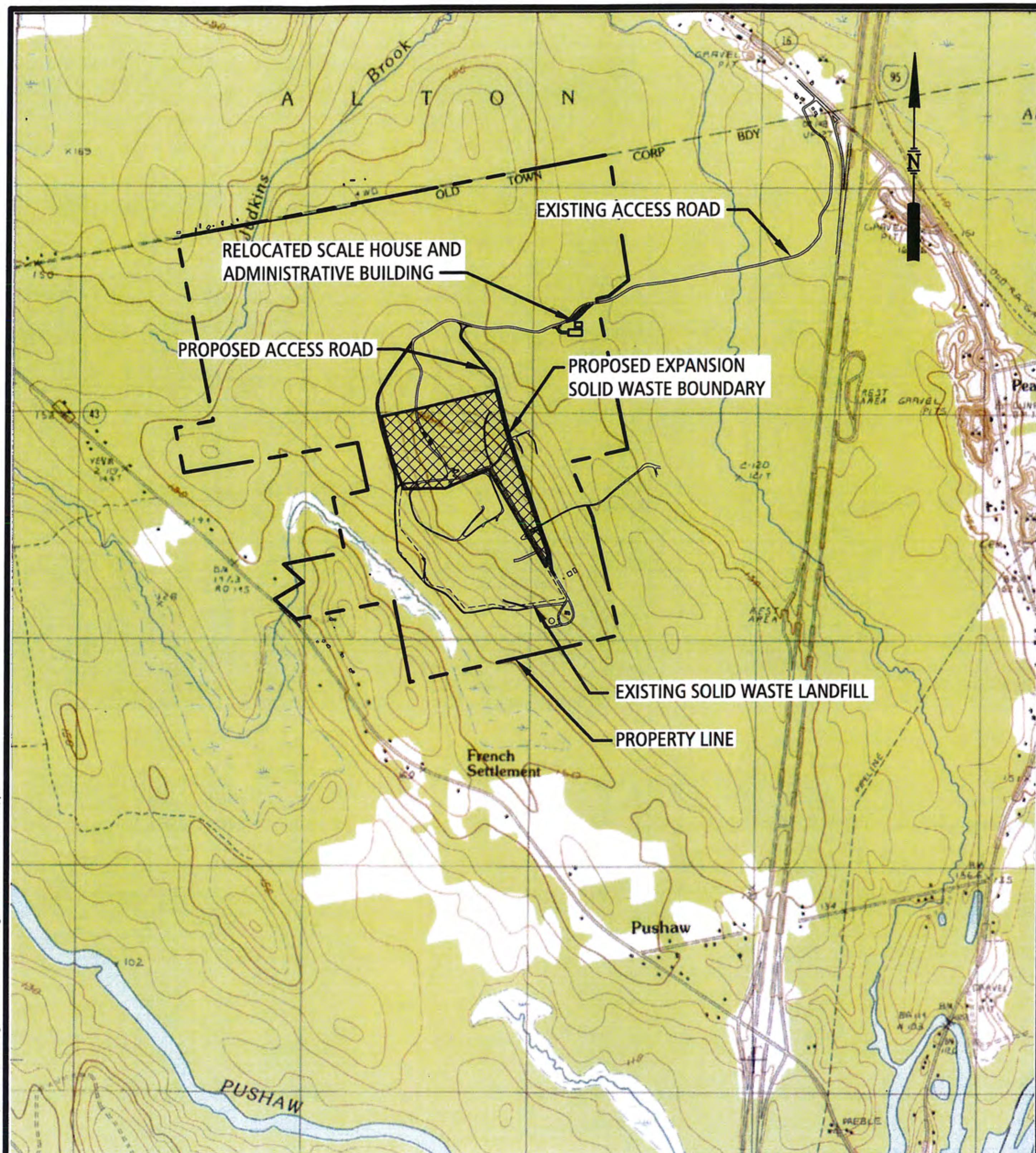

SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL · CIVIL · GEOTECHNICAL · WATER · COMPLIANCE

DWG: PRESENTATION LMN: STANTEC CTB: SME-STD REV: 10/2/14

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SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

October 3, 2014 14101.00

Lisa St. Hilaire
Natural Areas Program
Maine Department of Conservation
93 State House Station
Augusta, Maine 04333

Subject: Rare and Exemplary Botanical Features Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Lisa:

The purpose of this letter is to request information on any rare and exemplary botanical features associated with land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known or suspected locations of rare, threatened, or endangered plants, exemplary natural communities, or Registered Critical Areas within, or in the vicinity of, the proposed project. For your convenience, the May 2008 review comments from your agency for the project area are attached.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

cc: John Perry, M.I.F.W.

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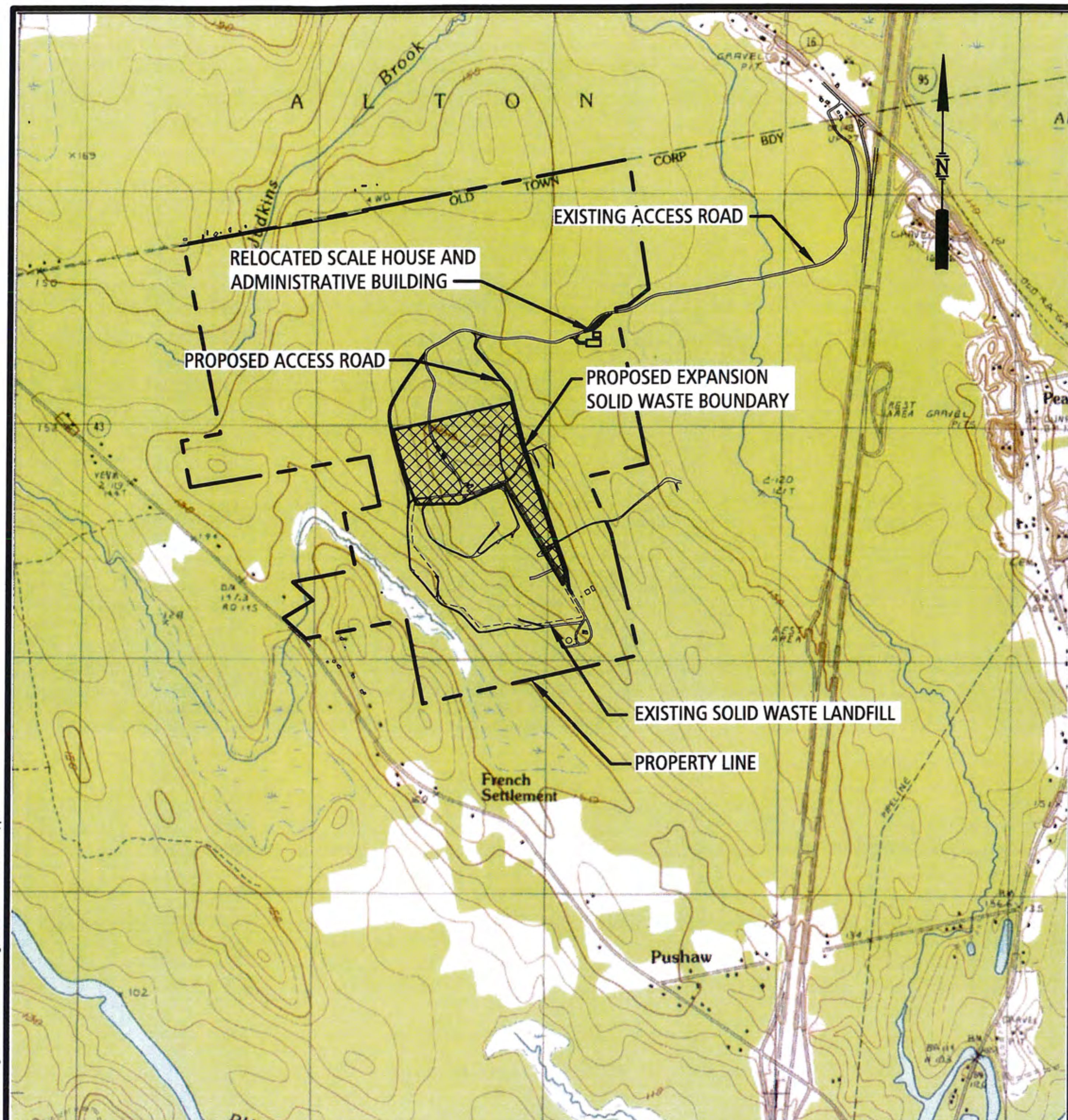

1000 0 2000 FEET

SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: PRESENTATION | LMN: STANTEC | CTB: SME-STD | REV: 10/2/14

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STATE OF MAINE
DEPARTMENT OF CONSERVATION
93 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0093

JOHN ELIAS BALDACCI
GOVERNOR

PATRICK K. MCGOWAN
COMMISSIONER

May 28, 2008

Jessica Haider
Stantec Consulting
30 Park Drive
Topsham, ME 04086

Re: Rare and exemplary botanical features, Proposed Project, PN195600338, Old Town, Maine.

Dear Ms. Haider:

I have searched the Natural Areas Program's digital, manual and map files in response to your request of May 21 2008 for information on the presence of rare or unique botanical features documented from the vicinity of the project site in the Town of 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 Steve Timpano, Environmental Coordinator, 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 areas. 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 sites. 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.

MAINE NATURAL AREAS PROGRAM
MOLLY DOCHERTY, DIRECTOR

PHONE: (207) 287-8044
FAX: (207) 287-8040
TTY: (207) 287-2213

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 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.

The Natural Areas Program 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. The Natural Areas Program welcomes coordination with individuals or organizations proposing environmental alteration, or conducting environmental assessments. If, however, data provided by the Natural Areas Program are to be published in any form, the Program should be informed at the outset and credited as the source.

The 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 $75.00 for our services.

Thank you for using the Natural Areas Program 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,

Douglas Suitor
Associate Information Manager
Maine Natural Areas Program
207-287-8044
douglas.suitor@maine.gov

Enclosures

Rare and Exemplary Botanical Features in the Project Vicinity

Documented within a Four-Mile Radius of the Proposed Project, PN195600338, Old Town, Maine.

Scientific Name Common Name	Last Seen	Global Rarity Rank	State Rarity Rank	State Protection Status	Habitat Description
Bluebell - balsam ragwort shoreline outcrop Rivershore Outcrop	1997-07-17	G3	S3		Low or steep circumneutral to calcareous rock outcrops along rivers with alluvial soil in the rock crevices. Vegetation sparse. Most are subject to annual flooding and/or ice scour.
Houstonia longifolia var. longifolia Long-leaved Bluet	1997-07-17	G4G5TNR	S2S3	SC	Slaty ledges or rivershore gravels, not strongly acidic.
Viola novae-angliae New England Violet	1990-05-29	G4Q	S2	SC	Gravels, wet rocks, shores and meadows.
Carex oronensis Orono Sedge	1997-07-17	G3	S3	T	Fields, meadows and clearings.
Carex oronensis Orono Sedge	1987-06-08	G3	S3	T	Fields, meadows and clearings.
Carex tenuiflora Sparse-flowered Sedge	1982-08-30	G5	S3	SC	Bogs and mossy woods or pond margins, usually higher pH.
Cyperus squarrosus Awned Sedge	1942-09-09	G5	S2	SC	Damp sands, silts and alluvium

Rare and Exemplary Botanical Features in the Project Vicinity

5/28/2008

Documented within a Four-Mile Radius of the Proposed Project, PN195600338, Old Town, Maine.

Scientific Name / Common Name	Last Seen	Global Rarity Rank	State Rarity Rank	State Protection Status	Habitat Description
Platanthera flava var. herbiola Pale Green Orchis	1933-07-06	G4T4Q	S2	SC	Swampy woods, bottomlands, swales, and wet shores.
Carex oronensis Orono Sedge	1988-07-05	G3	S3	T	Fields, meadows and clearings.
Spiranthes lucida Shining Ladies'-tresses	1946-07-08	G5	S1	T	Alluvial or damp rocky shores and slopes, rich damp thickets and meadows.
Cypripedium arietinum Ram's-head Lady's-slipper	1886-05-30	G3	S1	E	Damp or mossy woods or bogs.
Fimbristylis autumnalis Fall Fimbry	1899-09-18	G5	S2S3	T	Sandy or peaty shores and low ground.
Cyperus squarrosus Awned Sedge	1899-09-18	G5	S2	SC	Damp sands, silts and alluvium
Viola novae-angliae New England Violet	1934-10-24	G4Q	S2	SC	Gravels, wet rocks, shores and meadows.

Rare and Exemplary Botanical Features in the Project Vicinity

Documented within a Four-Mile Radius of the Proposed Project, PN195600338, Old Town, Maine.

Scientific Name / Common Name	Last Seen	Global Rarity Rank	State Rarity Rank	State Protection Status	Habitat Description
Cypripedium reginae Showy Lady's-slipper	1943-07-09	G4	S3	T	Circumneutral peatlands (often at edges) or sunlit openings of mossy woods.
Unpatterned fen ecosystem Unpatterned Fen Ecosystem	1988-06-30	GNR	S4		Peatlands fed by water carrying nutrients from adjacent uplands. Vegetation (with a large component of sedges, grasses, low shrubs, and sphagnum) is different and often more
Domed bog ecosystem Domed Bog	1999-08-25	GNR	S3		Raised bogs with concentrically patterned convex surfaces and concentric patterns. Vegetation zonation reflects the nutrient gradient from raised center to edge, with
Raised level bog ecosystem Raised Level Bog Ecosystem	2002	GNR	S4		Raised (but not concentrically patterned) peatlands in basins with mostly closed drainage. Sphagnum dominates the ground surface and is the main peat constituent.
Carex oronensis Orono Sedge	1916-07-01	G3	S3	T	Fields, meadows and clearings.
Carex adusta Swarthy Sedge	1916-07-01	G5	S2	E	Dry, open places.
Viola novae-angliae New England Violet	1916-07-01	G4Q	S2	SC	Gravels, wet rocks, shores and meadows.

STATE RARITY RANKS

S1	Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.
S2	Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
S3	Rare in Maine (20-100 occurrences).
S4	Apparently secure in Maine.
S5	Demonstrably secure in Maine.
SH	Known historically from the state, not verified in the past 20 years.
SX	Apparently extirpated from the state, loss of last known occurrence has been documented.
SU	Under consideration for assigning rarity status; more information needed on threats or distribution.
S#?	Current occurrence data suggests assigned rank, but lack of survey effort along with amount of potential habitat create uncertainty (e.g. S3?).

Note: State Rarity Ranks are determined by the Maine Natural Areas Program.

GLOBAL RARITY RANKS

G1	Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extinction.
G2	Globally imperiled because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.
G3	Globally rare (20-100 occurrences).
G4	Apparently secure globally.
G5	Demonstrably secure globally.

Note: Global Ranks are determined by NatureServe.

STATE LEGAL STATUS

Note: State legal status is according to 5 M.R.S.A. § 13076-13079, which mandates the Department of Conservation to produce and biennially update the official list of Maine's Endangered and Threatened plants. The list is derived by a technical advisory committee of botanists who use data in the Natural Areas Program's database to recommend status changes to the Department of Conservation.

E	ENDANGERED; Rare and in danger of being lost from the state in the foreseeable future; or federally listed as Endangered.
T	THREATENED; Rare and, with further decline, could become endangered; or federally listed as Threatened.

NON-LEGAL STATUS

SC	SPECIAL CONCERN; Rare in Maine, based on available information, but not sufficiently rare to be considered Threatened or Endangered.
PE	Potentially Extirpated; Species has not been documented in Maine in past 20 years or loss of last known occurrence has been documented.

Visit our website for more information on rare, threatened, and endangered species!
http://www.mainenaturalareas.org/docs/rare_plants/factsheets.php

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October 3, 2014 14101.00

Mark Caron
Regional Biologist
Maine Department of Inland Fisheries and Wildlife, Region F
73 Cobb Road
Enfield, Maine 04493

Subject: Significant Wildlife Resources Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Mr. Caron:

The purpose of this letter is to request information on any significant wildlife resources associated with land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known or suspected essential significant wildlife resources within, or in the vicinity of, the proposed project. Please note that a request has also been sent to Nels Kramer for information on fisheries resources within the project area. For your convenience, the May 2008 review comments from your agency for the project area are attached.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

cc: John Perry, M.I.F.W.

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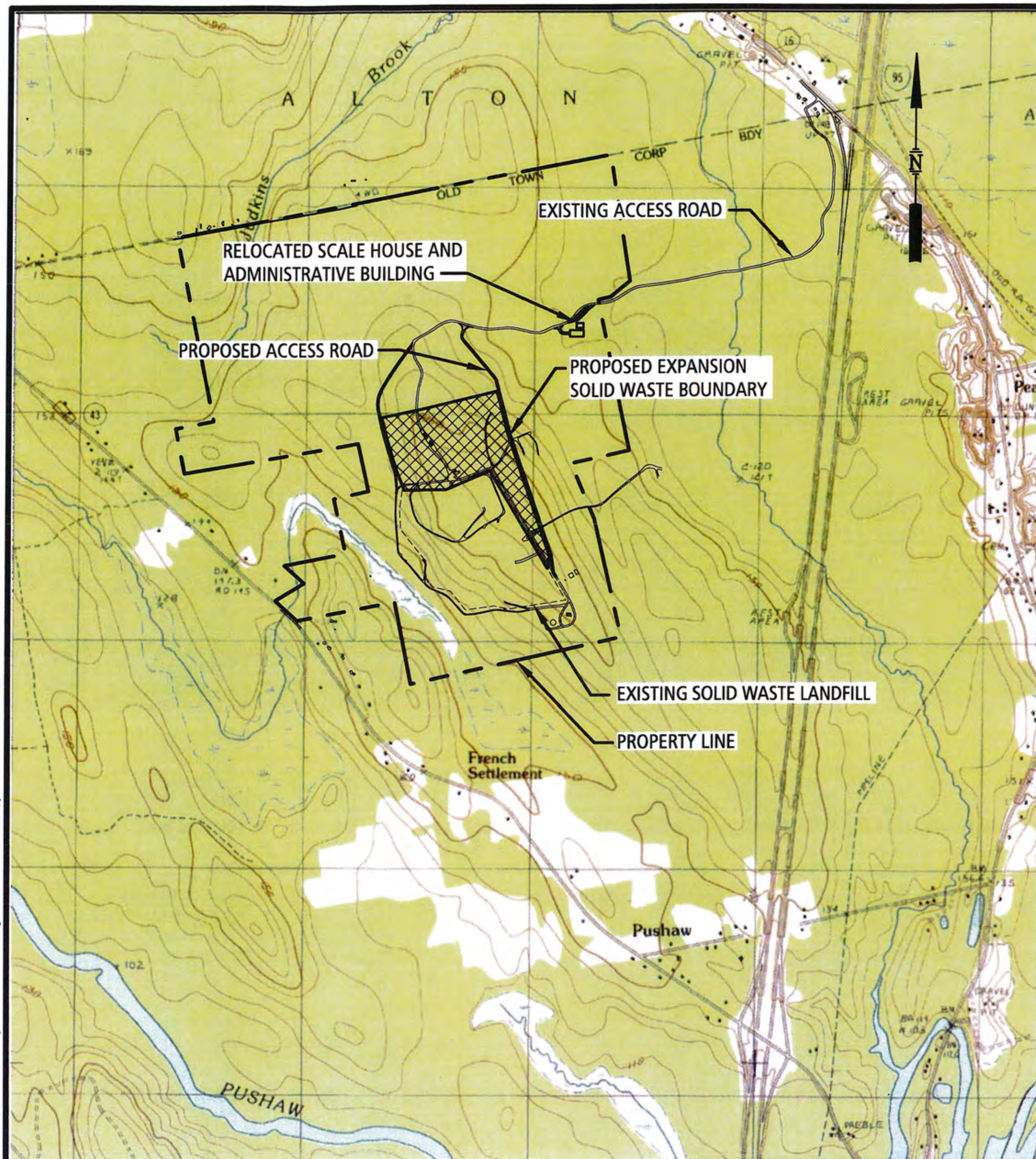

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SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

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DWG: PRESENTATION | LMN: STANTEC | CTB: SME–STD | REV: 10/2/14

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GOVERNOR
John E. Baldacci

COMMISSIONER
Roland D. Martin

Wildlife Division
73 Cobb Road
Enfield, ME 04493

May 28, 2008

Stantec Consulting
Attn: Jessica Haider
30 Park Drive
Topsham, ME 04086

Dear Jessica:

I have received your letters requesting Essential and Significant Habitat information for your project located in Old Town.

Essential Habitats:

Essential Habitats are defined as "areas currently or historically providing physical or biological features essential to the conservation of an endangered or threatened species in Maine and which may require special management considerations". Essential Habitat protection in Maine currently applies to bald eagle, roseate and least terns, and piping plover nest sites. Additional listed species may receive attention in the future.

According to MDIFW records, there are no Essential Habitats known to be associated with your project located in Old Town.

Significant Wildlife Habitats:

The Natural Resources Protection Act (NRPA), administered by the Maine Department of Environmental Protection (DEP), provides protection to certain natural resources including Significant Wildlife Habitats. Significant Wildlife Habitats are defined by the NRPA as:

> Habitat for state and federally listed endangered and threatened species.
>
> High and moderate value deer wintering areas (DWAs) and travel corridors.
>
> High and moderate value waterfowl and wading bird habitats (WWHs), including nesting and feeding areas.

Shorebird nesting, feeding, and staging areas.

Seabird nesting islands.

According to MDIFW records, there are several Significant Wildlife Habitats associated with your project located in Old Town. These include several Inland Waterfowl/Wadingbird Habitats. Please refer to the enclosed map.

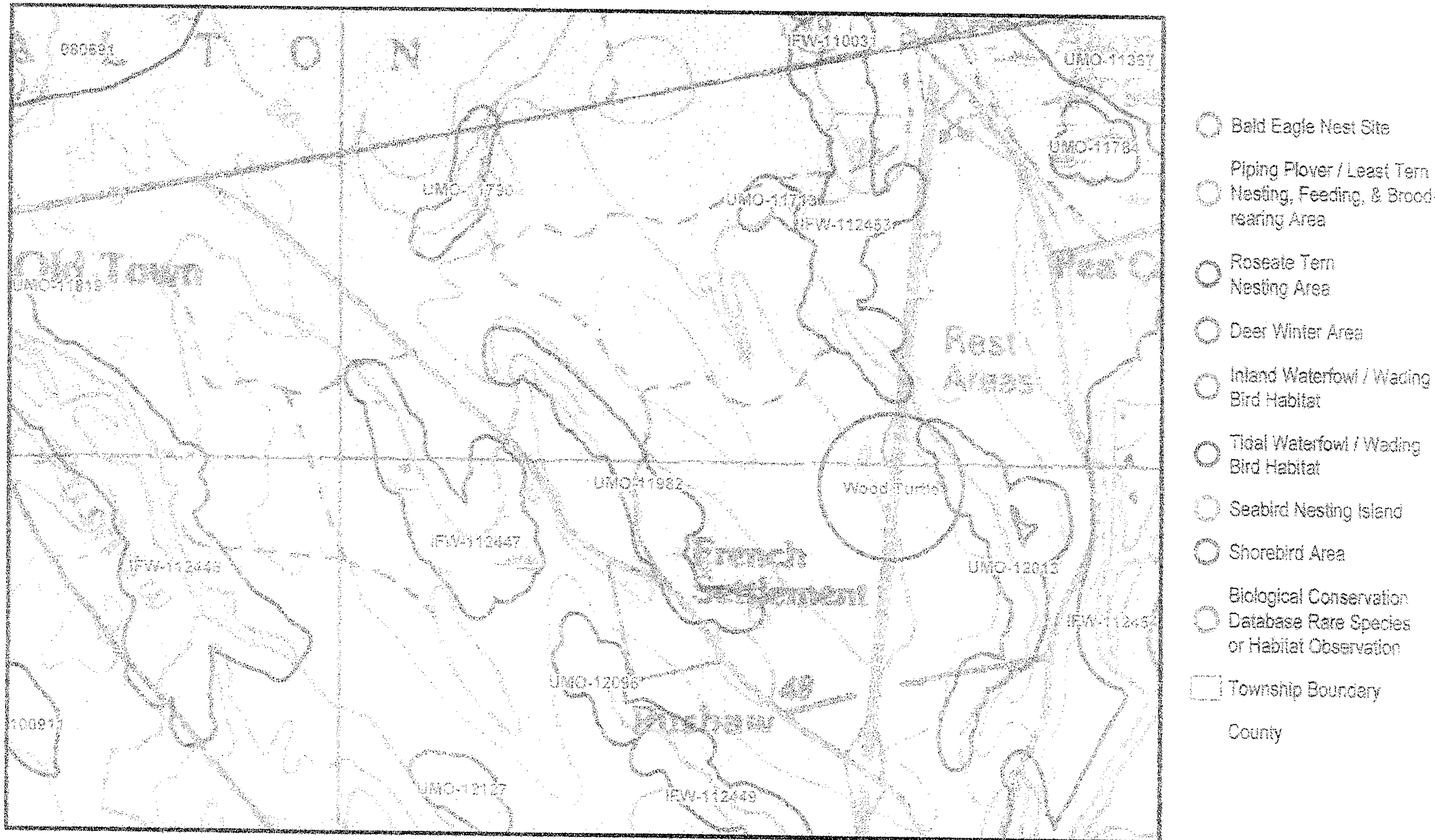
.Finally, MDIFW maintains a statewide database of endangered, threatened and special concern wildlife species and their habitats. There are no additional wildlife habitats of concern in this project area.

If you have any additional questions Jessica, feel free to give a call.

Sincerely,

Mark A. Caron
Regional Wildlife Biologist
Phone: 207-732-4132
Fax: 207-732-4405
E-Mail: mark.caron@maine.gov

Stantec-Old Town



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UTM Projection, Zone 19N, NAD83

73 Cobb Road
Enfield, ME 04493
Voice: (207) 732-4132
Fax: (207) 732-4405
May 27, 2008

Maine Department of Inland Fisheries & Wildlife
73 Cobb Road, Enfield, ME 04493
Phone: (207) 732-4132, FAX: (207) 732-4405

Site-Specific Search of Wildlife Observations and Habitat

SEARCH PARAMETERS

County:	Penobscot
IF&W Region:	F
Township(s):	Alton, Old Town
Search Center:	521292 east, 4980625 north (UTM NAD83 coordinates)
Search Area:	3.79 sq. miles
Date:	Wednesday, June 30, 2004

RESULTS

Essential Wildlife Habitats

BALD EAGLE NEST SITES
None Found

PIPING PLOVER / LEAST TERN NESTING, FEEDING, AND BROOD-REARING AREAS
None Found

ROSEATE TERN NESTING AREAS
None Found

Natural Resource Protection Act (NRPA) Habitats

Title 38, Chapter 3, Article 5-A, Section 480 of M.R.S.A. identifies habitats protected under the Natural Resources Protection Act (NRPA). Included in the definitions section (480-B) is "Significant Wildlife Habitat", which means areas that have been mapped by MDIFW or are within any other protected natural resource including habitat for listed endangered/threatened animal species; high/moderate value deer wintering areas; high/moderate value waterfowl/wading bird habitat; shorebird nesting, feeding, and staging areas; and seabird nesting islands. Although all of these habitats are mapped by MDIFW, to date only Seabird Nesting Islands have gone through the formal NRPA process. Specific deer wintering areas, inland and coastal *waterfowl/wading bird habitat, and shorebird areas have been designated "Candidate NRPA," indicating they meet the NRPA requirements but have not been formally zoned.*

SEABIRD NESTING ISLANDS
None Found

DEER WINTER AREAS
None Found

INLAND WATERFOWL/WADING BIRD HABITATS

Areas rated as high, moderate or indeterminate (see MDIFW: Significant Wildlife Habitat Protection Document, Waterfowl and Wading Bird Habitat - General, MDIFW, 12/22/93) qualify as Candidate NRPA habitats. The mapped boundary includes a 250-ft buffer adjacent to the wetland habitat used by waterfowl and wading birds. This data set was developed in accordance with NRPA and the Comprehensive Planning and Land Use Regulation Act (Growth Management).

Code	**Type**	**Rating**
112453	shrub swamp	moderate
	inland shallow fresh marsh	high
	inland shallow fresh marsh	high
112447	inland shallow fresh marsh	high

CODE = Unique identifier assigned by MDIFW to the polygon. Note: polygons without a code were identified by the University of Maine analysis of wetland habitats in 2002. These polygons do not have corresponding records in MDIFW's databases.
TYPE = Primary type of habitat
RATING = Inland waterfowl/wading bird habitats with a "high," "moderate," or "indeterminate" rating are considered as Candidate NRPA.

SHOREBIRD AREAS
None Found

COASTAL/TIDAL WATERFOWL/WADING BIRD HABITAT
None Found

Land Use Regulator Commission (LURC) Deer Winter Areas
None Found

Biological Conservation Database (BCD)

The Biological Conservation Database is an information management component of the Natural Heritage Program Network created by the Nature Conservancy. It is designed to track information on the status, life history, conservation needs, and *occurrences for rare species and natural communities. MDIFW is responsible for maintaining the zoological portion of the database, which contains information on approximately 1050 animal species native to the State.*

POINTS OBSERVATIONS BUFFERED BY 0.25 MILES

In the map, BCD points are surrounded by a 0.25-mile radius circle to represent the general area around the observation that should be considered for management. Ideally, the mapped polygon should show the extent of the important habitat(s) associated with the observation, but until a new landcover map of Maine becomes available, we are using simple circular buffers to approximate that area. This circular buffer is less appropriate for aquatic species for which the limit of the water body or a buffered stream segment may be more realistic. In all cases, an MDIFW biologist should investigate the habitat around a BCD observation to determine the most appropriate area for management consideration.

Classification of BCD observations as CONCERN = 'Y' or CONCERN = 'N' indicates whether the area around the observation should receive special management consideration based on the species involved (endangered, threatened, or rare), importance or rarity of the habitat, or whether the observation is recent or historical. Observations in BCD that are duplicated in other MDIFW datasets (e.g., Eagle Essential Wildlife Habitats) are classified here as CONCERN = 'N', not because they are unimportant but because they should already be flagged elsewhere in this report. Any questions regarding BCD observations should be directed to MDIFW's Endangered & Threatened Species Group.

Code	**Common Name**	**Survey Area**
ARAAD02020*041*ME	WOOD TURTLE	I-95

CODE = unique identifier of observation

MAPPED HABITAT POLYGONS

None Found

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October 3, 2014 14101.00

Nels Kramer
Regional Fisheries Biologist
Maine Department of Inland Fisheries and Wildlife, Region F
73 Cobb Road
Enfield, Maine 04493

Subject: Significant Fish or Fish Habitat Resources Associated with watercourses near the Juniper Ridge Landfill in Old Town, Maine

Dear Mr. Kramer:

The purpose of this letter is to request information on any significant fish or fish habitat resources associated with waterbodies near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known or suspected significant fish or fish habitat resources within, or in the vicinity of, the proposed project. Please note that a request has also been sent to Mark Caron for information on wildlife resources within the project area. For your convenience, the May 2008 review comments from your agency for the project area are attached.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

cc: John Perry, M.I.F.W.

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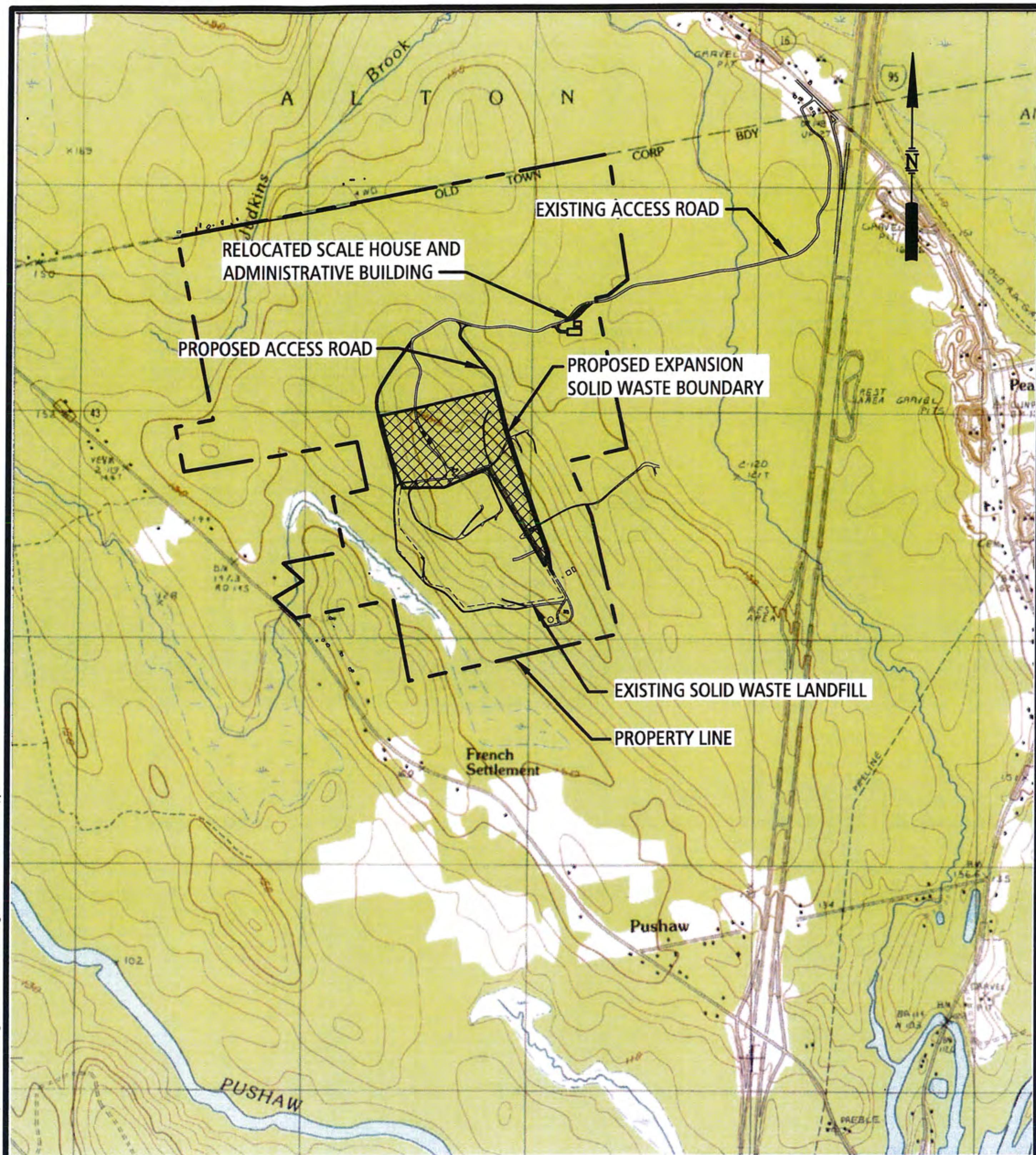

SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

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Comments - Environmental Project Review
Maine Department of Inland Fisheries and Wildlife

Fisheries Division Comments – Region F	
Applicant's Name: Stantec Consulting	
Project #: 195600338	Regulatory Agency:
Project Type: West Old Town Project	Project Manager: Jon Ryan; Asst. Jessica Haider
Comments Due Date:	Date Comments Sent: May 27, 2008
Project Location	
Town: West Old Town	County: Penobscot
Waterbody: Judkins Brook and unnamed streams	
Fisheries Biologist: Richard Dill	

After review of the application and consideration of the proposal's probable effect on the environment, and on our agencies programs and responsibilities, we provide the following comments:

I. Project Description/Resource Affected:
Significant fish or fish habitat resources in project area. Note: project type unspecified.

II. Comments/Recommended Considerations or Conditions:
Fisheries Considerations:
There are no lakes that fall within proposed project area.

Judkins Brook falls in the project area as well as two unnamed streams, on a small tributary to Pushaw Stream, the other a possible branch of Judkins Brook. It is possible that these streams have populations of Eastern brook trout, along with other native resident species of fish. I do not anticipate any significant impacts to fish and/or fish habit in these streams related to this project, but request a site visit at any proposed stream crossings in the project area before project plans are finalized.

Wildlife Considerations:
Will be responding separately.
[ ] Check if requesting copy of draft findings of fact and order.

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October 3, 2014 14101.00

Ms. Robin Reed
State Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, Maine 04333

Subject: Known Structures of Historical Significance or Known Archaeological Sites Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Robin:

The purpose of this letter is to request information on any known structures of historical significance or known archaeological sites on land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known structures of historical significance within, or in the vicinity of, the proposed project. For convenience, the June and September 2008 review comments and correspondence from your agency for this project are attached.

Thank you for your assistance in obtaining this information.

Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

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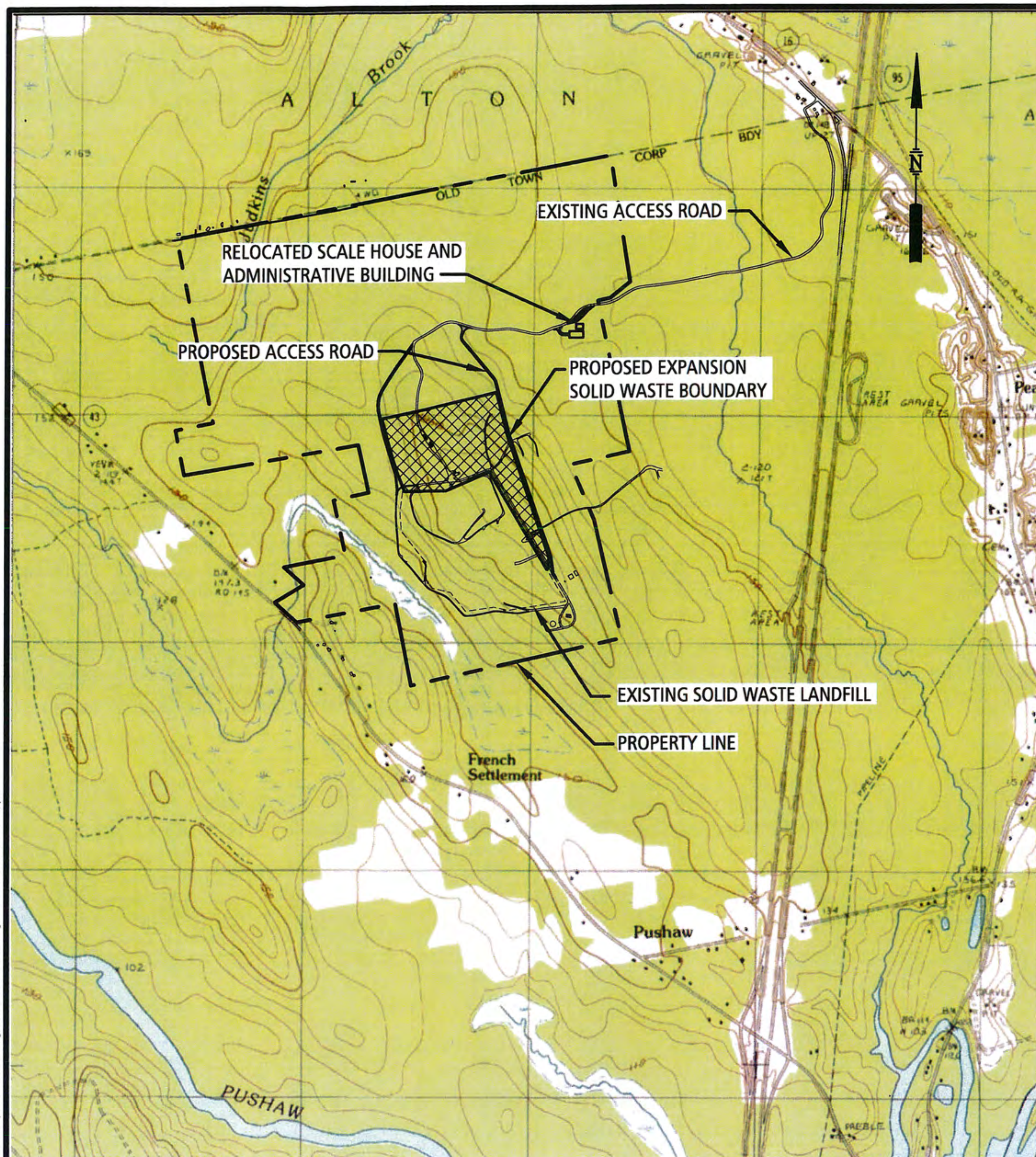

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SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

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MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JOHN ELIAS BALDACCI
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

September 15, 2008

Mr. Steven E. Patch
Sevee & Mahar Engineers, Inc.
P. O. Box 85A
Cumberland Center, ME 04021

RE: 100 acre Juniper Ridge landfill expansion, West Old Town, MHPC #0895-08

Dear Mr. Patch:

Dr. Arthur Spiess of my staff has reviewed the additional information for this project (expansion boundary and detailed topographic map) that you supplied with your letter of September 3rd. We withdraw our request for archaeological survey and for further architectural information.

I find that there will be no historic or archaeological properties affected by the proposed undertaking.

Sincerely,

Kirk Mohney

Kirk Mohney
Assistant Director/Deputy SHPO

SME

Sevee & Maher Engineers, Inc.
Waste Management and Hydrogeologic Consultants

September 3, 2008

08097.02
080903 mhpc.doc

Dr. Arthur Speiss
Maine Historic Preservation Commission
55 Capital Street
65 State House Station
Augusta, Maine 04333

Subject: MHPC #0895-08 – 100-Acre Project in West Old Town Maine
Stantec Project No. I95600338

Dear Dr. Speiss:

In May 2008, your office received correspondence from Ms. Jessica Haider of Stantec Consulting to initiate consultation on a landfill expansion project proposed for the Juniper Ridge Landfill. The Juniper Ridge Landfill is located on a 780-acre parcel located in Old Town, Maine. The parcel is owned by the State of Maine and administered by the State Planning Office (SPO).

A reply letter dated June 16, 2008 was sent by Mr. Kirk Mohney of your office, which discussed the potential need for a Phase I archaeological survey at the site. On July 16, 2008, I spoke briefly with you about Sevee & Maher Engineers, Inc. (SME) providing additional information regarding the location of the ground disturbance proposed for the expansion project. During our discussion, you indicated that the June 16, 2008 letter was a typical response letter sent to developers for commercial development and that it may not strictly apply to the development of a landfill expansion where the ground disturbance and increased level of human activity resulting from the proposed development is limited to the immediate area of the proposed expansion. You also indicated that if we could give you a better understanding of where the landfill and landfill infrastructure development will occur in relation to the segment of Judkins Brook that crosses the SPO parcel (i.e., the stream referenced in Mr. Mohney's June 16, 2008 letter), you could provide a more conclusive recommendation as to the need for a Phase I survey.

Attached are two figures that better define the location of the proposed landfill expansion project. As shown on the attached figures, the ground disturbance associated with the proposed landfill expansion development is approximately 1,500 linear feet (plus or

4 Blanchard Road P.O. Box 85A Cumberland Center, ME 04021 (207) 829-5016 FAX (207) 829-5692 www.smemaine.com

minus 500 meters) from Judkins Brook. The human activity associated with the proposed landfill expansion will also be limited to those areas within the limits of the landfill expansion footprint. As such, the proposed development will not disturb any ground within 50 meters of Judkins Brook or any prehistoric archaeological sites located near this segment of the Brook (if they do indeed exist).

Please call us if you have any questions or if you require any additional information regarding the proposed expansion project. Thank you again for taking time to reconsider the need for a Phase I archaeological survey for this project.

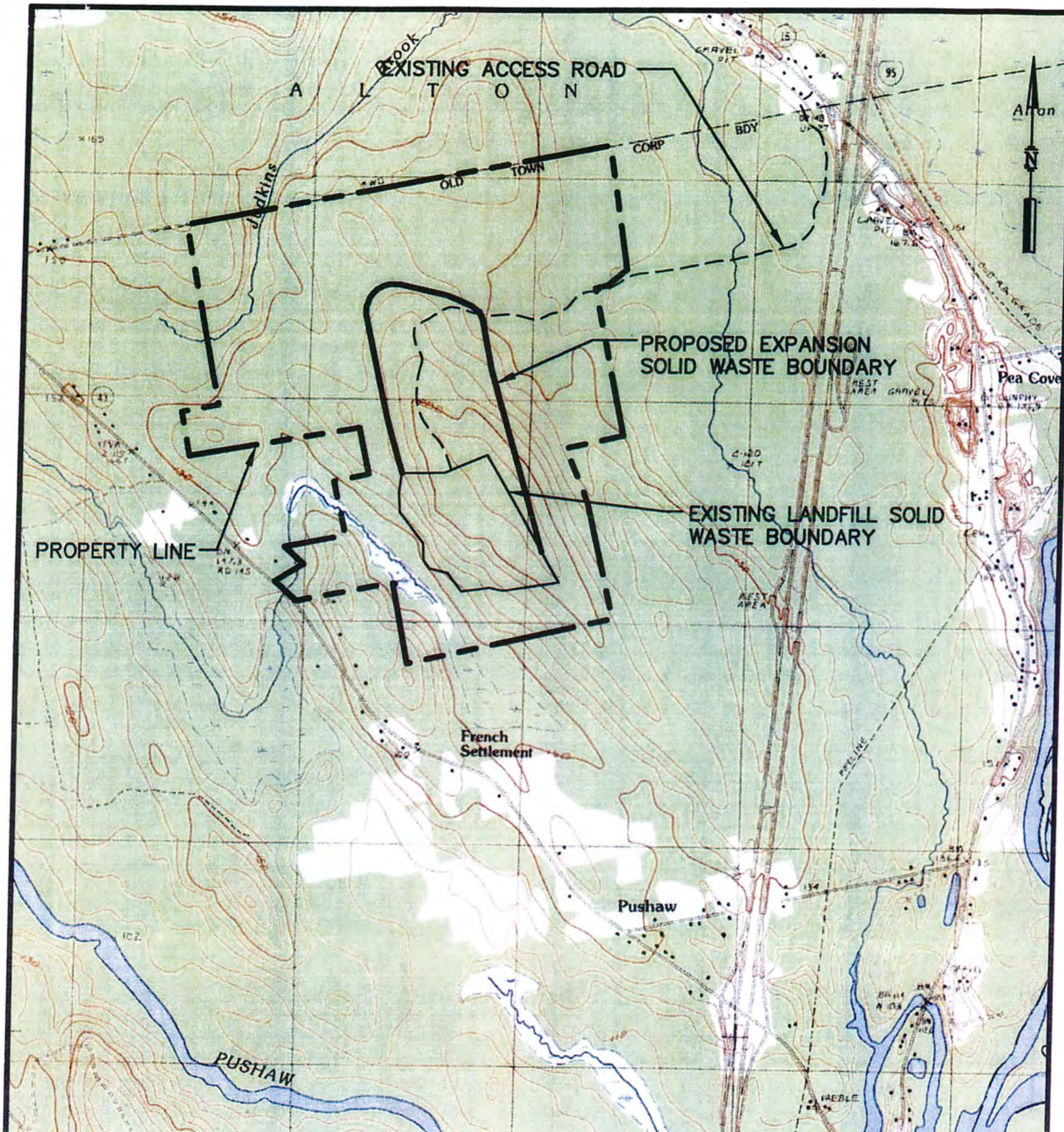
Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Steven E. Patch, P.E.
Project Engineer

Attachments

cc: Toni King, NEWSME Operations
Don Meagher, NEWSME Operations
George McDonald, State Planning Office
Jon Ryan, Stantec



NOTE:

BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE
OLD TOWN, MAINE–1988

1000 0 2000 4000 FEET

SITE LOCATION
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.

DWG: SITELOC LMN:EXP–PL CTB: WATERSHED REV: 9/2/08

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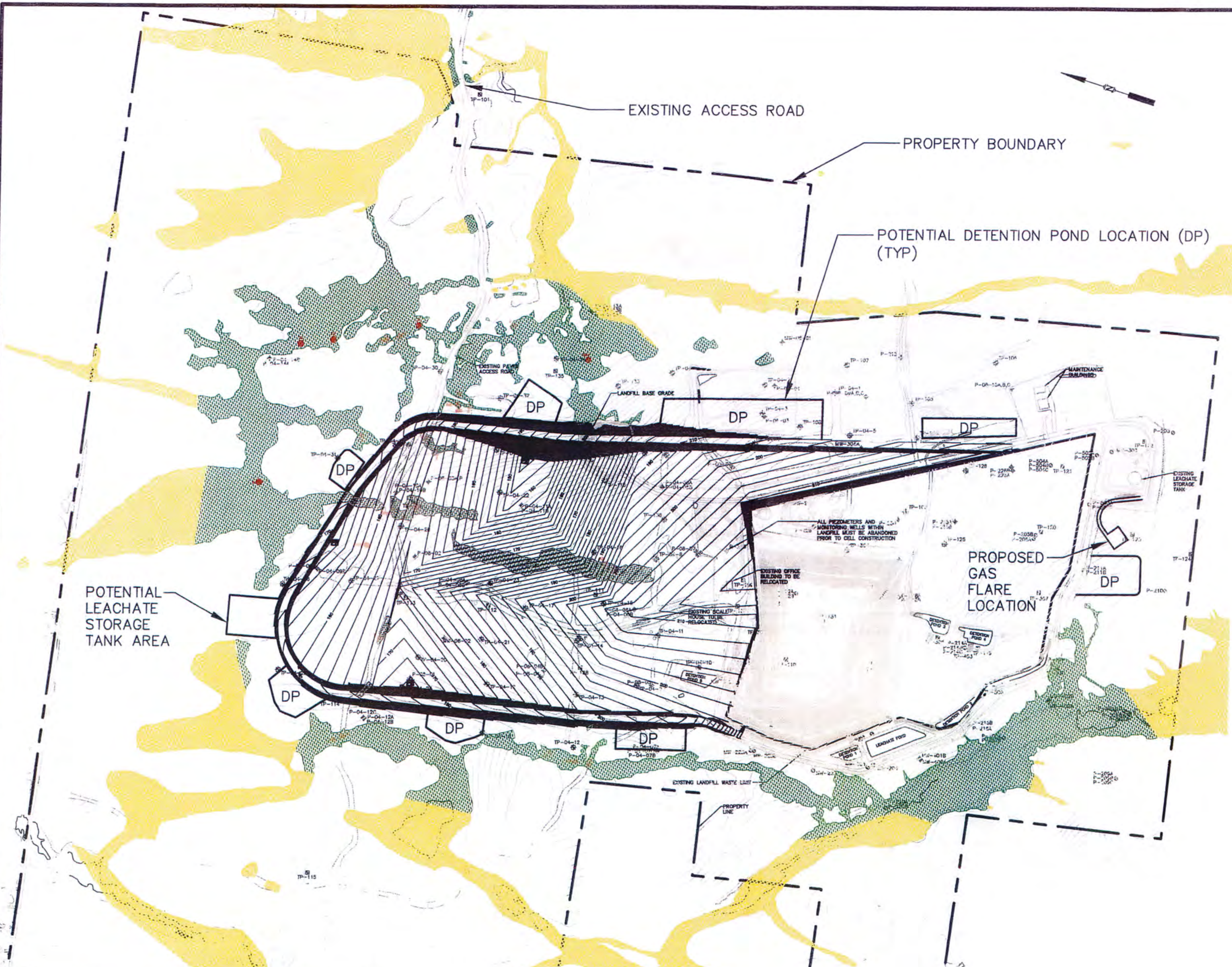


NOTES

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO, NORRIDGEWOCK, MAINE. PHOTO DATE MAY 2, 2008. VERTICAL DATUM BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM MAINE STATE COORDINATE SYSTEM EAST ZONE, NAD 83. GROUND CONTROL BY PLISGA & DAY, BANGOR, MAINE. STANDARD PRACTICE DICTATES THAT PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. OF TOPSHAM, MAINE IN 2004, 2005, 2006 & 2008.

3. PROPERTY BOUNDARY LOCATION IS 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. SIZE AND LOCATION OF STORM WATER DETENTION PONDS ARE SUBJECT TO CHANGE WITH FINAL DESIGN.

LEGEND

- VERNAL POOL & DESIGNATION
- SIGNIFICANT VERNAL POOL & DESIGNATION
- WETLAND DELINEATED
- WETLAND PHOTO INTERPRETED

DRAFT

ATTORNEY-CLIENT PRIVILEGED

300 0 600 FEET

JUNIPER RIDGE LANDFILL
PROPOSED EXPANSION
SITE PLAN

SME
Sevee & Maher Engineers, Inc.

DWG: RELOCATION LMN: CTB: RELOCATION REV: 8/13/08

\\Aserver\cfs\Casella\OldTownLandfill\Expansion\Acad\Figures\Relocation.dwg, 8/13/2008 9:16:23 AM, paf

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JOHN ELIAS BALDACCI
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

June 16, 2008

Ms. Jessica Haider
Project Assistant
Stantec Consulting
30 Park Drive
Topsham, ME 04086

Project: MHPC # 0895-08 - 100 acre project area in West Old Town; Stantec project # 195600338
Town: Old Town, ME

Dear Ms. Haider:

In response to your recent request, I have reviewed the information received May 22, 2008 to initiate consultation on the above referenced project.

Based on the information provided, I have concluded that the project area that is within 50 m of the stream is likely to contain one or more prehistoric archaeological sites based on our predictive model of archaeological site location. Therefore, Phase I archaeological survey is necessary for this parcel prior to any ground disturbance. A list of qualified prehistoric archaeologists is enclosed along with material explaining the Phase I/II/III approach to archaeological survey. This information can also be found on our website: www.maine.gov/mhpc/project_review This office must approve any proposal for archaeological fieldwork.

In order to determine whether historic above ground resources will be affected by the proposed undertaking, we are requesting photos of any buildings over fifty years of age on properties that are on, adjacent to, or across the street from the project site and any associated access roads. All photos should be keyed to a 7.5' U.S.G.S. quad map and submitted on the enclosed *Maine Historic Preservation Commission Historic Building/Structure Survey Form* with lines 3-5 filled out. If no such buildings exist, please indicate this in writing.

Once this information is received, we will forward a response regarding the results of our evaluation. Please contact Dr. Arthur Spiess of my staff regarding archaeology or Robin Stancampiano of my staff regarding architecture if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
Deputy State Historic Preservation Officer

enc.

PHONE: [illegible]

FAX: [illegible]

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

JOHN ELIAS BALDACCI
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

Prehistoric Archaeologists Approved List: Review and Compliance Consulting/Contracting (Active)

LEVEL 1

Ms Edna Feighner (207-879-9496)
NH Division of Historical Resources
PO Box 2043
Concord NH 03302-2043
Efeighner@NHCHR.state.nh.us

James A Clark (207-667-4055)
TRC/Northeast Cultural Resources
71 Oak St
Ellsworth ME 04605
clark.ja@gmail.com

Mr. Michael Brigham (207-778-7012)
Archaeology Research Center
University of Maine at Farmington
139 Quebec St
Farmington ME 04938
brigham@maine.edu

Richard P Corey (207-778-7012)
PO Box 68
E Wilton ME 04234-0068
rcorey@maine.edu

Edward Kitson (207-778-7012)
Archaeology Research Center
University of Maine at Farmington
139 Quebec St
Farmington ME 04938
kitson@maine.edu

Mr Brian Valimont (207-251-9467)
New England Archaeology Co LLC
117 Cat Mousam Rd
Kennebunk ME 04043
newarch1@verizon.net

Ms. Sarah Haugh (207-879-9496 x238)
Northern Ecological Associates
451 Presumpscot St
Portland ME 04103
shaugh@neamaine.com

LEVEL 2

Dr Richard Will (207-667-4055)
TRC/Northeast Cultural Resources
71 Oak St
Ellsworth ME 04605
FAX: 207-667-0485
willtrc@adelphia.net

Dr Jonathan Lothrop (412-856-6400)
GAI Consultants
570 Beatty Rd
Monroeville PA 15146
j.lothrop@gaiconsultants.com

Dr Stuart Eldridge (207-879-9496)
Northern Ecological Associates
451 Presumpscot St
Portland ME 04103
seldridge@neamaine.com

Dr Ellen Cowie (207-778-7012)
Archaeology Research Center
University of Maine at Farmington
139 Quebec St
Farmington ME 04938-1507
ecowie@maine.edu

Robert N Bartone
Archaeology Research Center
University of Maine at Farmington
139 Quebec St
Farmington ME 04938
b_bartone@maine.edu

Dr Victoria Bunker (603-776-4306)
PO Box 16
New Durham NH 03809-0016
vbi@worldpath.net

Dr Bruce J Bourque (207-287-3909)
Maine State Museum
83 State House Station
Augusta ME 04333-0083
bbourque@abacus.bates.edu

Dr Leslie Shaw (207-725-3815)
Dept of Sociology & Anthropology
Bowdoin College
Brunswick ME 04011
e-mail: lshaw@bowdoin.edu

David Putnam (207-762-5078)
47 Hilltop Rd
Chapman ME 04757
putnamd@umpi.edu

Dr Nathan Hamilton (207-780-5324)
Dept of Geography & Anthropology
University of Southern Maine
Gorham ME 04038

Dr William R Belcher
US Army CILHI
310 Worchester Ave Bldg 45
Hickam AFB HI 96853-5530
wbelcher@msn.com

Dr Steven L Cox (207-342-7790)
57 Ghent Rd
Searsmont ME 04973
stevencox@fairpoint.net

Geraldine Baldwin (914-271-0897)
John Milner Associates Inc
1 Croton Point Ave Ste B
Croton-on-Hudson NY 10520
FAX: 914-271-0898
GeraldineBaldwin@aol.com

Dr. Robert Goodby (603-446-2366)
Monadnock Archaeological Consulting
16 Fox Hill Rd
Stoddard NH 03464
MonadArch@surfglobal.net

Edward Moore
TRC/Northeast Cultural Resources
71 Oak St
Ellsworth ME 04605
FAX: 207-667-0485

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

ANGUS S. KING, JR
GOVERNOR

EARLE G. SHETTLEWORTH, JR
DIRECTOR

CONTRACT ARCHAEOLOGY GUIDELINES

June 10, 2002

This document is provided as background information to agencies, corporations, professional consultants or individuals needing contract archaeological services (also known as Cultural Resources Management archaeology) in Maine. These guidelines are based on state rules (94-089 Chapter 812).

Project Types

The vast majority of contract archaeology survey work falls into one of three categories. **Phase I** surveys are designed to determine whether or not archaeological sites exist on a particular piece of land. Such work involves checking records of previous archaeology in the area, walking over the landscape to inspect land forms and look for surface exposures of soil and possible archaeological material, and the excavation of shovel test pits in areas of high probability.

Phase II surveys are designed to focus on one or more sites that are already known to exist, find site limits by digging test pits, and determine site content and preservation. Information from Phase II survey work is used by the Maine Historic Preservation Commission (MHPC) to determine site significance (eligibility for listing in the National Register of Historic Places). **Phase III** archaeological work, often called data recovery, is careful excavation of a significant archaeological site to recover the artifacts and information it contains in advance of construction or other disturbance.

Archaeological sites are further divided into two broad categories of culture, **prehistoric** (or Native American), and **historic** (or European-American). Different archaeological specialists are usually needed for prehistoric or historic sites because the nature of content and preservation and site locations are quite different.

Scope of Work

In responding to a project submission, the MHPC may issue a letter specifying which type of archaeological survey is needed (prehistoric, historic or both) and at what level (Phase I, II, or III). Often the response letter contains further information, such as the suspected presence of an historic site of a certain age, or a statement that only a portion of the project parcel in question is sensitive for prehistoric sites and only that portion needs archaeological survey.

Once the project applicant has one or more scopes of work (proposals) from appropriate archaeologists (see below), the applicant should submit their preferred proposal *(without attached financial information or bid total)* to the MHPC for approval. MHPC will not comment upon cost, but will comment on the appropriateness of the scale and scope of the work. An approval from MHPC of the scope of work is the applicant's guarantee that, if the field and laboratory work are done according to the scope, and appropriately described in writing, the results will be accepted by MHPC.

The final written report on the project must also be submitted to MHPC for review and comment

PHONE: (207) 287-2132 FAX: (207) 287-2335

Finding an Archaeologist

At the time that MHPC issues a letter requiring archaeological survey work, MHPC will also supply one (or more) lists of archaeologists (Levels 1 and/or 2, historic or prehistoric) appropriate to the type of work (Phase I, II, III, historic or prehistoric). Archaeologists on the Level 2 Approved Lists can do projects of any level, including Phase I archaeological survey projects. Level 1 archaeologists are restricted to doing Phase I surveys, and certain planning projects for municipal governments.

MHPC maintains lists of archaeologists interested in working in different geographic areas of Maine, and those who are qualified in different types of work. The archaeologists themselves indicate their availability (except for short-term absence) to MHPC on a periodic basis, so archaeologists on the list can be expected to respond to inquiries. The applicant should solicit proposals or bids for work from archaeologists whose names appear on the list supplied by MHPC.

These archaeologists' names are taken from lists of archaeologists approved for work in Maine by MHPC under a set of rules establishing minimal qualifications, such as previous supervisory experience in northern New England, and an appropriate graduate degree. *However, the inclusion of an archaeologist on one of these lists should not be interpreted as an endorsement by the MHPC beyond these limited qualification criteria. Moreover, the MHPC cannot recommend the services of an individual archaeologist.*

Project Final Report

Whatever the archaeological survey result, a final report on the project should be submitted by the applicant to the MHPC. The MHPC will review the report, and issue further guidance or issue a "clearance" letter for the project.

SURVEY MAP NO. ____

SURVEY MAP NAME ____

MHPC USE ONLY

INVENTORY NO.

MAINE HISTORIC PRESERVATION COMMISSION
Historic Building/Structure Survey Form

1. PROPERTY NAME (HISTORIC): ____
2. PROPERTY NAME (OTHER): ____
3. STREET ADDRESS: ____
4. TOWN: ____ 5. COUNTY: ____
6. DATE RECORDED: ____ 7. SURVEYOR: ____
8. OWNER NAME: ____ ADDRESS: ____
9. PRIMARY USE (PRESENT):
___ SINGLE FAMILY ___ MULTI-FAMILY ___ INDUSTRY ___ TRANSPORTATION ___ RECREATION/CULTURE OTHER ____
___ AGRICULTURE ___ GOVERNMENTAL ___ RELIGIOUS ___ DEFENSE ___ UNKNOWN
___ COMMERCIAL/TRADE ___ EDUCATION ___ HOTEL ___ SUMMER COTTAGE/CAMP
___ FUNERARY ___ HEALTH CARE ___ LANDSCAPE ___ SOCIAL

10. CONDITION: ___ GOOD ___ FAIR ___ POOR ___ DESTROYED, DATE _/_/_

ARCHITECTURAL DATA

11. PRIMARY STYLISTIC CATEGORY:
___ COLONIAL ___ FEDERAL ___ GREEK REVIVAL ___ GOTHIC REVIVAL ___ ITALIANATE ___ SECOND EMPIRE
___ STICK STYLE ___ QUEEN ANNE ___ SHINGLE STYLE ___ R. ROMANESQUE ___ ROMANESQUE ___ HIGH VIC. GOTHIC
___ NEO-CLASSICAL REV. ___ RENAISSANCE REV. ___ 19TH/20TH C. REVIVAL ___ ARTS & CRAFTS ___ BUNGALOW OTHER ____
___ FOUR SQUARE ___ ART DECO ___ INTERNATIONAL ___ RANCH ___ VERNACULAR

12. OTHER STYLISTIC CATEGORY:
___ COLONIAL ___ FEDERAL ___ GREEK REVIVAL ___ GOTHIC REVIVAL ___ ITALIANATE ___ SECOND EMPIRE
___ STICK STYLE ___ QUEEN ANNE ___ SHINGLE STYLE ___ R. ROMANESQUE ___ ROMANESQUE ___ HIGH VIC. GOTHIC
___ NEO-CLASSICAL REV. ___ RENAISSANCE REV. ___ 19TH/20TH C. REVIVAL ___ ARTS & CRAFTS ___ BUNGALOW OTHER ____
___ FOUR SQUARE ___ ART DECO ___ INTERNATIONAL ___ RANCH ___ VERNACULAR

13. HEIGHT:
___ 1 STORY ___ 5 STORY ___ 1 1/2 STORY ___ OVER 5 (___) ___ 2 STORY ___ 2 1/2 STORY ___ 3 STORY ___ 4 STORY

14. PRIMARY FACADE WIDTH (MAIN BLOCK; USE GROUND FLOOR):
___ 1 BAY ___ 2 BAY ___ 3 BAY ___ 4 BAY ___ 5 BAY ___ MORE THAN 5 (___)

15. APPENDAGES: ___ SIDE ELL ___ DORMERS ___ REAR ELL ___ PORCH ___ FRONT ___ TOWER ___ ADDED STORIES ___ CUPOLA ___ SHED ___ BAY WINDOW

PHOTOGRAPH:

16. PORCH:
___ ATTACHED ___ ENGAGED ___ ONE STORY ___ MORE THAN ONE STORY
___ FULL WIDTH ___ WRAPAROUND ___ SLEEPING PORCH ___ SECONDARY PORCH

17. PLAN:
___ HALL AND PARLOR ___ 1/2 CAPE ___ CENTRAL HALL ___ SIDE HALL
___ BACK HALL ___ IRREGULAR ___ OTHER ___

18. PRIMARY STRUCTURAL SYSTEM:
___ TIMBER FRAME ___ BRACED FRAME ___ BRICK ___ STONE ___ BALLOON FRAME
___ CONCRETE ___ STEEL ___ LOG ___ PLANK WALL ___ PLATFORM FRAME
___ FRAME CONSTRUCTION - TYPE UNKNOWN ___ OTHER ___

19. CHIMNEY PLACEMENT:
___ INTERIOR ___ INTERIOR FRONT/REAR ___ CENTER ___ INTERIOR END ___ EXTERIOR
OTHER ___

20. ROOF CONFIGURATION:
___ GABLE SIDE ___ GABLE FRONT ___ HIP ___ MANSARD ___ FLAT
___ GAMBREL ___ PARAPET GABLE ___ SHED ___ CROSS ___ GABLE
___ COMPOUND ___ OTHER ___

21. ROOF MATERIAL: WOOD ___ METAL ___ TILE ___ SLATE ___ ASPHALT ___ ASBESTOS ___

22. EXTERIOR WALL MATERIALS:
___ CLAPBOARD ___ BRICK ___ FLUSH SHEATHING ___ WOOD SHINGLE ___ STONE
___ LOG ___ PRESSED METAL ___ CONCRETE ___ STUCCO ___ ASPHALT
___ GRANITE ___ ASBESTOS ___ TERRA COTTA ___ BOARD AND BATTEN ___ ALUMINUM/VINYL
OTHER ___

23. FOUNDATION MATERIAL:
___ FIELDSTONE ___ BRICK ___ WOOD ___ CONCRETE ___ GRANITE ___ ORNAMENTAL CONC. BLOCK
OTHER ___

24. OUTBUILDINGS/FEATURES:
___ CARRIAGE HOUSE ___ FENCE OR WALL ___ CEMETERY ___ BARN (CONNECTED)
___ BARN (DETACHED) ___ FORMAL GARDEN ___ LANDSCAPE/PLANT MAT. ___ ARCHAEOLOGICAL SITE
___ GARAGE ___ OTHER ___

HISTORICAL DATA

25. DOCUMENTED DATE OF CONSTRUCTION: ___ 26. ESTIMATED DATE OF CONSTRUCTION: ___

27. DATE MAJOR ADDITIONS/ALTERATIONS: ___

28. ARCHITECT: ___ 29. CONTRACTOR: ___

30. ORIGINAL OWNER: ___

31. SUBSEQUENT SIGNIFICANT OWNER: ___ DATES: ___

32. CULTURAL/ETHNIC AFFILIATION:
___ ENGLISH ___ FRENCH ACADIAN ___ NATIVE AMERICAN ___ SCOTTISH ___ FRENCH CANADIAN
___ EAST EUROPEAN ___ IRISH ___ OTHER ___

33. HISTORIC CONTEXT(S):
___ COMMERCE ___ INDUSTRY ___ TRANSPORTATION ___ AGRICULTURE ___ MILITARY
___ RELIGION ___ CIVIC AFFAIRS ___ RECREATION ___ HABITATION ___ EDUCATION
___ ART, LIT, SCIENCE ___ SOCIAL

34. COMMENTS/SOURCES: ___

35. HISTORICAL DRAWINGS EXIST: ___ YES ___ NO LOCATION: ___

ENVIRONMENTAL DATA

36. SITE INTEGRITY: ___ ORIGINAL ___ MOVED DATE MOVED ___
37. SETTING: ___ RURAL/UNDISTURBED ___ RURAL/BUILT UP ___ SMALL TOWN ___ URBAN ___ SUBURBAN
38. QUADRANGLE MAP USED: ___ QUADRANGLE #: ___
39. UTM NORTHING: ___ 40. UTM EASTING: ___
41. FACADE DIRECTION (CIRCLE ONE): N S E W NE NW SE SW

MHPC USE ONLY

DATE ENTERED IN INVENTORY: ___ PHOTO FILE #: ___
NR STATUS: L ___ HD ___ E ___ NE ___ ND ___ REVIEWER ___
DATA SOURCE ___ HPI ___ CLG ___ R&C ___ STAFF ___ STATE SURVEY ___ OTHER ___ LEVEL OF SURVEY ___ R ___ I

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

October 3, 2014 14101.00

Thom Danielson
Maine Department of Environmental Protection
Division of Water Resource Regulations
State House Station 17
Augusta, Maine 04333

Subject: Significant Rivers and Streams Associated with Land Near the Juniper Ridge Landfill in Old Town, Maine

Dear Thom:

The purpose of this letter is to request information on any significant lakes, ponds, rivers, streams, or brooks associated with land near the Juniper Ridge Landfill in Old Town, Maine. An approximate 54-acre landfill expansion is being proposed for this area. Please review the attached map and let me know if there are any known significant waterbodies within, or in the vicinity of, the proposed project. For your convenience, the July 2004 review comments from your agency are attached.

Thank you for your assistance in obtaining this information.

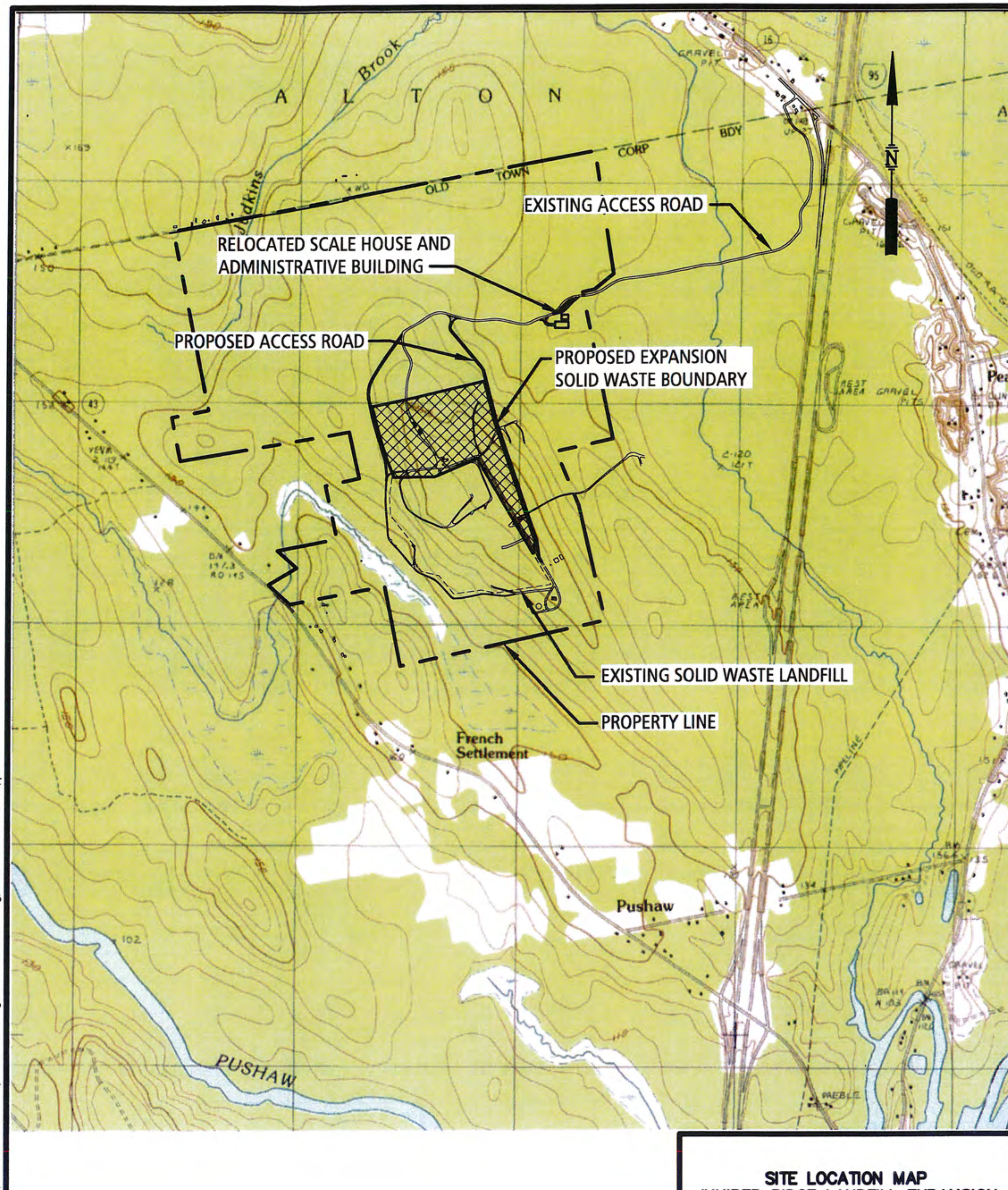
Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachments

Z:\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Docs\L\20141002misc_letters.docx



SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: PRESENTATION LMN: STANTEC CTB: SME–STD REV: 10/2/14

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STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

ıN ELIAS BALDACCI
GOVERNOR

DAWN R. GALLAGHER
COMMISSIONER

July 9, 2004

Jeffrey Simmons
Woodlot Alternatives, Inc.
30 Park Drive
Topsham, ME 04086

Re: Significant rivers and streams associated with 100-acre parcel in Old Town

Dear Jeffrey,

Several streams are located in the vicinity of the 100-acre parcel in Old Town. Judkins Brook and its tributaries drain the northern portion of the project area. An unnamed tributary of the Penobscot River drains the southeast corner of the project area. A tributary of Pushaw Stream drains the western portion of the project area. All of these streams are statutory class B. The USGS topo map appears to have errors on it. The project applicant should walk the above treams and locate and map streams within the project boundary. Alton Bog is an exceptional wetland located northeast of the proposed project. I recommend that you contact the Maine Natural Areas Program and Department of Inland Fisheries and Wildlife for information about Alton Bog. Other waterbodies in the vicinity include Penobscot Stream, Penobscot River, and a tributary of Pushaw Stream located to the southwest of the proposed project. They are all class B. The proposed project should minimize the risk of transporting pollutants to the above water bodies through surface water runoff or groundwater flow. If you have any questions, please contact me at 287-7728.

Sincerely,

Thomas J Danielson

Thomas J. Danielson

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

October 7, 2014 14101.00

Jim Beyer
Maine Department of Environmental Protection
Central Maine Regional Office
106 Hogan Road
Bangor, Maine 04401

Subject: Significant Natural Resources Information Request
Juniper Ridge Landfill in Old Town, Maine

Dear Jim:

The purpose of this letter is to request information on any significant natural resources associated with the location depicted on the attached figure, showing the Juniper Ridge Landfill expansion project in Old Town, Maine.

Please review the attached map and let me know if there are any known or suspected locations of rare, threatened, or endangered plants or listed wildlife species, exemplary natural communities, significant wildlife habitat, registered critical areas, or other significant natural resources within the outlined area associated with this potential development area. Should you have any questions, please feel free to contact me.

Thank you for your assistance in obtaining this information.

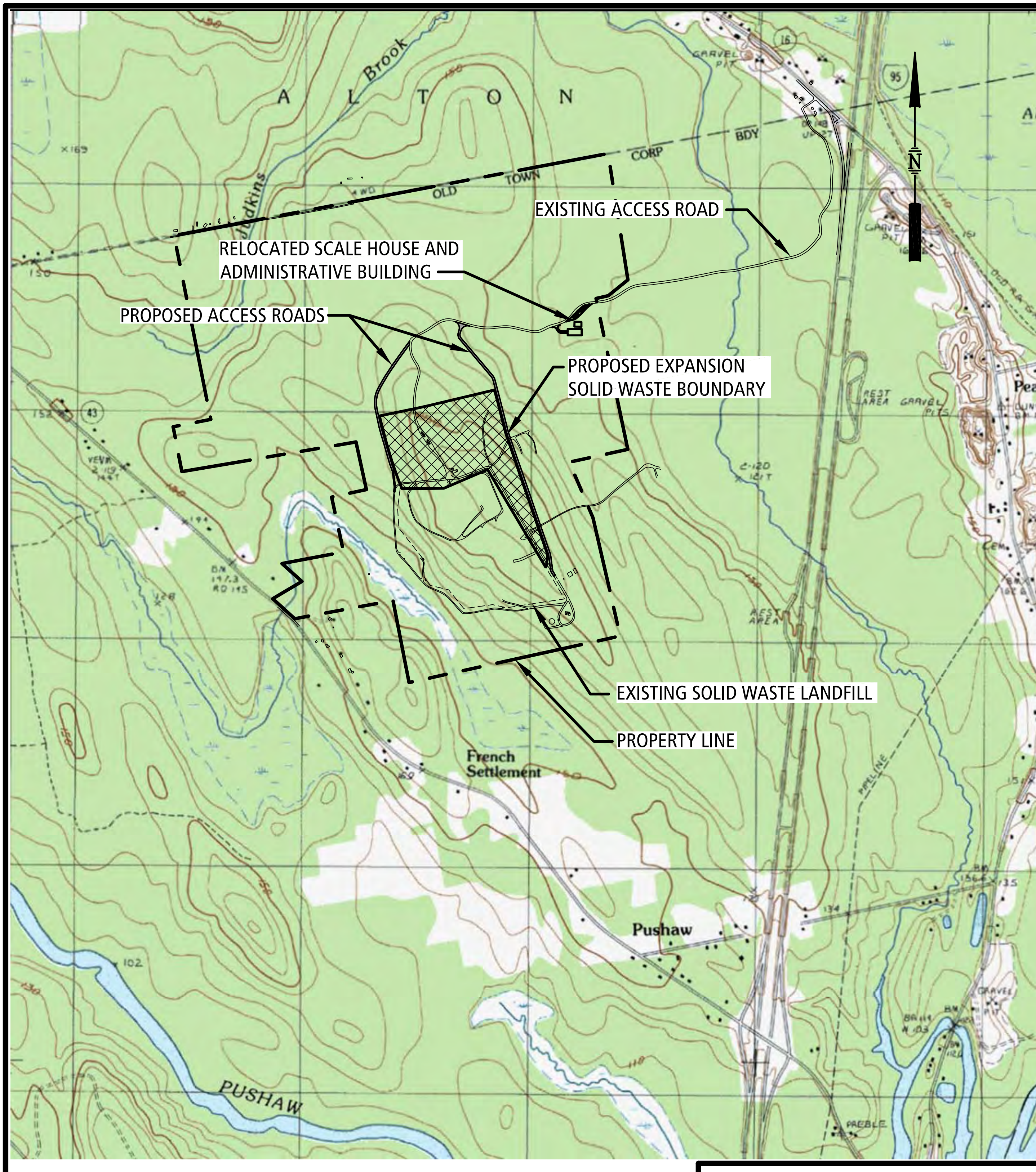
Sincerely,

SEVEE & MAHER ENGINEERS, INC.

Michael S. Booth, P.E.
Senior Project Manager

Attachment

Z:\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Docs\L\20141002misc_letters.docx



SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: PRESENTATION LMN: STANTEC CTB: SME–STD REV: 10/2/14

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Maine Ecological Services Field Office
17 GODFREY DRIVE, SUITE 2
ORONO, ME 4473
PHONE: (207)866-3344 FAX: (207)866-3351
URL: www.fws.gov/mainefieldoffice/index.html

Consultation Code: 05E1ME00-2015-SLI-0213 June 04, 2015
Event Code: 05E1ME00-2015-E-00272
Project Name: Juniper Ridge Expansion

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies the threatened, endangered, candidate, and proposed species and designated or proposed critical habitat that may occur within the boundary of your proposed project or may be affected by your proposed project. This 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 ECOS-IPaC Web site at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-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 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 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:
http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

This species list also identifies candidate species under review for listing and those species that the Service considers species of concern. Candidate species have no protection under the Act but are included for consideration because they could be listed prior to completion of your project. Species of concern are those taxa whose conservation status is of concern to the Service (i.e., species previously known as Category 2 candidates), but for which further information is needed.

If a proposed project may affect only candidate species or species of concern, you are not required to prepare a Biological Assessment or biological evaluation or to consult with the Service. However, the Service recommends minimizing effects to these species to prevent future conflicts. Therefore, if early evaluation indicates that a project will affect a candidate species or species of concern, you may wish to request technical assistance from this office to identify appropriate minimization measures.

Please be aware that bald and golden eagles are not protected under the Endangered Species Act but are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.). Projects affecting these species may require development of an eagle conservation plan:
http://www.fws.gov/windenergy/eagle_guidance.html Information on the location of bald eagle nests in Maine can be found on the Maine Field Office Web site:
http://www.fws.gov/mainefieldoffice/Project%20review4.html

Additionally, wind energy projects should follow the wind energy guidelines:
http://www.fws.gov/windenergy/ for minimizing impacts to migratory birds and bats. Projects may require development of an avian and bat protection plan.

Migratory birds are also a Service trust resource. Under the Migratory Bird Treaty Act, construction activities in grassland, wetland, stream, woodland, and other habitats that would result in the take of migratory birds, eggs, young, or active nests should be avoided. Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm and at:

http://www.towerkill.com; and at:
http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html

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 Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

Official Species List

Provided by:

Maine Ecological Services Field Office
17 GODFREY DRIVE, SUITE 2
ORONO, ME 4473
(207) 866-3344
http://www.fws.gov/mainefieldoffice/index.html

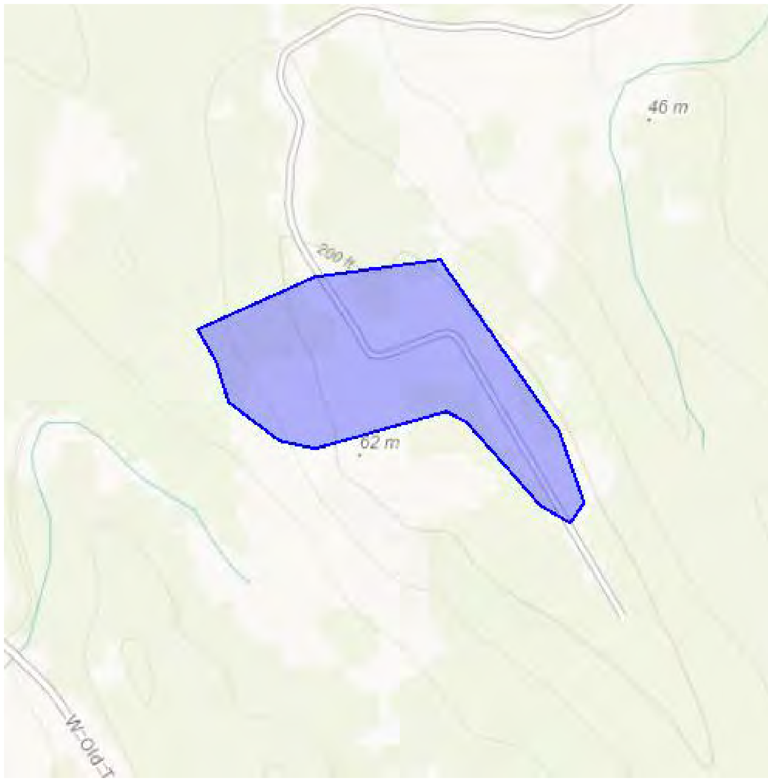
Consultation Code: 05E1ME00-2015-SLI-0213
Event Code: 05E1ME00-2015-E-00272

Project Type: Landfill

Project Name: Juniper Ridge Expansion
Project Description: 74 acre expansion in Old Town Maine to increase Landfill Capacity

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-68.71997594833374 44.980205778054916, -68.71935367584229 44.9789156244963, -68.71971845626831 44.97855134058888, -68.72044801712036 44.978854910672446, -68.72237920761108 44.980357558917945, -68.72287273406982 44.980554873439196, -68.72626304626465 44.979902215123424, -68.72720718383789 44.980023640488874, -68.72851610183716 44.980737009317664, -68.72881650924683 44.98148072481643, -68.72931003570557 44.98205747713286, -68.72626304626465 44.98302883634043, -68.7230658531189 44.98333238271767, -68.71997594833374 44.980205778054916)))

Project Counties: Penobscot, ME

Endangered Species Act Species List

There are a total of 2 threatened or endangered species on your 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. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Fishes	**Status**	**Has Critical Habitat**	**Condition(s)**
Atlantic salmon *(Salmo salar)* Population: Gulf of Maine DPS	Endangered	Final designated	
Mammals			
Northern long-eared Bat *(Myotis septentrionalis)*	Threatened		

Critical habitats that lie within your project area

The following critical habitats lie fully or partially within your project area.

Fishes	Critical Habitat Type
Atlantic salmon *(Salmo salar)* Population: Gulf of Maine DPS	Final designated

Mike Booth

From: Perry, John <John.Perry@maine.gov>
Sent: Wednesday, November 05, 2014 9:20 AM
To: Mike Booth
Subject: Information Request--Juniper Hill Landfill Expansion
Attachments: MDIFWResponse_ERid1069_ERVerID1120-FINAL.pdf; TopoMap_ERid1069_ERVerID1120.pdf

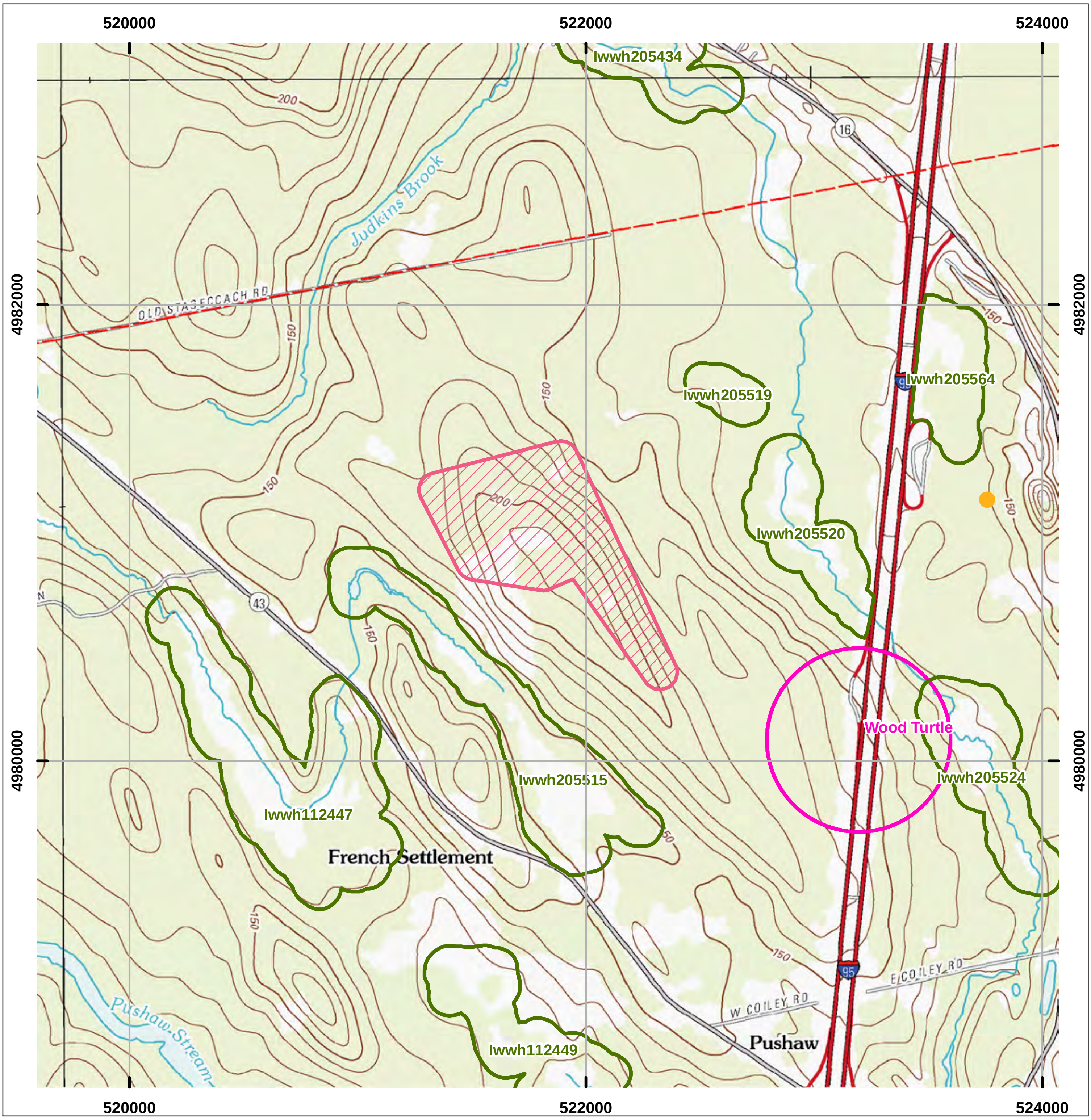
Hi Michael,

Attached is MDIFW's response to your request for information for the Juniper Hill Landfill Expansion Project. Please let me know if you need additional information.

Also, future information requests can be submitted electronically to IFWEnvironmentalreview@maine.gov

John

John Perry
Environmental Review Coordinator
Maine Department of Inland Fisheries and Wildlife
284 State Street, 41 SHS
Augusta, Maine 04333-0041
Tel (207) 287-5254; Cell (207) 446-5145
Fax (207) 287-6395
www.mefishwildlife.com



Environmental Review of Fish and Wildlife Observations and Priority Habitats

Project Name: Juniper Ridge - Old Town (Version 1)

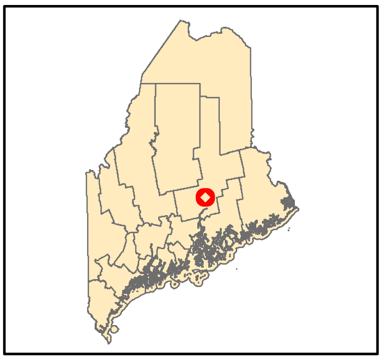
Maine Department of Inland Fisheries and Wildlife

0 0.125 0.25 0.5 0.75 1 Miles

Projection: UTM, NAD83, Zone 19N

Date: 10/17/2014

- ProjectPoints
- ProjectLines
- ProjectPolys
- ProjectSearchAreas
- Deer Winter Area
- LURC p-fw
- Cooperative DWAs
- Seabird Nesting Islands
- Inland Waterfowl/Wading Bird
- Shoreland Zoning_Iwwh
- Tidal Waterfowl/Wading Bird
- Significant Vernal Pools
- Environmental Review Polygons
- Roseate Tern
- Piping Plover/Least Tern
- Aquatic ETSc (2.5 mi review)
- Rare Mussels (5 mi review)
- A and B List Ponds
- Arctic Charr Habitat
- E. Brook Trout Joint Venture Subwatershed Classification
- Redfin Pickerel/Swamp Darter Habitats (buffer100ft)
- Special Concern-occupied habitats(100ft buffer)
- Wild Lake Trout Habitats



STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
284 STATE STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

PAUL R. LEPAGE
GOVERNOR

CHANDLER E. WOODCOCK
COMMISSIONER

November 5, 2014

Michael Booth
Sevee & Maher Engineers, Inc.
4 Blanchard Road, P.O. Box 85A
Cumberland Center, ME 04021

RE: Information Request - Juniper Ridge Landfill Expansion, Old Town

Dear Michael:

Per your request received October 10, 2014, 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 fisheries habitat concerns within the vicinity of the *Juniper Ridge Landfill Expansion Project* in Old Town.

Our information indicates no locations of Endangered, Threatened, or Special Concern species within the project area. Additionally, our Department has not mapped any Essential Habitats that would be directly affected by your project.

Significant Wildlife Habitat

At this time, Significant Wildlife Habitat, which includes Waterfowl and Wading Bird Habitat, Deer Wintering Areas, Seabird Nesting Islands, Shorebird Areas and Significant Vernal Pools, has not been mapped within the project area. A comprehensive statewide inventory for Significant Vernal Pools, however, has not been completed. Surveys for vernal pools in the project boundary will need to be conducted prior to final project design to determine whether there are Significant Vernal Pools present. Once surveys are completed, our Department will need to verify vernal pool data sheets prior to final determination of significance.

Fisheries Habitat Concerns

Without details, it is difficult to know what impacts your project may have on the mapped streams within the search area. That being said, MDIFW makes the following general recommendations as they pertain to streams.

We recommend that a 100-foot undisturbed vegetated buffer be maintained along these streams. Buffers should be measured from the edge of stream or associated fringe and floodplain wetlands. Maintaining buffers along coldwater fisheries is critical to the protection of water temperatures, water quality, and inputs of coarse woody debris necessary to support conditions required by brook trout. Stream crossings should be avoided, but if a stream crossing is necessary it should be designed to provide adequate fish passage. Generally, MDIFW recommends that all new and replacement stream crossings be sized to span 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 not only providing habitat connectivity for fish but also for other aquatic organisms. We encourage you to contact our Region F Fisheries staff (207-732-4131) for crossing design recommendations that best maintain fish passage. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts to stream habitat. 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 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,

John Perry
Environmental Review Coordinator

MAINE HISTORIC PRESERVATION COMMISSION
55 CAPITOL STREET
65 STATE HOUSE STATION
AUGUSTA, MAINE
04333

PAUL R. LEPAGE
GOVERNOR

EARLE G. SHETTLEWORTH, JR.
DIRECTOR

January 15, 2015

Mr. Michael Booth
Sevee & Maher Engineers, Inc.
P.O. Box 85A
Cumberland, ME 04021

Project: MHPC# 0017-15 – Juniper Ridge Landfill; Map 3 lot 1; 54 acres landfill expansion

Town: Old Town, ME

Dear Mr. Booth:

In response to your recent request, I have reviewed the information received January 7, 2015 to initiate consultation on the above referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA).

Based on the information submitted, I have concluded that there will be **no historic properties affected** by this proposed undertaking, as defined by Section 106.

Please contact Robin Reed of our staff if we can be of further assistance in this matter.

Sincerely,

Kirk F. Mohney

Kirk F. Mohney
Deputy State Historic Preservation Officer

PHONE: (207) 287-2132

Mike Booth

From: Reed, Robin K <robin.k.reed@maine.gov>
Sent: Friday, January 16, 2015 9:21 AM
To: Mike Booth
Subject: RE: Old Town landfill project - MHPC# 0017-15
Attachments: MHPC# 0017-15.pdf

MHPC# 0017-15

Mike:

Please find our consultation letter attached for your project.

No further review is required with our office.

Let me know if you need anything else.

Robin K. Reed
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333
phone: 207-287-2132 ext. 1
fax: 207-287-2335
robin.k.reed@maine.gov
http://www.maine.gov/mhpc

From: Mike Booth [mailto:msb@smemaine.com]
Sent: Wednesday, January 07, 2015 2:09 PM
To: Reed, Robin K
Subject: RE: Old Town landfill project - MHPC# 1488-14

great

From: Reed, Robin K [mailto:robin.k.reed@maine.gov]
Sent: Wednesday, January 07, 2015 1:42 PM
To: Mike Booth
Subject: RE: Old Town landfill project - MHPC# 1488-14

Mike:

Thank you – I will log your submittal in for review as of today.

Robin K. Reed
Maine Historic Preservation Commission

From: Mike Booth [mailto:msb@smemaine.com]
Sent: Wednesday, January 07, 2015 1:35 PM

To: Reed, Robin K
Subject: RE: Old Town landfill project - MHPC# 1488-14

Hi Robin
Thanks for getting back to me. The project you forwarded was not for the actual landfill project, rather it appears to be for a borrow pit, adjacent to the site that is being developed by the construction contractor who does most of the landfill construction work. I've attached the letter we sent out back in October which shows the boundary of the actual landfill expansion project we are currently preparing a permit application for, and some correspondences relating to a previous version of this project. Basically the current project is about half the size of the previous project. The smaller project is located within the same footprint as the larger project. The site is located on Old Town Tax Map 3 lot 1. Let me know if there is any other information you would need.
Thanks
Mike

Michael Booth P.E.
Sevee & Maher Engineers, Inc.
4 Blanchard Road
PO Box 85A
Cumberland, ME 04021
Phone 207.829.5016
Cell Phone 207-749-2867
Fax 207.829.5692

Sent: Wednesday, January 07, 2015 12:48 PM
To: Mike Booth
Subject: Old Town landfill project - MHPC# 1488-14

Michael:

Per your voice message yesterday, please see attached a letter about a landfill project in Old Town that was issued in Sept. 2014.

If this is not the project you are looking for, please give me more information including street address, map, lot, a topo map indicating the site etc. and I will search our files again.

Let me know, Robin

Robin K. Reed
Maine Historic Preservation Commission
55 Capitol Street
65 State House Station
Augusta, ME 04333
phone: 207-287-2132 ext. 1
fax: 207-287-2335
robin.k.reed@maine.gov
http://www.maine.gov/mhpc

Mike Booth

From: Danielson, Thomas J <Thomas.J.Danielson@maine.gov>
Sent: Tuesday, January 06, 2015 2:40 PM
To: Mike Booth
Subject: RE: Inquiry into Significant Rivers and Streams Associated with Landfil Near the Juniper Ridge Landfill in Old Town Maine

Hi Mike,
The attached letter from 2004 is still valid. Also, it is the responsibility of the applicant or qualified consultant to walk the property and identify and delineate any waterbodies that might be impacted by the project, including small streams or vernal pools that often are not shown on maps.
Best regards,
Tom

****

Tom Danielson, Biologist
Maine Department of Environmental Protection
17 State House Station
Augusta, ME 04333-0017
phone: (207) 441-7430
fax: (207) 287-7826
thomas.j.danielson@maine.gov

From: Mike Booth [mailto:msb@smemaine.com]
Sent: Tuesday, January 06, 2015 11:31 AM
To: Danielson, Thomas J
Subject: Inquiry into Significant Rivers and Streams Associated with Landfil Near the Juniper Ridge Landfill in Old Town Maine

Dear Tom
On October 3, 2014 we sent the Department the attached letter requesting any information on Significant Rivers and Streams associated with land near the Juniper Ridge Landfill in Old Town Maine, which is attached. Do date we haven't received a response and we are following up with this email. We are working on a permit for an expansion of this facility need this information as part of preparing this application. You had responded to a similar request for information back in 2004, which is attached to the letter and we are just checking to confirm the information contained in that letter is still valid. We would appreciate a response as soon as possible. If you have any questions please contact me via email or at 829-5016.
Thanks
Mike Booth

Michael Booth P.E.
Sevee & Maher Engineers, Inc.
4 Blanchard Road
PO Box 85A
Cumberland, ME 04021
Phone 207.829.5016
Cell Phone 207-749-2867

Fax 207.829.5692

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
93 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0093

PAUL R. LEPAGE
GOVERNOR

WALTER E. WHITCOMB
COMMISSIONER

October 7, 2014

Michael Booth
Sevee & Maher Engineers, Inc.
4 Blanchard Road
Cumberland Center, ME 04021

Re: Rare and exemplary botanical features in proximity to: Project #14101.00, Juniper Ridge Landfill, ~54-acre expansion, Old Town, Maine

Dear Mr. Booth:

I have searched the Natural Areas Program's Biological and Conservation Data System files in response to your request received October 6, 2014 for information on the presence of rare or unique botanical features documented from the vicinity of the project site 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.

MAINE NATURAL AREAS PROGRAM
MOLLY DOCHERTY, DIRECTOR

PHONE: (207) 287-8044
FAX: (207) 287-8040
TTY: (207) 287-2213

The Natural Areas Program 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. The Natural Areas Program welcomes coordination with individuals or organizations proposing environmental alteration, or conducting environmental assessments. If, however, data provided by the Natural Areas Program are to be published in any form, the Program should be informed at the outset and credited as the source.

The 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 the Natural Areas Program 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,

Don Cameron
Ecologist
Maine Natural Areas Program
207-287-8041
don.s.cameron@maine.gov

Rare & Exemplary Botanical Features within 4 miles of

Project: #14101.00, Juniper Ridge Landfill, ~54-acre expansion, Old Town, Maine

Scientific Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Bluebell - balsam ragwort shoreline outcrop	<null >	S2	G3	2010-07-13	1	Non-tidal rivershore (non-forested, seasonally wet)
Carex adusta	E	S2	G5	1916-07-01	1	Rocky coastal (non-forested, upland)
Carex bullata	SC	S2	G5	1983-08-12	1	<null>
Carex oronensis	T	S3	G3	2011-07-25	33	Old field/roadside (non-forested, wetland or upland)
Carex oronensis	T	S3	G3	1997-07-17	4	Old field/roadside (non-forested, wetland or upland)
Carex oronensis	T	S3	G3	1987-06-08	9	Old field/roadside (non-forested, wetland or upland)
Carex oronensis	T	S3	G3	1916-07-01	65	Old field/roadside (non-forested, wetland or upland)
Cyperus squarrosus	SC	S2	G5	1942-09-09	1	Non-tidal rivershore (non-forested, seasonally wet)
Cyperus squarrosus	SC	S2	G5	1899-09-18	7	Non-tidal rivershore (non-forested, seasonally wet)
Cypripedium arietinum	E	S1	G3	1886-05-30	5	Forested wetland
Cypripedium reginae	T	S3	G4	1943-07-09	22	Forested wetland
Domed bog ecosystem	<null >	S3	GNR	2012-09-12	6	Forested wetland

Project: #14101.00, Juniper Ridge Landfill, ~54-acre expansion, Old Town, Maine

Scientific Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Elymus macgregorii	SC	S2	GNR	2010-07-13	7	<null>
Fimbristylis autumnalis	T	S2S3	G5	1899-09-18	14	Open wetland, not coastal nor rivershore (non-forested, wetland)
Houstonia longifolia var. longifolia	SC	S2S3	G4G5TNR	2010-07-13	4	Non-tidal rivershore (non-forested, seasonally wet)
Platanthera flava var. herbiola	SC	S2	G4T4Q	1933-07-06	5	Non-tidal rivershore (non-forested, seasonally wet)
Raised level bog ecosystem	<null>	S4	GNR	2009-07-09	14	Forested wetland
Silver maple floodplain forest	<null>	S3	GNR	2010-07-13	37	Forested wetland
Spiranthes lucida	T	S1	G5	1946-07-08	8	Non-tidal rivershore (non-forested, seasonally wet)
Unpatterned fen ecosystem	<null>	S5	GNR	2009	8	Forested wetland
Viola novae-angliae	SC	S2	G4Q	2010-07-13	10	Non-tidal rivershore (non-forested, seasonally wet)
Viola novae-angliae	SC	S2	G4Q	1934-10-24	11	Non-tidal rivershore (non-forested, seasonally wet)
Viola novae-angliae	SC	S2	G4Q	1916-07-01	9	Non-tidal rivershore (non-forested, seasonally wet)

STATE RARITY RANKS

S1 Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.

S2 Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.

S3 Rare in Maine (20-100 occurrences).

S4 Apparently secure in Maine.

S5 Demonstrably secure in Maine.

SU Under consideration for assigning rarity status; more information needed on threats or distribution.

SNR Not yet ranked.

SNA Rank not applicable.

S#? Current occurrence data suggests assigned rank, but lack of survey effort along with amount of potential habitat create uncertainty (e.g. S3?).

Note: **State Rarity Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines State Rarity Ranks for animals.

GLOBAL RARITY RANKS

G1 Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extinction.

G2 Globally imperiled because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.

G3 Globally rare (20-100 occurrences).

G4 Apparently secure globally.

G5 Demonstrably secure globally.

GNR Not yet ranked.

Note: **Global Ranks** are determined by NatureServe.

STATE LEGAL STATUS

Note: State legal status is according to 5 M.R.S.A. § 13076-13079, which mandates the Department of Conservation to produce and biennially update the official list of Maine's **Endangered** and **Threatened** plants. The list is derived by a technical advisory committee of botanists who use data in the Natural Areas Program's database to recommend status changes to the Department of Conservation.

E ENDANGERED; Rare and in danger of being lost from the state in the foreseeable future; or federally listed as Endangered.

T THREATENED; Rare and, with further decline, could become endangered; or federally listed as Threatened.

NON-LEGAL STATUS

SC SPECIAL CONCERN; Rare in Maine, based on available information, but not sufficiently rare to be considered Threatened or Endangered.

PE Potentially Extirpated; Species has not been documented in Maine in past 20 years or loss of last known occurrence has been documented.

Visit our website for more information on rare, threatened, and endangered species!
http://www.maine.gov/dacf/mnap

ELEMENT OCCURRENCE RANKS - EO RANKS

Element Occurrence ranks are used to describe the quality of a rare plant population or natural community based on three factors:

- **<u>Size</u>**: Size of community or population relative to other known examples in Maine. Community or population's viability, capability to maintain itself.
- **<u>Condition</u>**: For communities, condition includes presence of representative species, maturity of species, and evidence of human-caused disturbance. For plants, factors include species vigor and evidence of human-caused disturbance.
- **<u>Landscape context</u>**: Land uses and/or condition of natural communities surrounding the observed area. Ability of the observed community or population to be protected from effects of adjacent land uses.

These three factors are combined into an overall ranking of the feature of **A**, **B**, **C**, or **D**, where **A** indicates an **excellent** example of the community or population and **D** indicates a **poor** example of the community or population. A rank of **E** indicates that the community or population is **extant** but there is not enough data to assign a quality rank. The Maine Natural Areas Program tracks all occurrences of rare (S1-S3) plants and natural communities as well as A and B ranked common (S4-S5) natural communities.

Note: **Element Occurrence Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines Element Occurrence ranks for animals.

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
73 COBB ROAD
ENFIELD, ME 04493
TEL: 207-732-4132

PAUL R. LEPAGE
GOVERNOR

CHANDLER E. WOODCOCK
COMMISSIONER

October 6, 2014

Sevee & Maher
Attn: Michael Booth, P.E.
4 Blanchard Road, PO Box 85A
Cumberland Center, ME 04021

Dear Michael:

I have received your letter requesting Essential and Significant Habitat information for your project located in Old Town.

Essential Habitats:

Essential Habitats are defined as "areas currently or historically providing physical or biological features essential to the conservation of an endangered or threatened species in Maine and which may require special management considerations". Essential Habitat protection in Maine currently applies to roseate and least terns, and piping plover nest sites. Additional listed species may receive attention in the future.

According to MDIFW records, there are no Essential Habitats known to be associated with your project area located in

Significant Wildlife Habitats:

The Natural Resources Protection Act (NRPA), administered by the Maine Department of Environmental Protection (DEP), provides protection to certain natural resources including Significant Wildlife Habitats. Significant Wildlife Habitats are defined by the NRPA as:

> Habitat for state and federally listed endangered and threatened species.
>
> High and moderate value deer wintering areas (DWAs) and travel corridors.
>
> High and moderate value waterfowl and wading bird habitats (WWHs), including:
>
> nesting and feeding areas.
>
> Shorebird nesting, feeding, and staging areas.
>
> Seabird nesting islands.

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
73 COBB ROAD
ENFIELD, ME 04493
TEL: 207-732-4132

PAUL R. LEPAGE
GOVERNOR

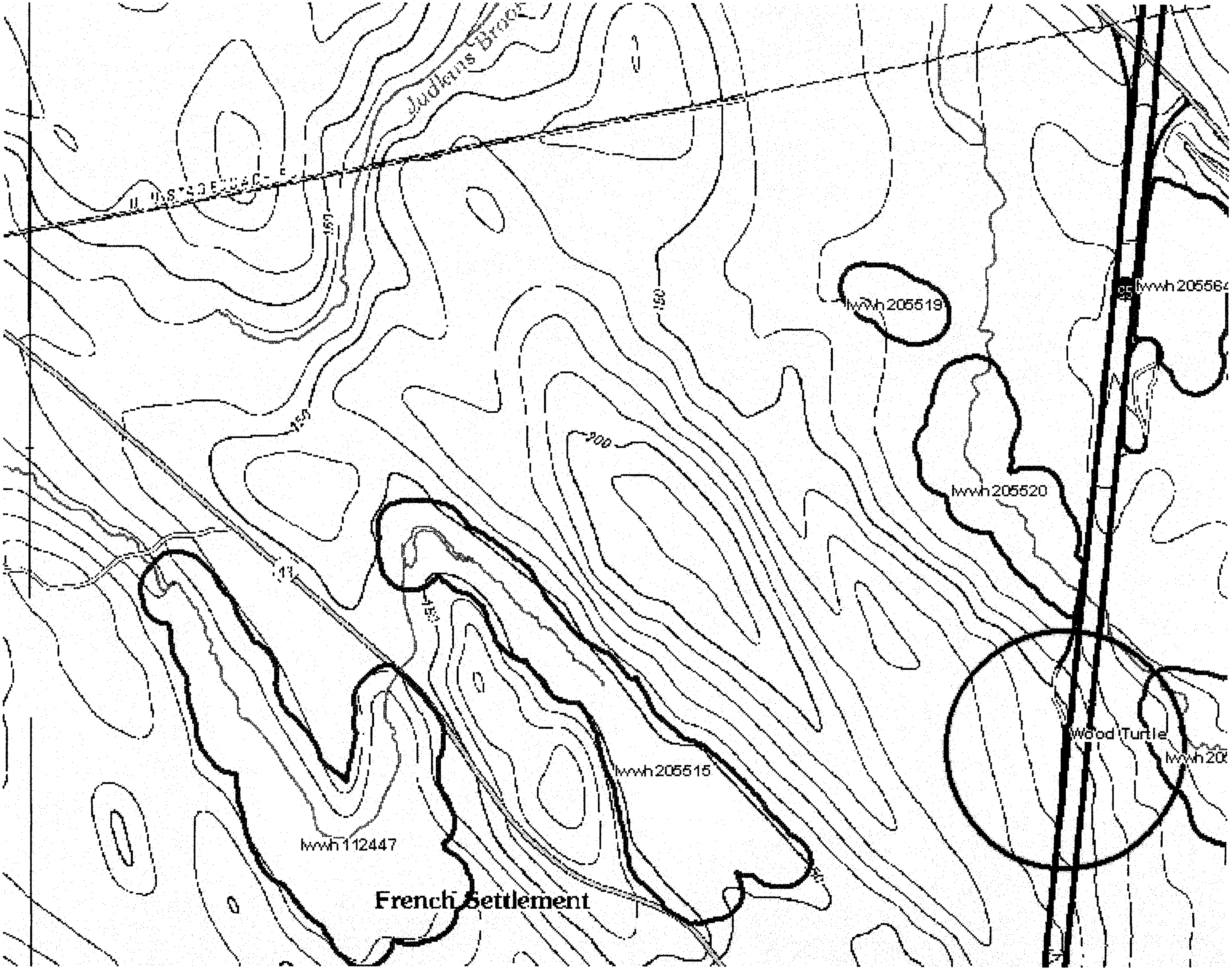
CHANDLER E. WOODCOCK
COMMISSIONER

According to MDIFW records, there are three Significant Wildlife Habitats potentially associated with your project area located in Old Town. None appear to be within the proposed expansion area but are found within the ownership or bordering to, so I have included them for your consideration. These include three Inland Waterfowl/Wadingbird Habitats (IWWH). All three IWWHs (205515, 205519, and 205520 are rated as Moderate Value. Please refer to the enclosed map.

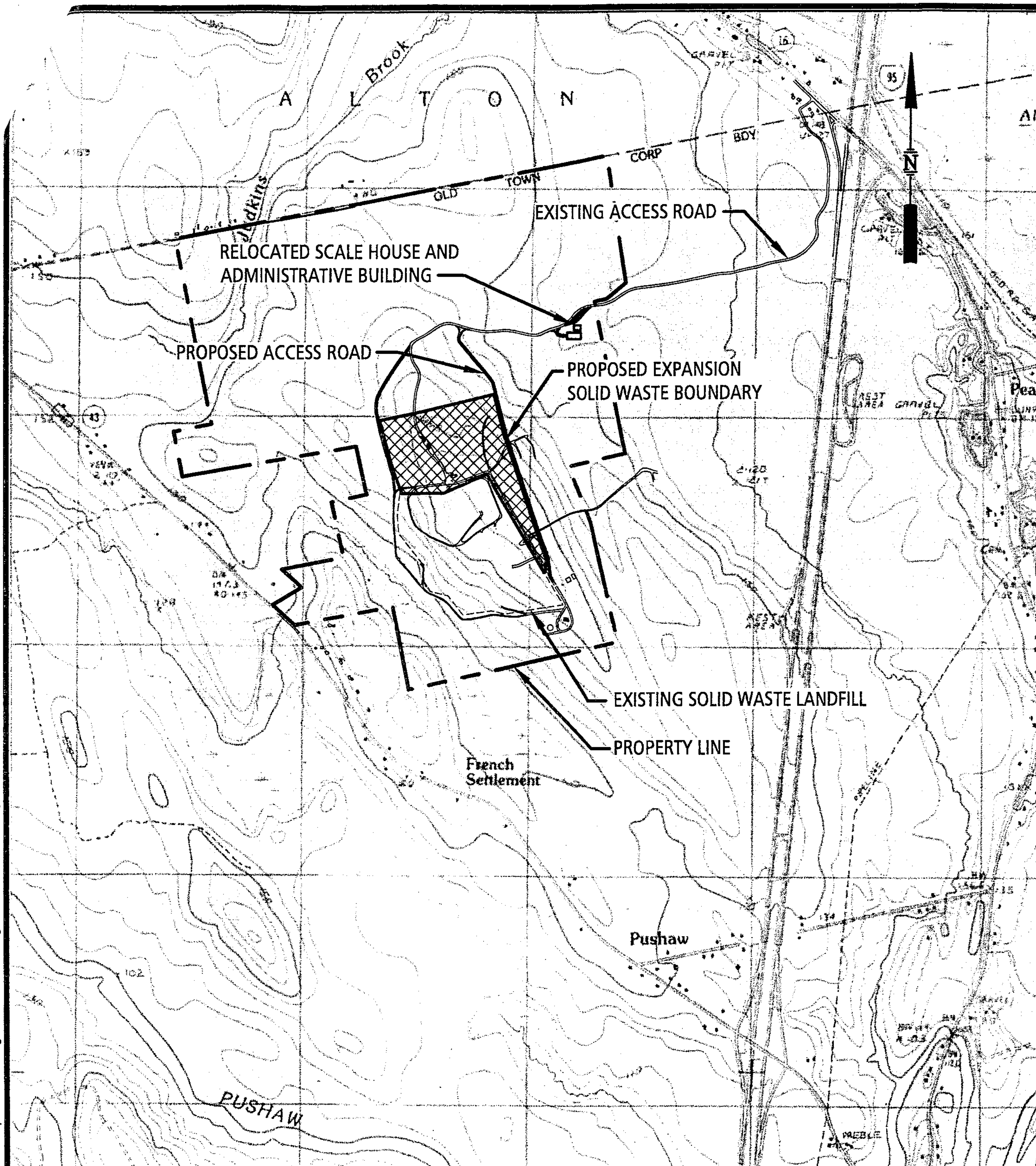
Finally, MDIFW maintains a statewide database of endangered, threatened and special concern wildlife species and their habitats. These include endangered and threatened species not included under Essential Habitat and species that are of special concern to MDIFW but for which sufficient data may be currently lacking. Review of department records indicate no such habitats associated within your project area.

Sincerely,

Mark A. Caron
Regional Wildlife Biologist
Phone: 207-732-4132 ext: 4008
Fax: 207-732-4405
E-Mail: mark.caron@maine.gov



Judkins Brook
150
200
lwwh205519
lwwh205564
lwwh205520
Wood Turtle
lwwh205515
lwwh112447
French Settlement



SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

1000 0 2000 FEET

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL · CIVIL · GEOTECHNICAL · WATER · COMPLIANCE

DWG: PRESENTATION LMN: STANTEC CTB: SME-STD REV: 10/2/14

\\Nserver\cfs\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Acad\Figures\Presentation.dwg, 10/2/2014 1:03:23 PM, paf

Appendix C Summary Letter of 2008 Field Work

Stantec

January 27, 2009

Sevee & Maher Engineers, Inc
Attn: Steve Patch
P.O. Box 85A
Cumberland Center, Maine 04021

Subject: Proposed Expansion of the Juniper Ridge Landfill, West Old Town, Maine

Dear Mr. Patch:

This letter is offered in response to your request for documentation of observations and findings made by Stantec Consulting (Stantec) in connection with resource assessments conducted at the Juniper Ridge Landfill (Landfill) in West Old Town, Maine. The operator of the Landfill has proposed to expand the facility within the existing Landfill property. This expansion will present some direct impact to natural resources found on the property. These impacts are summarized below and presented in greater detail in our wetland delineation report and function and value assessment.

According to the Chapter 400 of the Maine Department of Environmental Protection's *Solid Waste Management Rules* (Chapter 400), a solid waste facility with waste handling capacity of more than three acres must demonstrate that the proposed activity "will not unreasonably adversely affect protected natural resources." Chapter 400 defines "protected natural resources" to include coastal sand dune systems, coastal wetlands, Significant Wildlife Habitat, fragile mountain areas, freshwater wetlands, great ponds or rivers, streams, or brooks as these are defined in 38 MRSA § 480-B of the Natural Resources Protection Act.

Stantec was contracted to conduct field work and contact natural resources agencies to identify protected natural resources on and adjacent to the subject property. Of the above-listed protected natural resources, freshwater wetlands, streams, and Significant Wildlife Habitat were identified on or adjacent to the subject property. Although not included within the definition of protected natural resources, information also was gathered on rare, threatened and endangered species. One species of Special Concern, wood turtle (*Clemmys insculpta*), has been historically documented in the vicinity of the project area but was not observed on the subject property.

Freshwater Wetlands and Streams:
Stantec delineated wetlands and streams within the proposed Landfill expansion area and within an approximate 500-foot buffer zone. In addition, aerial photograph interpretation and limited ground-truthing were used to identify wetlands and streams located outside the assumed 500-foot buffer but within approximately 2,000 feet of the proposed Landfill expansion. Wetland communities identified on and adjacent to the property are forested, scrub-shrub, emergent, and open water. These communities occur in various combinations with each other, but the most commonly occurring type of wetland is forested or formerly forested. Three of these wetlands include stream resources. The proposed expansion will directly impact approximately 4.85 acres of primarily forested or formerly forested wetlands. The wetlands that will be impacted include several relatively small, isolated and generally low functioning resources. In addition, small areas (0.36 acres and 0.08 acres) within two of the larger and higher functioning wetland communities will be filled. The impact to these larger wetlands should not

Stantec Consulting 30 Park Drive Topsham, ME 04086 (207) 729-1199 (207) 729-2715 Fax stantec.com

significantly change their functional capacity. There are no direct impacts proposed to any of the identified stream resources.

Significant Wildlife Habitat:
The Maine Department of Inland Fisheries and Wildlife (MDIFW) identified Waterfowl and Wading Bird Habitat (WWH) in three of the open water/emergent wetland communities. These wetlands are located to the south, east, and northwest of the existing Landfill. The existing Landfill encroaches into the upland habitat of the WWH located to its south, but no additional direct impact is planned to the upland habitat within 250 feet of this WWH or to the wetland itself. The WWH mapped to the east is located more than 2,400 feet from the limits of the proposed expansion, and there is no anticipated direct impact to this habitat. The WWH located to the northwest of the Landfill is located approximately 1,600 feet from the limits of the proposed expansion, and there are no anticipated impacts to this habitat. Vernal pool surveys conducted in 2008 identified five Significant Vernal Pools as defined by Chapter 335, Significant Wildlife Habitat, of the Maine Natural Resource Protection Act. These pools are located primarily to the north and east of the proposed Landfill expansion. The existing Landfill access road occurs within 250 feet of one of these Significant Vernal Pools, but there is no road upgrade proposed and no other development planned within this habitat. No development currently exists or is proposed within 250 feet of the other four Significant Vernal Pools on this portion of the property.

Rare, Threatened or Endangered Species:
Correspondence from MDIFW stated that there are no Essential Habitats—those habitats essential for endangered or threatened wildlife species—on or adjacent to the subject property. In addition, MDIFW has stated that their database, which includes endangered, threatened, and special concern wildlife species and their habitat, indicates no other wildlife habitats of concern in this area. MDIFW has a historic record of a road-kill wood turtle in the vicinity of the Landfill property. It was found near the abandoned rest area on northbound Interstate 95, approximately 0.6 mile east of the Landfill. The wood turtle is listed as a species of Special Concern in Maine and prefers slow moving streams and rivers with sandy substrates. They also utilize vernal pools during the early spring. Wood turtles were not observed at any of the 27 vernal pools that were surveyed within the project area.

The U.S. Fish and Wildlife Service indicated that there are no federally-listed species of wildlife or plants in this area. The Maine Natural Areas Program also has indicated that there are no rare botanical features documented specifically within the project area. Based upon agency correspondence and Stantec's site observations, there does not appear to be rare, threatened, or endangered species on or immediately adjacent to the subject property.

Please contact me if you have any questions or require additional information.

Sincerely,
STANTEC CONSULTING

Jonathan T. Ryan

Jonathan T. Ryan
Project Manager

PN 195600338

Stantec

Appendix D Acoustic NLEB Survey Summary Memo

Stantec **Memo**

To:	NEWSME Landfill Operations LLC	From:	Trevor Peterson Jake Riley Stantec Consulting Services Inc.
File:	195600983	Date:	July 2, 2015

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

Introduction

NEWSME Landfill Operations, LLC (NEWSME), as operator, and the State of Maine Bureau of General Services (BGS), as owner requested an acoustic survey to determine presence or probable absence of federally threatened northern long-eared bats (*Myotis septentrionalis*) (NLEB) at Juniper Ridge Landfill in Old Town, Maine. BGS and NEWSME are proposing to expand the current landfill facility site by 74 acres (54 acres of which is landfill footprint), which includes the clearing of second growth forested habitat. Stantec Consulting Services Inc. (Stantec) conducted this acoustic survey on the nights of June 10 and 11, 2015, according to the methods described in the project specific NLEB Sampling Plan, approved by the US Fish and Wildlife Service (USFWS), which was based on the 2015 Range-wide Indiana Bat Summer Survey Guidelines (USFWS Guidelines). The summer survey protocol for Indiana Bats is being applied to northern long-eared bats throughout their range.

Methods

Stantec deployed three Anabat SD1 (Titley Electronics) detectors at the site on the afternoon of June 10, 2015 (see Figure 1 for exact locations). Stantec fixed two detectors to tree trunks, ~1.5 meters (m) above ground, orienting the detectors along the edge of potential flight corridors. We fixed one detector to a wooden post, also ~1.5 m above ground and oriented in a similar manner. Detector locations met the criteria for detector placement described in the USFWS Guidelines. The detector locations were spread out across the 74-acre facility site area, within potential NLEB habitat and corridors identified by Stantec based on analysis of aerial imagery and on-the-ground natural resource surveys (Figure 1). Detectors were housed in waterproof PVC boxes with a 45 degree angle PVC elbow used to weatherproof the microphone.

Detector #1 was deployed on the edge of a narrow (5-m wide) dirt road running through a stand of sugar maple (*Acer saccharinum*) trees managed as a sugar bush (Figure 2). The habitat surrounding the detector consisted of sugar maple and red maple (*Acer rubrum*) trees. The detector was oriented 18 m from the clearing for the landfill access road and parallel to the edge of the dirt logging road. We estimated the range of the detection to be 20 m in front of the unit. The area has a moderate roost potential due to the presence of large trees.

Detector #2 was deployed at the intersection of two paths along a dirt skidder road, in the middle of the proposed expansion area. The detector was oriented southward, with an estimated range of 18 m (Figure 3). The habitat surrounding the detector was an open clearing with mature forest, consisting of red maple, sugar maple, hemlock (*Tsuga canadensis*), and beech (*Fagus grandifolia*), along with subcanopy paper birch (*Betula papyrifera*) and white pine (*Pinus strobus*). The area has a moderate roost potential due to the presence of large trees.

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

Detector #3 was deployed on the edge of a marsh clearing, near the proposed scale building. We estimated the range of the detection to be 23 m in front of the unit (Figure 4). The habitat surrounding the detector was an open emergent wetland with a surrounding forest of red maple, aspen (*Populus tremuloides*), and mixed hardwoods. The area has a high roost potential due to the presence of snags in the wetland.

Detectors operated successfully for two nights each, recording a total of six detector nights of data, which exceeds the required level of survey effort in the USFWS Guidelines for the approximately 74 acres of potential habitat proposed for impact. Weather conditions (as reported at the Bangor International Airport NOAA weather station) met the criteria described in the USFWS Guidelines for both nights (no fog or precipitation, sustained wind speeds less than 9 miles/hour and temperatures above 50° F during the first 5 hours of each survey night), and detectors appeared to be operating normally when deployed and demobilized.

Results

We analyzed data using Echoclass software (version 3.1) and BCID software (version 2.7c). Neither program identified any bat passes as NLEB at any of the three sites. BCID software identified a total of 30 bat passes across the 3 sites, including the silver-haired bat (Lasionycteris noctivagans; LANO) (n = 13), big brown bat (Eptesicus fuscus; EPFU) (n = 11), little brown bat (Myotis lucifugus; MYLU) (n = 3), hoary bat (Lasiurus cinereus; LACI) (n = 2), and eastern red bat (Lasiurus borealis; LABO) (n = 1) Table 1. Echoclass software identified a total of 26 bat passes across the 3 sites, including the big brown bat (n = 18), silver-haired bat (n = 2), eastern red bat (n = 2), hoary bat (n = 2), and little brown bat (n = 2) (Table 2).

Conclusions

Acoustic bat surveys followed current USFWS Guidelines and occurred during nights with suitable conditions. All of the equipment and analysis software used functioned properly. BCID and Echoclass software yielded slightly different results, with BCID identifying a total of 30 bat passes and Echoclass identifying a total of 26 bat passes during the survey period. According to BCID, silver-haired bats (n = 13) outnumbered big brown bats (n = 11), whereas Echoclass identified 18 big brown bats and 2 silver-haired bats. This difference is likely a result of the similar acoustic call characteristics between these two species. Neither program detected the presence of NLEB at the Juniper Ridge Landfill Expansion Phase 2. Based on this information, Stantec did not document presence of NLEB in the facility site area following the USFWS Guidelines and the project specific NLEB Sampling Plan. The attached datasheets include details of detector placement, operation, and analysis.

Stantec Consulting Services Inc.

Trevor Peterson
Senior Wildlife Biologist
Phone: 207-406-5497
trevor.peterson@stantec.com

Jake Riley, CFP, CE
Project Manager/Fisheries Biologist
Phone: 207-406-5478
jake.riley@stantec.com

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

Attachments: Tables
Figures
Acoustic Bat Survey Datasheets

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

Table 1. Results of analysis using BCID software (Version 2.7c) for acoustic surveys at Juniper Ridge

Detector Number	Night of	EPFU	LANO	LABO	LACI	MYLU	Total
1	6/10/15	1	4	0	1	1	7
	6/11/15	4	1	1	0	0	6
2	6/10/15	3	2	0	0	2	7
	6/11/15	1	0	0	0	0	1
3	6/10/15	0	5	0	0	0	5
	6/11/15	2	1	1	0	0	4
Total		11	13	1	2	3	30

Table 2. Results of analysis using Echoclass software (Version 3.1) for acoustic surveys at Juniper Ridge

Detector Number	Night of	EPFU	LANO	LABO	LACI	MYLU	Total
1	6/10/15	3	2	0	1	0	6
	6/11/15	4	0	1	0	0	5
2	6/10/15	4	0	0	1	2	7
	6/11/15	0	0	1	0	0	1
3	6/10/15	5	0	0	0	0	5
	6/11/15	2	0	0	0	0	2
Total		18	2	2	2	2	26

V:\1956\active\195600983\drawing\mxd\Avian_Bat\00983_01_NorthernLongEaredBatAcousticSurvey.mxd Revised: 2015-06-18 By: djohnson

195600983

Stantec

30 Park Drive
Topsham, ME USA 04086
Phone (207) 729-1199

Prepared by DLJ on 2015-06-17
Reviewed by JWR on 2015-06-18

00983_01_NorthernLongEaredBatAcousticSurvey.mxd

Legend

- Acoustic Anabat Detector (6/10/15 - 6/12/15)
- 2014/2015 Delineated Wetland
- Approximate 2015 Proposed Expansion

Client/Project

NEWSME Landfill Operations LLC
Juniper Ridge Landfill Expansion
Old Town, Maine

Figure No.

1

Title

Northern Long-eared Bat Acoustic Survey

6/18/2015

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

Figure 2. View of acoustic Detector #1 (gray box) looking west. Stantec, June 10, 2015.

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

Figure 3. View of acoustic Detector #2 (gray box) looking southwest. Stantec, June 10, 2015.

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

Figure 4. View of acoustic Detector #3 (gray box) looking south. Stantec, June 10, 2015.

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

ACOUSTIC BAT DATASHEETS

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

Juniper Ridge Landfill Expansion Project – Acoustic Bat Survey Datasheet

Site. ID: 1 Site Location: Sugar Maple Area West of Access Road

Lat/Long: 44.98385 68.72785 (WM Point 30) County/State: Penobscot ME

Biologist(s): J. Riley, T. Peterson

Deployment Date: 6/10/15 Collection Date: 6/12/15

Detection Time Begin: 1800 pm Time End: 8:00 am am

Detector #: 4210 CF card #: 4 GB Sensitivity: 6.75

RESULTS	Echoclass Day 1:	Echoclass Day 2:	BCID Day 1:	BCID Day 2:
Number of files recorded	11	8	7	6
Number of NLEB files recorded	0	0	0	0
Maximum Likelihood Ratio	N/A	N/A	N/A	N/A

Range 40 ft

HABITAT DESCRIPTION

Estimated Canopy Closure (circle one): Closed **Moderate** – In Sugar Maple Habitat Open

Dominant Canopy Species: Avg. DBH range (inches): 6

Red & Sugar Maple

Roost Tree Potential; (circle one): High **Moderate** Low

Roost Tree Type (circle one): **Large Trees** Snags Both

Estimated Subcanopy Closure (circle one): Dense ~~Moderate~~ **Open**

Dominant Subcanopy Species: Avg. DBH (inches): NA

Herbaceous Shrubs – Ferns – No Secondary Growth

Dominant Shrub Species:

Bracken Fern

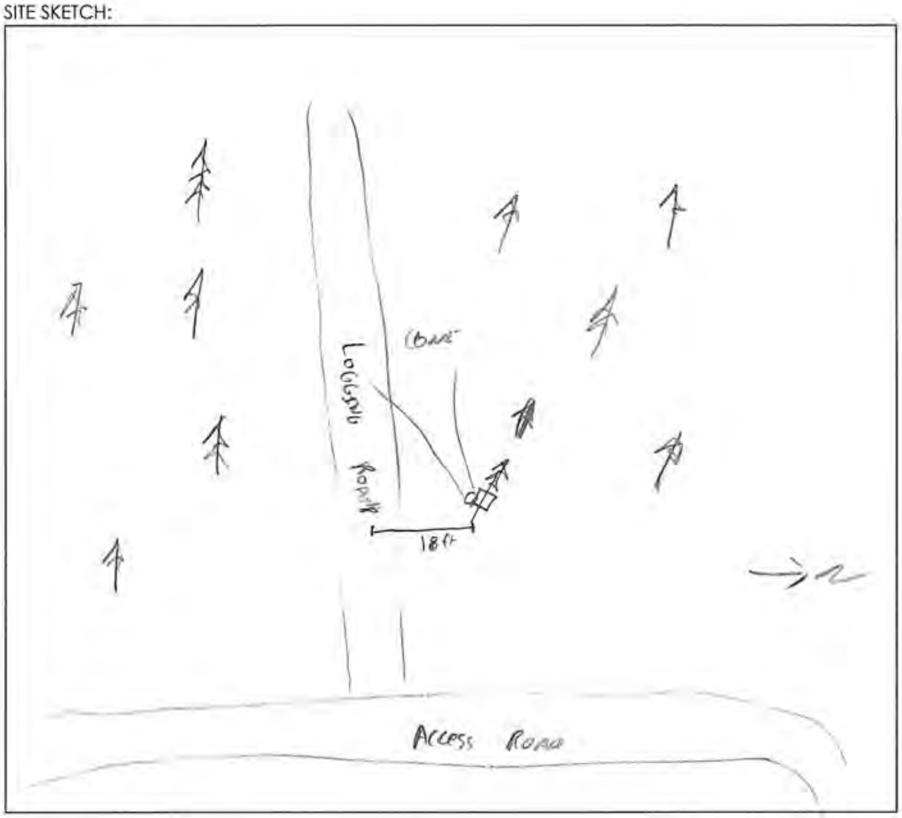
Site Sketch on Reverse Side

Stantec

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

BEARING OF DETECTOR ORIENTED AT 245°

SITE SKETCH:



Estimated Distance to Water:______________ Type?:______________

Photo No.: Detector-View______________ Surrounding Habitat______________

Weather Notes: Sunny, 70s - Suitable wx based on Bangor intl airport records

Comments: 6/10- 185 files; 6/11 - 15 files

____

Stantec

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

30 meters from Detector 1

Juniper Ridge Landfill Expansion Project – Acoustic Bat Survey Datasheet

Site. ID: 2 Site Location: SKSODEN RD (IN MIDDLE OF EXPANSIONS (Crossway intersection between 2 roads)

Lat/Long: 44.98334 68.72418 (WAY POINT 31) County/State: PENOBSCOT / MAINE

Biologist(s): S. RILEY + T. PETERSON

Deployment Date: 6/10/15 Collection Date: 6/[illegible]/15

Detection Time Begin: 6 pm pm Time End: 8 am am

Detector #: 5467 CF card #: N/A Sensitivity: 6.75

RESULTS	Echoclass		BCID	
	Day 1:	Day 2:	Day 1:	Day 2:
Number of files recorded	41	7	7	1
Number of NLEB files recorded	0	0	0	0
Maximum Likelihood Ratio	N/A	N/A	N/A	N/A

HABITAT DESCRIPTION Open Clearing within MATURE FOREST

Estimated Canopy Closure (circle one): Closed Moderate Open

Dominant Canopy Species: Avg. DBH range (inches): 5

RED MAPLE, HEMLOCH, Sugar MAPLE, BEECH

Roost Tree Potential: (circle one): High Moderate Low

Roost Tree Type (circle one): Large Trees Snags Both

Estimated Subcanopy Closure (circle one): Dense Moderate Open

Dominant Subcanopy Species: Avg. DBH (inches):

Paper BIRCH + BEECH, White PINE

Dominant Shrub Species:

RASPBERRY, SEDGES, BRACKEN FERN

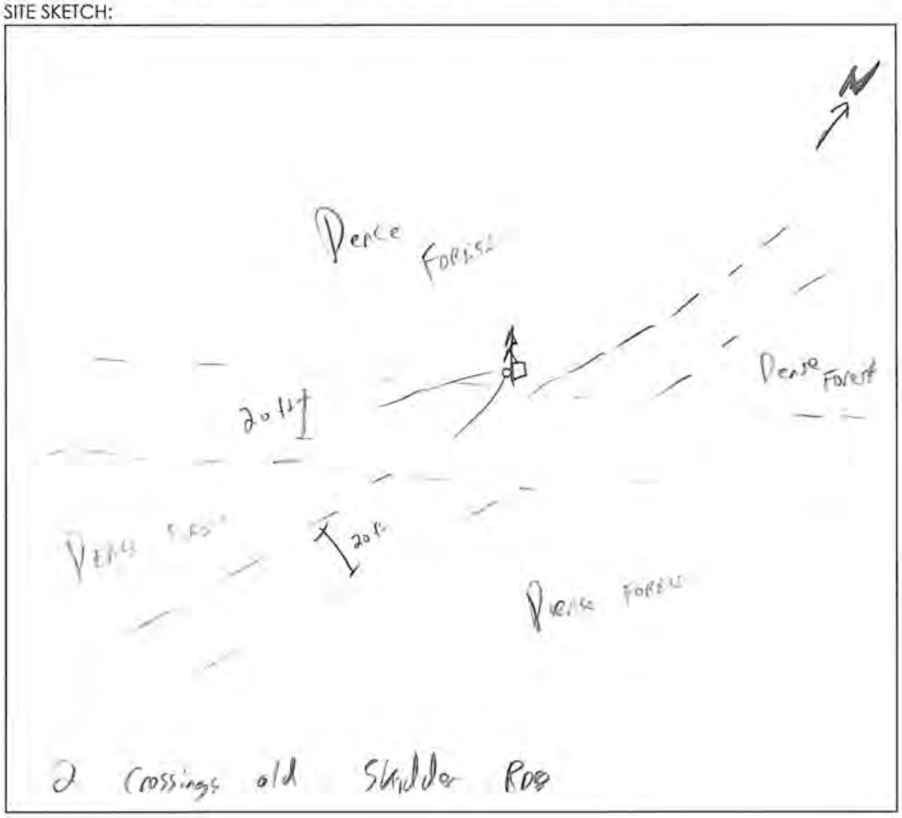
Site Sketch on Reverse Side

Stantec

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

60 ft of Detection
Bearing of Detector 225

SITE SKETCH:



Estimated Distance to Water:__________ Type?:__________

Photo No.: Detector-View__________ Surrounding Habitat D

Weather Notes: Sunny 70s - suitable weather based on Bangor int'l airport records

Comments: 6/10 - 142 files; 6/11 - 9 files

Stantec

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

Juniper Ridge Landfill Expansion Project – Acoustic Bat Survey Datasheet

Site. ID: 3 Site Location: EDGE OF MARSH Clearing – NEAR FUTURE SCALE BUILDING

Lat/Long: 44.98658 68.71901 (Way point 58) County/State: PENOBSCOT, ME

Biologist(s): S. RILEY T. Peterson

Deployment Date: 6/10/15 Collection Date: 6/12/15

Detection Time Begin: 6 pm pm Time End: 8:00 am am

Detector #: 3073 CF card #: NA Sensitivity: 7

RESULTS	Echoclass		BCID	
	Day 1:	Day 2:	Day 1:	Day 2:
Number of files recorded	7	7	5	4
Number of NLEB files recorded	0	0	0	0
Maximum Likelihood Ratio	N/A	N/A	N/A	N/A

HABITAT DESCRIPTION OPEN EMERGENT WETLAND

Estimated Canopy Closure (circle one): Closed Moderate Open

Dominant Canopy Species: Avg. DBH range (inches): 4

Surrounding Forest Red Maple, Aspen, Mixed HARDWOODS

Roost Tree Potential; (circle one): High – SNAGS in WETLAND Moderate Low

Roost Tree Type (circle one): Large Trees Snags Both

Estimated Subcanopy Closure (circle one): Dense Moderate Open

Dominant Subcanopy Species: Some in there Avg. DBH (inches):

Red Maples, Aspen, Willow

Dominant Shrub Species:

SEDGES Raspberry, Fern

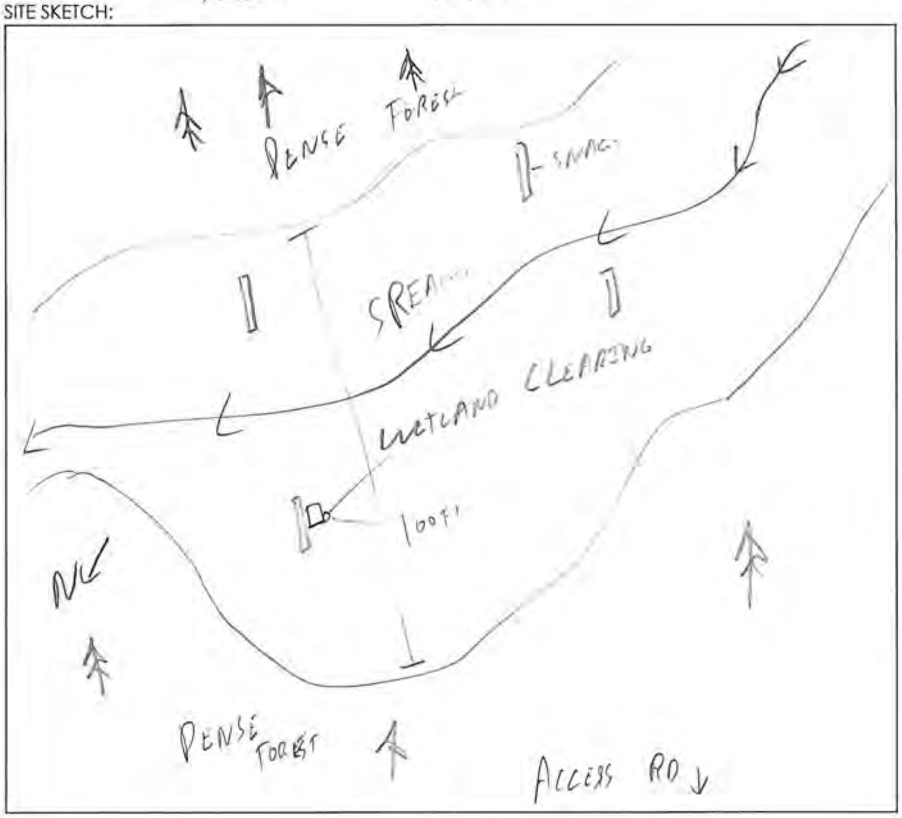
Site Sketch on Reverse Side

Stantec

Reference: Acoustic Bat Surveys at Juniper Ridge Landfill Expansion Phase 2

DETECTION RANGE = 60 ft
DETECTION BEARING 200

SITE SKETCH:



Estimated Distance to Water: 30 ft Type?: Stream

Photo No.: Detector-View ________ Surrounding Habitat Open MARSH

Weather Notes: verified suitable wx based on Bangor intl airport

Comments: 6/10 - 40 files, 6/11 - 11 files

Detector

Stantec

APPENDIX G

SOUND LEVEL ASSESSMENT REPORT - Epsilon

SOUND LEVEL ASSESSMENT REPORT

Juniper Ridge Landfill 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 Clock Tower Place, Suite 250
Maynard, MA 01754

July 7, 2015

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1.0 EXECUTIVE SUMMARY

An expansion of the existing Juniper Ridge Landfill (JRL) in Old Town, Maine has been proposed by NEWSME Landfill Operations, LLC (NEWSME) and the Maine Bureau of General Services (BGS). Under a separate application, an energy facility designed to burn landfill gas will be developed on the landfill property, and existing equipment for the management of solid waste will be relocated to the expansion portion of the site. A sound level impact assessment has been conducted by Epsilon Associates, Inc. (Epsilon) for this project, including both the landfill gas energy facility and the solid waste management equipment.

This sound level assessment consisted of a sound monitoring program which included a description of existing sound levels around the operating landfill and the measurement of potential noise sources, 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 DEP noise regulations from Chapter 400 of the Maine DEP solid waste rules, as well as the Old Town Chapter 24 Solid Waste Facility rules.

Sound sensitive receivers in all directions of the expansion 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 western area (i.e., Cells 14, 15, and 16) for this assessment under daytime and nighttime operating scenarios. Under both scenarios, sound levels due to the operation of the proposed energy facility in the southeastern corner of JRL were included. In addition, the sound level modeling conservatively includes an uncertainty factor of 2 dBA for calculated Project-Only sound levels.

During periods when the management of solid waste is occurring on the western side of the landfill expansion (Cells 14, 15 and 16), all modeling locations will be below the daytime noise limits. During nighttime operations (6 a.m. – 7 a.m.), landfill equipment with combined sound levels of 77 dBA at 50 feet, or less, will meet the nighttime noise limit at a distance of approximately 480[1] feet (or more) from the western property line. For example, a Caterpillar 836 compactor is 77 dBA or less at 50 feet, while the Caterpillar 826 compactor is 75 dBA or less at 50 feet. Either one of these pieces of equipment can operate during nighttime hours and meet the nighttime limit.

Sound level impacts from the management of solid waste in the northern, eastern, and southern regions (i.e., Cells 11, 12, and 13) of the landfill expansion were also considered. The predicted sound levels, including contribution from operation of the energy facility, are

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[1] 480 feet from the western property line is 60 feet from the expansion's solid waste boundary.

below the daytime and nighttime limits at all modeling locations; therefore, the proposed JRL expansion will meet both the local and state regulations with respect to noise when work is conducted in these general areas.

Therefore, operations in the landfill expansion area 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 western expansion area during nighttime operations in order to comply with the noise limits.

2.0 INTRODUCTION

NEWSME Landfill Operations, LLC (NEWSME) and Bureau of General Services (BGS) are proposing an expansion to develop an additional 9.35 million cubic yards of disposal capacity at the existing JRL in Old Town, Maine. Epsilon has been retained to conduct a sound level assessment report to examine potential noise impacts due to the expansion.

The expansion of the landfill will consist of continued use of the existing mobile noise sources within the 780 acre site. In addition to the proposed expansion, a new stationary noise source, the landfill gas to energy (LFGTE) facility, is planned to be developed on the landfill property. As part of the expansion application, mobile noise sources associated with the management of solid waste will eventually be relocated predominantly to the north and northwest of their current location. A LFGTE facility proposed to create electricity from combusting gas collected from the landfill will be located in the southeastern corner of the site. Both types of sources of sound are analyzed in this report.

This analysis has been prepared to address the requirements of the Maine DEP noise regulations from Chapter 400 of the Maine DEP solid waste rules, as well as the Old Town Chapter 24 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 Maine DEP under 38 M.R.S.A. § 1310-N are exempt from review under the Site Law).

The LFGTE facility was modeled in Cadna/A using sound data from their respective manufacturers. The landfill equipment was modeled in Cadna/A using sound pressure levels measured from existing equipment at the JRL. 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 METRICS

There are several ways in which sound (noise) levels are measured and quantified. All of them use the logarithmic decibel (dB) scale. The following information defines the noise measurement 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 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 three-decibel increase (to 53 dB), not a doubling to 100 dB. Thus, every three dB change in sound levels represents a doubling or halving of sound energy. Related to this is the fact that a change in sound levels of less than three dB is imperceptible to the human ear.

Another property of decibels is that if one source of noise is 10 dB (or more) louder than another source, then the total sound level is simply the sound level of the higher source. For example, a source of sound at 60 dB plus another source of sound at 47 dB is 60 dB.

The sound level meter used to measure noise is a standardized instrument.[2] It contains "weighting networks" to adjust the frequency response of the instrument to approximate that of the human ear under various circumstances. One network is the A-weighting network (there are also B- and C-weighting networks). The A-weighted scale (dBA) most closely approximates how the human ear responds to sound at various frequencies, and is the accepted scale used for community sound level measurements. Sounds are frequently reported as detected with the A-weighting network of the sound level meter. A-weighted sound levels emphasize the middle frequency (*i.e.,* middle pitched – around 1,000 Hertz sounds), and de-emphasize lower and higher frequency sounds. A-weighted sound levels are reported in decibels designated as "dBA." Sound pressure levels for some common indoor and outdoor environments are shown in Figure 3-1.

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 a large 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 of 0 to 100 percent. Several sound level metrics that are commonly reported in community noise monitoring are described below.

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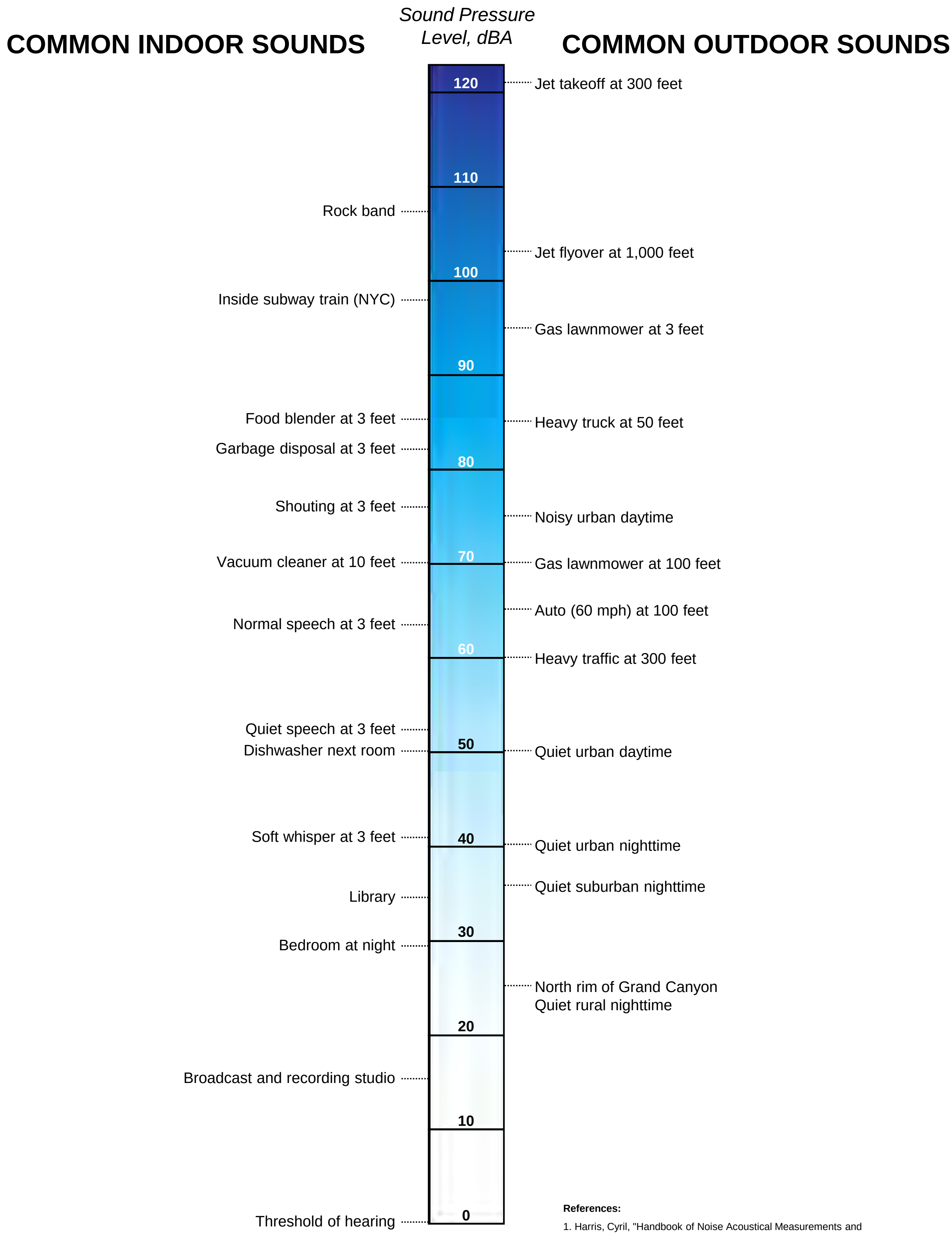
2 *American National Standard Specification for Sound Level Meters*, ANSI S1.4-1983, published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

- L_{90} is the sound level in dBA 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 noise 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 also 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 occasional loud noises.

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. In the event that noise-control is necessary for this project, the estimates of noise levels due to equipment operation are also presented in terms of octave band sound pressure levels.



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 Maine Department of Environmental Protection (DEP) under Chapter 400 of the Solid Waste Management 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 City of Old Town Solid Waste Ordinance "Chapter 24 Solid Waste Facilities." The most recent version was approved by the City Council June 1, 2009. Noise-related information required for a solid waste facility permit is contained in §24-8.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 §24-12.H. "Noise" and are virtually identical to the Maine DEP regulations for solid waste facilities. The term "protected location" in the Old Town noise regulations has the same definition as the Maine DEP regulations.

5.0 EXISTING SOUND LEVELS

The City of Old Town solid waste regulations require a description of the existing sound levels at the Facility (§24-8.J.). The State of Maine solid waste management regulations 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)].

An existing condition sound level measurement program was conducted in April 2014 as part of the Maine DEP Amended Solid Waste Order #S-020700-WD-N-A, condition #21. The details of the measurement program, including the existing sound levels, can be found in the report "Condition Compliance Noise Study, Juniper Ridge Landfill – Cell #9, Old Town, Maine", prepared for NEWSME Landfill Operations, LLC by Epsilon Associates, Inc., May 5, 2014. This report is included as Appendix A.

A landfill gas treatment facility (the Thiopaq® plant) was installed in January 2015 at JRL in the southeast corner of the property. Sound level contributions from the Thiopaq® plant were therefore not included in the ambient sound measurement program. To accurately represent the total sound levels in regard to the proposed expansion, a reference sound level measurement program was performed June 12, 2015 at the Thiopaq® plant. Reference sound levels of the Thiopaq® plant were measured as 71 dBA at 50 feet. These sound levels were entered into the noise model to determine total sound levels from JRL.

6.0 CONSTRUCTION AND MAINTENANCE ACTIVITIES

Both the State [§400.4.F(2)(d)] and local [§24-12.H.4] solid waste noise regulations 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 quantitative local/state/federal noise limits on these activities.

Some or all of the following equipment may be used during cell construction at JRL:

- One 27-40 ton excavator
- Three to five 30-35 ton off-road trucks
- Two bulldozers
- One tracked steer skid
- One mini-backhoe
- Pipe fusion equipment
- One water truck
- Pad foot / smooth drum rollers

Environmental noise control devices on construction and maintenance equipment will include:

- Effective exhaust mufflers in proper working condition will be installed on all engine-power construction equipment at the site. Mufflers found to be defective will be replaced promptly.
- Construction contractors will be required to ensure that their employee 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 FUTURE OPERATIONAL CONDITIONS

Sources of noise from routine operation of the JRL expansion will primarily arise from the same equipment already operating at the landfill. The one new source is the proposed landfill gas to energy (LFGTE) facility to be located in the southeastern corner of the site.

Current operating hours for the landfill are Monday to Friday 6:00 a.m. – 6:00 p.m., and Saturday and Sunday 7:30 a.m. – 2:30 p.m. The LFGTE facility is expected to operate 24 hours per day, seven days per week.

7.1 Operational Sound Sources

7.1.1 Mobile

The following pieces of equipment are currently operating at JRL and may be operating within the landfill expansion area as well:

1. Two compactors – Caterpillar 836G and Caterpillar 826G
2. Two bulldozers – John Deere 850J and John Deere 850K
3. One front-end loader -- Caterpillar 966G
4. One on-site haul truck – John Deere 400D
5. One excavator -- John Deere 270

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 assessment.

Sound level measurement programs were conducted March 10, and June 12, 2015 at JRL on the above-listed pieces of equipment. The purpose was to obtain reference sound level measurements 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.

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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.

Table 7-1 Reference Sound Pressure Levels at 50 ft. – Mobile Operational Sources at JRL

Source	L_{eq} 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–John Deere 850K	75	71	74	75	68	69	72	68	61	52
Compactor (Front)–Caterpillar 836G	69	77	73	75	67	70	60	57	55	56
Compactor (Side)–Caterpillar 836G	77	78	71	82	73	76	72	67	62	61
Compactor (Front)–Caterpillar 826G	64	71	80	68	64	61	59	53	49	43
Compactor (Side)–Caterpillar 826G	75	75	69	74	76	72	72	66	59	54
Excavator—John Deere 270	74	73	76	79	72	72	67	65	61	55
Front-end loader—Caterpillar 966G	74	77	84	75	73	68	69	67	61	56
Haul truck—John Deere 400D	74	75	77	81	70	67	69	69	59	52

7.1.2 Stationary

Three Caterpillar G3520C landfill gas engine-generators are proposed for the LFGTE facility. Each unit is rated at 1600 kW at 100% output for a total of 4800 kW. The engine-generator sets will be housed in a masonry block building with a dedicated radiator outside the building for each unit. Each engine-generator will run through a silencer and exhaust through its own stack approximately 32 feet above ground level (AGL). Other new potential noise sources will include an air-cooled chiller, landfill gas cooler, one transformer, engine room ventilation fans, and gas scrubber room ventilation fans. Table 7-2 lists the sound level data for each piece of LFGTE equipment included in the sound level modeling. Note, for some equipment only a broadband sound level was provided by the manufacturer. In these cases, all energy was assigned to the 500 Hz frequency by default. In conjunction with the proposed LFGTE facility, a new gas flare will be constructed. Once constructed, the existing gas flare will only operate when the LFGTE facility is down or at partial load. Since the LFGTE facility sound levels are much greater than the flare, modeling of the LFGTE facility sound levels is worst-case. Therefore, the new gas flare was not included in the sound level impact assessment. Any sound from the existing flare was already captured in the existing condition sound level measurements (see Section 5).

In addition, as discussed in Section 5, the landfill gas treatment facility ("Thiopaq® plant") was installed in January 2015. This source is 71 dBA at 50 feet and was also included as a stationary source in the modeling.

Table 7-2 Reference Sound Levels (per unit) – LFGTE Facility at JRL

LFGTE 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
Caterpillar Gas Engine - Mechanical[3]	3	Lw	NA	117	-	-	107	109	107	111	110	106	113
Caterpillar Gas Engine - Exhaust[3,4]	3	Lw	NA	118	-	-	124	116	110	107	107	111	112
SMITHCO Radiator (1 F17-110-1)[5]	3	Lp	3	76	-	-	-	-	-	-	-	-	-
Trane Air-Cooled Chiller (96.2 ton)[5]	1	Lw	NA	95	-	-	-	-	-	-	-	-	-
SMITHCO Gas Cooler (1 F17-110-1)[5]	1	Lp	1,200	45	-	-	-	-	-	-	-	-	-
Wall Fans — Engine Room[6]	3	Lw	NA	94	-	93	93	91	89	87	86	86	86
Roof Exhaust Fan — Gas Scrubber Room[7]	1	Lw	NA	95	-	85	90	92	93	90	88	83	76
Roof Intake Fan — Gas Scrubber Room[8]	1	Lw	NA	94	-	84	89	90	92	88	86	81	73
Transformer – 6 MVA[9]	1	Lw	NA	81	77	83	85	80	80	74	69	64	57

Notes:
1. Lp = sound pressure; Lw = sound power
2. Sound levels shown on a per unit basis.
3. Data from technical specification sheet for a G3520C engine provided by Casella Waste Systems, Inc.
4. Does not include reduction from the exhaust silencer.
5. Data from manufacturer's specification sheet provided by Aria Energy.
6. Data from technical specification sheet for a Hartzell Model A02RG-482NB-STFCK4 fan.
7. Data from technical specification sheet for a Hartzell Model A16EG-423-L-STFXK3 fan.
8. Data from technical specification sheet for a Hartzell Model A16IG-423-L-STFXK3 fan.
9. No sound data provided; Sound power levels estimated according to procedures in the Electric Power Plant Environmental Noise Guide, Edison Electric Institute,

7.2 Environmental Noise Controls

7.2.1 Mobile Sources

The only aspect of mobile operations that lends itself 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 (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 B.

7.2.2 Stationary Sources

Several environmental noise controls have been incorporated into the LFGTE facility. These include the following:

- LFG engine-generator sets housed inside masonry block building,
- Selection of quieter models of various equipment (radiators; gas cooler),
- LFG engine exhaust to be reduced by silencer, and
- Significant distance to the nearest residences.

The masonry block building will provide significant transmission loss for the mechanical noise portion of the engine-generator sets while the exhaust portion of the LFG engine will be reduced through the use of a silencer. These are the most significant sound sources from the LFGTE facility. Approximate reductions of these two noise controls are listed below in Table 7-3. In addition to the reductions presented in Table 7-3, a sound level reduction was applied to sound propagating from inside the building through the openings for the wall mounted fans based on typical construction of similar facilities. Finally, the placement of the LFGTE 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 will also help reduce sound levels from the LFGTE facility.

Table 7-3 Noise Control Values – LFGTE Facility

Form of Mitigation	Application	Attenuation (dB) per Octave Band Center Frequency (Hz)								
		31.5	63	125	250	500	1k	2k	4k	8k
Exhaust Silencer – Silex JC-16[1]	Combustion Exhaust	14	29	40	37	26	26	26	25	25
Hollow Core Dense Concrete Block (4")[2]	Walls of the LFGTE Building	26	31	35	36	37	42	46	50	54
26 Gauge Wall Panels[3,4]	Roll-up and Standard Entry Doors for the LFGTE Building	3	6	12	14	19	19	20	27	27
24 Gauge Roof Panels[3,4]	Roof of the LFGTE Building	3	6	12	13	19	24	30	32	32

Notes:
1. Data from a Silex technical specification sheet for a similar silencer (JC-18) provided by Aria Energy; Insertion loss at 31.5 Hz assumed.
2. Table 5-2 in Hoover & Keith Inc. (2008). Noise Control for Buildings and Manufacturing Plants (20th printing). Houston, TX.
3. "The Facts about the Acoustical Performance of Metal Building Insulation", NAIMA Pub. No. MB315 4/01.
4. Transmission loss not provided for 31.5 Hz octave band; value estimated.

7.3 Modeling Scenarios

The noise impacts associated with the proposed JRL expansion were predicted using the Cadna/A noise calculation software developed by DataKustik GmbH. This software uses the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). The benefits of this software are a more refined set of computations due to the inclusion of topography, ground attenuation, multiple building reflections, drop-off with distance, and atmospheric absorption. The Cadna/A software allows for octave band calculation of sound from multiple sources as well as computation of diffraction.

If the expansion is approved, solid waste operations will occur in various locations and elevations in the expansion area during the proposed timeline for the landfill 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 which represent the greatest sound level impacts produced by the JRL expansion. 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 West – Daytime Operations (mobile + stationary sources)
- Scenario 2 West – Nighttime Operations (mobile + stationary sources)

Both scenarios consider operations along the western side of the expansion area and calculate the sound level impacts at receivers in all directions relative to the JRL property line. Since the LFGTE facility (stationary source) has the potential to operate 24 hours per day, 7 days per week, sound sources associated with the LFGTE facility were included in each of the 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 six of the seven mobile sources identified in Table 7-1 are operating simultaneously at full power. Generally, one or two dozers and one or two compactors will be used simultaneously with the other one as a backup. The two compactors and a bulldozer are assumed to operating in the western region shaded in Figure 7-1. The excavator, front-end loader, and haul truck are assumed to be operating farther to the east as depicted in Figure 7-1. These mobile sources are modeled at 480 feet or greater from the nearest property line.

Since Locations 2PL and 3PL are modeled at 51 and 58 dBA respectively under Scenario 1, Scenario 1 would not show compliance with the lower nighttime limit of 50 dBA; therefore, a reduction in the amount of equipment operating simultaneously over the course of 1-hour will be necessary during operations at nighttime hours defined by the Rules. For the modeling of nighttime operations of mobile sources, one mobile source (compactor) operating near the western property line with a sound pressure level of 77 dBA at 50 feet is included in Scenario 2. This mobile source is approximately 480 feet from the western property line, or about 60 feet from the expansion's solid waste boundary. No other mobile sources were included in this scenario.

Sound level impacts from the management of solid waste in the northern, eastern, and southern regions (i.e., Cells 11, 12, and 13) of the landfill expansion were also considered. The predicted sound levels, including contribution from operation of the energy facility, are below the daytime and nighttime limits at all modeling locations. For clarity, only the detailed modeling results for the solid waste management equipment operating near the western property line are presented in this report.

7.4 Modeling Inputs

Inputs and significant parameters employed in the model are described below:

- *Project Layout:* A site plan, including the expansion, was provided by Sevee & Maher Engineers, Inc. on October 2, 2014, and a map with the new LFGTE facility was provided by NEWSME on March 26, 2015. These site plans allowed for potential LFGTE facility sound sources identified in the plans to be accurately placed into the model. Based on the expansion area presented in the plans and its relative proximity to Protected Locations, future work areas for the sound level modeling as shown in Figure 7-1 through Figure 7-6, were selected.

- *Receivers:* The expansion area is generally north of the existing JRL. Therefore, the predictive modeling focused on the Protected Locations nearest to the expansion. These are residences to the west along Hudson Road (Rte. 43) and to the north along Old Stagecoach Road. Sound level modeling was conducted at the three closest residential property lines to the west of the expansion, at a residential property line north of the site, along the eastern and southern property lines, and at a residential parcel boundary to the south. The corresponding residences to the west and south were also modeled. All 11 receptors were modeled with a height of 1.5 meters AGL to mimic the ears of a typical standing observer.

- *Terrain Elevation:* Elevation contours for the modeling domain were directly imported into Cadna/A which allowed for consideration of terrain shielding where appropriate. ESRI's ArcGIS software package was utilized to combine existing terrain, simplified terrain for the "at capacity" approved future condition, simplified terrain for the proposed expansion, and terrain modifications around the proposed LFGTE facility. Existing onsite terrain and the landfill expansion terrain were provided in AutoCAD files dated September 19, 2014. Terrain modifications for the proposed LFGTE facility were provided in AutoCAD files provided by NEWSME on March 26, 2015. Mobile sound sources were modeled at a ground level elevation of between approximately 200 and 360 feet msl. 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 & Controls:* Broadband and octave band sound power levels (when available) for the mobile and stationary sound sources presented in Tables 7-1 and 7-2, respectively were included in the sound level modeling. Proposed mitigation, i.e., the exhaust stack silencers and LFGTE building were included as appropriate. The attenuation values expected from these components are presented in Table 7-3. The sound levels of the sound sources under each of the modeling scenarios was 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.

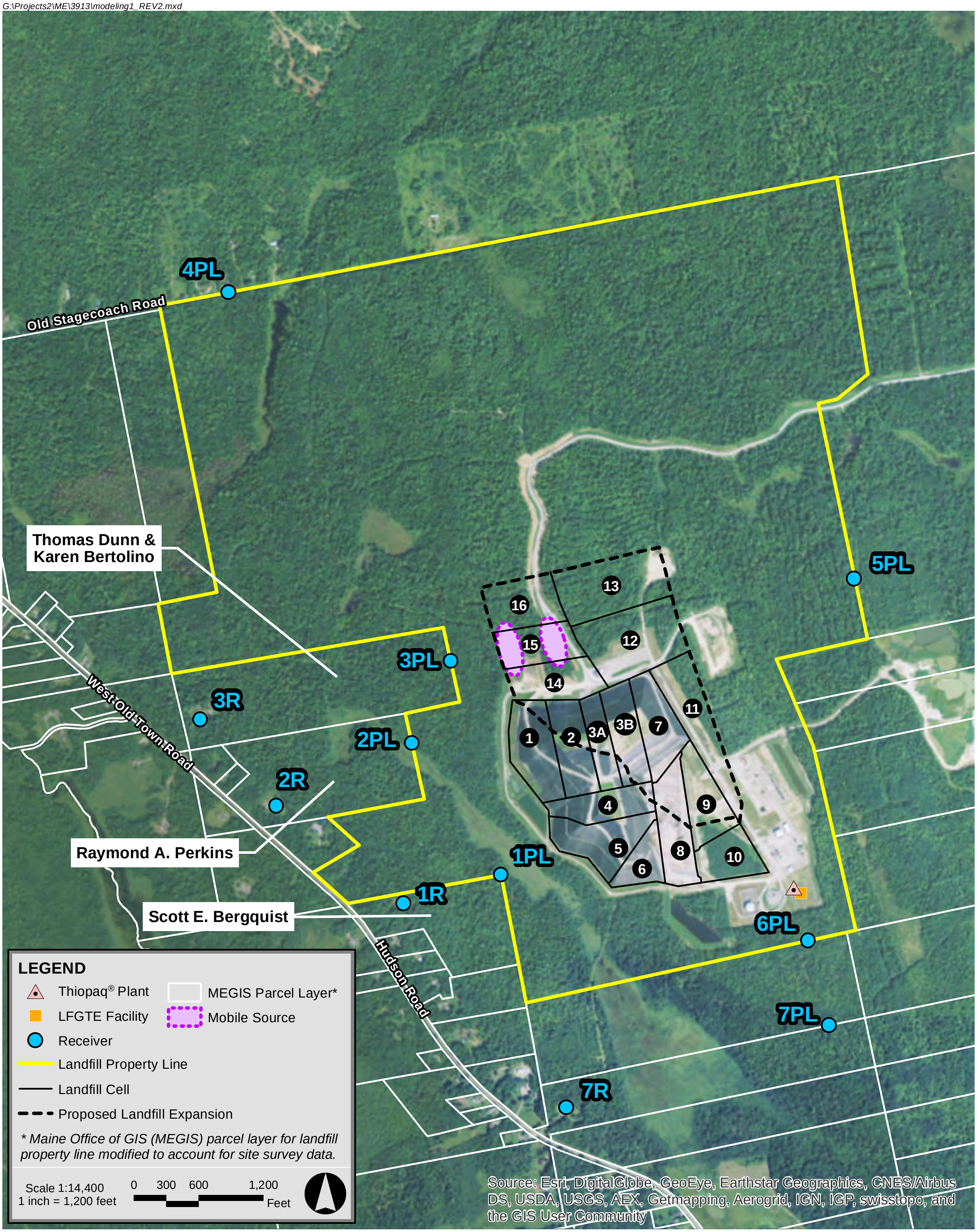
- *Ground Attenuation:* Spectral ground absorption was calculated using a G-factor of 0.5 which corresponds to "mixed ground" consisting of both hard and porous ground cover. This method yields more conservative results (i.e., higher sound levels) as the vast majority of the area is actually forested.

Several modeling assumptions inherent in the ISO 9613-2 calculation methodology, or selected as conditional inputs by Epsilon, were implemented in the Cadna/A model to ensure conservative results (i.e., higher sound levels), and are described below:

- As per ISO 9613-2, 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 equivalently 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 Results

Table 7-4 shows the predicted "Project-Only" broadband (dBA) sound levels at the 11 modeling locations (receivers) for each of the two (2) modeling scenarios under conditions specified in the previous section. The predicted sound levels at the modeling locations range from 38 to 58 dBA for the daytime (Scenario 1) and from 27 to 58 dBA for the nighttime (Scenario 2). These sound levels include contributions from both landfill equipment (mobile) sources on the landfill as well as the LFGTE facility. The sound levels presented in the tables do not include any contribution from existing noise sources in the area.



Juniper Ridge Landfill   Old Town, Maine

Epsilon ASSOCIATES INC.

Figure 7-1

Sound Level Modeling - Scenario 1

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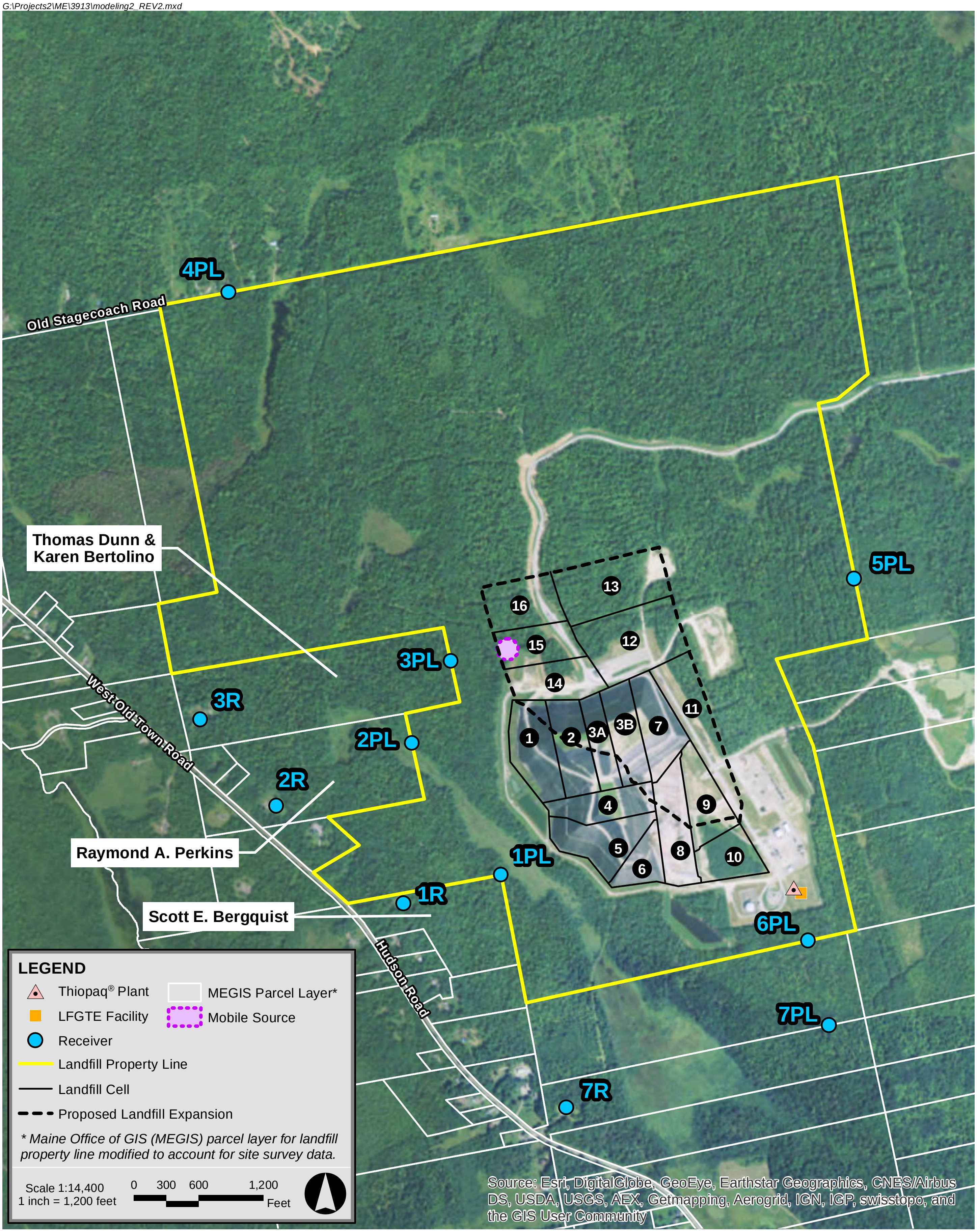

Juniper Ridge Landfill **Old Town, Maine**

Epsilon ASSOCIATES INC.

Figure 7-2

Sound Level Modeling - Scenario 2

Table 7-4 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)
1PL	Western Property Line – Bergquist Residence	282008.67	145580.37	46	36
2PL	Western Property Line – Perkins Residence	281756.66	145952.43	51	39
3PL	Western Property Line – Bertolino Residence	281870.34	146168.06	58	47
4PL	Northern Property Line – Residential	281238.58	147225.65	38	27
5PL	Eastern Property Line	283004.93	146417.53	41	36
6PL	Southern Property Line	282875.57	145395.14	58	58
7PL	Southern Residential Property Line	282933.55	145156.82	48	48
1R	Bergquist Residence	281733.32	145500.84	44	34
2R	Perkins Residence	281374.59	145775.97	43	33
3R	Bertolino Residence	281159.90	146019.46	42	31
7R	Southern Residence	282191.91	144923.63	41	38

8.0 EVALUATION OF SOUND LEVELS

Noise is regulated at this facility by the Maine DEP under Section 400.4.F.2 of the Solid Waste Management Rules. Noise standards applicable to the JRL facility under the City of Old Town Solid Waste Ordinance are virtually identical to the Maine DEP regulations 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 and southern property lines of the site which border undeveloped land. 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 the homes. The site boundary borders residential use properties to the north and west. In addition, there is a parcel to the south which does not border the site, but is residential. The applicable noise limits at these properties are 60 dBA during the day and 50 dBA at night. Daytime is defined as 7:00 a.m. to 7:00 p.m. while nighttime is defined as the remaining hours.

8.1 Daytime Evaluation

During the day, the management of solid waste will occur along with the operation of the LFGTE facility. While the LFGTE facility is a stationary noise source, the management of the solid waste within the landfill will involve mobile noise sources.

For daytime operations (Scenario 1), the potential mobile noise sources were modeled in the western area of the proposed expansion as described in Section 7 in addition to the LFGTE Facility. 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 expansion will meet both the local and state regulations with respect to noise when work is conducted in this area, or anywhere farther east during the day.

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
1PL	Western Property Line – Bergquist Residence	Residential	46	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	38	60	Complies
5PL	Eastern Property Line	Undeveloped	41	75	Complies
6PL	Southern Property Line	Undeveloped	58	75	Complies
7PL	Southern Residential Property Line	Residential	48	60	Complies
1R	Bergquist Residence	Residential	44	60	Complies
2R	Perkins Residence	Residential	43	60	Complies
3R	Bertolino Residence	Residential	42	60	Complies
7R	Southern Residence	Residential	41	60	Complies

8.2 Nighttime Evaluation

Based on the proposed operational hours of the facility, the nighttime noise limits will apply for one hour of mobile source operations, 6:00 a.m. – 7:00 a.m. During this time the management of solid waste will occur along with the operation of the LFGTE facility. While the LFGTE facility is a stationary noise source, the management of the solid waste will involve mobile noise sources.

Scenario 2 considers one piece of equipment operating at approximately 480 feet from the western property line, or 60 feet from the solid waste boundary. The modeling results as compared to the applicable limits are presented in Table 8-2. During the night the modeling locations are below the noise limits; therefore, the proposed JRL expansion will meet both the local and state regulations with respect to noise when work is conducted in this area during the night with landfill equipment operating at a combined sound pressure level of 77 dBA or less at 50 feet.

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
1PL	Western Property Line – Bergquist Residence	Residential	36	50	Complies
2PL	Western Property Line – Perkins Residence	Residential	39	50	Complies
3PL	Western Property Line – Bertolino Residence	Residential	47	50	Complies
4PL	Northern Property Line – Residential	Residential	27	50	Complies
5PL	Eastern Property Line	Undeveloped	36	75	Complies
6PL	Southern Property Line	Undeveloped	58	75	Complies
7PL	Southern Residential Property Line	Residential	48	50	Complies
1R	Bergquist Residence	Residential	34	50	Complies
2R	Perkins Residence	Residential	33	50	Complies
3R	Bertolino Residence	Residential	31	50	Complies
7R	Southern Residence	Residential	38	50	Complies

9.0 CONCLUSIONS

A comprehensive sound level impact assessment was conducted for the JRL expansion project which will consist of the operation of existing mobile noise sources within the new 54 acre expansion footprint, and the introduction of a new stationary noise source, the LFGTE facility. This analysis has been prepared to address the requirements of the Maine DEP noise regulations from Chapter 400 of the Maine DEP solid waste rules, as well as the Old Town Chapter 24 Solid Waste Facility rules.

Sound sensitive receivers in all directions of the expansion 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 western area (i.e., Cells 14, 15, and 16) for this assessment under daytime and nighttime operating scenarios. Under both scenarios, sound levels due to the operation of the energy facility in the southeastern corner of JRL were included. In addition, the sound level modeling conservatively includes an uncertainty factor of 2 dBA for calculated Project-Only sound levels.

During periods when the management of solid waste is occurring on the western side of the landfill expansion (Cells 14, 15 and 16), the modeling locations are below the daytime noise limits. During nighttime operations (6 a.m. – 7 a.m.), landfill equipment with combined sound levels of 77 dBA at 50 feet, or less, will meet the nighttime noise limit at a distance of approximately 480 feet (or more) from the western property line. For example, a Caterpillar 836 compactor is 77 dBA or less at 50 feet, while the Caterpillar 826 compactor is 75 dBA or less at 50 feet. Either one of these pieces of equipment can operate during nighttime hours and meet the nighttime limit.

Sound level impacts from the management of solid waste in the northern, eastern, and southern regions (i.e., Cells 11, 12, and 13) of the landfill expansion were also considered. The predicted sound levels, including contribution from operation of the energy facility, are below the daytime and nighttime limits at all modeling locations; therefore, the proposed JRL expansion will meet both the local and state regulations with respect to noise when work is conducted in these general areas.

Therefore, operations in the landfill expansion area 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 western expansion area during the one hour of nighttime operations in order to comply with the noise limits.

Appendix A

Condition Compliance Noise Study – May 5, 2014

CONDITION COMPLIANCE NOISE STUDY

Juniper Ridge Landfill – Cell #9
Old Town, Maine

Prepared for:

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1.0 INTRODUCTION

NEWSME Landfill Operations, LLC ("NEWSME Operations"), a Casella Waste Systems, Inc. ("Casella") subsidiary, operates the Juniper Ridge Landfill (JRL) for the State of Maine. JRL is located in Old Town, Maine. As part of the site's Amended Solid Waste Order #S-020700-WD-N-A from the Maine Department of Environmental Protection (MEDEP), condition #21 requires a noise compliance test. Condition #21 is repeated below:

> "The applicant shall perform 2 additional noise studies in accordance with the provisions of the Rules: one within the first month of operation of cell 3, and the other within the first month of operation of cell 9. The results of each of the noise studies shall be submitted to the Department for its review and comment within 2 weeks of completion. If the actual noise levels are above the limits prescribed in the Rules, additional noise measures shall be implemented to meet the requirements of the Rules within 1 month of the submittal of the noise study."

The noise testing work for cell 3 was completed in 2006. Details are found in the report "Juniper Ridge Landfill Cell #3 Operation – Compliance Noise Study", submitted by EnRad Consulting, Old Town, ME, June 20, 2006 [EnRad report, 2006]. The current work is related to cell 9. Where possible, the means and methods of compliance testing for cell 9 followed the procedures developed in 2006 for cell 3 testing. The results of this compliance testing are found in this report.

2.0 NOISE REGULATIONS

2.1 Federal Regulations

There are no federal community noise regulations applicable to this project.

2.2 Maine State Regulations

Noise is regulated at this facility by the Maine Department of Environmental Protection under Chapter 400 of the Solid Waste Management Rules. Section 400.4.F.2 contains the applicable noise regulations. The hourly equivalent sound level (L_{eq}) is limited to 75 dBA at the property line at any time of day. For "protected locations" (residential or noise sensitive land use), hourly equivalent sound limits are as follows based on zoning. Daytime is defined as 7:00 a.m. to 7:00 p.m. while nighttime is defined as the remaining hours. At protected locations more than 500 feet from living and sleeping quarters, the daytime hourly sound level limits apply regardless of the time of day.

Commercial, Industrial	70 dBA (day)/60 dBA (night)
Residential, Other	60 dBA (day)/50 dBA (night)
Residential, Other with low ambient noise levels (< 45 dBA day; < 35 dBA night)	55 dBA (day)/45 dBA (night)

Additional regulations apply to tonal sound, short duration repetitive sounds, and construction noise. The noise from trucks 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 alarms are also exempt from the noise regulation. The Residential limits (60 dBA daytime; 50 dBA nighttime) are applicable to any protected location measured for this project.

3.0 COMPLIANCE MONITORING

3.1 Methodology

Operations in Cell 9 began on April 7, 2014. The sound monitoring program operated from Wednesday, April 9 through Thursday, April 17, 2014. Each sound level monitoring site ran for no less than seven full days (168 hours).. Equivalent sound level measurements (L_{eq}) were logged on an hourly basis 24 hours/day during the program. The exact time period for each site is listed below:

- Site 1 start 4/9/14 @ 4:00 PM; end 4/17/14 @ 2:00 PM (190 hours)
- Site 2 start 4/9/14 @ 6:00 PM; end 4/17/14 @ 5:00 PM (191 hours)
- Site 3 start 4/10/14 @ 1:00 PM; end 4/17/14 @ 3:00 PM (170 hours)
- Site 4 start 4/10/14 @ 1:00 PM; end 4/17/14 @ 3:00 PM (170 hours)

3.2 Sound Level Measurement Locations

Measurement locations were selected based on the locations used in a previous sound monitoring program performed by EnRad Consulting in 2006. The closest noise sensitive property lines are represented by three of the four locations (Site 1, 2, 3) and one protected location, as defined by the State of Maine, is represented by the fourth location (Site 4). An On-site monitor was utilized on the active cell of the Juniper Ridge facility for site-related activity identification.

Each of these five sound level measurement locations are depicted in Figure 1 and described below. NEWSME coordinated access to properties not owned by Casella prior to the commencement of the measurement program.

- Site 1
  - This location is representative of the sound levels at the Thomas Dunn & Karen Bertolino property line. The home is located east of West Old Town Road.
- Site 2
  - This location is representative of the sound levels at the Raymond A. Perkins property line. The home is located east of West Old Town Road.
- Site 3
  - This location is representative of the sound levels at the Scott E. Bergquist property line. The home is located east of West Old Town Road.

- Site 4
  - This location is representative of the sound levels within a 500 foot radius of the home at the Scott E. Bergquist property.
- On-Site Monitor
  - This location is representative of the sound levels on an active cell at the facility located at Juniper Ridge Landfill.

3.3 Measurement Equipment

3.3.1 Sound Level Instrumentation

A total of five (5) integrating sound level meters were used during the field program. The instrumentation met the "Type 1 - Precision" requirements set forth in American National Standards Institute (ANSI) S1.4-1983 for acoustical measuring devices as specified in the S12.18-1994 methodology. Each microphone with a windscreen was tripod-mounted at a height of 1.5 meters above ground. The microphones were connected to a sound level meter by an extension cable, and the meters were housed in environmental suitcases. The measurement equipment was calibrated in the field before and after the surveys with the manufacturer's acoustical calibrator which meets the standards of IEC 942 Class 1L and ANSI S1.40-1984.

All calibrations were within $\pm$ 1.0 dB from the most recent calibration. The meters were calibrated and certified as accurate to standards set by the National Institute of Standards and Technology by an independent laboratory within the past 12 months. Four Larson Davis model 820 sound level meters and one Larson Davis model 831 sound level meter was used for the monitoring. The model 820 sound level meters and the model 831 sound level meter measured A-weighted sound levels. The instruments have data logging capability and were programmed to log statistical data every 1-hour with a 1-minute resolution. One model 820 was arranged with an external sound recorder at the on-site location. The model 831 has continuous sound recording capability that was utilized in this monitoring program. The sound level instrumentation used for the measurement program is summarized in Table 1.

3.3.2 Meteorological Instrumentation

Continuous ground-level wind speed and direction were collected by Epsilon at one (1) location at the Juniper Ridge Landfill facility. This location was considered representative of ground-level winds in the general area. One HOBO H21-002 micro-weather stations (manufactured by Onset Computer Corporation) was used to continuously measure the wind speed and wind direction. The wind sensors were mounted at a height of approximately 2 meters above ground level and data were logged every hour. This wind instrument has a measurement range of 0 to 44 m/s (99 mph) and an accuracy of +/- 0.5

m/s (1.1 mph). The starting threshold is 0.5 m/s (1.1 mph). The wind direction measurement range is 0 to 358 degrees (2-degree dead band), with an accuracy of +/- 5 degrees. The location of the meteorological tower is displayed in Figure 1.

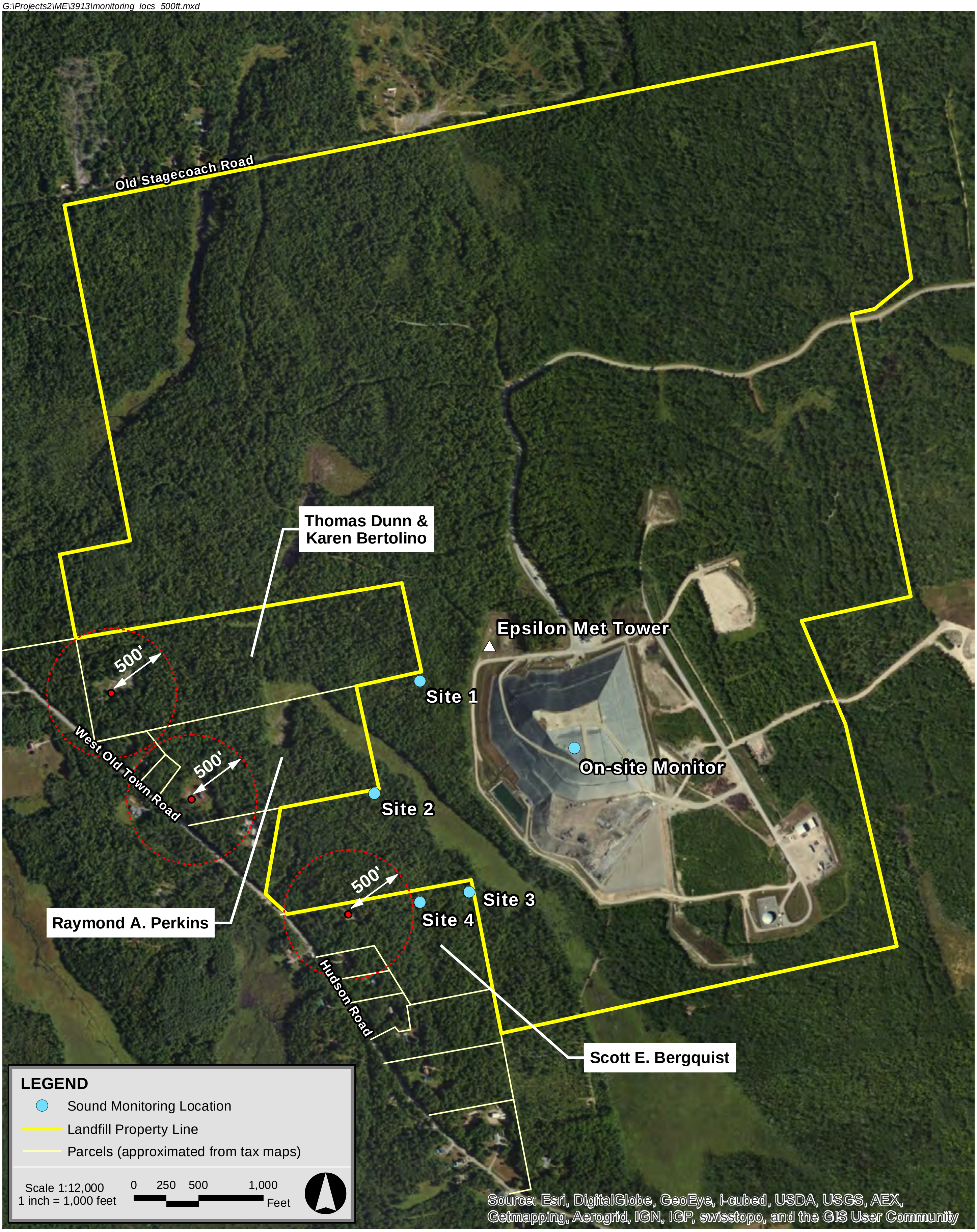
Table 1 Sound Level Measurement Instrumentation

Equipment	Model	Serial Number
Meter	Larson Davis 820	1762
Preamp	PCB Piezotronics PRM828	2745
Microphone	PCB Piezotronics 377B20	112343
Meter	Larson Davis 820	1853
Preamp	PCB Piezotronics PRM828	1857
Microphone	PCB Piezotronics 377B20	105123
Meter	Larson Davis 820	1764
Preamp	PCB Piezotronics PRM828	2738
Microphone	PCB Piezotronics 377B20	112345
Meter	Larson Davis 820	1852
Preamp	PCB Piezotronics PRM828	2120
Microphone	PCB Piezotronics 377B20	105122
Meter	Larson Davis 831	1992
Preamp	PCB Piezotronics PRM831	015258
Microphone	PCB Piezotronics 377B20	112340
Calibrator	Larson Davis CAL200	7146

3.4 Measured Sound Levels

Appendix A contains a detailed list of the sound level data for each of the four locations for the entire measurement period.

G:\Projects2\ME\3913\monitoring_locs_500ft.mxd



Casella Juniper Ridge Landfill **Old Town, Maine**

Epsilon ASSOCIATES INC

Figure 1

Aerial Locus Map

4.0 EVALUATION OF SOUND LEVELS

The Maine State regulation limits the sound levels of a residential protected location to be 60 dBA from 7:00 A.M. to 7:00 P.M. and 50 dBA from 7:00 P.M. to 7:00 A.M. Sound levels at the property line of the JRL facility are limited to 75 dBA. Only Site 4 sound levels are subject to the protected location limits while Sites 1, 2, and 3 are subject to the 75 dBA property line limit. For information purposes, Figure 2 displays plotted L_{eq} (dBA) data for Sites 1, 2, 3, and 4 compared to the protected location noise limit for the measurement duration. Since property-line Sites 1, 2, and 3 meet the protected location limits, it is clear that the actual protected locations on these properties will easily meet these limits too since they are much further away from JRL. Juniper Ridge Landfill operational hours are highlighted in Figure 2. Sound levels at Sites 1, 2, and 3 were well below the property line limit of 75 dBA, and therefore, this level was not indicated on the plot. A log of truck deliveries was also recorded for the monitoring term provided by the client and displayed in Table 2.

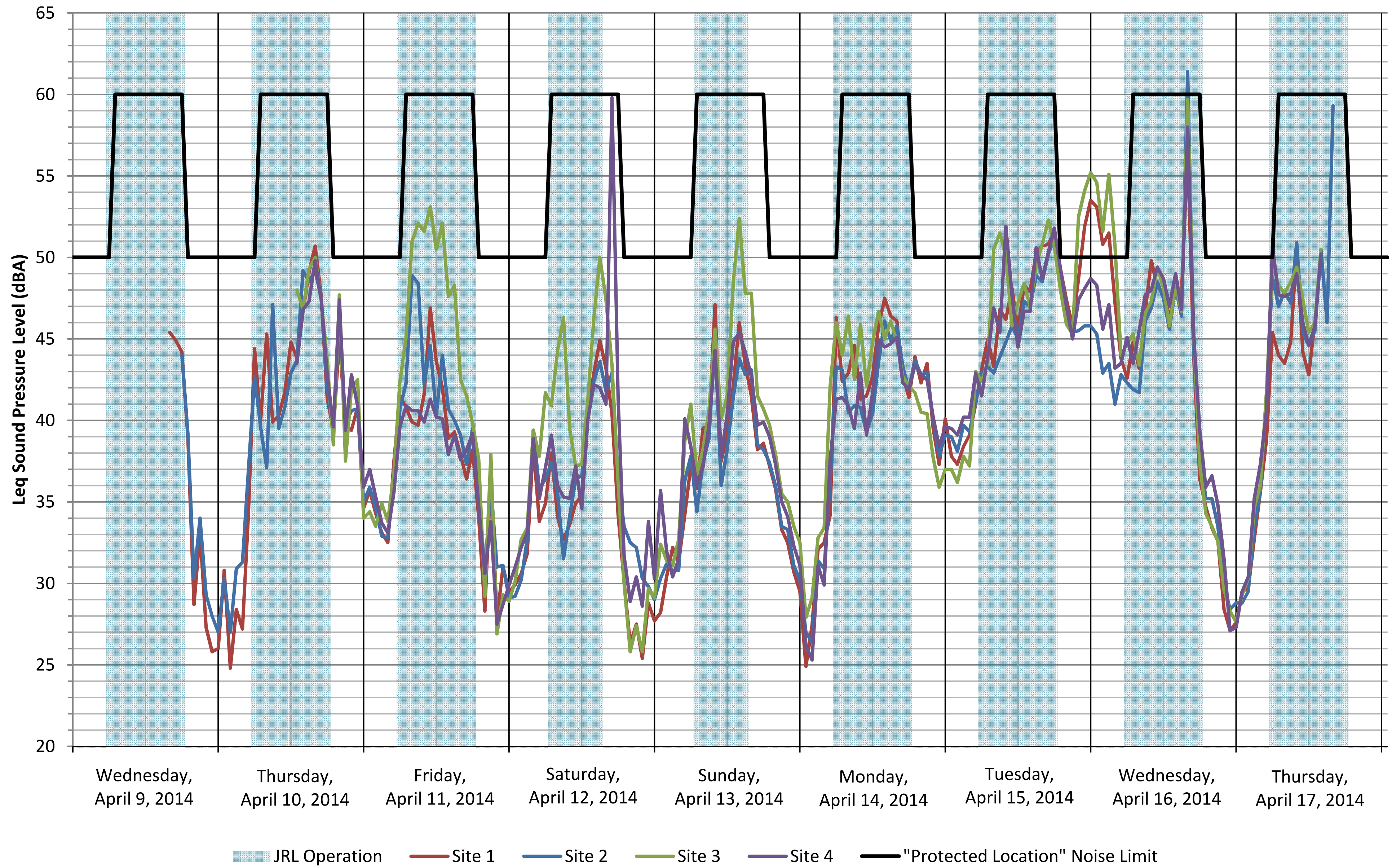
On Wednesday, April 16 at 4:00 P.M., a peak in the sound levels can be observed at all four off-site locations. This is during landfill operational hours. Sound recordings enabled the identification of a low-flying helicopter during this monitoring hour which is the probable cause of the high sound levels.

Site 4 is the only "protected location" monitored in this sound level measurement program. On Thursday, April 17 at 6:00 A.M., the hourly L_{eq} level was measured to be 50.7 dBA. This level exceeds the limit during this hour by less than half a decibel. Site 3, which is closer to the Juniper Ridge Landfill, measured 49.6 dBA and shows compliance to the limit. These measured levels logarithmically average the landfill facility activity noise with the ambient (non-JRL sources) levels in proximity to the monitoring location. If ambient levels were subtracted from the overall measured sound level, Site 4 will be 50 dBA or less, and show compliance during this 6:00 A.M. hour.

Table 2 Truck Delivery Log

Date	Wed. April 9, 2014	Thurs. April 10, 2014	Fri. April 11, 2014	Sat. April 12, 2014	Sun. April 13, 2014	Mon. April 14, 2014	Tues. April 15, 2014	Wed. April 16, 2014	Thurs. April 17, 2014
# of Trucks	82	96	96	27	15	101	103	86	58

Figure 2. Sound Level Measurements



5.0 CONCLUSIONS

Sound level data were collected for the duration of one full week around the Juniper Ridge Landfill facility in Old Town, ME. Measurement locations were selected based on previously monitored locations which were subject to the State of Maine noise regulations.

Site 4 complies with the Maine State regulation of a 60 dBA daytime limit and a 50 dBA nighttime limit for protected locations. Property line Sites 1, 2, and 3 easily met the 75 dBA property line limit. For informational purposes, measured sound levels at all four locations were compared against the protected location limits. All monitoring locations met their respective limits during hours of landfill operation; therefore the Juniper Ridge Landfill shows compliance with Condition #21 of their solid waste permit.

Appendix A

Raw Sound Level Data

Date	Start Time	Sound Levels, L_{eq} (dBA)			
		Site 1	Site 2	Site 3	Site 4
4/9/2014	4:00 PM	45.4			
4/9/2014	5:00 PM	44.9			
4/9/2014	6:00 PM	44.2	44		
4/9/2014	7:00 PM	38.9	39.2		
4/9/2014	8:00 PM	28.7	30.3		
4/9/2014	9:00 PM	33.1	34		
4/9/2014	10:00 PM	27.3	29.3		
4/9/2014	11:00 PM	25.8	28		
4/10/2014	12:00 AM	26	27		
4/10/2014	1:00 AM	30.8	30.3		
4/10/2014	2:00 AM	24.8	27		
4/10/2014	3:00 AM	28.4	30.9		
4/10/2014	4:00 AM	27.2	31.3		
4/10/2014	5:00 AM	34.3	37		
4/10/2014	6:00 AM	44.4	42.7		
4/10/2014	7:00 AM	39.9	39.6		
4/10/2014	8:00 AM	45.3	37.1		
4/10/2014	9:00 AM	39.9	47.1		
4/10/2014	10:00 AM	40.3	39.5		
4/10/2014	11:00 AM	41.7	40.8		
4/10/2014	12:00 PM	44.8	42.9		
4/10/2014	1:00 PM	43.8	43.7	48	43.5
4/10/2014	2:00 PM	46.7	49.2	46.8	46.8
4/10/2014	3:00 PM	49.1	48.5	49.3	47.3
4/10/2014	4:00 PM	50.7	49.2	50	49.8
4/10/2014	5:00 PM	47.6	47.5	47.4	47.4
4/10/2014	6:00 PM	41.3	42	43.6	42.8
4/10/2014	7:00 PM	39.4	39.4	38.5	39.6
4/10/2014	8:00 PM	45	46.4	47.7	47.4
4/10/2014	9:00 PM	39.7	39.8	37.5	39.4
4/10/2014	10:00 PM	39.4	40.6	42	42.8
4/10/2014	11:00 PM	40.8	40.7	42.5	40.9
4/11/2014	12:00 AM	34.6	35	34	35.9
4/11/2014	1:00 AM	35.7	35.9	34.4	37
4/11/2014	2:00 AM	34.3	34.6	33.5	35.3
4/11/2014	3:00 AM	33.1	32.9	34.9	33.7
4/11/2014	4:00 AM	32.5	32.8	33.8	33.1
4/11/2014	5:00 AM	37.5	36.3	36.8	35.6
4/11/2014	6:00 AM	41.5	40.7	42.4	39.6
4/11/2014	7:00 AM	40.8	42.3	45.1	40.9
4/11/2014	8:00 AM	39.9	48.9	51	40.6
4/11/2014	9:00 AM	39.7	48.4	52.1	40.6
4/11/2014	10:00 AM	41.6	42.2	51.6	39.9
4/11/2014	11:00 AM	46.9	44.6	53.1	41.3

Date	Start Time	Sound Levels, L_{eq} (dBA)			
		Site 1	Site 2	Site 3	Site 4
4/11/2014	12:00 PM	43.6	40.3	50.5	40.2
4/11/2014	1:00 PM	42	44	52.1	40.1
4/11/2014	2:00 PM	38.9	40.7	47.6	37.9
4/11/2014	3:00 PM	39.3	40	48.3	39.1
4/11/2014	4:00 PM	37.9	39.1	42.5	37.6
4/11/2014	5:00 PM	36.4	37.3	41.5	38.2
4/11/2014	6:00 PM	38.2	39.5	39.8	39.2
4/11/2014	7:00 PM	34	35.6	37.6	34.7
4/11/2014	8:00 PM	28.3	30.7	29.2	30.6
4/11/2014	9:00 PM	36.8	36	37.9	33.8
4/11/2014	10:00 PM	27.8	31	26.9	27.5
4/11/2014	11:00 PM	31	31.1	29.3	28.7
4/12/2014	12:00 AM	29.5	29.1	28.9	29.9
4/12/2014	1:00 AM	29.9	29.2	30.1	31
4/12/2014	2:00 AM	30.6	30.2	32.7	32.2
4/12/2014	3:00 AM	31.8	32.7	33.4	33.1
4/12/2014	4:00 AM	38.5	39.4	39.4	38.9
4/12/2014	5:00 AM	33.8	35.8	37.8	35.2
4/12/2014	6:00 AM	34.9	36.4	41.7	37.1
4/12/2014	7:00 AM	38	37.4	40.9	39.1
4/12/2014	8:00 AM	34.1	35.6	44.3	36
4/12/2014	9:00 AM	32.7	31.5	46.3	35.3
4/12/2014	10:00 AM	33.6	34.1	39.5	35.2
4/12/2014	11:00 AM	34.9	36.4	37.2	37.2
4/12/2014	12:00 PM	35.4	36.6	37.3	34.6
4/12/2014	1:00 PM	40.4	40.2	41.2	40
4/12/2014	2:00 PM	42.9	42.4	46.3	42.2
4/12/2014	3:00 PM	44.9	43.6	50	42
4/12/2014	4:00 PM	43.2	41.8	47.4	41
4/12/2014	5:00 PM	40.4	42.9	43.4	59.8
4/12/2014	6:00 PM	34.2	36.5	36.2	41.4
4/12/2014	7:00 PM	30.1	33.5	30	31.7
4/12/2014	8:00 PM	26.3	32.5	25.8	28.9
4/12/2014	9:00 PM	27.5	32.2	27.4	30.4
4/12/2014	10:00 PM	25.4	30.3	25.8	28.6
4/12/2014	11:00 PM	28.8	29.8	29.7	33.8
4/13/2014	12:00 AM	27.7	29	29.1	30.3
4/13/2014	1:00 AM	28.2	30.3	32.4	35.7
4/13/2014	2:00 AM	30.4	31.2	31.4	32
4/13/2014	3:00 AM	32.2	30.8	31.1	30.4
4/13/2014	4:00 AM	31.3	30.8	32.7	31.5
4/13/2014	5:00 AM	34.2	36.3	38.7	40.1
4/13/2014	6:00 AM	37.2	37.8	41	38.4
4/13/2014	7:00 AM	35.8	34.4	36.7	36

Date	Start Time	Sound Levels, L_{eq} (dBA)			
		Site 1	Site 2	Site 3	Site 4
4/13/2014	8:00 AM	39.5	37.4	38.2	37.1
4/13/2014	9:00 AM	39.7	38.9	40.6	39.7
4/13/2014	10:00 AM	47.1	45.2	45.6	44.3
4/13/2014	11:00 AM	37.5	36	40.1	37.8
4/13/2014	12:00 PM	39.2	38.2	41.5	40.3
4/13/2014	1:00 PM	42.1	41.4	48.4	44.8
4/13/2014	2:00 PM	46	43.8	52.4	45.4
4/13/2014	3:00 PM	43.4	42.8	47.8	44.2
4/13/2014	4:00 PM	41.5	43.1	47.8	42.7
4/13/2014	5:00 PM	38.2	38.5	41.5	39.7
4/13/2014	6:00 PM	38.6	38.2	40.7	39.9
4/13/2014	7:00 PM	37.2	37.4	39.7	39
4/13/2014	8:00 PM	35.8	36	37.9	37.3
4/13/2014	9:00 PM	33.3	33.5	35.5	35
4/13/2014	10:00 PM	32.5	33.3	35	34.1
4/13/2014	11:00 PM	30.7	31.1	33.5	32.3
4/14/2014	12:00 AM	29.5	30.2	32.5	31.1
4/14/2014	1:00 AM	24.9	27	27.9	26.2
4/14/2014	2:00 AM	27.4	26.4	29.1	25.3
4/14/2014	3:00 AM	32.1	31.4	32.8	31.1
4/14/2014	4:00 AM	32.5	30.9	33.4	29.9
4/14/2014	5:00 AM	34.2	36.2	42.1	37.6
4/14/2014	6:00 AM	46.3	43.3	46	41.3
4/14/2014	7:00 AM	42.4	43.1	44	41.4
4/14/2014	8:00 AM	42.9	40.5	46.4	40.9
4/14/2014	9:00 AM	44.6	40.9	42.5	39.5
4/14/2014	10:00 AM	41.3	40.8	45.9	42.9
4/14/2014	11:00 AM	41.5	39.3	42.1	39.1
4/14/2014	12:00 PM	42.7	40.4	44.8	41.7
4/14/2014	1:00 PM	45.8	43.6	46.7	44.9
4/14/2014	2:00 PM	47.5	46.1	45	44.5
4/14/2014	3:00 PM	46.4	44.9	46.1	44.7
4/14/2014	4:00 PM	46.1	45.8	44.8	45.1
4/14/2014	5:00 PM	42.7	43.3	42.7	42.3
4/14/2014	6:00 PM	41.4	41.9	42.1	41.9
4/14/2014	7:00 PM	43.9	43.7	41.7	43.4
4/14/2014	8:00 PM	42.3	42.8	40.5	42.8
4/14/2014	9:00 PM	43.5	42.9	40.4	42.5
4/14/2014	10:00 PM	39.5	40.1	37.7	40.2
4/14/2014	11:00 PM	37.3	37.8	35.9	38.4
4/15/2014	12:00 AM	40.1	39.1	37	39.6
4/15/2014	1:00 AM	37.8	39	37	39.5
4/15/2014	2:00 AM	37.3	38.1	36.2	39.1
4/15/2014	3:00 AM	38.4	39.7	37.8	40.2

Date	Start Time	Sound Levels, L_{eq} (dBA)			
		Site 1	Site 2	Site 3	Site 4
4/15/2014	4:00 AM	39.1	39.3	37.2	40.2
4/15/2014	5:00 AM	41	41.1	43	42.9
4/15/2014	6:00 AM	43.1	42.9	42.4	41.5
4/15/2014	7:00 AM	45	43.3	43.5	43.9
4/15/2014	8:00 AM	43.3	42.9	50.5	46.9
4/15/2014	9:00 AM	46.8	43.9	51.5	45.4
4/15/2014	10:00 AM	46.2	44.8	50.1	51.9
4/15/2014	11:00 AM	48.1	45.8	45.8	47.7
4/15/2014	12:00 PM	45.5	45	47.2	44.5
4/15/2014	1:00 PM	48.3	47.3	48.4	46.7
4/15/2014	2:00 PM	47.9	47	47	46.7
4/15/2014	3:00 PM	50.3	48.9	49.5	50.6
4/15/2014	4:00 PM	50.7	48.5	50.8	48.7
4/15/2014	5:00 PM	50.8	50.2	52.3	50.3
4/15/2014	6:00 PM	51.6	51.2	50.7	51.8
4/15/2014	7:00 PM	49.3	48.3	48	49.3
4/15/2014	8:00 PM	47.4	46.6	45.9	47
4/15/2014	9:00 PM	45.8	45.4	45.3	45
4/15/2014	10:00 PM	48.7	45.5	52.5	47.4
4/15/2014	11:00 PM	51.9	45.8	54.1	48.1
4/16/2014	12:00 AM	53.5	45.8	55.2	48.7
4/16/2014	1:00 AM	53.1	45.3	54.6	48.3
4/16/2014	2:00 AM	50.8	42.9	51.6	45.6
4/16/2014	3:00 AM	51.5	43.5	55.1	47.1
4/16/2014	4:00 AM	47.2	41	50.7	43.2
4/16/2014	5:00 AM	43.8	42.8	44	43.5
4/16/2014	6:00 AM	42.6	42.3	44.7	45.1
4/16/2014	7:00 AM	44.8	41.9	45.3	43.5
4/16/2014	8:00 AM	43.2	41.7	43.4	45.5
4/16/2014	9:00 AM	46.7	46.1	46.6	47.7
4/16/2014	10:00 AM	49.8	46.9	47.3	48
4/16/2014	11:00 AM	48.2	48.5	49.4	49.4
4/16/2014	12:00 PM	47.8	47.5	48.1	48.7
4/16/2014	1:00 PM	46.3	45.6	45.8	47
4/16/2014	2:00 PM	48	48.2	48.3	49
4/16/2014	3:00 PM	47.9	46.4	46.7	46.8
4/16/2014	4:00 PM	56.5	61.4	59.7	58
4/16/2014	5:00 PM	44	44.3	45.4	45.3
4/16/2014	6:00 PM	36.4	38.2	37.3	39.4
4/16/2014	7:00 PM	34.7	35.2	34.3	35.9
4/16/2014	8:00 PM	33.4	35.2	33.5	36.6
4/16/2014	9:00 PM	32.6	33.5	32.6	34.8
4/16/2014	10:00 PM	28.4	29.9	29.6	31.5
4/16/2014	11:00 PM	27.1	28.4	28.3	27.1

Date	Start Time	Sound Levels, L_{eq} (dBA)			
		Site 1	Site 2	Site 3	Site 4
4/17/2014	12:00 AM	27.6	28.8	27.6	27.3
4/17/2014	1:00 AM	29.5	28.8	29.3	29.5
4/17/2014	2:00 AM	29.7	29.5	30.3	30.4
4/17/2014	3:00 AM	32.7	33.4	34.6	35.2
4/17/2014	4:00 AM	35.6	35.6	36	37.3
4/17/2014	5:00 AM	38.8	41.7	41.7	40.6
4/17/2014	6:00 AM	45.4	48.8	49.6	50.7
4/17/2014	7:00 AM	44	47	48.3	47.7
4/17/2014	8:00 AM	43.5	47.9	47.8	47.6
4/17/2014	9:00 AM	44.8	47.2	48.5	47.8
4/17/2014	10:00 AM	50.5	50.9	49.4	49
4/17/2014	11:00 AM	44.2	45.4	47.4	46
4/17/2014	12:00 PM	42.8	44.6	45.4	44.6
4/17/2014	1:00 PM	46.1	45.5	46	45.8
4/17/2014	2:00 PM		50.5	50.5	50.2
4/17/2014	3:00 PM		46		
4/17/2014	4:00 PM		59.3		

Appendix B

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](http://www.sirennet.c)
[Newsletter (http://www.sirennet.c Nov06.pdf)](http://www.sirennet.c)
[NPC Testimonial (http://www.sirennet.c Testimonial.pdf)](http://www.sirennet.c)

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

APPENDIX H

VISUAL ASSESSMENT REPORT – SMRT

ARCHITECTURE ENGINEERING PLANNING INTERIOR DESIGN COMMISSIONING

SMRT

Visual Assessment Report
Juniper Ridge Landfill

Old Town, Maine

Prepared for:
NEWSME Landfill Operations, LLC
and
Maine Bureau of General Services

July 2015

Submitted by:

SMRT Architects and Engineers
144 Fore St., P.O. Box 618
Portland, Maine 04101
p 207.772.3846

This report presents the Visual Assessment completed for the expansion of the Juniper Ridge Landfill (JRL) as proposed by the Maine Bureau of General Services (BGS), as owner, and NEWSME Landfill Operations, LLC (NEWSME), as operator, to the Maine Department of Environmental Protection (MEDEP). The JRL Expansion (the Expansion) will be located directly to the north and adjacent to the existing JRL on a 780-acre parcel of land in west Old Town, Maine and will expand the current licensed footprint from 68 acres to 122 acres. The Visual Assessment (VA) was completed to evaluate whether the Expansion will have an unreasonable adverse effect on existing uses and scenic character, and, specifically, whether it will unreasonably interfere with views from "established public viewing areas" in accordance with the requirements of Maine Solid Waste Management Rules Chapter 400.4.F(1)(c) and (e); MEDEP Rules Chapter 315 *Assessing and Mitigating Impacts to Existing Scenic and Aesthetic Uses*; and similar requirements of Chapter 24 Solid Waste Facilities of the Town of Old Town Code (§24-8.M).

As defined in MEDEP Chapter 400.1, ""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." The City of Old Town Chapter 24 Solid Waste Facilities' Ordinance uses this same definition.

The Expansion is being reviewed for a Tier III permit application under the Natural Resource Protection Act for wetland impact. This VA was also completed in accordance with MEDEP Rules Chapter 315 which state that "An applicant is required to demonstrate that the proposed activity will not unreasonably interfere with existing scenic and aesthetic uses of a scenic resource" as defined. Chapter 315.5.H (Definitions) defines a scenic resource 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."

This VA confirmed that the Expansion will satisfy the above-referenced standards.

I. Executive Summary

The proposed Expansion has been studied through computer-generated and photo-simulation modeling with ground-based confirmation to assess and approximate the appearance of the Expansion from selected vantage points. The study was performed using U. S. Forest Service standards, and guidelines in MEDEP Chapter 315, *Assessing and Mitigating Impacts to Existing Scenic and Aesthetic Uses*. Stakeholders, including state agencies, surrounding municipalities, and the Penobscot Indian Nation, were engaged to determine the presence of public viewing areas "within 2,000 feet" of the facility, the specified area identified by MEDEP's Chapter 400.4.F(3)(b) and the City of Old Town's Ordinance, and other areas of potential scenic significance. In response to questions raised in Public Milestone Meeting #2 on October 16, 2014 about the possibility of views from the western shore of Pushaw Lake and vicinity, the study area was conservatively expanded to 6 miles to include this vantage point.
No "public viewing" areas as defined were identified within 2,000 feet of the facility. Potential scenic resources within the study area include Pushaw Lake, Pushaw Stream, Penobscot River, Stillwater River, Hirundo Wildlife Refuge, Sunkhaze Meadows National Wildlife Refuge, and Mud Pond (*aka* Perch Pond and the Perch Pond Recreational Trails). Of these, Pushaw Lake, Sunkhaze Meadows National Wildlife Refuge, Hirundo Wildlife Refuge, and Perch Pond Recreational Trails, are all arguably , as defined in MEDEP Chapter 315.10 'Scenic Resources' **(please refer to MEDEP VISUAL EVALUATION FIELD SURVEY CHECKLIST following this narrative)**. To be conservative, these additional locations were also considered in the course of this VA. This VA determined that defined or potential scenic resources within the area as described above either do not have views to the landfill, or are at such distance ("background" as defined by USFS) that the views to the landfill have no unreasonable visual impact. Views of the facility from area roadways within 6 miles include those from Route 16 (intermittent and infrequent), from I-95 southbound (broken by roadside vegetation and distant), and from Route 43 (effectively screened by plantings previously installed as a visual buffer by the Applicant) and are not defined public viewing areas, scenic resources, or scenic byways.

Therefore, the 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", nor will it "unreasonably interfere with existing scenic and aesthetic uses of a scenic resource".

II. Introduction

SMRT, Inc. (SMRT) has been retained by NEWSME and BGS to conduct a visual impact analysis in accordance with Maine Department of Environmental Protection (MEDEP) and City of Old Town solid waste licensing requirements as stated above and elsewhere in this application. The following details and summarizes the process, findings, and conclusions of this analysis.

III. Background

The original design and permitting for the JRL, a new landfill facility in west Old Town, Maine (James River Paper Company landfill) took place in the early 1990's. In fulfillment of DEP Solid Waste Management Act and City of Old Town permitting requirements, a visual impact assessment (VIA) was performed by Maine registered landscape architect Dennis V. Jud, ASLA, Principal of the firm of Environmental Analysis and Design in Portland, Maine ("Visual Impact Assessment, West Old Town Landfill Facility, James River Paper Company, Inc., submitted to Sevee & Maher Engineers, Inc.", dated July 31, 1991).

An application for Amendment to the MEDEP license for JRL was sought in 2003 by the State Planning Office (SPO), though its agent NEWSME, which was selected by the State to operate the landfill. The State, through SPO, acquired JRL pursuant to a Maine legislative Resolve in early 2004. An updated visual study was prepared for the application by Mr. Jud, by then a Principal at SMRT, Inc. ("Updated Visual Impact Assessment, West Old Town Landfill, Amendment Application for a Vertical Increase and Change to Landfill Operations", dated October 31, 2003). The vertical amendment application proposed a finished height of elevation 390' above mean sea level (MSL) from the prior 270', plus some operational revisions. An Amendment Order With Conditions (MEDEP #S-020700-WD-N-A) was issued by the DEP on April 9, 2004. Two conditions pertained to the facility's visual impact:

22. *The applicant shall conduct a future visual analysis, performed when the final elevation of the landfill reaches 330 feet, and demonstrate that the results agree with the projections provided in the application. If that demonstration cannot be made, the applicant shall propose alternative mechanisms for meeting the visual impact standards of the Rules within 1 month of the date of the visual analysis.*

23. *The applicant shall negotiate in good faith with the Route 43 landowner for permission to plant a tree screen in the location identified in the visual impact assessment.*

The landfill reached the 330 foot elevation in early April 2014, and NEWSME contacted and retained SMRT to perform the visual analysis as described in condition 22 above. Condition 23 was met by NEWSME, establishing a visual screen in 2008. Mark G. Johnson, ASLA, Senior Landscape Architect, a Maine registered landscape architect, of SMRT performed the analysis, Mr. Jud having retired some years prior. The resulting study concluded that the conditions of approval as defined above had been met. The MEDEP concurred with the study conclusion and issued a Condition Compliance Order # S-020700-WD-BH-C on October 7, 2014.

In 2014, Mr. Johnson was retained by NEWSME to perform the VIA for the JRL Expansion as proposed in this application.

IV. Process Overview

Mr. Johnson, a registered landscape architect since 1982, has practiced in the state of Maine since 1986. Prior to that, his experience in visual impact analysis included work on the George Washington National Forest with the U.S. Forest Service based in Harrisonburg, VA, utilizing the Bureau of Land Management VIA methodology. He was briefly involved with the original 1991 VIA as a consultant to Mr. Jud.

Preparation of this study included the following:

1. Review of existing documentation: This included reports and supporting materials from the 1991 and 2003 efforts.
2. GIS-based modeling of the JRL site and identification of locations with potential views of the landfill.
3. Correspondence with municipalities, state agencies, and the Penobscot Indian Nation to determine potential for visual impact.
4. Temporary installation of weather balloons to model proposed maximum landfill elevation.
5. Assessment of potential viewpoints and photo-documentation of the site from them (if visible) with temporary balloon installation in place.
6. Integration of CAD generated modeling of the full landfill build-out into photo-documentation of the site.
7. Assessment of potential visual impact.
8. Reporting of findings, conclusions, and recommendations.

V. Methodology

This assessment is conducted in the manner of an "expert study" wherein practices previously defined and accepted in the industry are employed. This assessment is based in part on the parameters and findings previously established in prior studies performed for the JRL facility, and incorporates them by reference. The methods utilized for this study and assessment of the proposed expansion are as follows.

a. Computer Model: The engineers of record for the facility – Sevee & Maher Engineers, Inc., Cumberland, Maine – provided SMRT with AutoCAD drawing files (.dwg) of the existing site and proposed expansion. A computer generated surface was created in AutoCAD Civil 3D utilizing the proposed topographic contours.

b. GIS Simulation: The purpose of this simulation was to create a guidance mechanism that would point to potential viewing points to the proposed Expansion site in the surrounding landscape. This method is the current technological equivalent for determination of potential viewsheds by the "line-of-site-profile" (MEDEP Chapter 315, Appendix A), or other geometric and trigonometric methods such as the "similar triangles" method (Jud 4*).* Geographic Information System (GIS) files for topography, roads, and other features in the vicinity surrounding the JRL site were downloaded from the Maine Office of GIS (MeGIS) website and assembled utilizing the ESRI ArcView GIS program. Vegetative land cover for the area was obtained from the joint federal-state sponsored Maine Landcover database (2004). The data sets were combined to create a surface approximating terrain plus vegetation elevation. Vegetation types were defined and average elevations conservatively set as follows. (Note: Forest cover in the area was observed to be generally second or later growth with heights typically in excess of 40').

i. Forest: 40' height (minimum conservative dimension)
ii. Scrub/shrub: 10' height
iii. Crops/farmland: 1' height

Using the ArcView software, the top of the Expansion was set as a viewing point, a non-regulatory 6-mile distance zone from the landfill was established in response to questions raised in Public Milestone Meeting #2 on October 16, 2014 about the possibility of views from the western shore of Pushaw Lake and vicinity. Therefore the study area was conservatively expanded to 6 miles to include this vantage point in response to this inquiry. Areas within that zone that could be seen from the landfill top were identified **(please refer to attached Figure 2)**. The "viewable" areas appear as bright green squares singly or in clusters. The squares result from the way GIS databases are created and displayed based on 100 meter by 100 meter data "cells". These areas, therefore, are those from which the landfill potentially could be seen according to the model, and large concentrations of them (large green areas) are areas of more pronounced visibility. They were then compared with mapped features and sites identified as being potential public areas. Only those areas that were <u>both</u> identified as being a potential public viewing area or a scenic resource (as defined in Chapter 315) <u>and</u> a modeled view area were visited in the field.

c. Stakeholder Engagement: Municipalities falling within the 6-mile distance zone as defined above and state agencies with jurisdiction over "public viewing areas" and scenic resources were identified. The Penobscot Indian Nation also fell within the view zone. These entities were notified about the Expansion and requested to provide information regarding potential impact areas. One township, Argyle Township, lies within the area and was not contacted because it is largely uninhabited (less than 300 persons according to the 2010 Census), and an unorganized township without accessible scenic resources. Those contacted include:

i. City of Old Town
ii. Town of Alton
iii. Town of Glenburn
iv. Town of Greenbush
v. Town of Hudson
vi. Town of Milford
vii. Penobscot Indian Reservation
viii. Maine Bureau of Parks and Lands

ix. Maine Department of Transportation

A copy of the sample contact letter and responses are appended to this report **(please see Appendix C)**. Of those entities contacted, all but the Penobscot Indian Reservation (after repeated contact) responded.

d. Physical Simulation: In addition to computer modeling, the proposed landfill expansion was simulated in the field. Two 5.5-foot diameter weather balloons (color: red) were floated at strategically located points and elevations corresponding to the future ridgeline of the Expansion landfill **(please see Figure 3)**. The southernmost balloon was set at a height corresponding to elevation 390' MSL and represented the southern end of the Expansion and final landfill elevation The northernmost balloon was set at an elevation of 386' above MSL and represented the northern end of the Expansion ridgeline. Using these as visual markers, coordination of the computer model and photographic image could reasonably be achieved. Coordinates and elevations of the final balloon locations were obtained using GPS equipment in the field. Potential viewing locations, as identified by stakeholders, were visited in addition to the previously established Rt. 43 (Hudson Road) location to determine actual field visibility of the proposed landfill expansion.

e. Photographic Documentation: Potential viewing locations identified by area stakeholders and which coincided with modeled view areas as described above were visited to confirm if views to the Expansion were possible. At locations with views to the Expansion and confirmed by balloon simulation, photographs were taken to simulate "normal" viewing angles and heights. "Normal" vision is best simulated using a 58 mm lens with a standard 35 mm camera or its modern equivalent, the digital single-lens reflex camera with full-frame sensor, as described below.

- Time/conditions: Sites were visited and photographs captured on April 9, 2015. Weather conditions were overcast in the morning and early afternoon with a high cloud ceiling (allowing clear sight to the balloons), temperatures in the 40's F, and light winds generally from the south. Conditions gradually cleared to mostly sunny and warming to the 50's F. The ground was partially snow-covered and, because it was very early spring, exposed ground was predominantly shades of brown, and deciduous trees were leafless. Photographing during this time of year was deemed to be best, exemplifying "worst case" conditions where, because of lack of leaf cover, the Expansion could most readily be seen.
- Instrument:
  - Camera: Canon 6D DSLR (digital single-lens reflex with full-frame sensor); 21 megapixel
  - Image format: Initial image capture in camera RAW file format

- Lens: Canon EF 28-105mm f4.0
- Focal length: Approximately 58mm ("normal" view). NOTE: zoom lens settings are variable and presetting specific focal lengths is approximate. Metadata from gathered imagery indicated that zoom setting was 60 mm.
- Exposure: ISO 200
- Aperture: f8
- Shutter speed: varies
- Height of instrument:
  - "eye level" (standing): 5'-8"
  - "eye level" (standard automobile height): 4'-6" (6" added to account for road and shoulder crown)

Images were taken at each location with camera set and leveled on a tripod. A camera height of 4'-6" was used to best and most accurately simulate the view as seen by the "average viewer" in a standard automobile traveling north on Route 43. A height of 5'-8" was used elsewhere to simulate eye level for a 6-foot tall individual.

f. Photographic Simulation: View locations from which the Expansion could be seen were recorded and entered into the AutoCAD computer model. From them, computer-generated views of the proposed landfill surface model were created and rendered. These views were then exported as image files, rendered using Adobe Photoshop CS5.1 software to closely approximate surface texture, color, contrast, and lighting, then combined as a photomontage with the corresponding photographs taken in the field to create a simulation of how the Expansion ultimately will appear.

g. Assessment: The resulting photographic simulations were assessed based upon factors including contrast/congruity, scale, form, orientation, line, color, and texture.

VI. Findings:

Viewpoint locations: Responses received from local and state agencies, with two exceptions, (Towns of Alton and Milford), indicated that there were no "public viewing areas" as defined within their jurisdictions or boundaries. The distance zones defined on the study maps include the 2,000 foot zone from the project site as required by Chapter 400, and the 6-mile zone from the project site described earlier. It should be noted that objects located greater than 4-miles from a viewer are classified as "background" as established by the U.S. Forest Service (USFS 4-4, 4-12) in which viewer positions are defined relative to distance from observed elements as follows:

- Immediate foreground (0' – 300')
- Foreground (0 – 0.5 mile)
- Middleground (0.5 – 4 miles)
- Background (4 miles – horizon)

In the landscape, the background consists of broadly discerned patterns and forms, lack of depth and detail, and an overall "simplified" character. Any viewing location, then, between the mandated 2,000-foot limit and 4-miles (i.e., in the middleground) could be considered as potentially more significant (when compared with other contributing factors) than a viewing location beyond 4-miles which would place the facility in the background.

It should be reemphasized here that the state's Chapter 400 rules require study to only within 2,000 feet of the project.

The following lists sites considered as potentially impacted by the two municipalities (Alton and Milford), and a discussion of each **(please refer to Figure 2)**.

- Alton
  - Hirundo Wildlife Refuge: This site is located off the Hudson Road proximate to Pushaw Stream and is approximately 3 miles from the project boundary and outside the 2,000 foot distance zone. Public access to the site is via one of three gated trails off the north side of the road. The area consists generally of a mix of wooded and wetland landscape. The GIS model indicated sporadic single-pixel cells of potential viewing areas. For this study, the closest access point to the JRL facility – Gate #1 – was investigated to a point approximately .25 mile into the site to a large open area designated for temporary parking. At no point did views open to the JRL site. If views can be had, it is likely that they are limited due to intervening vegetation and landform, and experienced by a small population segment. Therefore, it is concluded that this site will not be unreasonably impacted by the proposed Expansion.

- Milford:
  - Sunkhaze National Wildlife Refuge: This site, located to the east of JRL, lies mostly outside the assessment's 6-mile distance zone including the primary public access points which lie off the County Road. The site was not visited for this reason. If views to the landfill exist they are likely limited, in the extreme background, and would comprise a very small angular portion of the observer's field of view. Therefore, it is concluded that this site will not be unreasonably impacted by the proposed Expansion.
  - Downtown Milford Sites: Three sites were identified in this area and include the old Milford Dam, the Milford Playground located

immediately to the east of the dam, and the Lewis Libby School and Field approximately 0.2 mile further to the east. The dam site, as accessed from Davenport Street was signed as private property and so was not considered “public”. No views to the JRL site were noted from the playground and school and were effectively blocked by intervening landform and vegetation. Therefore, it is concluded that these sites will not be unreasonably impacted by the proposed Expansion.

- North Milford Sites + Penobscot River: The river corridor, the Costigan Historical Cemetery, and the Public Boat Launch all along Rt. 2 were identified. The latter two sites were in close proximity to the intersection of Greenfield Road. No views to the JRL facility were noted at the sites or along the corridor and were effectively blocked by intervening landform and vegetation. Therefore, it is concluded that these sites will not be unreasonably impacted by the proposed Expansion.

- Rt. 43 / Hudson Road: Photo-documentation was performed of the proposed Expansion from points approximately 2,800 feet from the site as described above **(please refer to photosimulation exhibits in Appendix B)**. View locations were proximate to CMP utility poles numbered 25, 26, and 27, corresponding to those studied in prior assessments (Jud, 1991; Johnson, 2014). The proposed Expansion extends the landfill form in a south-to-north direction with minimal east-west expansion of the apparent profile as viewed from the south. Therefore, the planned upper limit of elevation 390’ will appear no different from what has been previously modeled, reviewed, and approved by the MEDEP and the City. Further, the planted screening previously installed by the Applicant along the northerly edge of Rt. 43 in this area will, as confirmed in prior assessments, effectively buffer views to the landfill as the plants continue to grow, and mitigate its visual impact upon those traveling northbound. Therefore, it is concluded that the Rt. 43 corridor in this area will not be unreasonably impacted by the proposed Expansion.

- Pushaw Lake Area: The area west of Pushaw Lake was studied by travel along Rt. 221 south from the Town of Hudson. Rt. 221 was left approximately 6.5 miles south of Hudson at Glenburn Center to proceed east on Lakeview Road. No views to the Expansion were observed along these roads. The GIS model indicated a concentration of potential viewing areas along the southwest shore of the lake. Though no “public viewing” areas as defined exist there, a number of private businesses catering to the public do. A location on Lucky’s Landing – a private seaplane base – was chosen to study as being representative of potential views in the vicinity **(please refer to photosimulation exhibits in Appendix B)**.

Binoculars were required to confirm siting of the landfill and balloons which could be seen low on the horizon. Human physiology creates a “binocular” cone of vision (both eyes overlapping individual visual fields) of approximately 166 degrees with the head being stationary (Smarden 40-42). Peripheral vision (monocular for each individual eye) adds to this for a resultant total field of vision of approximately 208 degrees. For reference, at a focal length of 60 mm, the camera “sees” a field of view of approximately 34 degrees. The width of the landfill Expansion from this viewing location is approximately 2500’ wide as appears above the tree line. At approximately 6 miles distance, this equates to a horizontal angle of approximately 4 degrees, or around 2.5% of the observer’s binocular field of view.

The Expansion from this viewing point appears low on the horizon, its contrast/congruity, scale, form, orientation, and line, are consistent with the surrounding landscape; and its color and texture do not create significant contrast. Therefore, it is concluded that the Pushaw Lake area will not be unreasonably impacted by the proposed Expansion.

- Other scenic areas: In addition to agency and municipal contacts, state sponsored studies of lakes and rivers were reviewed. No lakes within the assessment area were identified as scenic. Note that, though listed in the lakes study, Pushaw Lake is identified only for wildlife, fisheries, botanic, and cultural resources, with “No significant (scenic) features reported.” (Parkin, Lortie, Humphrey, DiBello 62). No rivers within the assessment area were identified as scenic (Maine Department of Conservation). Therefore, it is concluded that no other potential scenic resources are unreasonably impacted by the proposed Expansion.

VII. Conclusions:

No “public viewing areas” as defined according to Chapter 400 lie within 2,000 feet of the proposed landfill expansion. Further, no significant viewing locations or identified scenic resources from which the public in general could view the landfill exist within the conservative, and non-regulatory, distance of 6 miles of the site. Vehicular ways that may have visual connection to the landfill are not regarded by state standards for landfill licensing as “public viewing areas” or as identified “scenic byways”. Those that do have views – most notably Rt. 43 – are either visually screened and buffered, or as with Rt. 16 and I-95, have infrequent and intermittent views.

Because the landfill falls above the threshold (30 seconds of arc) for “normal” detection by the unaided eye (Smardon 45) when viewed from the 6-mile range, other factors must be considered to determine visual impact. The proposed Expansion is not a radical departure from that which has been and is currently permitted. As concluded in the original visual assessment and supported in succeeding studies, the landfill when completed, capped, and vegetated "will appear highly congruous with the existing landscape in having a similar height, scale, form, orientation, and line as nearby hillsides, within existing landscape lines. The proposed landfill will be less than fully congruous with the existing forest character in color and texture." (Jud 19). With respect to color and congruity, this last aspect refers to the basic difference in hue, saturation, and luminosity or brightness inherent to objects or surfaces. Ultimately, the Expansion will be closed and its surface fully planted in a grass mix and maintained. By nature, though planted, this surface will be different, but not totally inconsistent, with respect to color when compared to the surrounding landscape of mixed forest and fields.

During construction and operation of the landfill, the color and form will be different. As discussed in earlier studies, the operating landfill will have a generally gray color with operating equipment in view. It will gradually grow over time to its permitted final elevation. Prior to final capping, closed cells will be covered in black protective membrane. 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 land forms, and the lighter gray operating areas will be more pronounced but will blend in with the warmer tones of intervening areas of leafless deciduous trees. At other times, the dark membrane may contrast more with the surroundings when viewed from the fore or middle ground, or when brightly front lit. These operational conditions are not inconsistent with those at present, which have been determined to not have an unreasonably adverse visual impact.

Therefore, and as presented herein, the proposed Expansion will not have an unreasonable adverse effect on existing uses, scenic character, and scenic resources in the area, and will not unreasonably interfere with views from established public viewing areas.

Citations:

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

2. Johnson, Mark G., *Maine Department of Environmental Protection – Condition Compliance, Solid Waste Order Amendment #S-020700-WD-N-A*, 2014

3. Smarden, Richard C., *Foundation for Visual Project Analysis,* United States, John Wiley & Sons, Inc., 1986

4. USDA Forest Service, *Landscape Aesthetics, A Handbook for Scenery Management*, 1995

5. Parkin, Lortie, Humphrey, DiBello; *Maine's Finest Lakes – The Results of the Maine Lakes Study*; Maine State Planning Office Critical Areas Program; 1989

6. Maine Department of Conservation, et al; *Maine Rivers Study – Final Report*; 1982

APPENDIX A: MDEP VISUAL EVALUATION
FIELD SURVEY CHECKLIST
(Natural Resources Protection Act, 38 M.R.S.A. §§ 480 A - Z)

Name of applicant: **State of Maine Bureau of General Services /NEWSME Landfill Operations, LLC**

Phone: **862-4200 ext. 230**

Application Type: **Tier 3**

Activity Type: (brief activity description) **The filling 2.04 acres of freshwater wetlands, and clearing in 0.10 acres of freshwater wetland in association with the Juniper Ridge landfill which includes approximately 54 acres of additional landfill footprint and 20.5 acres of infrastructure (roads, sedimentation ponds, and the like).**

Activity Location: Town: **Old Town** Court: ______________________________

GIS Coordinates, if known: **East 926,318.17', North 478,738.75' (Maine State Plane East NAD83)**

Date of Survey: **April 9, 2015** Observer: **Mark G. Johnson, SMRT** Phone: **772-3846**

	Distance Between the Proposed Visibility Activity and Resource (in Miles)		
1. Would the activity be visible from:	0-¼	¼-1	1+
A. A National Natural Landmark or other outstanding natural feature?			
B. A State or National Wildlife Refuge, Sanctuary, or Preserve or a State Game Refuge?			☑
C. A state or federal trail?			
D. A public site or structure listed on the National Register of Historic Places?			
E. A National or State Park?			
F. 1) A municipal park or public open space?			
2) A publicly owned land visited, in part, for the use, observation, enjoyment and appreciation of natural or man-made visual qualities?			
3) A public resource, such as the Atlantic Ocean, a great pond or a navigable river?			☑

2. What is the closest estimated distance to a similar activity? **1.9 miles (straight line) to Old Town Landfill (closed).**

3. What is the closest distance to a public facility intended for a similar use?			☑

4. Is the visibility of the activity seasonal? ☑Yes No
(i.e., screened by summer foliage, but visible during other seasons)

5. 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 No

A listing of National Natural Landmarks and other outstanding natural features in the State of Maine can be found at: www.nature.nps.gov/nnl/Registry/USA_map/states/Maine/maine.htm . In addition, unique natural areas are listed in the Maine Atlas and Gazetteer published by DeLorme.

(pink)

Most Maine State and National Wildlife Refuges, Sanctuaries, and Preserves and State Game Refuges are listed in the Maine Atlas and Gazetteer published by DeLorme.

Most State and federal trails are listed in the Maine Atlas and Gazetteer published by DeLorme. In addition, the Maine Department of Conservation maintains a list of state parks with trails that can be searched by county at: www.state.me.us/doc/parks/programs/db_search/index.html

Maine sites and structures listed on the National Register of Historic Places pursuant to the National Historic Preservation Act of 1966, as amended, can be searched by town at: www.cr.nps.gov/nr/research/nris.htm

In addition, State historic sites can be found at: www.state.me.us/doc/parks/programs/db_search/index.html A partial listing of historic sites in Maine can be found in the Maine Atlas and Gazetteer published by DeLorme.

A listing of Maine State Parks can be found at: www.state.me.us/doc/parks/programs/db_search/index.html or in the Maine Atlas and Gazetteer published by DeLorme. Acadia National Park on Mount Desert Island is Maine's only National Park.

For guidance on completing this field survey checklist, please contact Licensing staff in the Division of Land Resource Regulation at the following offices:

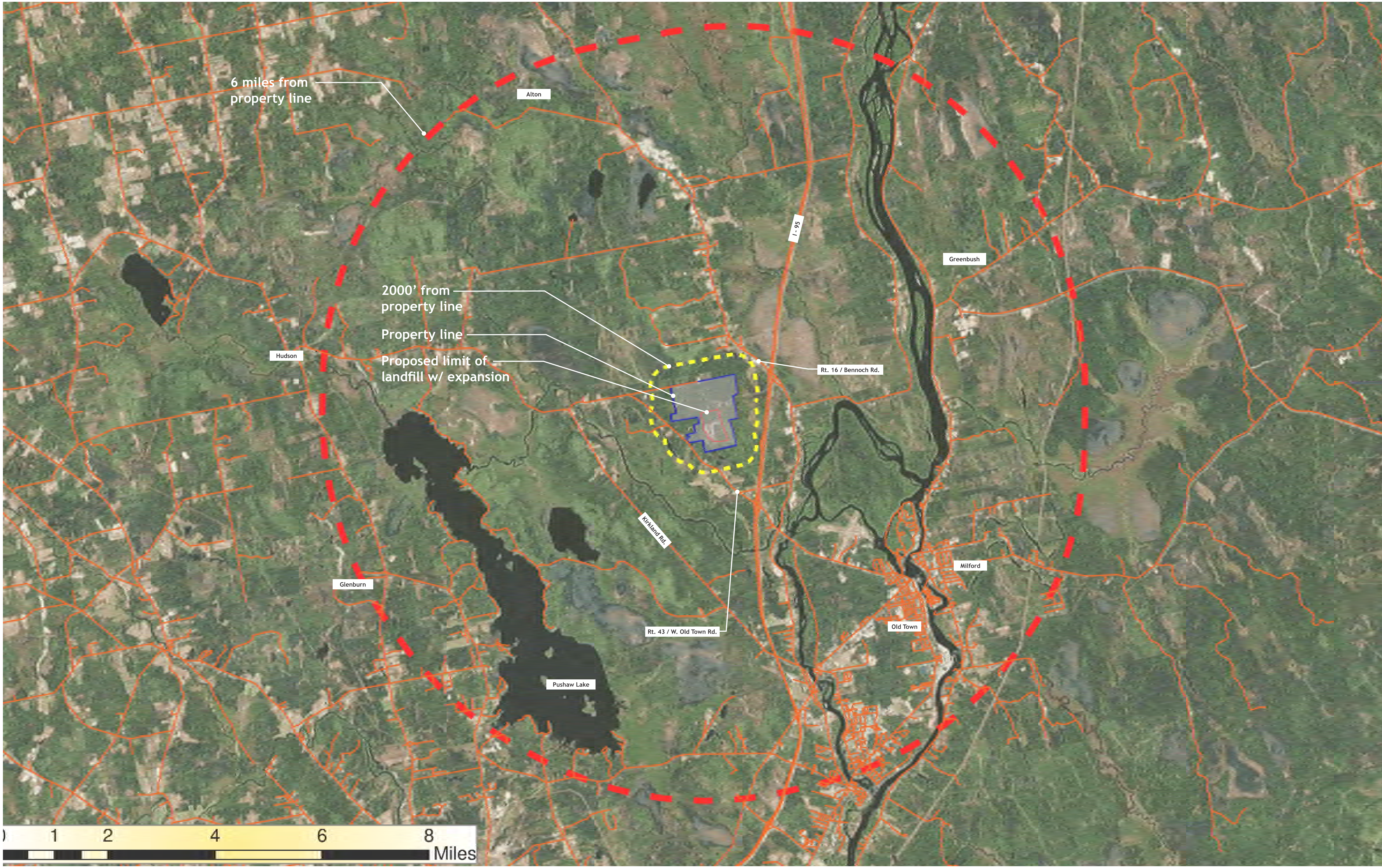
(Headquarters)
Central Maine Regional Office
17 State House Station
Ray Building, Hospital Street
Augusta, Maine 04333
(207) 287-3901 or
toll free at **1-800-452-1942**

Eastern Maine Regional Office
106 Hogan Road
Bangor, Maine 04401
(207) 941-4570 or
toll free at **1-888-769-1137**

Northern Maine Regional Office
1235 Central Drive
Presque Isle, Maine 04769
(207) 764-0477 or
toll free at **1-888-769-1053**

Southern Maine Regional Office
312 Canco Road
Portland, Maine 04103
(207) 822-6300 or
toll free at **1-888-769-1036**

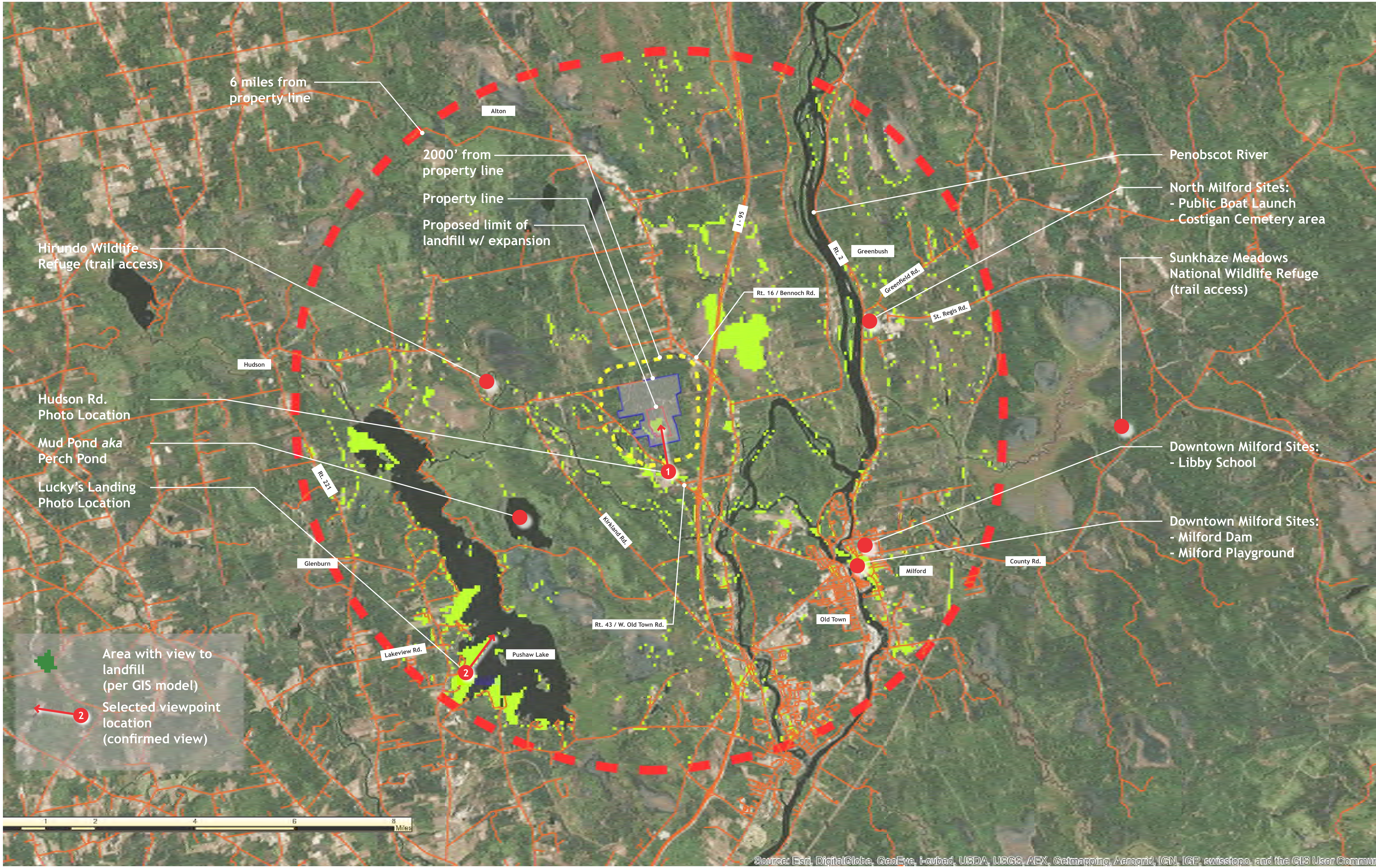
Appendix A: Figures



NEWSME Landfill Operations, LLC
Juniper Ridge Landfill Expansion

VISUAL ANALYSIS
FIGURE 1: CONTEXT PLAN

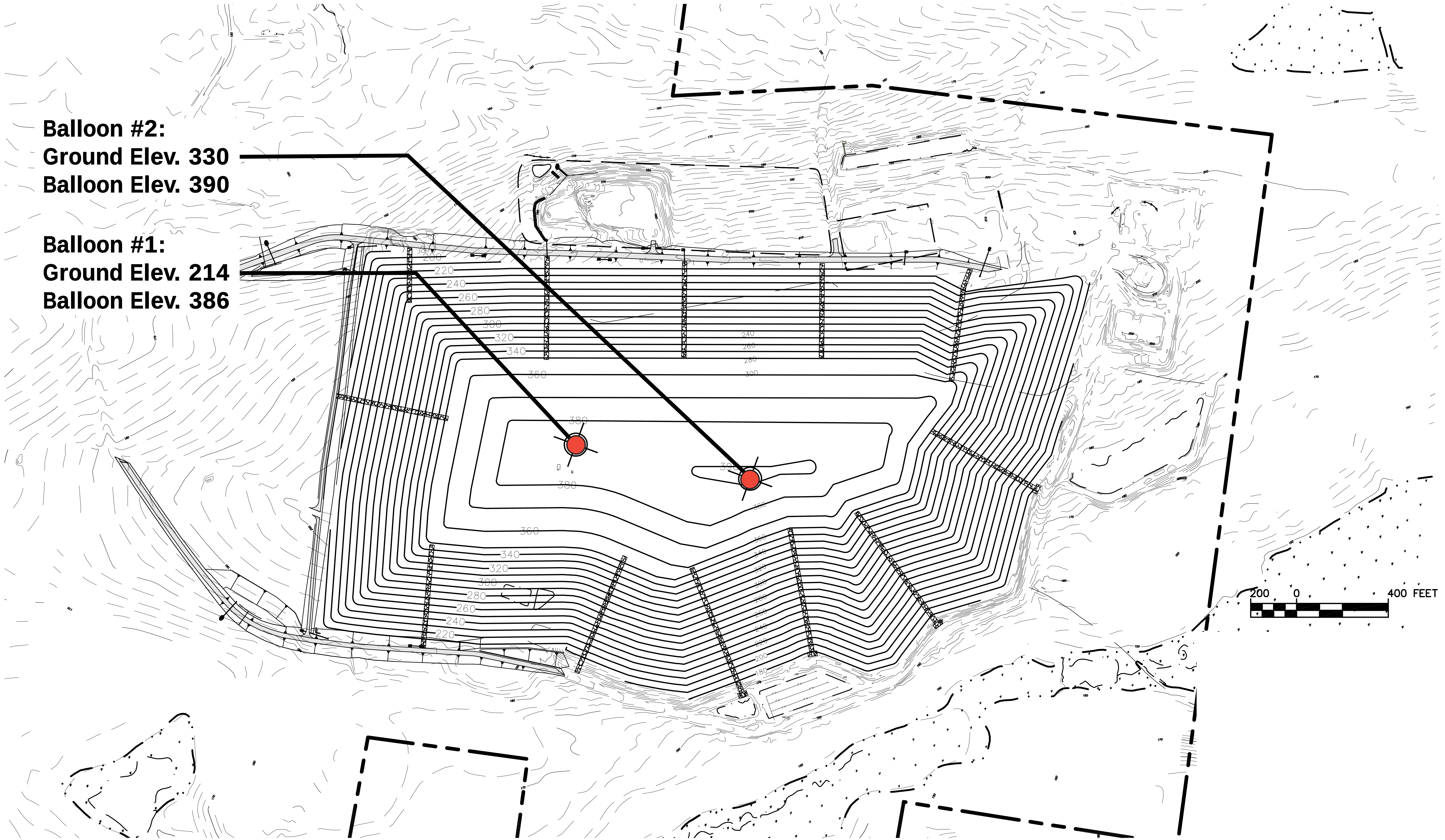
AS SHOWN
14145
JULY 2015



NEWSME Landfill Operations, LLC
Juniper Ridge Landfill Expansion

VISUAL ANALYSIS
FIGURE 2: VIEWSHED PLAN

AS SHOWN
14145
JULY 2015



SMRT

NEWSME Landfill Operations, LLC

Juniper Ridge Landfill Expansion

VISUAL ANALYSIS

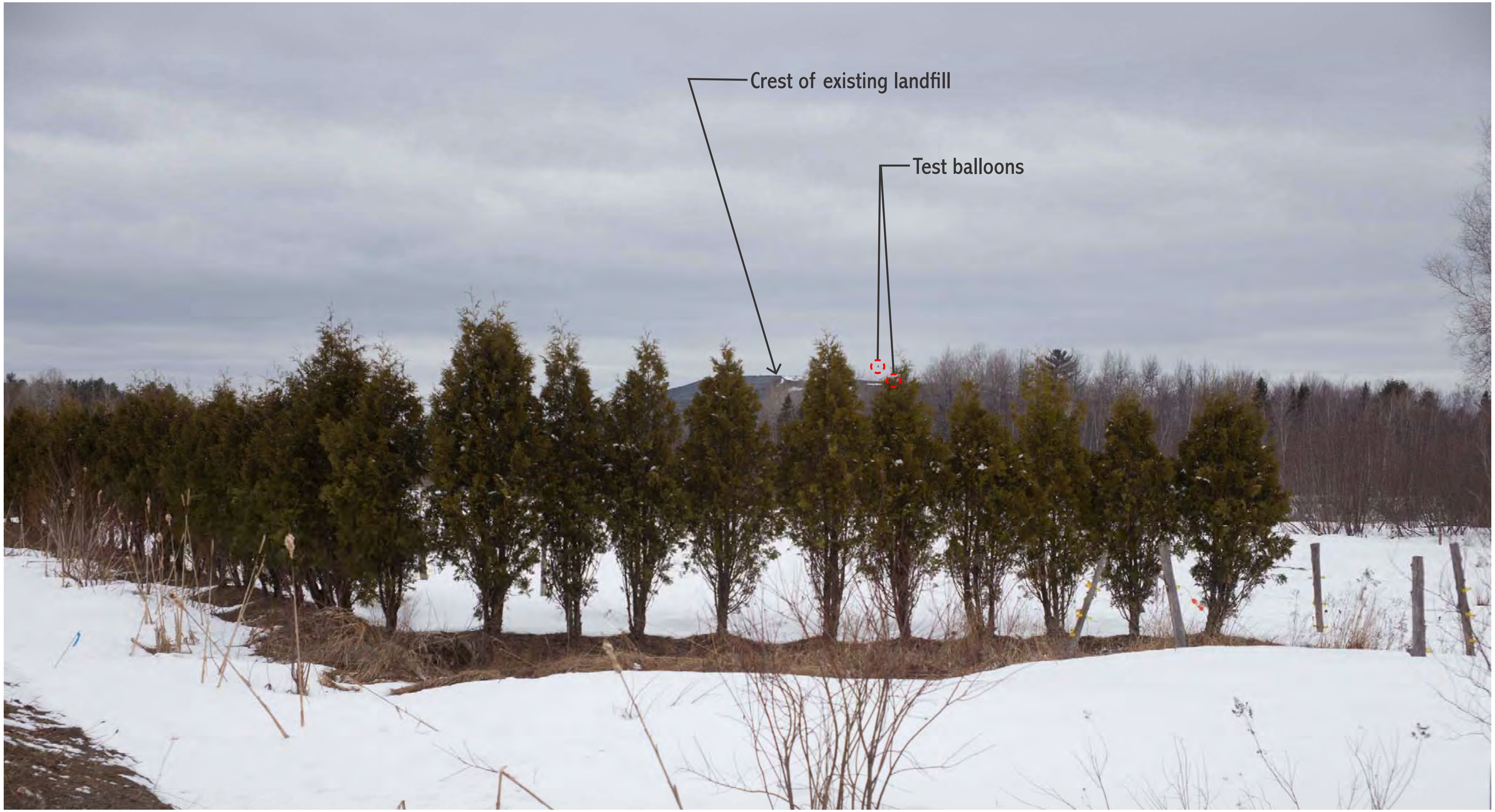
FIGURE 3: BALLOON LOCATION PLAN

NTS

14145

JULY 2015

Appendix B: Photo-simulations



Camera Height (“eye level”) = 4’-6”

SMRT

NEWSME Landfill Operations, LLC
Juniper Ridge Landfill Expansion

VISUAL ANALYSIS
View @ Rt. 43 (Pole 25-26): Current

NTS
14145
JULY 2015

Camera Height ("eye level") = 4'-6"

SMRT

NEWSME Landfill Operations, LLC
Juniper Ridge Landfill Expansion

VISUAL ANALYSIS
View @ Rt. 43 (Pole 25-26): Post-Closure

NTS
14145
JULY 2015

Camera Height (“eye level”) = 4’-6”

SMRT

NEWSME Landfill Operations, LLC
Juniper Ridge Landfill Expansion

VISUAL ANALYSIS
View @ Rt. 43 (Pole 26): Current

NTS
14145
JULY 2015

Camera Height ("eye level") = 4'-6"

SMRT

NEWSME Landfill Operations, LLC

Juniper Ridge Landfill Expansion

VISUAL ANALYSIS

View @ Rt. 43 (Pole 26): Post-Closure

NTS

14145

JULY 2015

Camera Height ("eye level") = 4'-6"

SMRT

NEWSME Landfill Operations, LLC
Juniper Ridge Landfill Expansion

VISUAL ANALYSIS
View @ Rt. 43 (Pole 27): Current

NTS
14145
JULY 2015

Camera Height ("eye level") = 4'-6"

SMRT

NEWSME Landfill Operations, LLC
Juniper Ridge Landfill Expansion

VISUAL ANALYSIS
View @ Rt. 43 (Pole 27): Post-Closure

NTS
14145
JULY 2015

Camera Height (“eye level”) = 5’-8”

SMRT

NEWSME Landfill Operations, LLC

Juniper Ridge Landfill Expansion

VISUAL ANALYSIS

View @ Lucky’s Landing: Current

NTS

14145

JULY 2015

Camera Height (“eye level”) = 5’-8”

NEWSME Landfill Operations, LLC

Juniper Ridge Landfill Expansion

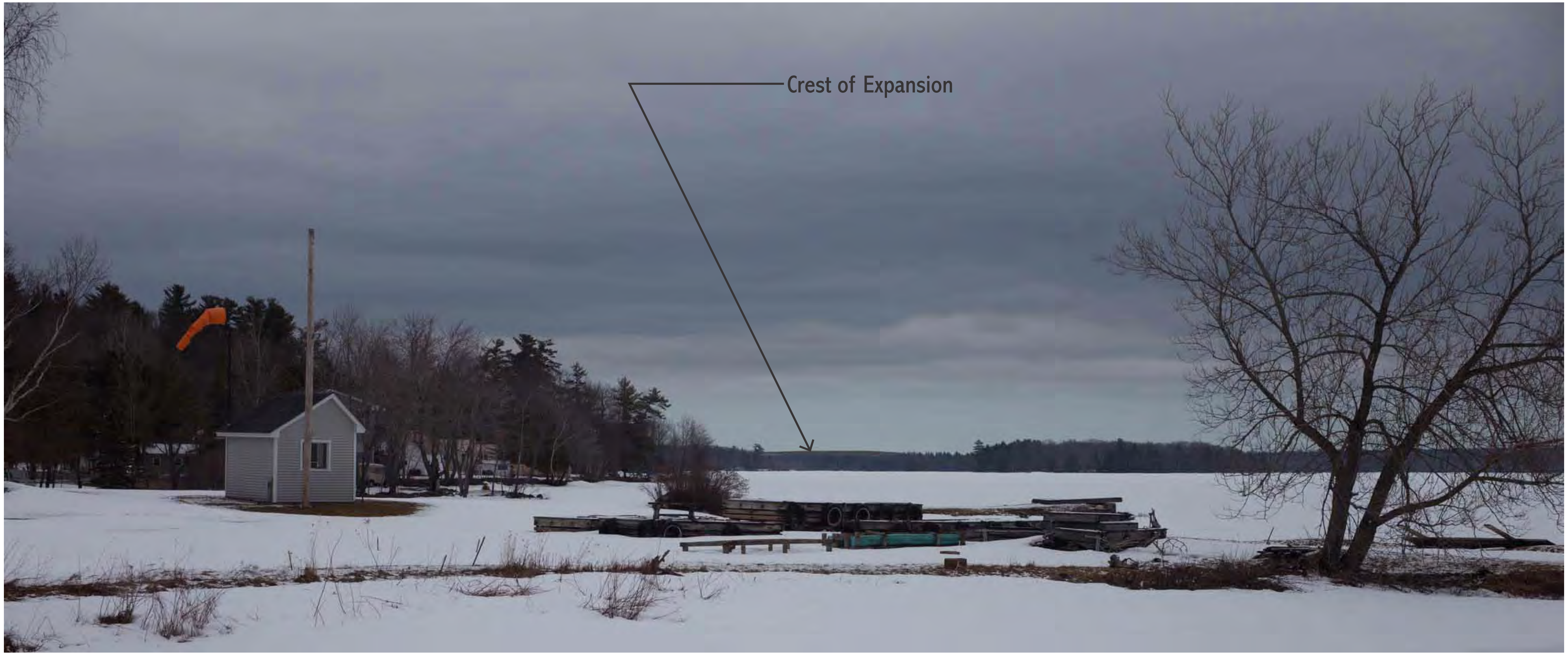
VISUAL ANALYSIS

Telephoto View @ Lucky’s Landing: Current

NTS

14145

JULY 2015



Camera Height ("eye level") = 5'-8"

SMRT

NEWSME Landfill Operations, LLC

Juniper Ridge Landfill Expansion

VISUAL ANALYSIS

View @ Lucky's Landing: Post-Closure

NTS

14145

JULY 2015

Appendix C: Area Stakeholder Correspondence

November 20, 2014

John Banks, Director
Department of Natural Resources
Penobscot Indian Nation
Tribal Administration
12 Wabanaki Way,
Indian Island, Maine 04468

Re: Juniper Ridge Landfill
Old Town, Maine
SMRT Project #14145

Dear Mr. Banks,

We are preparing submission information for a permit amendment application to the State for the above-referenced facility for which an approximately 54-acre expansion is being proposed.

We request a letter of determination from your office addressing the presence and location of any "public viewing area" generally within a 4-mile radius, and specifically within 2000 feet, of the facility property (please see attached location map). Per Maine Department of Environmental Protection Chapter 400 rules, a public viewing area is defined as *"an area designated for the public to view scenic areas, historical sites, unusual natural features or public monuments. Thes areas include but are not limited to scenic highways; public easements; scenic turnouts; public monuments; and national, state or municipal parks."*

Please let us know if you have any questions or require further information at this time.

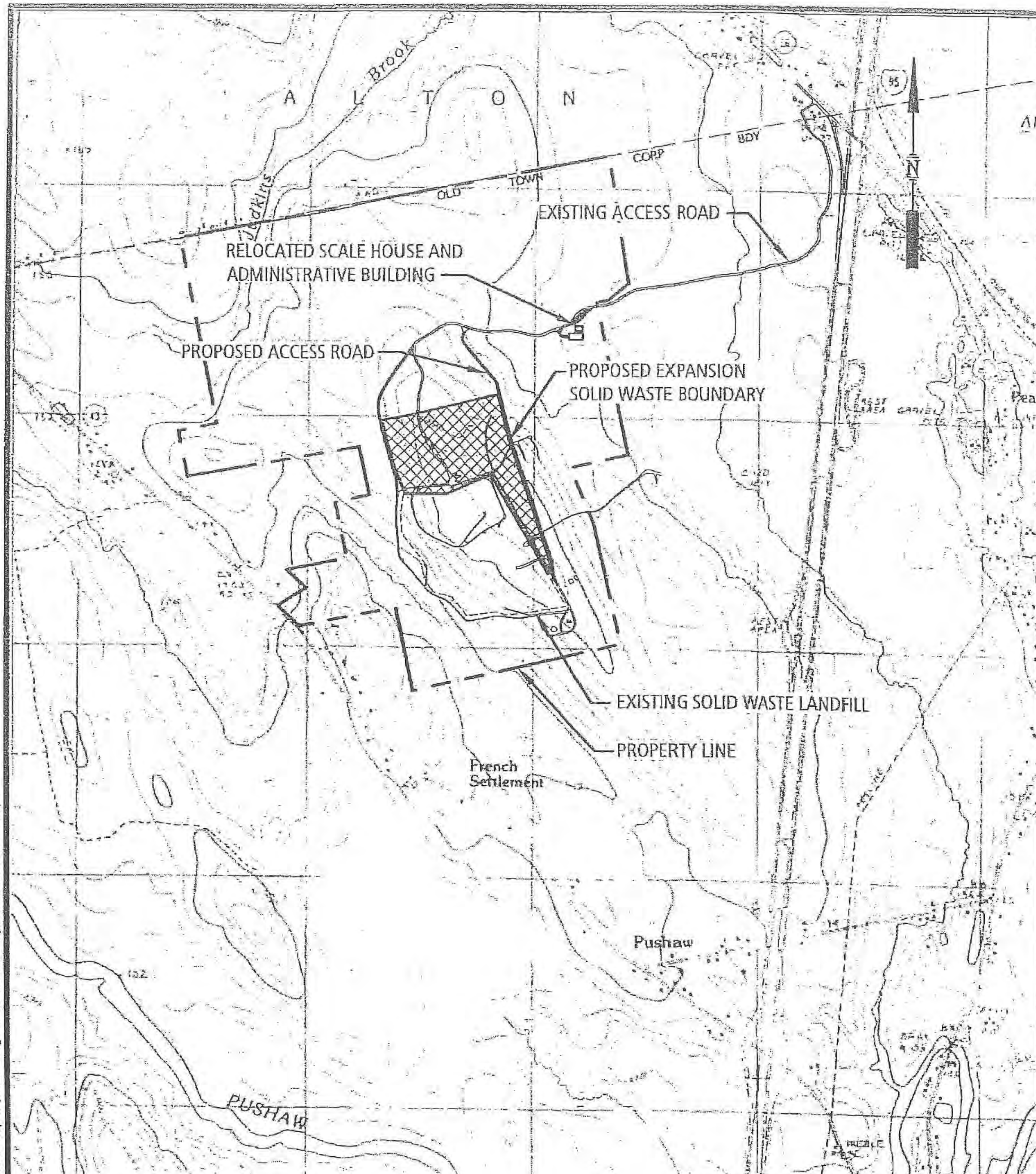
Sincerely,
SMRT

Mark G. Johnson, ASLA
Senior Landscape Architect
Maine Registered Landscape Architect

144 Fore Street
P.O. Box 618
Portland, ME 04104
p 207.772.3846 f 207.772.1070 email: mjohnson@smrtinc.com

Encl. Site Location Map

cc. file 14145/241



SITE LOCATION MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

1000 0 2000 FEET

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL · CIVIL · GEOTECHNICAL · WATER · COMPLIANCE

DWG: PRESENTATION LMN: STANTEC CTB: SME-STD REV: 10/2/14

erver\cla\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Acad\Figures\Presentation.dwg, 10/2/2014 1:03:23 PM, paf

Old Town

265 MAIN STREET * OLD TOWN, MAINE 04468-1497

October 7, 2014

Mark Johnson
SMRT
144 Fore Street
P.O. Box 618
Portland, Maine 04104

RE: SMRT Project # 14145. Scenic Viewing Area determination for JRL. 2828 Bennoch Road, Old Town, Maine (Tax Map 003, Lot 001)

Dear Mr. Johnson,

As per your request I am notifying you in writing as to the presence of any public viewing areas generally within a 4-mile radius, and specifically within 2,000 feet, of the Juniper Ridge Landfill facility property. After reviewing the City's tax maps, road maps and in speaking with staff with historical knowledge of the area, I find that there are no such viewing areas that the proposed, approximately 54 acre expansion, would effect.

If you have any questions or concerns, please feel free to contact me at the numbers listed below.

Sincerely,

David C. Russell
Code Enforcement Officer

Cc: City Manager

David C. Russell, Code Enforcement Officer
207-827-3965 x 205 Cell: 570-6798 Fax: 207-827-3966
drussell@old-town.org

Mark Johnson

From: Michael Falvey <falveym@glenburn.net>
Sent: Tuesday, October 21, 2014 6:43 PM
To: Mark Johnson
Subject: Juniper Ridge

Dear Mr. Johnson,

In reference to your letter dates October 17, 2014. The Town of Glenburn does not have an area designated for the public viewing of scenic areas. To my knowledge there are no public viewing areas.

Regards,

Michael Falvey
CEO/LPI/Building Official
144 Lakeview Road
Glenburn, ME 04401
falveym@glenburn.net
Telephone:207-942-2905
Fax:207-990-2953

cc: file 14145/241

Mark Johnson

From: Mike Polyot <mpolyot1@gmail.com>
Sent: Thursday, October 30, 2014 9:39 AM
To: Mark Johnson
Subject: Juniper Ridge Expansion

Dear Mr. Johnson,

I have checked with The Hudson Selectpersons and the Planning Board members and local records about public viewing areas and find that there are no Public Viewing Areas in Hudson within 4 miles or specifically within 2000 ft. of the facility.

Sincerely,

Mike Polyot
Code Enforcement Officer
Hudson, Maine

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION AND FORESTRY
22 STATE HOUSE STATION
AUGUSTA, MAINE
04333-0022

PAUL RICHARD LEPAGE
GOVERNOR

WALTER E. WHITCOMB
COMMISSIONER

November 7, 2014

Mark G. Johnson, ASLA
SMRT
144 Fore Street
P.O. Box 618
Portland, ME 04104

RE: Request for Comment
Juniper Ridge Landfill Expansion, Old Town, Maine

Dear Mr. Johnson,

The Bureau of Parks and Lands has reviewed the proposed expansion of the Juniper Ridge Landfill in Old Town, and has determined there are no public viewing areas designated at any parks, public lands, or historic sites under our authority in the vicinity of, or within view of this project.

Sincerely,

Katherine Eickenberg

Katherine Eickenberg
Chief of Planning and Acquisitions
Bureau of Parks and Lands

Cc Mari-Wells, DACF

THOMAS A. MORRISON, ACTING DIRECTOR
BUREAU OF PARKS & LANDS
www.maine.gov/acf

PHONE: (207) 287-3821
FAX: (207) 287-8111
TTY: (888) 577-6690

File 14145/241

THE TOWN OF ALTON, MAINE

A Little Town Of Neighbors

Town Clerk
3352 Bennoch Rd
Alton, Maine 04468
PH: (207) 394-2601
Fax: (207) 394-3271

November 11, 2014

NOV 14 2014
SMRT INC

SMRT, Inc
Attn: Mark G Johnson
PO Box 618
Portland, ME 04104

Letter of Determination

Greetings Mr. Johnson,

As per your letter dated, October 17th, 2014, to the Town Official of Alton, Maine, asking us to identify any "public viewing area" within a 4-mile radius of the Juniper Ridge Landfill, we have concluded as follows.

Within the 4-mile radius as outlined in your "Context Plan" map, Hirundo Wildife Refuge is located northwest of the Juniper Ridge Landfill. Hirundo Wildlife Refuge is a land and water mass that the public is invited to view its scenic and historic sites. Most every weekend the people that manage the Refuge conduct tours for bird watching, mushroom identification, and canoe trips. The management at Hirundo Wildlife Refuge encourages the general public to visit their compound and explore their unusual natural features.

If we can be of further assistance, please contact us.

Sincerely,

Alton Board of Selectmen

Keith Feero, Chairman Brian Engstrom Ronald Borja

Mark Johnson

From: Code Enforcement <ceo@milfordmaine.org>
Sent: Wednesday, November 19, 2014 3:04 PM
To: Mark Johnson
Subject: RE: JRL letter?

Mr. Johnson,

I did indeed receive your letter and have reviewed its content.

Frankly, I have found it difficult to determine impact based on the limited information that was provided.

Areas of Possible impact to the Town of Milford include but are not limited to:

Sunkhaze National Wildlife Refuge.
The Milford Dam, which is I believe on the Historical Register.
The Milford Boat Launch located on Route 2.
The Milford Playground, located on Davenport Street.
The Doctor Lewis Libby School & Chaisson Field, located on County Road.
Costigan Historical Cemetery, located on Route 2 near the Penobscot River.
The Penobscot River Corridor.

Please feel free to contact me should you require further information.

Andrew Fish
Code Enforcement Officer
Local Heath Officer
Town of Milford Maine

Voice: 207.827.2072
Fax: 207.827.1524
Email: ceo@milfordmaine.org

From: Mark Johnson [mailto:MJohnson@SMRTInc.com]
Sent: Wednesday, November 19, 2014 13:05
To: 'tax@milfordmaine.org'
Subject: JRL letter?
Importance: High

Greetings Mr. Fish,

I sent a letter requesting your input regarding a proposed expansion of the Juniper Ridge Landfill a while back (see attached copy). Have you had a chance to review and may we expect your response soon?

We're trying to put together a tour of the area to photo-document potential viewing locations and your input will be valuable.

Please let me know if you have questions or need further information at this time.

Thanks,

Mark G. Johnson ASLA, LEED AP
CLARB Certified Landscape Architect
Senior Landscape Architect
Maine Licensed Landscape Architect

SMRT
144 Fore Street, PO Box 618 Portland, Maine 04104
p 207.772.3846 f 207.772.1070
www.smrtinc.com

Mark Johnson

From: Cooper, Kent <Kent.Cooper@maine.gov>
Sent: Thursday, November 20, 2014 8:36 AM
To: Mark Johnson
Subject: RE: Juniper Ridge, Old Town

Hi, Mark: I have sent your inquiry to Fred Michaud in our Planning section, Bob Moosmann in M&O, and Larry Johannesman another Multimodal LA--- there seem to be no conflicts as such nor officiially sanctioned "scenic" designation here other than the view from 95 probably including the area in question. Please let me know if you need anything further. kc

Kent Cooper
Transportation Landscape Architect
Multimodal Program / Project Development
Maine Department of Transportation
207-624-3085 cell 207-592-0771
kent.cooper@maine.gov

From: Mark Johnson [mailto:MJohnson@SMRTInc.com]
Sent: Wednesday, November 19, 2014 3:09 PM
To: Cooper, Kent; Johannesman, Lawrence
Subject: Juniper Ridge, Old Town
Importance: High

Gents,

We are preparing submission information for a permit amendment application to the State for the Juniper Ridge Landfill facility in Old Town for which an approximately 54-acre expansion is being proposed.

We request a letter of determination from your office addressing the presence and location of any "public viewing area" generally within a 4-mile radius, and specifically within 2000 feet, of the facility property (please see attached location map). Per Maine Department of Environmental Protection Chapter 400 rules, a public viewing area is defined as "an area designated for the public to view scenic areas, historical sites, unusual natural features or public monuments. Thes areas include but are not limited to scenic highways; public easements; scenic turnouts; public monuments; and national, state or municipal parks."

I have reached out also to surrounding municipalities and the Bureau of Parks and Lands.

I've sent this as a formal letter, too. Please let me know if you have questions or need further information at this time.

Thanks,

Mark G. Johnson ASLA, LEED AP
CLARB Certified Landscape Architect
Senior Landscape Architect
Maine Licensed Landscape Architect

SMRT

Mark Johnson

From:	Cooper, Kent <Kent.Cooper@maine.gov>
Sent:	Thursday, November 20, 2014 8:37 AM
To:	Mark Johnson
Subject:	FW: Juniper Ridge, Old Town

fyi . kc

From: Moosmann, Robert
Sent: Wednesday, November 19, 2014 3:31 PM
To: Cooper, Kent; Michaud, Fred
Cc: Johannesman, Lawrence; Riley, Kevin
Subject: RE: Juniper Ridge, Old Town

Both rest areas on the interstate near this location are closed to the public as functioning rest areas. The SB side is an active weigh station for the state police. There is no view shed from that rest area to the west. Route 16 and Route 43 are mostly wooded and I am not aware of any issues on either of those roads.

From: Cooper, Kent
Sent: Wednesday, November 19, 2014 3:20 PM
To: Michaud, Fred
Cc: Johannesman, Lawrence; Moosmann, Robert; Riley, Kevin
Subject: FW: Juniper Ridge, Old Town
Importance: High

anone care to comment or run with this......? anyone's jurisdiction? .... kc

---

From: Mark Johnson [mailto:MJohnson@SMRTInc.com]
Sent: Wednesday, November 19, 2014 3:09 PM
To: Cooper, Kent; Johannesman, Lawrence
Subject: Juniper Ridge, Old Town
Importance: High

Gents,

We are preparing submission information for a permit amendment application to the State for the Juniper Ridge Landfill facility in Old Town for which an approximately 54-acre expansion is being proposed.

We request a letter of determination from your office addressing the presence and location of any "public viewing area" generally within a 4-mile radius, and specifically within 2000 feet, of the facility property (please see attached location map). Per Maine Department of Environmental Protection Chapter 400 rules, a public viewing area is defined as "an area designated for the public to view scenic areas, historical sites, unusual natural features or public monuments. Thes areas include but are not limited to scenic highways; public easements; scenic turnouts; public monuments; and national, state or municipal parks."

I have reached out also to surrounding municipalities and the Bureau of Parks and Lands.

I've sent this as a formal letter, too. Please let me know if you have questions or need further information at this time.

Thanks,

Mark Johnson

From:	Cooper, Kent <Kent.Cooper@maine.gov>
Sent:	Thursday, November 20, 2014 8:37 AM
To:	Mark Johnson
Subject:	FW: Juniper Ridge, Old Town

fyi. kc

From: Michaud, Fred
Sent: Wednesday, November 19, 2014 3:39 PM
To: Moosmann, Robert; Cooper, Kent
Cc: Johannesman, Lawrence; Riley, Kevin
Subject: RE: Juniper Ridge, Old Town

The top of Mt. Juniper Ridge can be seen from the southbound lane immediately south of Alton Stream and through most of the Alton Bog portion on I95. Looks like a big hill and blends in much more nicely than Mt. Sawyer in Hampden.

I do not see any issues related to scenic vistas.

Fred Michaud
Scenic Byways Program Coordinator
Policy Development Specialist
Maine Department of Transportation
16 State House Station
Augusta, ME 04333-0016

Telephone: 207-624-3279
Fax: 207-624-3099
Cell: 207-446-7000

fred.michaud@maine.gov

From: Moosmann, Robert
Sent: Wednesday, November 19, 2014 3:31 PM
To: Cooper, Kent; Michaud, Fred
Cc: Johannesman, Lawrence; Riley, Kevin
Subject: RE: Juniper Ridge, Old Town

Both rest areas on the interstate near this location are closed to the public as functioning rest areas. The SB side is an active weigh station for the state police. There is no view shed from that rest area to the west. Route 16 and Route 43 are mostly wooded and I am not aware of any issues on either of those roads.

From: Cooper, Kent
Sent: Wednesday, November 19, 2014 3:20 PM
To: Michaud, Fred
Cc: Johannesman, Lawrence; Moosmann, Robert; Riley, Kevin
Subject: FW: Juniper Ridge, Old Town
Importance: High

anone care to comment or run with this......? anyone's jurisdiction? .... kc

---

~~**From:** Mark Johnson [mailto:MJohnson@SMRTInc.com]~~
Sent: Wednesday, November 19, 2014 3:09 PM
To: Cooper, Kent; Johannesman, Lawrence

cc: file 14145 /241

Mark Johnson

From: Jerry Davis <greenbh1@midmaine.com>
Sent: Friday, December 19, 2014 1:14 PM
To: Mark Johnson
Subject: RE: JRL letter?

Mark, We cannot see juniper Ridge Landfill, there is no Public Viewing area issues per DEP/chapter 400 rules. Thank, You Jerry

---

From: Mark Johnson [mailto:MJohnson@SMRTInc.com]
Sent: Friday, December 19, 2014 12:54 PM
To: 'greenbh1@midmaine.com'
Subject: FW: JRL letter?
Importance: High

Hi Jerry,

Thanks for your assistance with this. Please let me know if you have any questions.

Best,

Mark G. Johnson ASLA, LEED AP
CLARB Certified Landscape Architect
Senior Landscape Architect
Maine Licensed Landscape Architect

SMRT
144 Fore Street, PO Box 618 Portland, Maine 04104
p 207.772.3846 f 207.772.1070
www.smrtinc.com

From: Mark Johnson
Sent: Wednesday, November 19, 2014 12:53 PM
To: 'greenbh1@midmaine.com'
Subject: JRL letter?
Importance: High

Greetings,

I sent a letter requesting your input regarding a proposed expansion of the Juniper Ridge Landfill a while back (see attached copy). Have you had a chance to review and may we expect your response soon?

We're trying to put together a tour of the area to photo-document potential viewing locations and your input will be valuable.

Please let me know if you have questions or need further information at this time.

Thanks,

APPENDIX I

AIR QUALITY EXHIBITS
MEDEP BUREAU OF AIR QUALITY PERMIT

PAUL R. LEPAGE
GOVERNOR

PATRICIA W. AHO
COMMISSIONER

State of Maine and
NEWSME Landfill Operations, LLC
d/b/a Juniper Ridge Landfill
Penobscot County
Old Town, Maine
A-921-70-B-R

Departmental
Findings of Fact and Order
Part 70 Air Emission License
Renewal with Amendment

FINDINGS OF FACT

After review of the Part 70 License renewal and 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 Annotated (M.R.S.A.), §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 and Part 70 Significant License Modification
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 a major source for criteria pollutants. JRL does not have the potential to emit more than 10 TPY of a single hazardous air pollutant (HAP) or more than 25 TPY of combined HAP. Therefore, the source is 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
Sold Waste Landfill	10.0 MM cubic yards (approx.) 7.95 million Megagrams	n/a

JRL has additional insignificant activities which do not need to be listed in the emission equipment 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 CMR 140 (as amended).

C. Application Classification

The application for JRL is for the renewal of their existing Part 70 Air License. JRL has also requested incorporation into the Part 70 Air License the relevant terms and conditions of the 06-096 CMR 115 New Source Review (NSR) licenses issued to JRL, including A-921-77-2-A issued 11/26/12, A-921-77-3-M issued 2/7/14, and A-921-77-4-M issued 5/9/14. Therefore, the license is considered to be a Part 70 License renewal with the incorporation of NSR requirements.

D. 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 previously licensed the installation of 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. This control equipment, as well as the timetable for its installation, is addressed in this license.

E. 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 CMR 101	Visible Emissions
06-096 CMR 102	Open Burning
06-096 CMR 103	Fuel Burning Equipment Particulate Emission Standard
06-096 CMR 104	Incinerator Particulate Emission Standard
06-096 CMR 109	Emergency Episode Regulation
06-096 CMR 110	Ambient Air Quality Standard
06-096 CMR 116	Prohibited Dispersion Techniques
06-096 CMR 137	Emission Statements
06-096 CMR 140	Part 70 Air Emission License Regulations
06-096 CMR 143	New Source Performance Standards
06-096 CMR 144	National Emission Standards for Hazardous Air Pollutants (NESHAP)
40 CFR Part 60, Subpart WWW	Standards of Performance for Municipal Solid Waste Landfills
40 CFR Part 70	State Operating Permit Programs
40 CFR Part 98	Mandatory Greenhouse Gas Reporting

Note: CMR = Code of Maine Regulations
CFR = Code of Federal Regulations

F. Units of Measurement

The following units of measurement are used in this license:

BTU/scf	British Thermal Units per standard cubic feet
gal	gallons
grains/dscf	grains per dry standard cubic feet
lb/hr	pounds per hour
lb/MMBtu	pounds per million British Thermal Units
MMBtu/hr	million British Thermal Units per hour
m^3	cubic meters
ppmv	parts per million by volume
scfm	standard cubic feet per minute
scf/hr	standard cubic feet per hour
tpy	tons per year

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 06-096 CMR 100 (as amended). 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 CMR 138 (as amended) is applicable to sources that have the potential to emit quantities of NO_x equal to or greater than 100 tons/year. Annual emissions of NO_x from JRL are limited to less than 100 ton/year. 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 CMR 134 (as amended) is applicable to sources that have the potential to emit quantities of VOC equal to or greater than 40 tons/year. Annual emissions of VOC from JRL are limited to 40 ton/year. Therefore, VOC RACT does not apply to this facility.

D. Mandatory Greenhouse Gas (GHG) Reporting

Federal regulation 40 CFR Part 98, *Mandatory Greenhouse Gas Reporting*, 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 40 CFR Part 98, Subpart A, *General Provision*, § 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, per 40 CFR Section 98.2(a)(1), JRL shall fulfill the recordkeeping and reporting requirements of 40 CFR Part 98.

E. PSD/BACT Review

The Department issued Air License A-921-77-2-A on 11/26/12 to JRL. The license was issued to permit the current flare configuration. The license was issued pursuant to federal Prevention of Significant Deterioration (PSD) requirements and the Department's air licensing requirements for major modifications. JRL has modified certain requirements contained in A-921-77-2-A and underwent the appropriate air licensing procedures to address these changes.

F. Solid Waste Landfill

JRL operates and maintains a municipal solid waste landfill.

1. New Source Performance Standards (NSPS)

JRL operates and maintains a municipal solid waste landfill that is subject to 40 CFR Part 60, Subpart WWW, *Standards of Performance for Municipal Solid Waste Landfills*. Subpart WWW requires that landfills with a design capacity in excess of 2.5 million cubic meters calculate a Non-Methane Organic Compound (NMOC) emission rate. If the annual NMOC emission rate is found to be greater than 50 megagrams per year, the owner of the landfill is required to install a collection and control system that complies with Subpart WWW.

The process of determining the NMOC emission rate is prescribed by Subpart WWW and is a tiered analysis. In 2006 JRL performed a Tier 1 analysis in which JRL calculated NMOC emissions based on a first order decay equation with default parameters and site specific waste values. JRL used a model developed by the EPA entitled "Landfill Gas Emissions Model (LandGEM), Version 2.01". The Tier I analysis indicated that the uncontrolled NMOC emissions from the landfill would exceed 50 megagrams per year. JRL therefore decided to proceed to a Tier 2 analysis.

Using a Tier 2 analysis allows for the collection of site-specific NMOC concentrations to be included in the LandGEM model. JRL conducted Tier 2 sampling in 2006. Based on the sampling information, the 2006 Tier 2 analysis showed an NMOC emission rate less than 50 megagrams per year prior to control.

Tier 2 sampling was repeated in 2011. Results of the 2011 Tier 2 sampling demonstrate that pre-control emissions of NMOC are now greater than 50 megagrams per year. Therefore, per Subpart WWW, JRL was required to submit a Collection and Control System Design plan, which it did on June 7, 2012.

In addition, JRL is required to install and operate an active gas collection system that meets the requirements of Subpart WWW by December 8, 2014. A gas collection and control system has been operated at JRL since 2005. However, because estimated pre-control emissions exceeded 50 megagrams per year in 2012, JRL must be operating the active gas collection system in compliance with the requirements of Subpart WWW no later than December 8, 2014.

The system consists of a gas collection system and three flares. The flares are designed to achieve 98% overall destruction of NMOCs and use a small amount of propane as a pilot light.

2. National Emissions Standards for Hazardous Air Pollutants (NESHAP)

Since JRL has demonstrated estimated uncontrolled emissions of NMOC exceed 50 megagrams per year, JRL is subject to *National Emission Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills,* 40 CFR 63, Subpart AAAA. However, compliance with 40 CFR Part 60, Subpart WWW constitutes compliance with 40 CFR 63, Subpart AAAA per §63.1955(a)(1).

3. TRS, H_2S, and SO_2 – Clarification of Terms Used

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 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 SO_2. The SO_2 emissions are directly correlated to the amount of sulfur in the landfill gas prior to combustion.

4. Control Equipment

The LFG generated at JRL is collected and then flared. The facility 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 (3550 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 (1350 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 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.

Prior to June 1, 2015, the H_2S concentration of the LFG going to the flares shall not exceed 4,500 ppmv on a daily average basis.

SO_2 is emitted as a result of combustion of TRS compounds in the LFG. As part of NSR Amendment A-921-77-3-M, 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.

No later than June 1, 2015, JRL shall install and operate 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.

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.

5. Emission Limits and Streamlining

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, and the applicable emission limits can be found below.

Pollutant	Applicable Emission Standards	Origin and Authority	Licensed Emission Limits
SO_2 (All flares combined)	449.0 tpy	06-096 CMR 115, BACT (A-921-77-2-A)	449.0 tpy

For Flare #2 a listing of potentially applicable emission standards, the origin and authority of the standards, notation if streamlining of the standards has been requested, and the applicable emission limits can be found below.

Pollutant	Applicable Emission Standards	Origin and Authority	Licensed Emission Limits
PM	0.2 grains/dscf	06-096 CMR 104	0.2 grains/dscf
	0.38 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	0.38 lb/hr
PM_{10}	0.38 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	0.38 lb/hr
$PM_{2.5}$	0.38 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	0.38 lb/hr

Pollutant	Applicable Emission Standards	Origin and Authority	Licensed Emission Limits
SO_2	33.09 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	33.09 lb/hr
	449.0 tpy (All flares combined)	06-096 CMR 115, BACT (A-921-77-2-A)	449.0 tpy (All flares combined)
NO_x	1.53 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	1.53 lb/hr
CO	8.33 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	8.33 lb/hr
VOC	0.07 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	0.07 lb/hr
Visible Emissions	30% opacity on a 6-minute block average basis except for two 6-minute block averages in a 3-hour period	06-096 CMR 101, §2(B)(1)(f)	20% opacity on a 6-minute block average basis *
	20% opacity on a 6-minute block average basis	06-096 CMR 115, BACT (A-921-77-2-A)	

Table Notes: * streamlining requested

For Flare #3 a listing of potentially applicable emission standards, the origin and authority of the standards, notation if streamlining of the standards has been requested, and the applicable emission limits can be found below.

Pollutant	Applicable Emission Standards	Origin and Authority	Licensed Emission Limits
PM	0.2 grains/dscf	06-096 CMR 104	0.2 grains/dscf
	0.69 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	0.69 lb/hr
PM_{10}	0.69 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	0.69 lb/hr
$PM_{2.5}$	0.69 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	0.69 lb/hr
SO_2	59.56 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	59.56 lb/hr
	449.0 tpy (All flares combined)	06-096 CMR 115, BACT (A-921-77-2-A)	449.0 tpy (All flares combined)
NO_x	2.75 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	2.75 lb/hr
CO	14.99 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	14.99 lb/hr
VOC	0.12 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	0.12 lb/hr
Visible Emissions	30% opacity on a 6-minute block average basis except for two 6-minute block averages in a 3-hour period	06-096 CMR 101, §2(B)(1)(f)	20% opacity on a 6-minute block average basis *
	20% opacity on a 6-minute block average basis	06-096 CMR 115, BACT (A-921-77-2-A)	

Table Notes: * streamlining requested

For Flare #4 a listing of potentially applicable emission standards, the origin and authority of the standards, notation if streamlining of the standards has been requested, and the applicable emission limits can be found below.

Pollutant	Applicable Emission Standards	Origin and Authority	Licensed Emission Limits
PM	0.2 grains/dscf	06-096 CMR 104	0.2 grains/dscf
	1.81 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	1.81 lb/hr
PM_{10}	1.81 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	1.81 lb/hr
$PM_{2.5}$	1.81 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	1.81 lb/hr
SO_2	157.0 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	157.0 lb/hr
	449.0 tpy (All flares combined)	06-096 CMR 115, BACT (A-921-77-2-A)	449.0 tpy (All flares combined)
NO_x	7.24 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	7.24 lb/hr
CO	39.41 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	39.41 lb/hr
VOC	0.32 lb/hr	06-096 CMR 115, BACT (A-921-77-2-A)	0.32 lb/hr
Visible Emissions	30% opacity on a 6-minute block average basis except for two 6-minute block averages in a 3-hour period	06-096 CMR 101, §2(B)(1)(f)	20% opacity on a 6-minute block average basis *
	20% opacity on a 6-minute block average basis	06-096 CMR 115, BACT (A-921-77-2-A)	

Table Notes: * streamlining requested

6. Emission Limit Compliance Methods

Compliance with the emission limits associated with the flares shall be demonstrated upon request by the Department.

7. Periodic Monitoring

JRL shall monitor and record the following periodic monitors as indicated in the following table.

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
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 flare	scf	Flow meter	Totalized Monthly; See Note 1
LFG flow entering TRS control equip (daily average)	scf/hr	Flow meter	See Note 2
LFG flow exiting TRS control equip (daily average)	scf/hr	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
Calibration of flow meters	Dates	As specified by manufacturer	Once per year

Item to be Monitored	**Units of Measure**	**Monitoring Tool/Method**	**Frequency**
NMOC Concentration	ppmv	As specified in 40 CFR 60.75(a)(3)	Once every five years by 12/31/17
Propane fuel use	gal	purchase records	Monthly
Hours of Operation for Flares #2 & #3 (each)	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.

G. Facility Annual Emissions

1. Total Annual Emissions

JRL is licensed for the following annual emissions, based on a 12 month rolling total. The tons per year were calculated using the rated capacity of Flare #4 (106.5 MMBtu/hr; 3,550 scfm of landfill gas with 50% methane) and the specific SO_2 annual limit.

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
Total TPY	**7.9**	**7.9**	**7.9**	**449.0**	**31.7**	**172.6**	**40.0**

Pollutant	Tons/year
Single HAP	9.9
Total HAP	24.9

2. Greenhouse Gases

Greenhouse gases are considered regulated pollutants as of January 2, 2011, through 'Tailoring' revisions made to EPA's *Approval and Promulgation of Implementation Plans,* 40 CFR Part 52, Subpart A, §52.21 Prevention of Significant Deterioration of Air Quality rule. Greenhouse gases, as defined in 06-096 CMR 100 (as amended), are the aggregate group of the following gases: Carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. For licensing purposes, greenhouse gases (GHG) are calculated and reported as carbon dioxide equivalents (CO_2e).

Based on the facility's fuel use limit(s), the worst case emission factors from AP-42, IPCC (Intergovernmental Panel on Climate Change), and *Mandatory Greenhouse Gas Reporting*, 40 CFR Part 98, and the global warming potentials contained in 40 CFR Part 98, JRL is above the major source threshold of 100,000 tons of CO_2e per year.

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 on 11/26/12). 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-B-R pursuant to 06-096 CMR 140 and the preconstruction permitting requirements of 06-096 CMR 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 in 06-096 CMR 108 or 115 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 permit. As such, the conditions in this license supercede all previously issued air license conditions.

Federally enforceable conditions in this Part 70 license must be changed pursuant to the applicable requirements in 06-096 CMR 115 for making such changes and pursuant to the applicable requirements in 06-096 CMR 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, or part thereof, of this License 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 CMR 140]

(2) The Part 70 license does not convey any property rights of any sort, or any exclusive privilege; [06-096 CMR 140]

(3) All terms and conditions are enforceable by EPA and citizens under the CAA unless specifically designated as state enforceable. [06-096 CMR 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 CMR 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 CMR 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.

Source	Citation	Description	Basis for Determination
Flares	06-096 CMR 102	Open Burning	These units are not considered open burning within the prohibition of 06-096 CMR 102.
Facility	06-096 CMR 105	General Process Source Particulate Emission Standard	All emission sources of PM at this facility are considered fugitive.
Facility	06-096 CMR 134	VOC RACT	Emissions from non-exempt equipment less than 40 tpy
Facility	06-096 CMR 138	NO_x RACT	Source's potential to emit for NO_x is less than 100 tpy

[06-096 CMR 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 3 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 CMR 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 CMR 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 CMR 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.A. §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 Chapter 140. [06-096 CMR 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 CMR 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.A. §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 CMR 140]
Enforceable by State-only

(6) 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 CMR 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 CMR 140]

(8) In accordance with the Department's air emission compliance test protocol and 40 CFR 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 CFR 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 CMR 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 CFR 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 CMR 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.A. § 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 CMR 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 CMR 140]

(12) The licensee shall submit semiannual reports of any required periodic monitoring. 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 CMR 140]

(13) The licensee shall submit a compliance certification to the Department and EPA at least annually, 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 CMR 140]

SPECIFIC CONDITIONS

(14) **Solid Waste Landfill**

A. JRL is subject to the requirements of 40 CFR Part 60, Subparts A and WWW, *Standards of Performance for Municipal Solid Waste Landfills* that apply to landfills with a design capacity greater than 2.5 million cubic meters and NMOC emissions greater than 50 megagrams/year. [40 CFR Part 60, Subpart WWW]

B. JRL shall operate and maintain an active LFG collection and control system. The active gas collection and control system shall be operated in compliance with the requirements of Subpart WWW no later than December 8, 2014. [06-096 CMR 140, BPT (A-921-70-A-I) and 40 CFR Part 60, Subpart WWW, §752(b)(2)(ii)]

C. JRL shall keep readily accessible, on-site records of the following:

1. The design capacity report which demonstrated that the landfill had a design capacity equal to or greater than 2.5 million megagrams and 2.5 million cubic meters.
2. The current amount of solid waste in-place.
3. The year-by-year waste acceptance rate.

Off-site records may be maintained if they are retrievable within 4 hours. Either paper copy or electronic formats are acceptable.
[40 CFR Part 60 §60.758(a)]

D. 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 CMR 115, BACT (A-921-77-2-A)]

E. 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. [06-096 CMR 115, BACT (A-921-77-2-A)]

F. 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 CMR 115, BACT (A-921-77-2-A)]

G. Flare Emission Limits

1. Emissions from Flare #2 shall not exceed the following limits:

Pollutant	grains/dscf	Origin and Authority	Enforceability
PM	0.2	06-096 CMR 104	**Federally Enforceable**

Pollutant	lb/hr	Origin and Authority	Enforceability
PM	0.38	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
PM_{10}	0.38	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
$PM_{2.5}$	0.35	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
SO_2	33.09	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
NO_x	1.53	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
CO	8.33	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
VOC	0.07	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**

2. Emissions from Flare #3 shall not exceed the following limits:

Pollutant	grains/dscf	Origin and Authority	Enforceability
PM	0.2	06-096 CMR 104	**Federally Enforceable**

Pollutant	lb/hr	Origin and Authority	Enforceability
PM	0.69	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
PM_{10}	0.69	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
$PM_{2.5}$	0.69	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
SO_2	59.56	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
NO_x	2.75	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
CO	14.99	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
VOC	0.12	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**

3. Emissions from Flare #4 shall not exceed the following limits:

Pollutant	grains/dscf	Origin and Authority	Enforceability
PM	0.2	06-096 CMR 104	**Federally Enforceable**

Pollutant	lb/hr	Origin and Authority	Enforceability
PM	1.81	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
PM_{10}	1.81	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
$PM_{2.5}$	1.81	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
SO_2	157.0	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
NO_x	7.24	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
CO	39.41	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**
VOC	0.32	06-096 CMR, BACT (A-921-77-2-A)	**Federally Enforceable**

4. Visible emissions from the flares shall each not exceed 20% opacity on a six (6) minute block average basis.
[06-096 CMR 115, BACT (A-921-77-2-A)]

H. 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 CMR 115, BACT (A-921-77-2-A)]

2. Total VOC emissions from the facility shall not exceed 40.0 tpy based on a 12-month rolling total. Compliance shall be demonstrated in accordance with methods approved by the Department. [06-096 CMR 140, BPT]

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 in accordance with methods approved by the Department. [06-096 CMR 140, BPT]

(15) **Control Technology Requirements**

A. The following requirements are in effect until June 1, 2015:

1. Hydrogen Sulfide (H_2S)

a. H_2S concentration in the landfill gas going to the flares shall not exceed 4,500 ppmv on a daily average basis as demonstrated by the procedures in Condition (15)(A)(1)(b).
[06-096 CMR 115, BACT (A-921-77-4-M)]

b. JRL shall sample the landfill gas H_2S concentration twice in the same day (morning and afternoon, with at least 4 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. If a daily average H_2S concentration of 4,250 ppmv or more is measured, then JRL shall sample H_2S concentrations twice daily until the average daily measured concentration is less than 4,000 ppmv for seven (7) consecutive days. Records shall be maintained on site documenting the H_2S measurements. [06-096 CMR 115, BACT (A-921-77-4-M)]

2. Juniper Ridge Landfill shall sample the TRS content of the landfill gas to be flared three times during a single day once per month using a test method approved by the Department (such as laboratory analysis with ASTM Method D-5504) and record the gas flow rate rates at the times the samples are taken. 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 and determine compliance with the ton per year (tpy) emission limit (on a 12-month rolling total basis) based on the assumption that TRS compounds are converted to SO_2 during combustion. Records shall be kept on a monthly and 12 month rolling total basis.
[06-096 CMR 115, BACT (A-921-77-4-M)]

B. The following requirements are in effect on and after June 1, 2015:

1. JRL shall install and operate the Thiopaq® system no later than June 1, 2015. [06-096 CMR 115, BACT (A-921-77-4-M)]

2. 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 CMR 115, BACT (A-921-77-4-M)]

3. 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 CMR 115, BACT (A-921-77-4-M)]

4. Periodic Monitoring [060-96 CMR 115, BACT (A-921-77-4-M)]

JRL shall monitor and record the following periodic monitors for the flares and associated TRS control equipment

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
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 flare	scf	Flow meter	Totalized Monthly; See Note 1
LFG flow entering TRS control equip (daily average)	scf/hr	Flow meter	See Note 2
LFG flow exiting TRS control equip (daily average)	scf/hr	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
Calibration of flow meters	Dates	As specified by manufacturer	Once per year
NMOC Concentration	ppmv	As specified in 40 CFR 60.75(a)(3)	Once every five years by 12/31/17
Propane fuel use	gal	purchase records	Monthly
Hours of Operation for Flares #2 & #3 (each)	Dates & Hours	Logbook	As occurs

Note 1: JRL shall sample the landfill gas TRS concentration in accordance with Condition (15)(B)(3) 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.

C. 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 CMR 115, BACT (A-921-77-4-M)]
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 CMR 115, BACT (A-921-77-4-M)]
3. Per 38 M.R.S.A. §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) **Fugitive Emissions**

Visible emissions from a fugitive emission source (including stockpiles and roadways) shall not exceed an opacity of 20 percent, except for no more than five (5) minutes in any 1-hour period. Compliance shall be determined by an aggregate of the individual fifteen (15)-second opacity observations which exceed 20 percent in any one (1) hour. [06-096 CMR 101]

(17) **General Process Sources**

Visible emissions from any general process source shall not exceed an opacity of 20% on a six (6) minute block average basis, except for no more than one (1) six (6) minute block average in a 1-hour period. [06-096 CMR 101]

(18) **Semiannual Reporting** [06-096 CMR 140]

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 before the due date or if the report is received by the DEP within seven calendar days of the due date.
C. 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.

(19) **Annual Compliance Certification**

JRL shall submit an annual compliance certification to the Department in accordance with Standard Condition (13) of this license. The annual compliance certification is due January 31 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 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 CMR 140]

(20) **Annual Emission Statement**

In accordance with *Emission Statements*, 06-096 CMR 137 (as amended), the licensee shall annually report to the Department the information necessary to accurately update the State's emission inventory by means of either:

A. A computer program and accompanying instructions supplied by the Department; or
B. A written emission statement containing the information required in 06-096 CMR 137.

The emission statement must be submitted by the date as specified in 06-096 CMR 137.

[06-096 CMR 137]

(21) **General Applicable State Regulations**

The licensee is subject to the State regulations listed below.

Origin and Authority	Requirement Summary	Enforceability
06-096 CMR 102	Open Burning	-
06-096 CMR 109	Emergency Episode Regulation	-
06-096 CMR 110	Ambient Air Quality Standard	-
06-096 CMR 116	Prohibited Dispersion Techniques	-
38 M.R.S.A. §585-B, §§5	Mercury Emission Limit	Enforceable by State-only

(22) **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 CFR 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 CFR, Part 82, Subpart F]

(23) **Asbestos Abatement**

When undertaking Asbestos abatement activities, JRL shall comply with the Standard for Asbestos Demolition and Renovation 40 CFR Part 61, Subpart M.

(24) **Expiration of a Part 70 license**

A. JRL shall submit a complete Part 70 renewal application at least 6 months prior, but no more than 18 months prior, to the expiration of this air license.
B. Pursuant to Title 5 MRSA §10002, and 06-096 CMR 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 CMR 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**

(25) **New Source Review**

JRL is subject to all previous New Source Review (NSR) requirements summarized in this Part 70 air emissions license and the NSR requirements remain in effect even if this 06-096 CMR 140 Air Emissions License (A-921-70-B-R) expires.

DONE AND DATED IN AUGUSTA, MAINE THIS 7 DAY OF October, 2014.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Marc Allen Robert Cone for
PATRICIA W. AHO, 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 6 months prior to expiration but no earlier than 18 months, then pursuant to Title 5 MRSA §10002, all terms and conditions of the Part 70 license shall remain in effect until the Department takes final action on the renewal of the Part 70 license.]

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: 6/17/10
Date of application acceptance: 7/8/10

Date filed with the Board of Environmental Protection:

Filed
OCT 08 2014
State of Maine
Board of Environmental Protection

This Order prepared by Lynn Muzzey, Bureau of Air Quality.

APPENDIX J

STORMWATER MANAGEMENT PLAN

JUNIPER RIDGE LANDFILL EXPANSION STORMWATER MANAGEMENT PLAN

Submitted by:

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

July 2015

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

STATE OF MAINE
GUY H. COTE, JR.
No. 5144
LICENSED PROFESSIONAL ENGINEER

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STORMWATER MANAGEMENT PLAN
JUNIPER RIDGE LANDFILL EXPANSION

1.0 INTRODUCTION

This narrative outlines the project concepts and design criteria for preparing this Stormwater Management Plan associated with the proposed landfill Expansion at the Juniper Ridge Landfill in Old Town Maine (Expansion) (See Figure 1-1). The project will require approval of the Maine Department of Environmental Protection Bureau of Waste Management.

The Plan has been prepared to address the standards and submission requirements of Chapter 400 Section 4.M including the following objectives:

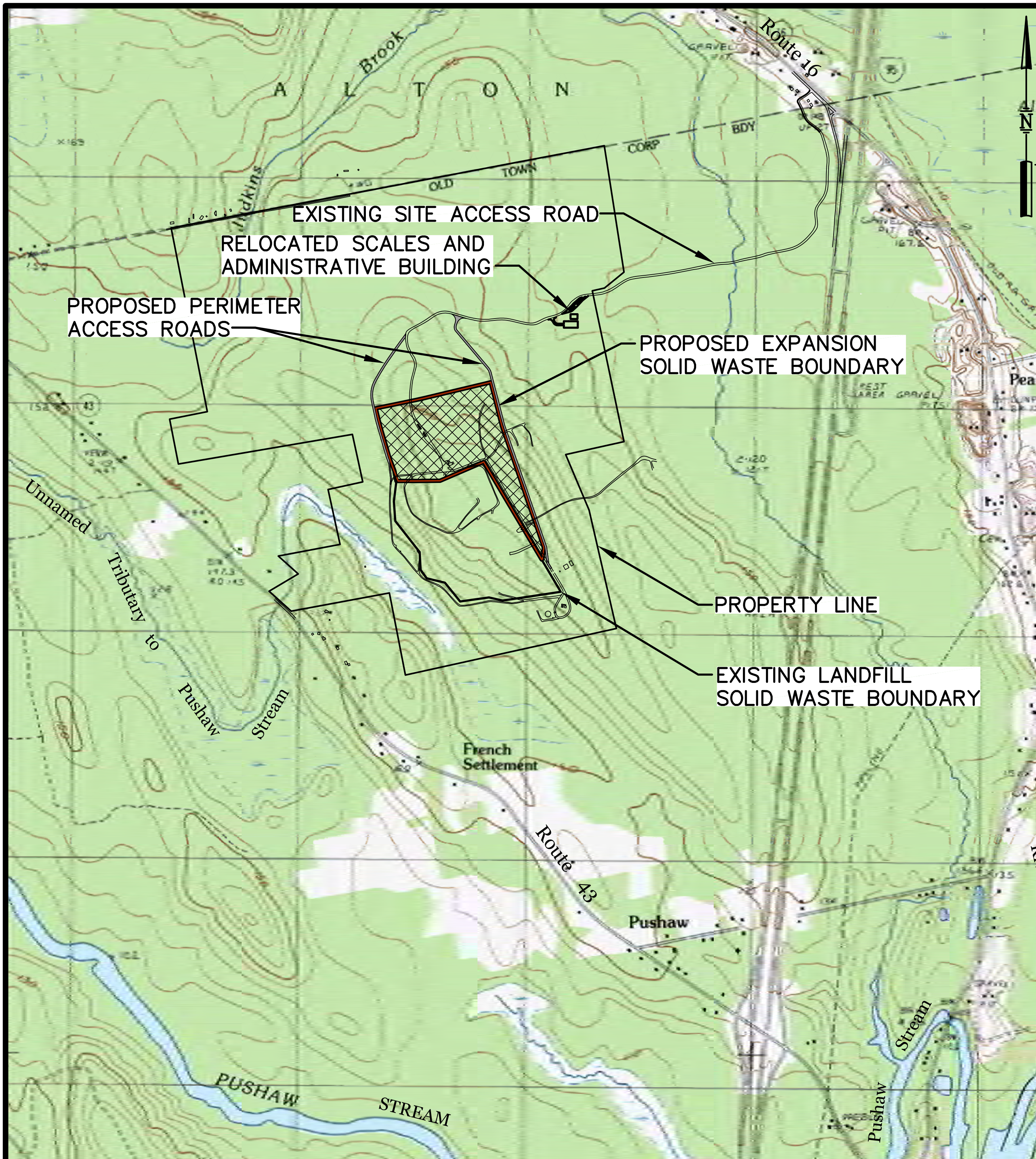
1. The solid waste facility may not unreasonably cause or increase flooding to on-site or adjacent properties;
2. The solid waste facility may not create an unreasonable flood hazard; and,
3. The solid waste facility may have no unreasonable effect on run-on, run-off and/or infiltration relationships.

The proposed development 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 MDEP's Rules for stormwater rules; therefore, the Expansion does not need to comply with Chapter 500 stormwater requirements for water quality.

Erosion control measures for the Expansion are addressed in the Expansion Application Erosion and Sedimentation Control Plan.

2.0 SITE DESCRIPTION

The existing landfill and the Expansion are located on an approximately 780-acre parcel of land located approximately one mile west of Interstate 95 in Old Town, Maine.



NOTE:

BASE MAP ADAPTED FROM 7.5 MIN USGS TOPOGRAPHIC QUADRANGLE OLD TOWN, MAINE–1988

1000 0 2000 4000 FEET

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

SME Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: SITELOC LMN: SITELOC CTB: SME-STD REV: 6/9/2015

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The existing landfill consists of the previously permitted 68-acre solid waste footprint (of which approximately 60 acres are currently developed or undergoing development), the former leachate pond (which has been repurposed to contain stormwater and renamed to Pond 1A), leachate storage tank, maintenance building, scale house (to be relocated as part of the Expansion), landfill gas flare, office building, soil borrow areas, soil stockpile areas, stormwater detention ponds, parking areas, access roads and other grassed areas (i.e., berm slopes, laydown areas, etc.).

The Expansion will be adjacent to and generally north of the existing landfill and will expand the solid waste footprint by about 54 acres. The total facility site, including supporting site infrastructure (e.g., access roads, stormwater management ponds, etc.) will be approximately 74 acres.

3.0 SITE SETTING

The majority 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 area analyzed for each of the watersheds is approximately 346, 26, 271, and 240 acres, respectively, in the predevelopment conditions. The northeast and the northwest watersheds both contribute to Judkins Brook and eventually Birch Stream. These watersheds will not be affected by the 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. Both 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 Drawing D-100 in Appendix A, and Drawing D-101 in Appendix B. Flows from Subcatchments 1 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 Expansion area currently ranges from approximately 170 to 215 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 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.

The grading and layout of the proposed facility was undertaken 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. No surface drainage outlet structures from the developed site will discharge concentrated flows directly onto abutting properties. Where necessary, the runoff from the developed site will discharge into detention basins that will attenuate peak flows rates to the unnamed tributary feeding Pushaw Stream or to wooded areas which eventually drain to a tributary of Judkins Brook.

TABLE 3-1

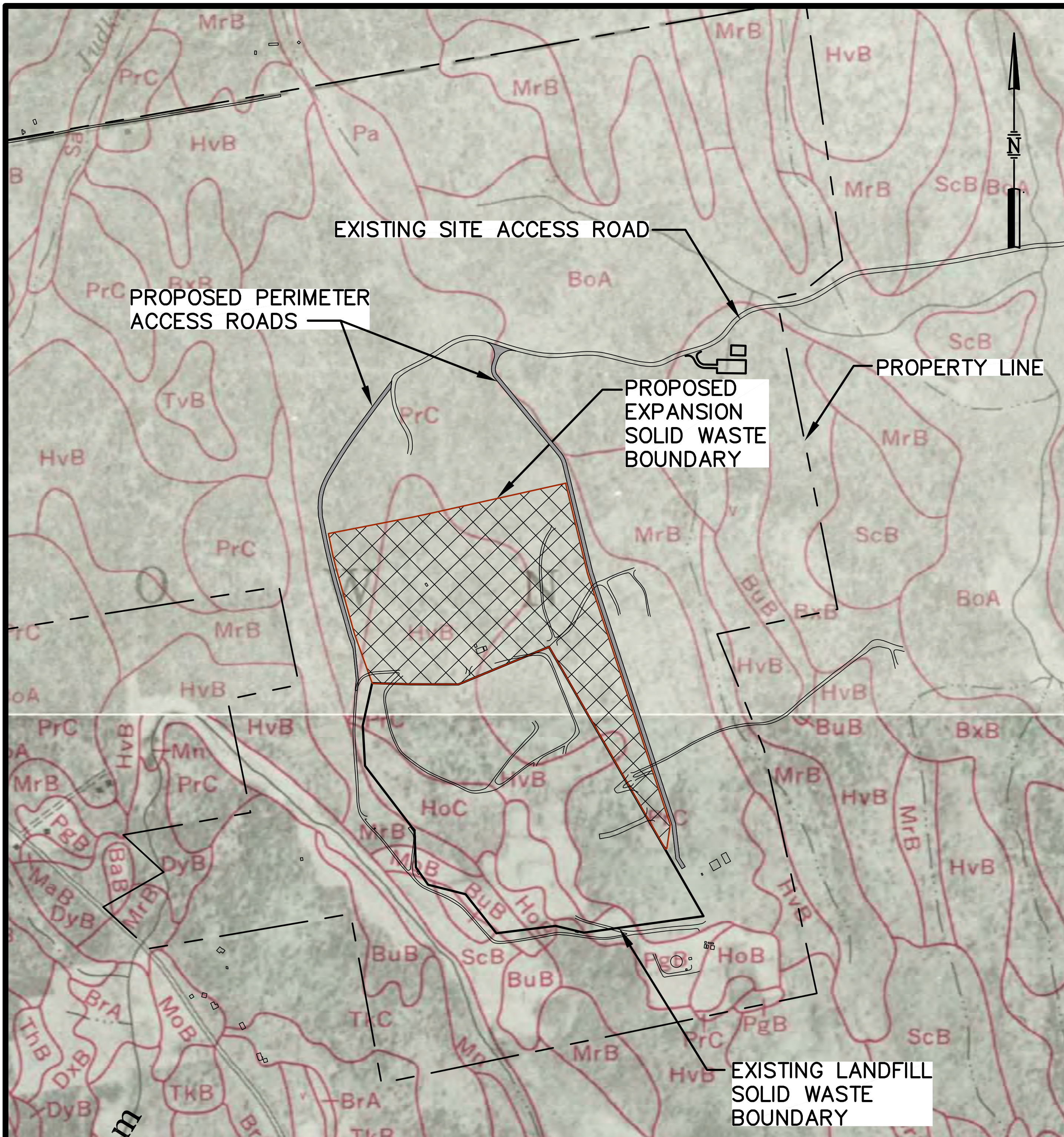
SITE SURFICIAL SOIL SUMMARY

Soil Series	Hydrologic Soil Group	Runoff Curve No.	Description
Plaisted	C	70/71	Woods, good condition/Meadow
Howland	C	70/71	Woods, good condition/Meadow
Monarda	D	77/78	Woods, good condition/Meadow
Buxton	C	70/71	Woods, good condition/Meadow
Scantic	D	77/78	Woods, good condition/Meadow
Landfill Cover	C	71	Meadow
Gravel Surfaces	C/D	89/91/96	Gravel Roads, Pads, Berms
Buildings/Roofs/Pond/ Paved Surfaces	NA	98	Impervious Surface

4.0 WATERSHED STORMWATER FLOWS

The pre-development and post-development surface water peak runoff rates were evaluated for the watersheds in which the Expansion is included. 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 Applied Microcomputer Systems of Chocorua, New Hampshire. A 24-hour/Type III Soil Conservation Service (SCS) rainfall distribution with antecedent moisture condition (AMC) 2 was used to model the runoff characteristics of the site.

The pre-development conditions used in this analysis represent site conditions prior to construction of the existing 68-acre landfill. The pre-development analysis was based on a previous version from the West Old Town Landfill License Amendment Application stormwater management report completed by Sevee & Maher Engineers, Inc. (SME) in October 2003; however, the area of analysis was increased to include the developed areas of the Expansion. The pre-development drainage boundaries are shown on pre-development stormwater Drawing D-100 located in Appendix A.



MAPPING SOURCE
NATURAL RESOURCES CONSERVATION SERVICE, WEB SOIL SURVEY OF PENOBSCOT COUNTY, MAINE, 2014.

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

500 0 1000 2000 FEET

FIGURE 3–1
MEDIUM INTENSITY SOIL TYPES
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
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DWG: SOILS LMN: SOILS CTB: SITELOC REV: 6/17/2015

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The post-development conditions consist of the final cover conditions for the entirety of the existing landfill, as well as the Expansion and associated infrastructure plus existing site facilities. The post-development drainage condition is shown on the post-development stormwater Drawing D-101 located in Appendix B.

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 Drawing D-100 in Appendix A, and 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 upon 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 travel paths. Peak runoff rates were calculated for the 2-, 10-, and 25-year storm events. HydroCad output sheets and calculations for pre-development and post-development conditions are contained in Appendices A and B, respectively.

4.1 Pre-Development Conditions

The cover types of the existing site are primarily woods (hardwood and softwood), with underbrush overlaying surficial soils classified under the hydrologic soil Groups C and D. Other cover types for the pre-development conditions analysis include historic roadways with HSGs of C or D as well as existing water bodies. The subcatchment boundaries were delineated based on review of topographic mappings and by means of aerial photography both of which predated the construction of the previously permitted 68-acre solid waste landfill.

A summary of the peak pre-development stormwater flows for the five analysis points are included in Table 4-1. HydroCad output sheets and calculations for pre-development stormwater flow conditions are contained in Appendix A.

4.2 Post-Development Conditions

Post-development assumes final cover conditions for the entirety of the existing landfill as well as the Expansion. To analyze the post-development conditions at the site, the watersheds containing the limits of development of the existing landfill and proposed Expansion were divided into 33 subcatchments. Subcatchments were named using the number of the analysis point that it contributes to, followed by a unique letter. The subcatchments in the post-development stormwater analysis are: SC-1A through 1J, SC-2A through 2C, SC-3, SC-4A through 4O, SC-5, and SC-P1A, the subcatchment representing Pond 1A (see Appendix B, Drawing D-101). The limits of these subcatchments were established by the design of 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 in part by the existing surface water drainage channels topographically downgradient of the proposed facility that will continue to be utilized to convey stormwater. Subcatchments 1B, 1D, 1E, 1G, 1H, 1I, 2B, and 4G through 4L represent the watersheds associated with the final cover landfill boundary (i.e., inside the perimeter access road). Subcatchments 1A, 1C, 1F, 1J, 2A, 2C, 3, 4A, 4B, 4C, 4D, 4E, 4F, 4M, 4N, 4O, 5, and P1A represent the watersheds outside the perimeter access road. 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 (with good crop conditions) and Type C hydrologic soil characteristics. 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) which can be described as meadow and Type C hydrologic soil characteristics. Assuming all roadways at the site are paved is a conservative assumption that will allow the owner the flexibility of paving or not paving areas as they choose without affecting stormwater systems. Time of concentrations (T_c) and time of travel (T_t) for the post-development subcatchments were determined by a detailed analysis of the final cover conditions, (i.e., a flow analysis of the terrace ditch, sideslope ditch, and perimeter ditch system within the landfill limits) and upon a flow analysis of the existing stormwater drainage channels below the landfill limits. The area defined by the boundaries of Pond P1A was included in the post-development analysis (Subcatchment P1A) because the pond is no longer being used to store leachate and will continue to be utilized for stormwater detention going forward. Peak rates of runoff were calculated for the 2-, 10-, and 25-year storm events. A summary of the post-development peak stormwater flows are included in Table 4-1. HydroCAD output sheets and calculations for the post-development conditions are contained in Appendix B.

TABLE 4-1

SUMMARY OF PEAK FLOWS

Analysis Point	Peak Flow (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 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

A comparison of the pre-development and post-development conditions of the site indicated the potential for increases in the post-development peak flows for the 2-, 10-, and 25-year storm events. To attenuate the increase peak flows during post-development final cover conditions, detention structures were designed to release stormwater at rates such that post-development rates do not exceed the pre-development peak rates.

5.1 Existing Detention Ponds to Remain in Final Conditions

Summaries for each existing detention pond to be utilized as well as the proposed ponds for post-development final cover conditions are listed below. The detention ponds', detention times, and storm storage curves are provided in Appendix C-1 and their locations shown on the Final Site Drainage Plan contained in Appendix D.

Post-development pond routing calculations were made using HydroCad software and are contained in Appendix B.

Detention Pond 1A

Post-development runoff from subcatchments SC-1I and SC-P1A (10.8 acres) will flow into the Detention Pond 1A at the western end of the landfill adjacent to Detention Pond 1. Detention Pond 1A is lined and is approximately 43,000 square feet in size and has a total depth of 8 feet, however it was assumed that the water level was 2 feet from the top of the pond (164.0 feet) for the HydroCAD analysis of post-development stormwater conditions. Detention Pond 1A has a total of 6 acre-ft of storage capacity with approximately 1.8 acre-ft of storage above the assumed water elevation. Detention Pond 1A will outlet via a broad crested weir into Detention Pond 1.

Detention Pond 1

Post-development runoff from subcatchments SC-1B and 1D (24.6 acres) as well as outflow from the Detention Pond 1A will flow into the existing Detention Pond 1. Detention Pond 1 is approximately 25,000 square feet in size, 5 feet deep with 3:1 sideslopes, and has a total volume capacity of approximately 2.1 acre-ft. The pond is unlined, surrounded by an 8-foot wide earthen berm, with an emergency spillway, and contains a combination outlet structure consisting of a 6-foot diameter drop inlet 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. Steps will be taken to convert the pond structure from a sedimentation pond to a detention pond during Cell 15 construction. These steps include:

- Removal of all sediment within the pond necessary to reach the design base elevation of the detention pond and disposal of the removed sediment within the limits of the landfill;

- Permanently block off all openings located on the 6-foot diameter drop outlet structure that are associated with sedimentation control (i.e., 3-inch diameter orifice opening);

- Open the 6-inch diameter stormwater control orifice located on the 6-foot diameter drop outlet structure; and

- Create an additional 12-inch diameter stormwater control orifice on the 6-foot diameter drop outlet structure at the same elevation as the 30-inch outlet barrel invert

The composite outlet structure of Detention Pond 1 consists of a 6-foot diameter drop inlet with a 30-inch diameter outlet barrel approximately 75 feet long and a 6-inch diameter orifice opening. As referenced above, a second 12-inch diameter orifice shall be added to the outlet structure at the same elevation as the 30-inch diameter outlet barrel invert. The 12-inch orifice is needed to accommodate additional inflow diverted to Detention Pond 1 from the Detention Pond 1A outlet. Without the 12-inch orifice, the runoff from subcatchments SC-1B and 1D along with the outflow from Detention Pond 1A would combine to exceed the storage capacity of Detention Pond 1 during a 25-yr storm and cause a backup of stormwater into Detention Pond 1A. The addition of the 12-inch orifice allows the 2-yr, 10-yr, and 25-yr storms to be controlled through the orifices without flow backing up into the Detention Pond 1A. A pond routing computation of Detention Pond 1 was performed with consideration to peak runoff rates, detention pond storage volume, and the performance of the composite outlet structure.

Detention Pond 2

Detention Pond 2 has a pond storage volume of approximately 1.1 acre-feet and receives flow from subcatchment SC-1E (10.7 acres). The primary outlet structure for Detention Pond 2 was designed to decrease peak flows for 2-year, 10-year, and 25-year storm frequency events. The primary outlet structure for Detention Pond 2 is a 4-foot diameter precast concrete catch basin with a 15-inch diameter inlet orifice to restrict flow. The 15-inch diameter orifice controls 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 4-foot diameter outlet structure through the 15-inch opening are then conveyed to a level spreader by a 24-inch diameter culvert. The emergency condition is assumed to be plugging of the 15-inch orifice, in which case the grate on the top of the structure is utilized to control the peak 25-year storm flow into the structure, which then flows out the 24-inch diameter discharge pipe. During the emergency condition, over 1 foot of freeboard is maintained between the peak water level over the grate and the top of the pond.

Detention Pond 6

Detention Pond 6 is designed to convey stormwater flows from the 2-, 10-, and 25-year/24-hour storm events with water at the elevation of the primary outlet without discharge to the pond emergency spillway. 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 seepage 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) will allow metering of flow from the pond so that a plug-flow detention time of 24 hours is obtained for the 10-year/24-hour storm event. The 24-inch diameter outlet culvert allows controlled discharge to a level lip spreader during storm events with a large quantity of runoff. 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, assuming that the starting water level within the ponds is at the principal spillway elevation (i.e., the invert of the 24-inch diameter culvert outlet) and no discharge occurs from the primary outlets (i.e., the underdrain system, 6-inch and 24-inch pipes). Detention Pond 6 has a pond storage volume of approximately 8.8 acre-feet below the emergency spillway primary outlet (elev. 179.0). During post-development conditions, Pond 6 will receive flow from subcatchments SC-1G, SC-1H and SC-1J (22.6 acres).

Detention Pond 9

Detention Pond 9 is located east of the previously permitted landfill and permitted wood waste handling area and it will remain in place for the life of the Expansion. This pond collects stormwater from subcatchments SC-4A, 4B, 4C, and 4D (14.5 acres), which consist of the borrow storage yard, existing wood waste handling area and maintenance area, landfill operations and construction laydown areas, and landfill gas treatment and future power generation facilities. This pond has an outlet structure consisting of a 12-inch diameter plastic pipe. The outlet pipe discharges to a level spreader which spreads flow through a wooded area east of the pond. The emergency spillway for this pond is a 10-foot wide grass-lined spillway. This pond also has a sand filter underdrain system which consists of approximately 200 feet of 6-inch diameter perforated pipe backfilled with stone and wrapped in a filter geotextile. This underdrain system allows filtering of stormwater seepage in the bottom of the pond prior to discharge during low flow conditions. The post-development conditions result in additional stormwater flows routed into Detention Pond 9 (runoff from SC-4K and 4L – 18.4 acres total). The pond will be modified to accommodate the additional stormwater flows. The footprint of the pond will be increased by enlarging the pond limits to the west. The proposed modification to Detention Pond 9 will increase its total storage volume from 2.3 acre-feet to 5.1 acre-feet below the emergency spillway outlet (elev. 190.5). This pond modification will be made during the construction of Cell 11. The previously described control structures (12-inch diameter CPP with level spreader, emergency spillway, and sand filter underdrain) will remain unchanged. The 6-inch diameter outlet pipe (located 1.7 feet above the pond bottom) was installed with a valve to meter flow out of the pond if necessary. The pond was designed to have a minimum plug flow detention time of 24 hours with the metering valve open on the 6-inch outlet for the 2-year/24-hour storm. In the case of the modified Detention Pond 9, the entire volume of water generated by a 2-year/24-hour storm can be stored in the pond without any outflow when the metering valve is closed. The 6-inch outlet pipe will control the peak flow from the 2-year/24-hour storm when the metering valve is open. The peak flows from the 10-year and 25-year storms will utilize the 12-inch diameter outlet pipe without any discharge to the pond emergency spillway. The emergency spillway for the modified 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.

5.2 Proposed Detention Ponds

Proposed detention ponds were designed to provide detention and sedimentation during cell construction, operations, and post-closure conditions. To allow sedimentation, each pond was designed to allow 24 hours (minimum) of plug flow detention time during the 2-year/24-hour storm event. Design calculations for each pond including plug-flow detention time 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 lip spreader. Plunge pools were designed to meet the requirements of *Maine Erosion and Sedimentation Control (MESC) BMPs* (SCS 3/2003). Design calculations for riprap plunge pools and level lip spreaders are included in Appendix C. Details for the detention pond structures are on Drawing C-306 included in Appendix D.

5.2.1 Detention Pond 10. Detention Pond 10 is a new pond to be located in the permitted till borrow pit east of Cell 12 and will be constructed as part of the Cell 12 construction project. During post-development conditions Pond 10 will receive flow from subcatchments SC-4I, 4IA, 4J and 4O (28.3 acres). The pond’s footprint is roughly 21,000 square feet and its design capacity is 3.6 acre-feet. The primary outlet structures for this pond include a pond underdrain system, a 6-inch diameter outlet pipe, and a 6-foot diameter drop inlet with an 18-inch diameter outlet culvert and one 6-inch orifice. 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 seepage 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) will be installed with a valve to meter flow out of the pond if necessary. The pond was designed to have a minimum plug flow detention time of 24 hours with the metering valve open on the 6-inch outlet for the 2-year/24-hour storm. The 6-inch outlet pipe will control the flow of the 2-year/24-hour storm. The 6-inch diameter orifice on the drop inlet and the grate atop the drop inlet will control the 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 allows controlled discharge to a level lip spreader during storm events with a large quantity of runoff. 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. In accordance with MESC BMP’s the Detention Pond 10 emergency spillway was designed with its invert 2 feet below the berm top elevation.

5.2.2 Detention Pond 11. Detention Pond 11 is a proposed detention pond located adjacent to Cell 13 in the northeast corner of the site. This pond shall be constructed currently with the construction of the remainder of the eastern side perimeter roadway, which is planned to occur as part of Cell 12 construction. During post-development conditions of the proposed Expansion, Pond 11 will receive flow from subcatchments SC-4G, 4H, 4HA, and 4M (22.1 acres). The proposed pond's footprint is approximately 40,000 square feet and the storage capacity is 1.9 acre-feet. The primary outlet structures for this pond include a pond underdrain system, a 6-inch diameter outlet pipe, and a 6-foot diameter drop inlet with an 18-inch diameter outlet culvert and one 6-inch orifice. The pond underdrain system consists of approximately 130 feet of 6-inch diameter perforated pipe backfilled with stone and wrapped in a filter geotextile. This underdrain system will allow filtering of stormwater seepage in the bottom of the pond prior to discharge during low flow conditions. The 6-inch diameter outlet pipe (located 0.6 feet above the pond bottom) will be installed with a valve to meter flow out of the pond if necessary. The pond was designed to have a minimum plug flow detention time of 24 hours with the metering valve open on the 6-inch outlet for the 2-year/24-hour storm. In the case of Detention Pond 11, the entire volume of water generated by a 2-year/24-hour storm can be stored in the pond without any outflow when the metering valve is closed. The 6-inch outlet pipe will control the peak flow from the 2-year/24-hour storm when the metering valve is open. 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 grate atop the drop inlet. The pond will utilize the grate on the 4-foot drop structure as the pond's emergency spillway due to the presence of an adjacent road. 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 adjacent road.

5.2.3 Detention Pond 12. Detention Pond 12 is a proposed detention pond located adjacent to Cell 16 in the northwest corner of the proposed development area. This pond shall be constructed concurrently with Cell 16. During post-development conditions, Pond 11 will receive flow from subcatchments SC-2B and 2C (16.7 acres). The proposed pond's footprint is approximately 29,000 square feet and the storage capacity is 1.7 acre-feet. The primary outlet structures for this pond include a pond underdrain system, a 6-inch diameter outlet pipe, and a 6-foot diameter drop inlet with an 18-inch diameter outlet culvert and one 8-inch orifice. The pond underdrain system consists of approximately 115 feet of 6-inch diameter perforated pipe backfilled with stone and wrapped in a filter geotextile. This underdrain system will allow filtering of stormwater seepage in the bottom of the pond prior to discharge during low flow conditions. The 6-inch diameter outlet pipe (located 1.5 feet above the pond bottom) will be installed with a valve to meter flow out of the pond if necessary. The pond was designed to have a minimum plug flow detention time of 24 hours with the metering valve open on the 6-inch outlet for the 2-year/24-hour storm. In the case of Detention Pond 12, the entire volume of water generated by a 2-year/24-hour storm can be stored in the pond without any outflow when the metering valve is closed. The 6-inch outlet pipe will control the peak flow from the 2-year and 10-year/24-hour storms when the metering valve is open. The 8-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 grate atop the drop inlet. The pond will utilize the grate on the 4-foot drop structure as the pond's emergency spillway due to the presence of an adjacent road. 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 adjacent road.

6.0 EXISTING DRAINAGE FACILITIES

In addition to ponds described above, there are several existing drainage structures within the proposed landfill project site. Several roadway culverts (30 inches and smaller) presently exist, crossing at various locations along the perimeter access road. Existing culverts that will remain in place were included in the stormwater routing analysis.

7.0 PROPOSED DRAINAGE FACILITIES

Surface water runoff from covered portions of the Expansion and areas adjacent to the Expansion perimeter access road will be conveyed on the Landfill project site by a series of drainage structures consisting of ditches, catch basins, storm drains, and culverts. Locations of the site ditches, 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 24-hour/25-year rainfall event.

The design capacity of the stormwater drainage structures is based on SCS TR20 methodology. Culverts and catch basins have been sized using a computer stormwater modeling system entitled *Hydrocad* by Applied Microcomputer Systems of Chocorua, New Hampshire*.* Ditches have been sized using the *Hydraulic Design Series No. 4, Design of Roadside Drainage Channels (Mannings Equation)*. Ditch linings, level lip spreaders, culvert inlet and outlet protection, and emergency spillways have been designed using SCS guidance found in the *Maine Erosion and Sediment Control BMPs* (SCS, 3/2003*)*. These calculations are found in the Appendices of the Expansion Erosion and Sedimentation Control Plan.

New culverts will be smooth high-density polyethylene (HDPE) and have diameters ranging from 18 to 36 inches. The culverts were designed with riprap aprons at inlet and riprap-lined aprons or plunge pools at outlet. Riprap for culvert inlet and outlet protection D-50 rating (i.e., 50 percent of riprap) ranges from 4 to 10 inches. Culvert outflows will be placed through level lip spreaders or vegetated swales.

The site stormwater drainage ditches (toe ditch) around the Expansion perimeter will be turf lined grass channels with a minimum base width of 2 feet, depth of 2 feet, and maximum sideslopes of 2H:1V. Terrace drain swales on the sideslopes of the landfill cover will be turf-lined ‘v’-channels with a depth of 1 foot, pitch of 5 percent (typical), and maximum sideslopes of 2H:1V. Downspouts on the landfill cover will be lined with riprap (D50 of 8 inches) and have a base width of 4 feet, depth of 2 feet, and maximum sideslopes of 2H:1V. Surface water ditches will have a minimum base width of 2 feet, depth of 2 feet and maximum sideslopes of 2H:1V.

TABLE 7-1

SUMMARY OF STORMWATER CULVERTS, STORM DRAINS, CATCH BASINS, DITCHES

Culverts	Diameter (in.)	Material	Length (ft.)	Slope (%)	Inv. In.	Inv. Out
EC-D-1G	24 (2)	CMP	56	0.018	183.0	182.0
C-2BA	36	HDPE	40	0.008	203.2	202.9
C-2BB	24	HDPE	96	0.010	195.0	194.0
C-4BA	24	HDPE	78	0.009	204.4	203.7
C-4BB	24	HDPE	78	0.009	204.4	203.7
C-4F	18	HDPE	78	0.04	165.0	162.0
C-4G	24	HDPE	36	0.028	175.0	174.0
C-4HA	18	HDPE	40	0.025	201.9	200.9
C-4HB	18	HDPE	101	0.025	178.5	176.0
C-4I	18	HDPE	80	0.131	202.5	192.0
C-4IA	18	HDPE	40	0.023	212.9	212.2
C-4JA	18	HDPE	60	0.028	214.0	212.3
C-4JB	24	HDPE	73	0.021	211.5	210.0
C-4JC	24	HDPE	73	0.021	211.5	210.0
C-4K	24	HDPE	51	0.043	216.5	214.3
C-4L	18	HDPE	121	0.017	213.0	211.0
C-4N	18	HDPE	33	0.030	184.0	183.0

Catch Basin	Basin Dia. (ft)	Grate Opening (in.)	Depth (ft)	Culvert Dia. (in.)
CB-2BB	4	30	7.2	24
CB-4G	4	24	8	24
CB-4HB	4	24	6.9	18
CB-4I	4	24	7.1	18
CB-4JA	4	24	6.7	18
CB-4K	4	30	5.5	24
CB-4L	4	24	4	18

Ditch	Base Width (ft.)	Depth (ft.)	Sideslope Z-Value ('/')	Lining
Ditch to Detention Pond 10	2	2	2	Segments 1&2: NAG S75 erosion Mat Segment 3: Riprap (D50=4", t=9")
Detention Pond 10 Emergency Spillway	10	2	2	Riprap (D50=4", t=9")
Perimeter (toe)	2'	2'	2 '/'	NAG S75 erosion mat
Maintenance Road Ditch	2'	3'	2 '/'	NAG S75 erosion mat
Terrace Drain	0' - V-ditch	2	2 '/'	NAG C125BN erosion mat
Downspouts	4'	2'	2 '/'	Riprap (D50=8", t=18")

Notes:
1. Existing culverts to remain for Post Development condition.
2. Location of structures shown on Drawing C-107 contained in Appendix D.

Terrace drain swales were uniformly sized based on the largest contributing drainage area and minimum expected slope. Riprap sizing is based on the maximum longitudinal slope. Rock chutes (riprap terrace downspouts) are uniformly sized for capacity based on the largest contributing drainage area and riprap size based on contributing area and slope. Computer software entitled HYDRAIN 6.01 (1996), Integrated Drainage Design Computer System, from the Federal Highway Administration (FHWA) has been utilized 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.) has been was utilized to determine temporary erosion matting for turf-lined and vegetated ditches.

The HYCHL Module of the FHWA HYDRAIN 6.01 software and the ECMDS software is designed to provide recommendations to the user 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

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'

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)
DP–1	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 ANY DEVELOPMENT WHICH PREDATES THE TOPOGRAPHY SHOWN.

150 0 300 600 FEET

REV.	BY	DATE	STATUS
		1/1/07	SUBMITTED TO CLIENT

JUNIPER RIDGE LANDFILL
EXPANSION PROJECT
OLD TOWN, MAINE

STORMWATER MANAGEMENT PLAN
PRE–DEVELOPMENT ANALYSIS

SME
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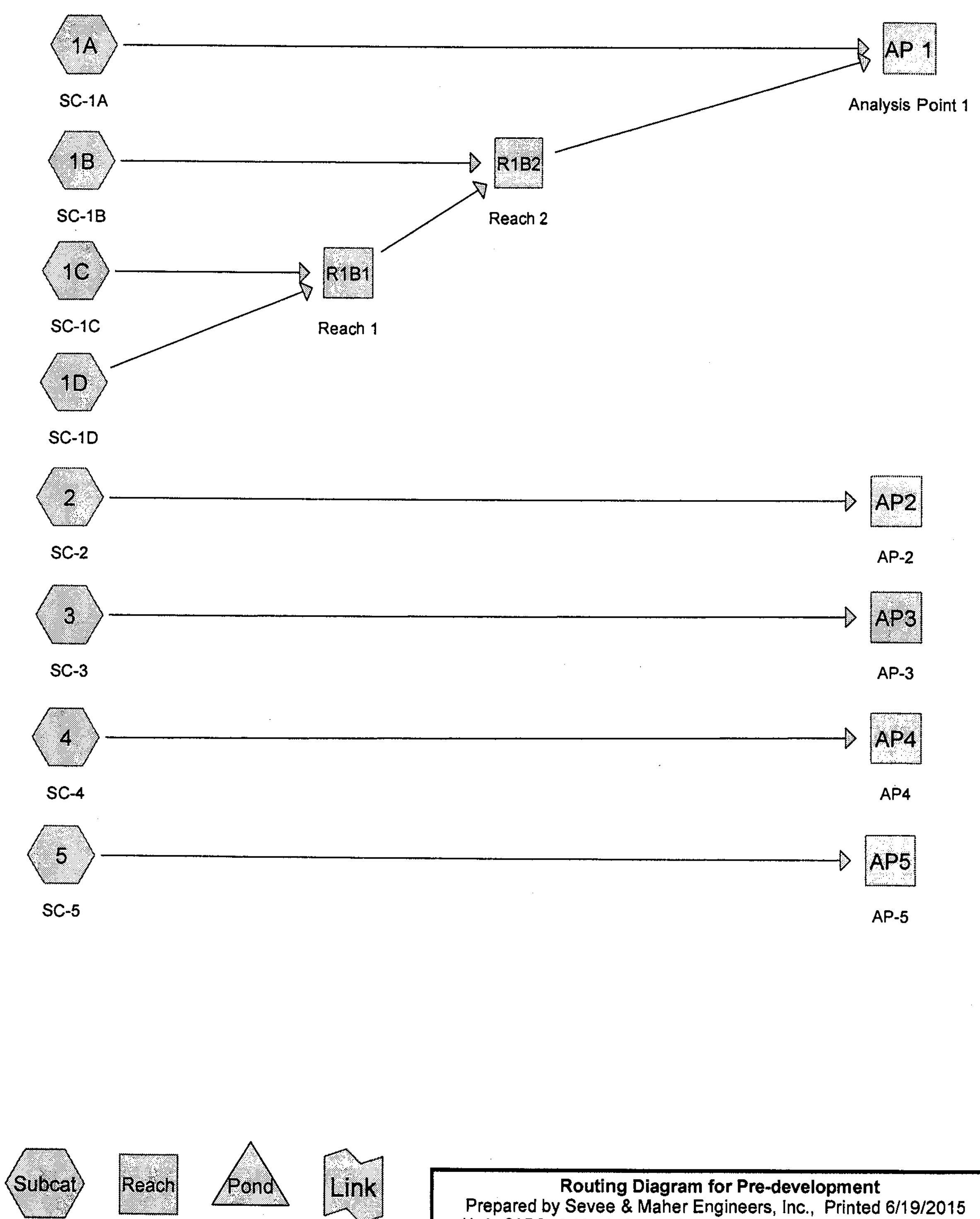
DESIGN BY: HME
DRAWN BY: HME
DATE: 4/08
CHECKED BY:
LMN:
CTB: SMP

JOB NO. 08097.00 DWG FILE SMP–PRE

D–100



Routing Diagram for Pre-development
Prepared by Sevee & Maher Engineers, Inc., Printed 6/19/2015
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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)

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchr Numbers
0.000	0.000	0.000	0.000	2.330	2.330	Existing Water Body	
0.000	0.000	0.000	0.000	1.600	1.600	Existing Waterbody	
0.000	0.000	0.950	0.000	0.000	0.950	Meadow, non-grazed	
0.000	0.000	0.000	0.000	0.320	0.320	Paved Areas (New)	
0.000	0.000	0.000	2.140	0.000	2.140	Paved roads w/open ditches, 50% imp	
0.000	0.000	503.481	345.129	0.000	848.610	Woods, Good	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: SC-1A Runoff Area=66.270 ac 0.00% Impervious Runoff Depth>0.58"
Flow Length=1,580' Tc=64.5 min CN=71 Runoff=14.56 cfs 3.211 af

Subcatchment 1B: SC-1B Runoff Area=32.390 ac 0.00% Impervious Runoff Depth>0.67"
Flow Length=1,350' Tc=61.4 min CN=73 Runoff=8.79 cfs 1.798 af

Subcatchment 1C: SC-1C Runoff Area=33.510 ac 0.00% Impervious Runoff Depth>0.54"
Flow Length=540' Tc=53.1 min CN=70 Runoff=7.55 cfs 1.520 af

Subcatchment 1D: SC-1D Runoff Area=46.550 ac 0.00% Impervious Runoff Depth>0.62"
Flow Length=1,890' Tc=66.2 min CN=72 Runoff=11.03 cfs 2.414 af

Subcatchment 2: SC-2 Runoff Area=61.430 ac 2.60% Impervious Runoff Depth>0.65"
Flow Length=2,738' Tc=127.3 min CN=73 Runoff=10.22 cfs 3.326 af

Subcatchment 3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth>0.62"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=29.11 cfs 13.855 af

Subcatchment 4: SC-4 Runoff Area=306.400 ac 0.00% Impervious Runoff Depth>0.63"
Flow Length=6,254' Tc=209.4 min CN=73 Runoff=36.11 cfs 15.981 af

Subcatchment 5: SC-5 Runoff Area=39.070 ac 0.37% Impervious Runoff Depth>0.77"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=6.20 cfs 2.493 af

Reach AP 1: Analysis Point 1 Inflow=29.50 cfs 8.776 af
Outflow=29.50 cfs 8.776 af

Reach AP2: AP-2 Inflow=10.22 cfs 3.326 af
Outflow=10.22 cfs 3.326 af

Reach AP3: AP-3 Inflow=29.11 cfs 13.855 af
Outflow=29.11 cfs 13.855 af

Reach AP4: AP4 Inflow=36.11 cfs 15.981 af
Outflow=36.11 cfs 15.981 af

Reach AP5: AP-5 Inflow=6.20 cfs 2.493 af
Outflow=6.20 cfs 2.493 af

Reach R1B1: Reach 1 Avg. Flow Depth=0.68' Max Vel=1.36 fps Inflow=18.27 cfs 3.933 af
n=0.030 L=1,850.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=15.50 cfs 3.815 af

Reach R1B2: Reach 2 Avg. Flow Depth=0.78' Max Vel=1.47 fps Inflow=20.68 cfs 5.613 af
n=0.030 L=570.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=20.49 cfs 5.565 af

Summary for Subcatchment 1A: SC-1A

Runoff = 14.56 cfs @ 12.99 hrs, Volume= 3.211 af, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 8.79 cfs @ 12.92 hrs, Volume= 1.798 af, Depth> 0.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 7.55 cfs @ 12.84 hrs, Volume= 1.520 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 11.03 cfs @ 13.01 hrs, Volume= 2.414 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 10.22 cfs @ 13.87 hrs, Volume= 3.326 af, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 29.11 cfs @ 15.72 hrs, Volume= 13.855 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 36.11 cfs @ 15.13 hrs, Volume= 15.981 af, Depth> 0.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 6.20 cfs @ 14.76 hrs, Volume= 2.493 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 29.50 cfs @ 13.55 hrs, Volume= 8.776 af
Outflow = 29.50 cfs @ 13.55 hrs, Volume= 8.776 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 > 0.65" for 2-Yr event
Inflow = 10.22 cfs @ 13.87 hrs, Volume= 3.326 af
Outflow = 10.22 cfs @ 13.87 hrs, Volume= 3.326 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 > 0.62" for 2-Yr event
Inflow = 29.11 cfs @ 15.72 hrs, Volume= 13.855 af
Outflow = 29.11 cfs @ 15.72 hrs, Volume= 13.855 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 > 0.63" for 2-Yr event
Inflow = 36.11 cfs @ 15.13 hrs, Volume= 15.981 af
Outflow = 36.11 cfs @ 15.13 hrs, Volume= 15.981 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 > 0.77" for 2-Yr event
Inflow = 6.20 cfs @ 14.76 hrs, Volume= 2.493 af
Outflow = 6.20 cfs @ 14.76 hrs, Volume= 2.493 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

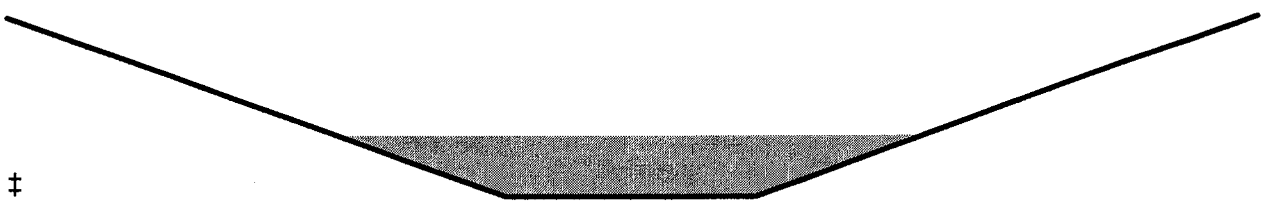
Summary for Reach R1B1: Reach 1

Inflow Area = 80.060 ac, 0.00% Impervious, Inflow Depth > 0.59" for 2-Yr event
Inflow = 18.27 cfs @ 12.92 hrs, Volume= 3.933 af
Outflow = 15.50 cfs @ 13.62 hrs, Volume= 3.815 af, Atten= 15%, Lag= 41.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.36 fps, Min. Travel Time= 22.6 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 38.4 min

Peak Storage= 21,074 cf @ 13.24 hrs
Average Depth at Peak Storage= 0.68'
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'



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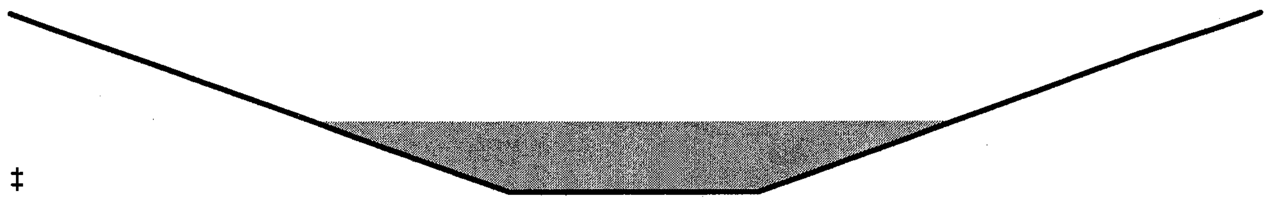
Summary for Reach R1B2: Reach 2

Inflow Area = 112.450 ac, 0.00% Impervious, Inflow Depth > 0.60" for 2-Yr event
Inflow = 20.68 cfs @ 13.52 hrs, Volume= 5.613 af
Outflow = 20.49 cfs @ 13.71 hrs, Volume= 5.565 af, Atten= 1%, Lag= 11.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.47 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 10.6 min

Peak Storage= 7,939 cf @ 13.60 hrs
Average Depth at Peak Storage= 0.78'
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 span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: SC-1A	Runoff Area=66.270 ac 0.00% Impervious Runoff Depth>1.44" Flow Length=1,580' Tc=64.5 min CN=71 Runoff=40.77 cfs 7.940 af
Subcatchment 1B: SC-1B	Runoff Area=32.390 ac 0.00% Impervious Runoff Depth>1.57" Flow Length=1,350' Tc=61.4 min CN=73 Runoff=22.82 cfs 4.250 af
Subcatchment 1C: SC-1C	Runoff Area=33.510 ac 0.00% Impervious Runoff Depth>1.38" Flow Length=540' Tc=53.1 min CN=70 Runoff=22.00 cfs 3.845 af
Subcatchment 1D: SC-1D	Runoff Area=46.550 ac 0.00% Impervious Runoff Depth>1.50" Flow Length=1,890' Tc=66.2 min CN=72 Runoff=29.72 cfs 5.834 af
Subcatchment 2: SC-2	Runoff Area=61.430 ac 2.60% Impervious Runoff Depth>1.54" Flow Length=2,738' Tc=127.3 min CN=73 Runoff=26.63 cfs 7.899 af
Subcatchment 3: SC-3	Runoff Area=270.330 ac 1.32% Impervious Runoff Depth>1.48" Flow Length=4,335' Tc=240.2 min CN=73 Runoff=74.13 cfs 33.230 af
Subcatchment 4: SC-4	Runoff Area=306.400 ac 0.00% Impervious Runoff Depth>1.50" Flow Length=6,254' Tc=209.4 min CN=73 Runoff=92.12 cfs 38.214 af
Subcatchment 5: SC-5	Runoff Area=39.070 ac 0.37% Impervious Runoff Depth>1.72" Flow Length=2,355' Tc=192.1 min CN=76 Runoff=14.61 cfs 5.590 af
Reach AP 1: Analysis Point 1	Inflow=92.64 cfs 21.615 af Outflow=92.64 cfs 21.615 af
Reach AP2: AP-2	Inflow=26.63 cfs 7.899 af Outflow=26.63 cfs 7.899 af
Reach AP3: AP-3	Inflow=74.13 cfs 33.230 af Outflow=74.13 cfs 33.230 af
Reach AP4: AP4	Inflow=92.12 cfs 38.214 af Outflow=92.12 cfs 38.214 af
Reach AP5: AP-5	Inflow=14.61 cfs 5.590 af Outflow=14.61 cfs 5.590 af
Reach R1B1: Reach 1	Avg. Flow Depth=1.16' Max Vel=1.83 fps Inflow=50.91 cfs 9.679 af n=0.030 L=1,850.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=45.97 cfs 9.498 af
Reach R1B2: Reach 2	Avg. Flow Depth=1.33' Max Vel=1.98 fps Inflow=62.14 cfs 13.747 af n=0.030 L=570.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=61.72 cfs 13.675 af

Summary for Subcatchment 1A: SC-1A

Runoff = 40.77 cfs @ 12.92 hrs, Volume= 7.940 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

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 = 22.82 cfs @ 12.88 hrs, Volume= 4.250 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

	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 = 22.00 cfs @ 12.78 hrs, Volume= 3.845 af, Depth> 1.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

	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 = 29.72 cfs @ 12.93 hrs, Volume= 5.834 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

	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 = 26.63 cfs @ 13.75 hrs, Volume= 7.899 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

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 = 74.13 cfs @ 15.27 hrs, Volume= 33.230 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

	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 = 92.12 cfs @ 14.91 hrs, Volume= 38.214 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

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 = 14.61 cfs @ 14.71 hrs, Volume= 5.590 af, Depth> 1.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

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 > 1.45" for 10-Yr event
Inflow = 92.64 cfs @ 13.25 hrs, Volume= 21.615 af
Outflow = 92.64 cfs @ 13.25 hrs, Volume= 21.615 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 > 1.54" for 10-Yr event
Inflow = 26.63 cfs @ 13.75 hrs, Volume= 7.899 af
Outflow = 26.63 cfs @ 13.75 hrs, Volume= 7.899 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 > 1.48" for 10-Yr event
Inflow = 74.13 cfs @ 15.27 hrs, Volume= 33.230 af
Outflow = 74.13 cfs @ 15.27 hrs, Volume= 33.230 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 > 1.50" for 10-Yr event
Inflow = 92.12 cfs @ 14.91 hrs, Volume= 38.214 af
Outflow = 92.12 cfs @ 14.91 hrs, Volume= 38.214 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 > 1.72" for 10-Yr event
Inflow = 14.61 cfs @ 14.71 hrs, Volume= 5.590 af
Outflow = 14.61 cfs @ 14.71 hrs, Volume= 5.590 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

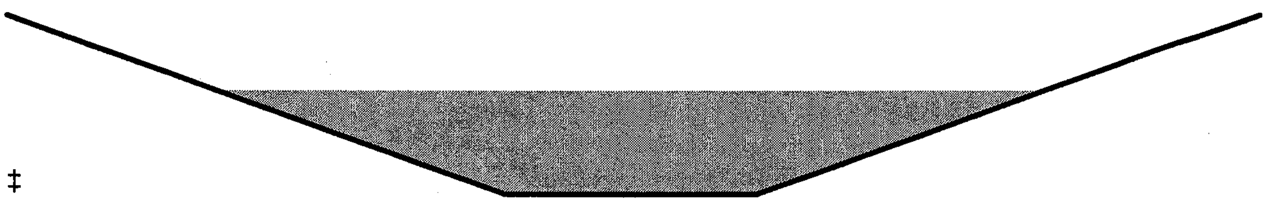
Summary for Reach R1B1: Reach 1

Inflow Area =	80.060 ac,	0.00% Impervious, Inflow Depth > 1.45"	for 10-Yr event	
Inflow =	50.91 cfs @	12.86 hrs, Volume=	9.679 af	
Outflow =	45.97 cfs @	13.36 hrs, Volume=	9.498 af,	Atten= 10%, Lag= 30.2 min

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= 16.8 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 31.8 min

Peak Storage= 46,438 cf @ 13.08 hrs
Average Depth at Peak Storage= 1.16'
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= 1,850.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 146.30'



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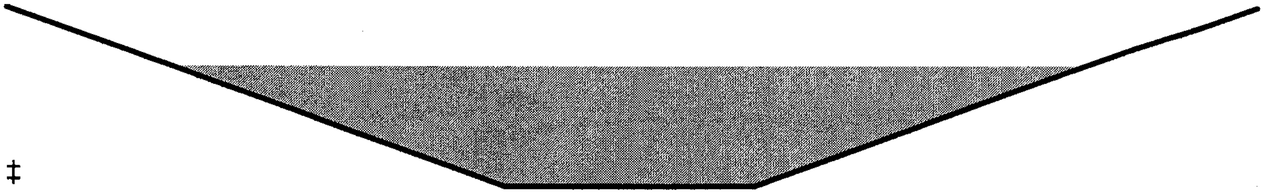
Summary for Reach R1B2: Reach 2

Inflow Area =	112.450 ac,	0.00% Impervious, Inflow Depth > 1.47"	for 10-Yr event	
Inflow =	62.14 cfs @	13.26 hrs, Volume=	13.747 af	
Outflow =	61.72 cfs @	13.40 hrs, Volume=	13.675 af,	Atten= 1%, Lag= 8.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.98 fps, Min. Travel Time= 4.8 min
Avg. Velocity = 1.07 fps, Avg. Travel Time= 8.9 min

Peak Storage= 17,767 cf @ 13.32 hrs
Average Depth at Peak Storage= 1.33'
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'



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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: SC-1A Runoff Area=66.270 ac 0.00% Impervious Runoff Depth>1.93"
Flow Length=1,580' Tc=64.5 min CN=71 Runoff=55.97 cfs 10.685 af

Subcatchment 1B: SC-1B Runoff Area=32.390 ac 0.00% Impervious Runoff Depth>2.09"
Flow Length=1,350' Tc=61.4 min CN=73 Runoff=30.76 cfs 5.651 af

Subcatchment 1C: SC-1C Runoff Area=33.510 ac 0.00% Impervious Runoff Depth>1.86"
Flow Length=540' Tc=53.1 min CN=70 Runoff=30.43 cfs 5.206 af

Subcatchment 1D: SC-1D Runoff Area=46.550 ac 0.00% Impervious Runoff Depth>2.01"
Flow Length=1,890' Tc=66.2 min CN=72 Runoff=40.50 cfs 7.804 af

Subcatchment 2: SC-2 Runoff Area=61.430 ac 2.60% Impervious Runoff Depth>2.05"
Flow Length=2,738' Tc=127.3 min CN=73 Runoff=36.03 cfs 10.515 af

Subcatchment 3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth>1.97"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=100.29 cfs 44.356 af

Subcatchment 4: SC-4 Runoff Area=306.400 ac 0.00% Impervious Runoff Depth>2.00"
Flow Length=6,254' Tc=209.4 min CN=73 Runoff=124.52 cfs 50.967 af

Subcatchment 5: SC-5 Runoff Area=39.070 ac 0.37% Impervious Runoff Depth>2.25"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=19.28 cfs 7.326 af

Reach AP 1: Analysis Point 1 Inflow=130.92 cfs 29.050 af
Outflow=130.92 cfs 29.050 af

Reach AP2: AP-2 Inflow=36.03 cfs 10.515 af
Outflow=36.03 cfs 10.515 af

Reach AP3: AP-3 Inflow=100.29 cfs 44.356 af
Outflow=100.29 cfs 44.356 af

Reach AP4: AP4 Inflow=124.52 cfs 50.967 af
Outflow=124.52 cfs 50.967 af

Reach AP5: AP-5 Inflow=19.28 cfs 7.326 af
Outflow=19.28 cfs 7.326 af

Reach R1B1: Reach 1 Avg. Flow Depth=1.36' Max Vel=2.00 fps Inflow=69.81 cfs 13.009 af
n=0.030 L=1,850.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=63.99 cfs 12.799 af

Reach R1B2: Reach 2 Avg. Flow Depth=1.56' Max Vel=2.16 fps Inflow=86.96 cfs 18.449 af
n=0.030 L=570.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=86.38 cfs 18.365 af

Summary for Subcatchment 1A: SC-1A

Runoff = 55.97 cfs @ 12.90 hrs, Volume= 10.685 af, Depth> 1.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

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 = 30.76 cfs @ 12.86 hrs, Volume= 5.651 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

	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 = 30.43 cfs @ 12.76 hrs, Volume= 5.206 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

	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 = 40.50 cfs @ 12.92 hrs, Volume= 7.804 af, Depth> 2.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

	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 = 36.03 cfs @ 13.73 hrs, Volume= 10.515 af, Depth> 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

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 = 100.29 cfs @ 15.24 hrs, Volume= 44.356 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

	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 = 124.52 cfs @ 14.88 hrs, Volume= 50.967 af, Depth> 2.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

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 = 19.28 cfs @ 14.70 hrs, Volume= 7.326 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

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 > 1.95"	for 25-Yr event
Inflow =	130.92 cfs @	13.19 hrs, Volume=	29.050 af	
Outflow =	130.92 cfs @	13.19 hrs, Volume=	29.050 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 > 2.05"	for 25-Yr event
Inflow =	36.03 cfs @	13.73 hrs, Volume=	10.515 af	
Outflow =	36.03 cfs @	13.73 hrs, Volume=	10.515 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 > 1.97"	for 25-Yr event
Inflow =	100.29 cfs @	15.24 hrs, Volume=	44.356 af	
Outflow =	100.29 cfs @	15.24 hrs, Volume=	44.356 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 > 2.00"	for 25-Yr event
Inflow =	124.52 cfs @	14.88 hrs, Volume=	50.967 af	
Outflow =	124.52 cfs @	14.88 hrs, Volume=	50.967 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 > 2.25"	for 25-Yr event
Inflow =	19.28 cfs @	14.70 hrs, Volume=	7.326 af	
Outflow =	19.28 cfs @	14.70 hrs, Volume=	7.326 af, Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

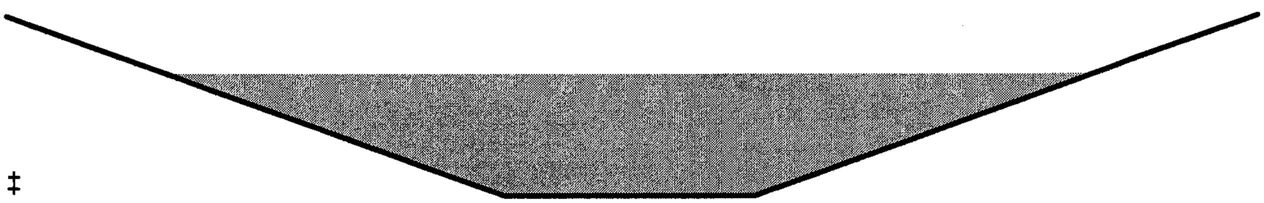
Summary for Reach R1B1: Reach 1

Inflow Area = 80.060 ac, 0.00% Impervious, Inflow Depth > 1.95" for 25-Yr event
Inflow = 69.81 cfs @ 12.85 hrs, Volume= 13.009 af
Outflow = 63.99 cfs @ 13.30 hrs, Volume= 12.799 af, Atten= 8%, Lag= 27.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.00 fps, Min. Travel Time= 15.4 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 29.9 min

Peak Storage= 59,202 cf @ 13.05 hrs
Average Depth at Peak Storage= 1.36'
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'



‡

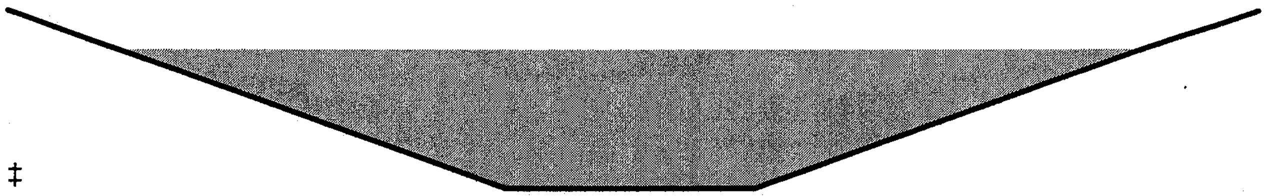
Summary for Reach R1B2: Reach 2

Inflow Area = 112.450 ac, 0.00% Impervious, Inflow Depth > 1.97" for 25-Yr event
Inflow = 86.96 cfs @ 13.20 hrs, Volume= 18.449 af
Outflow = 86.38 cfs @ 13.34 hrs, Volume= 18.365 af, Atten= 1%, Lag= 7.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.16 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 1.13 fps, Avg. Travel Time= 8.4 min

Peak Storage= 22,774 cf @ 13.26 hrs
Average Depth at Peak Storage= 1.56'
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'



APPENDIX B

POST-DEVELOPMENT STORMWATER ANALYSIS

TIME OF CONCENTRATION

SUBCATCHMENT 1A
A – B: Sht L=150', S=0.020
B – C: Direct Entry, L=1840'
C – D: Direct Entry, L=260'

SUBCATCHMENT 1B
A – B: Sht L=150', S=0.050
B – C: ShC L=185', S=0.100
C – D: Ch L=390', S=0.050
D – E: Ch L=560', S=0.330

SUBCATCHMENT 1C
A – B: Sht L=150', S=0.035
B – C: ShC L=230', S=0.013
C – D: Direct Entry

SUBCATCHMENT 1D
A – B: Sht L=150', S=0.050
B – C: ShC L=160', S=0.100
C – D: Ch L=200', S=0.050
D – E: Ch L=605', S=0.330

SUBCATCHMENT 1E
A – B: Sht L=150', S=0.100
B – C: ShC L=150', S=0.150
C – D: Ch L=93', S=0.050
D – E: Ch L=517', S=0.330

SUBCATCHMENT 1F
A – B: Sht L=100', S=0.010
B – C: Sht L=17', S=0.330
C – D: ShC L=300, S=0.019
D – E: ShC L=1649', S=0.050
E – F: Direct Entry

SUBCATCHMENT 1G
A – B: Sht L=150', S=0.100
B – C: ShC L=62', S=0.100
C – D: ShC L=90', S=0.330
D – E: Ch L=140', S=0.500
E – F: Ch L=415', S=0.330

SUBCATCHMENT 1H
A – B: Sht L=150', S=0.330
B – C: Ch L=610', S=0.030

SUBCATCHMENT 1i
A – B: Sht L=150', S=0.050
B – C: ShC L=150', S=0.100
C – D: Ch L=220', S=0.050
D – E: Ch L=570', S=0.330

SUBCATCHMENT 1J
A – B: Sht L=100', S=0.040
B – C: ShC L=123', S=0.057
C – D: Ch L=370', S=0.019

SUBCATCHMENT 2A
A – B: Sht L=150', S=0.030
B – C: ShC L=540', S=0.020
C – D: ShC L=530', S=0.009
D – E: Cf L=1213', S=0.008

SUBCATCHMENT 2B
A – B: Sht L=150', S=0.050
B – C: ShC L=190', S=0.100
C – D: Ch L=430', S=0.050
D – E: Ch L=450', S=0.330

SUBCATCHMENT 2C
A – B: Sht L=150', S=0.013
B – C: ShC L=290', S=0.024
C – D: Ch L=260', S=0.011

SUBCATCHMENT 3
A – B: Sht L=150', S=0.020
B – C: ShC L=1120', S=0.005
C – D: Direct Entry, L=3070'

SUBCATCHMENT 4A
A – B: Sht L=150', S=0.017
B – C: ShC L=160', S=0.041
C – D: ShC L=70', S=0.043

SUBCATCHMENT 4B
A – B: Sht L=24', S=0.020
B – C: Sht L=19', S=0.500
C – D: ShC L=584', S=0.014
D – E: Ch L=40', S=0.025

SUBCATCHMENT 4C
A – B: Sht L=61', S=0.020
B – C: Sht L=61', S=0.020
C – D: ShC L=374', S=0.011

SUBCATCHMENT 4D
A – B: Sht L=125', S=0.022
B – C: Sht L=25', S=0.052
C – D: ShC L=270', S=0.019
D – E: ShC L=40', S=0.330
E – F: ShC L=100', S=0.015
F – G: ShC L=258', S=0.003

SUBCATCHMENT 4E
A – B: Sht L=150', S=0.013
B – C: ShC L=2625', S=0.019
C – D: Direct Entry L=1590'
D – E: Direct Entry, L=760'
E – F: Direct Entry, L=960'

SUBCATCHMENT 4F
A – B: Sht L=140', S=0.028
B – C: ShC L=1067', S=0.029
C – D: Ch L=20', S=0.021

SUBCATCHMENT 4G
A – B: Sht L=100', S=0.050
B – C: Sht L=50', S=0.100
C – D: ShC L=150', S=0.100
D – E: Ch L=130', S=0.050
D – F: Ch L=500', S=0.330

SUBCATCHMENT 4H
A – B: Sht L=75', S=0.100
B – C: Sht L=75', S=0.330
C – D: ShC L=150', S=0.330
D – E: Ch L=290', S=0.050
E – D: Ch L=240', S=0.330

SUBCATCHMENT 4HA
A – B: Sht L=140', S=0.330

SUBCATCHMENT 4i
A – B: Sht L=150', S=0.050
B – C: ShC L=200', S=0.100
C – D: Ch L=290', S=0.050
D – E: Ch L=440', S=0.330

SUBCATCHMENT 4iA
A – B: Sht L=140', S=0.333

SUBCATCHMENT 4J
A – B: Sht L=150', S=0.050
B – C: ShC L=200', S=0.100
C – D: Ch L=270', S=0.050
D – E: Ch L=430', S=0.330

SUBCATCHMENT 4K
A – B: Sht L=150', S=0.050
B – C: ShC L=270', S=0.055
C – D: Ch L=270', S=0.050
D – E: Ch L=410', S=0.330

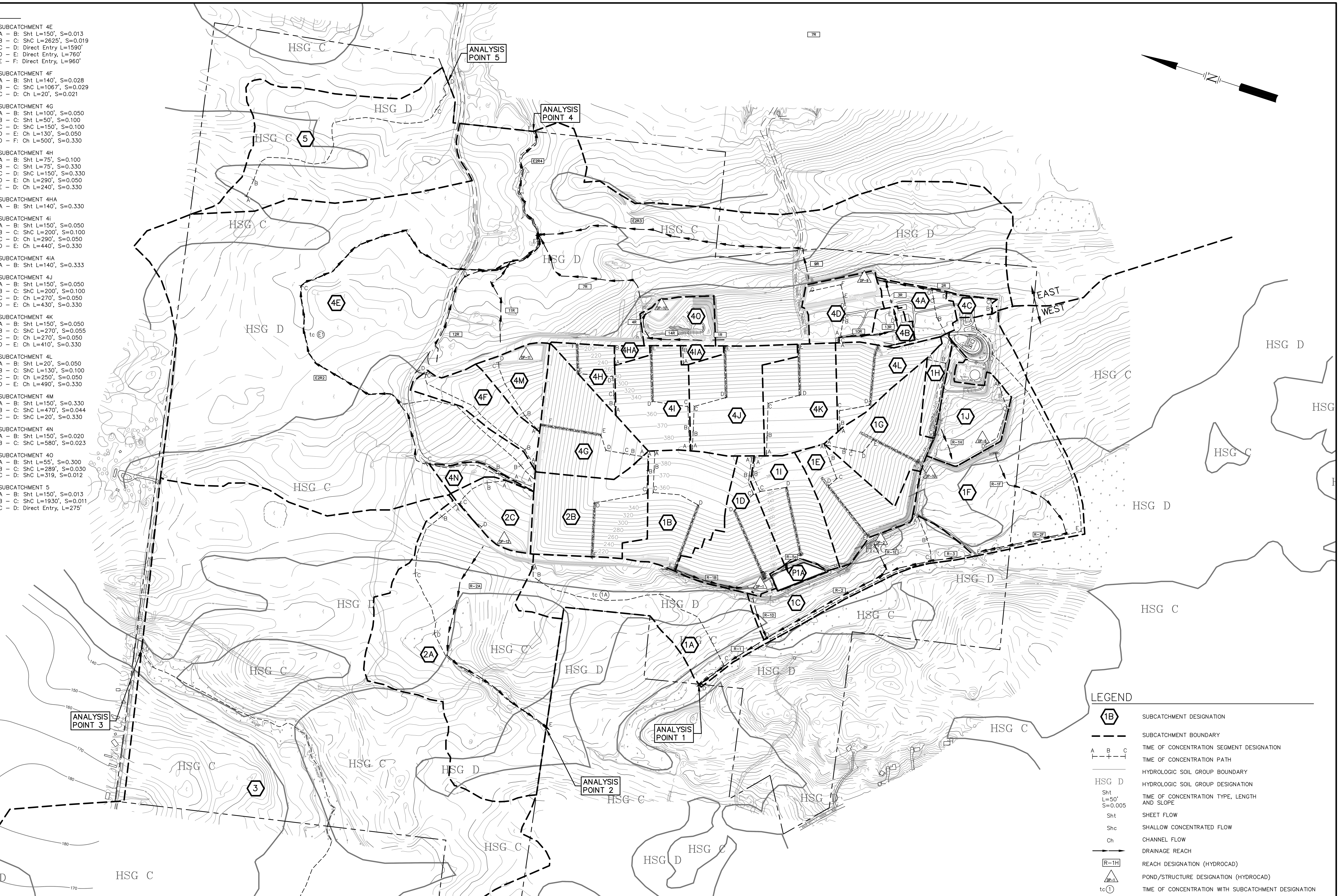
SUBCATCHMENT 4L
A – B: Sht L=20', S=0.050
B – C: ShC L=130', S=0.100
C – D: Ch L=250', S=0.050
D – E: Ch L=490', S=0.330

SUBCATCHMENT 4M
A – B: Sht L=150', S=0.330
B – C: ShC L=470', S=0.044
C – D: ShC L=20', S=0.330

SUBCATCHMENT 4N
A – B: Sht L=150', S=0.020
B – C: ShC L=580', S=0.023

SUBCATCHMENT 4O
A – B: Sht L=55', S=0.300
B – C: ShC L=289', S=0.030
C – D: ShC L=319, S=0.012

SUBCATCHMENT 5
A – B: Sht L=150', S=0.013
B – C: ShC L=1930', S=0.011
C – D: Direct Entry, L=275'



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 1	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
		–	–

CASELLA
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

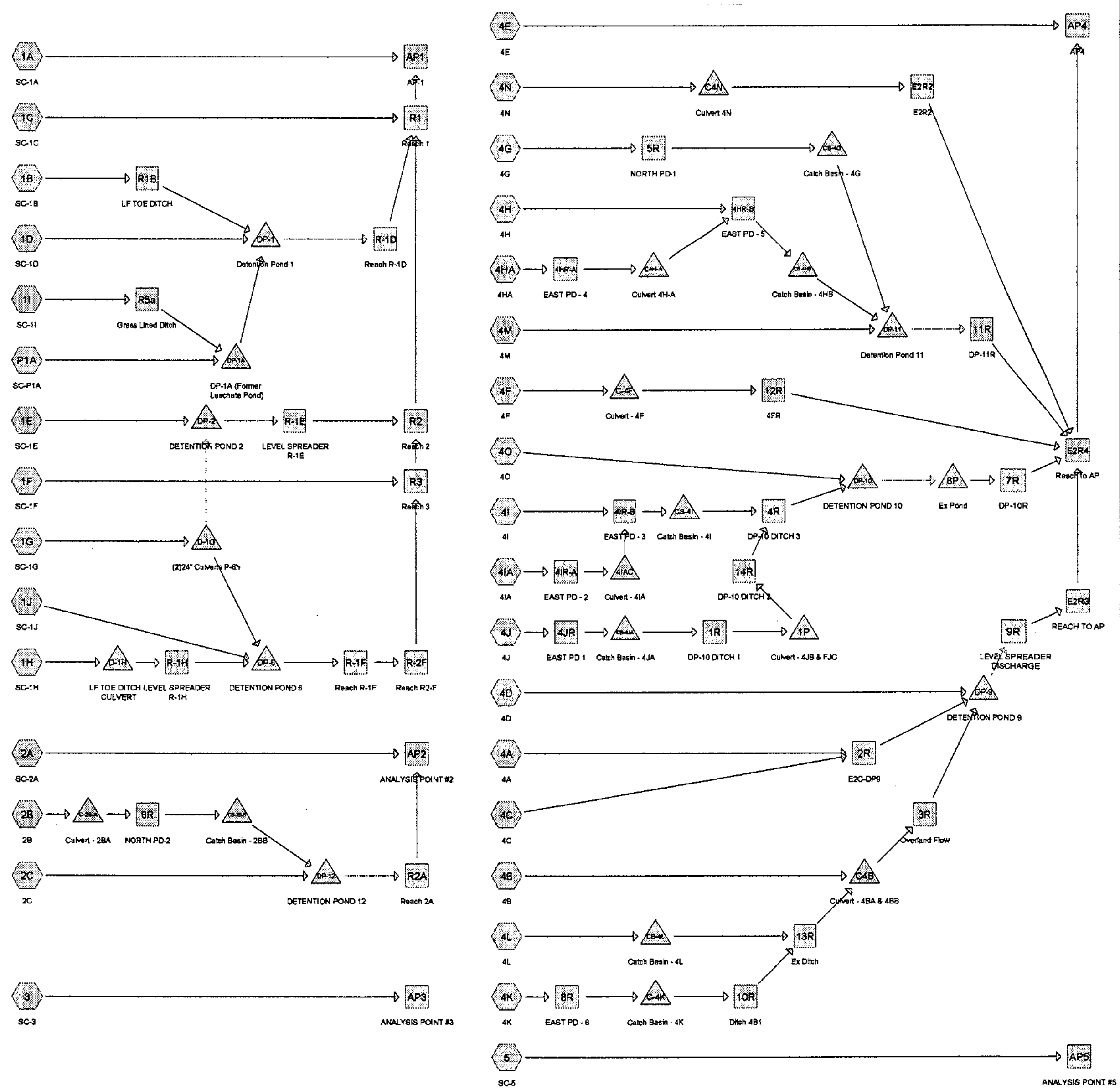
STORMWATER MANAGEMENT PLAN
POST DEVELPOMENT ANALYSIS

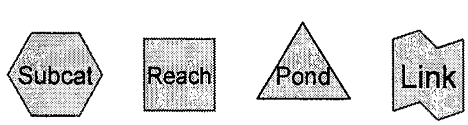
SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DESIGN BY: MNA
DRAWN BY: SJM
DATE: 2/15
CHECKED BY:
LMN: SMP–POST
CTB: SME–STD

JOB NO. 14101.00 DWG FILE SMP–POST

D–101





Routing Diagram for Post-development
Prepared by Sevee & Maher Engineers, Inc., Printed 6/19/2015
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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.157	74	>75% Grass cover, Good, HSG C (4A, 4B, 4C, 4D)
4.940	70	Brush, Fair, HSG C (4B, 4O)
0.250	98	Building/Concrete Slabs (4C)
0.400	98	Detention Pond 10 (4O)
2.330	98	Existing Water Body (3)
1.600	98	Existing Waterbody (2A)
2.133	91	Gravel (4D)
1.300	96	Gravel Road (1A, 1C)
2.470	96	Gravel Road/Berm (1D, 1E, 1G, 1H)
0.876	96	Gravel Road/Pad (1F, 1J)
0.456	91	Gravel Roads (4C)
2.126	89	Gravel roads, HSG C (4A, 4B, 4D, 4F, 4M, P1A)
0.600	98	Impervious / Structures (1F)
142.422	71	Meadow, non-grazed, HSG C (1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 2A, 2B, 3, 4A, 4G, 4H, 4HA, 4I, 4IA, 4J, 4K, 4L, 4N)
11.170	78	Meadow, non-grazed, HSG D (1A, 1C, 1F)
0.333	79	Pasture/grassland/range, Fair, HSG C (P1A)
0.380	98	Paved Area (New) (2A)
0.320	98	Paved Areas (New) (3)
0.800	98	Paved and Gravel Shoulder (4O)
3.940	98	Paved roads w/curbs & sewers, (4E)
1.184	98	Paved roads w/curbs & sewers, HSG C (1F, 4A, 4B, 4C, 4D)
2.140	93	Paved roads w/open ditches, 50% imp, HSG D (3, 5)
1.634	98	Pond (4D)
1.145	98	Pond and Liner (P1A)
1.653	98	Pond water surface (1J)
0.800	78	Pond, Meadow HSG D (1D)
0.111	98	ROOF (4A, 4B)
1.560	98	Water Surface, HSG C (2C, 4M)
4.280	70	Woods, Good HSG C (1J)
324.010	70	Woods, Good, HSG C (1A, 1C, 1F, 2A, 2C, 3, 4E, 4F, 4M, 4N, 5)
333.995	77	Woods, Good, HSG D (1A, 1C, 1F, 2A, 3, 4E, 5)

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchr Numbers
0.000	0.000	5.157	0.000	0.000	5.157	>75% Grass cover, Good	
0.000	0.000	4.940	0.000	0.000	4.940	Brush, Fair	
0.000	0.000	0.000	0.000	0.250	0.250	Building/Concrete Slabs	
0.000	0.000	0.000	0.000	0.400	0.400	Detention Pond 10	
0.000	0.000	0.000	0.000	2.330	2.330	Existing Water Body	
0.000	0.000	0.000	0.000	1.600	1.600	Existing Waterbody	
0.000	0.000	0.000	0.000	2.133	2.133	Gravel	
0.000	0.000	0.000	0.000	1.300	1.300	Gravel Road	
0.000	0.000	0.000	0.000	2.470	2.470	Gravel Road/Berm	
0.000	0.000	0.000	0.000	0.876	0.876	Gravel Road/Pad	
0.000	0.000	0.000	0.000	0.456	0.456	Gravel Roads	
0.000	0.000	2.126	0.000	0.000	2.126	Gravel roads	
0.000	0.000	0.000	0.000	0.600	0.600	Impervious / Structures	
0.000	0.000	142.422	11.170	0.000	153.592	Meadow, non-grazed	
0.000	0.000	0.333	0.000	0.000	0.333	Pasture/grassland/range, Fair	
0.000	0.000	0.000	0.000	0.380	0.380	Paved Area (New)	
0.000	0.000	0.000	0.000	0.320	0.320	Paved Areas (New)	
0.000	0.000	0.000	0.000	0.800	0.800	Paved and Gravel Shoulder	
0.000	0.000	1.184	0.000	0.000	1.184	Paved roads w/curbs & sewers	
0.000	0.000	0.000	0.000	3.940	3.940	Paved roads w/curbs & sewers,	
0.000	0.000	0.000	2.140	0.000	2.140	Paved roads w/open ditches, 50% imp	
0.000	0.000	0.000	0.000	1.634	1.634	Pond	
0.000	0.000	0.000	0.000	1.145	1.145	Pond and Liner	
0.000	0.000	0.000	0.000	1.653	1.653	Pond water surface	
0.000	0.000	0.000	0.800	0.000	0.800	Pond, Meadow	
0.000	0.000	0.000	0.000	0.111	0.111	ROOF	
0.000	0.000	1.560	0.000	0.000	1.560	Water Surface	
0.000	0.000	328.290	333.995	0.000	662.285	Woods, Good	

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: SC-1A Runoff Area=23.080 ac 0.00% Impervious Runoff Depth=0.72"
Flow Length=2,249' Slope=0.0260 '/' Tc=88.1 min CN=74 Runoff=5.38 cfs 1.392 af

Subcatchment 1B: SC-1B Runoff Area=13.169 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,282' Tc=17.5 min CN=71 Runoff=5.43 cfs 0.652 af

Subcatchment 1C: SC-1C Runoff Area=13.300 ac 0.00% Impervious Runoff Depth=0.87"
Flow Length=380' Tc=68.3 min CN=77 Runoff=4.61 cfs 0.963 af

Subcatchment 1D: SC-1D Runoff Area=10.620 ac 0.00% Impervious Runoff Depth=0.68"
Flow Length=1,117' Tc=16.9 min CN=73 Runoff=5.34 cfs 0.601 af

Subcatchment 1E: SC-1E Runoff Area=10.745 ac 0.00% Impervious Runoff Depth=0.64"
Flow Length=910' Tc=12.7 min CN=72 Runoff=5.49 cfs 0.569 af

Subcatchment 1F: SC-1F Runoff Area=31.220 ac 3.52% Impervious Runoff Depth=0.82"
Flow Length=2,066' Tc=73.2 min CN=76 Runoff=9.57 cfs 2.130 af

Subcatchment 1G: SC-1G Runoff Area=11.290 ac 0.00% Impervious Runoff Depth=0.64"
Flow Length=857' Tc=12.7 min CN=72 Runoff=5.77 cfs 0.598 af

Subcatchment 1H: SC-1H Runoff Area=3.030 ac 0.00% Impervious Runoff Depth=1.09"
Flow Length=759' Tc=15.4 min CN=81 Runoff=2.81 cfs 0.275 af

Subcatchment 1I: SC-1I Runoff Area=9.334 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,084' Tc=16.8 min CN=71 Runoff=3.92 cfs 0.462 af

Subcatchment 1J: SC-1J Runoff Area=360,761 sf 19.96% Impervious Runoff Depth=0.87"
Flow Length=593' Tc=33.0 min CN=77 Runoff=4.30 cfs 0.599 af

Subcatchment 2A: SC-2A Runoff Area=54.143 ac 3.66% Impervious Runoff Depth=0.72"
Flow Length=2,435' Tc=126.1 min CN=74 Runoff=9.80 cfs 3.266 af

Subcatchment 2B: 2B Runoff Area=13.996 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,218' Tc=17.6 min CN=71 Runoff=5.75 cfs 0.693 af

Subcatchment 2C: 2C Runoff Area=6.181 ac 10.68% Impervious Runoff Depth=0.68"
Flow Length=702' Tc=80.7 min CN=73 Runoff=1.40 cfs 0.350 af

Subcatchment 3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth=0.68"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=29.11 cfs 15.297 af

Subcatchment 4A: 4A Runoff Area=4.518 ac 7.22% Impervious Runoff Depth=0.87"
Flow Length=379' Tc=5.1 min CN=77 Runoff=4.37 cfs 0.327 af

Subcatchment 4B: 4B Runoff Area=2.330 ac 11.29% Impervious Runoff Depth=0.97"
Flow Length=667' Tc=13.2 min CN=79 Runoff=2.01 cfs 0.189 af

Subcatchment 4C: 4C Runoff Area=1.287 ac 24.86% Impervious Runoff Depth=1.41"
Flow Length=496' Tc=15.4 min CN=86 Runoff=1.58 cfs 0.151 af

Subcatchment 4D: 4D Runoff Area=6.660 ac 26.58% Impervious Runoff Depth=1.48"
Flow Length=824' Tc=33.9 min CN=87 Runoff=6.17 cfs 0.821 af

Subcatchment 4E: 4E Runoff Area=247.915 ac 1.59% Impervious Runoff Depth=0.77"
Flow Length=6,090' Tc=225.6 min CN=75 Runoff=32.46 cfs 15.916 af

Subcatchment 4F: 4F Runoff Area=6.771 ac 0.00% Impervious Runoff Depth=0.55"
Flow Length=1,228' Tc=68.8 min CN=70 Runoff=1.30 cfs 0.313 af

Subcatchment 4G: 4G Runoff Area=12.750 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=929' Tc=17.1 min CN=71 Runoff=5.29 cfs 0.631 af

Subcatchment 4H: 4H Runoff Area=3.400 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=823' Tc=11.9 min CN=71 Runoff=1.61 cfs 0.168 af

Subcatchment 4HA: 4HA Runoff Area=0.780 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=142' Slope=0.3300 '/' Tc=6.7 min CN=71 Runoff=0.44 cfs 0.039 af

Subcatchment 4I: 4I Runoff Area=9.930 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,082' Tc=17.1 min CN=71 Runoff=4.12 cfs 0.492 af

Subcatchment 4IA: 4IA Runoff Area=0.940 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=136' Slope=0.3333 '/' Tc=6.4 min CN=71 Runoff=0.54 cfs 0.047 af

Subcatchment 4J: 4J Runoff Area=12.310 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,051' Tc=17.2 min CN=71 Runoff=5.10 cfs 0.610 af

Subcatchment 4K: 4K Runoff Area=10.870 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,095' Tc=18.4 min CN=71 Runoff=4.40 cfs 0.538 af

Subcatchment 4L: 4L Runoff Area=7.500 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=896' Tc=14.1 min CN=71 Runoff=3.34 cfs 0.371 af

Subcatchment 4M: 4M Runoff Area=5.352 ac 16.82% Impervious Runoff Depth=0.77"
Flow Length=642' Tc=53.5 min CN=75 Runoff=1.86 cfs 0.344 af

Subcatchment 4N: 4N Runoff Area=1.921 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=730' Tc=30.5 min CN=71 Runoff=0.64 cfs 0.095 af

Subcatchment 4O: 4O Runoff Area=5.100 ac 23.53% Impervious Runoff Depth=0.87"
Flow Length=663' Tc=14.2 min CN=77 Runoff=3.75 cfs 0.369 af

Subcatchment 5: SC-5 Runoff Area=35.960 ac 0.40% Impervious Runoff Depth=0.82"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=5.71 cfs 2.453 af

Subcatchment P1A: SC-P1A Runoff Area=65,400 sf 76.26% Impervious Runoff Depth=2.06"
Tc=0.0 min CN=94 Runoff=4.03 cfs 0.258 af

Reach 1R: DP-10 DITCH 1 Avg. Flow Depth=0.33' Max Vel=2.32 fps Inflow=5.08 cfs 0.610 af
n=0.025 L=101.0' S=0.0079 '/' Capacity=128.49 cfs Outflow=5.02 cfs 0.610 af

Reach 2R: E2C-DP9 Avg. Flow Depth=0.30' Max Vel=3.49 fps Inflow=5.47 cfs 0.478 af
n=0.022 L=590.0' S=0.0169 '/' Capacity=488.04 cfs Outflow=5.13 cfs 0.478 af

Reach 3R: Overland Flow Avg. Flow Depth=0.13' Max Vel=9.99 fps Inflow=7.52 cfs 1.099 af
n=0.035 L=168.0' S=0.0554 '/' Capacity=119.87 cfs Outflow=7.51 cfs 1.099 af

Reach 4HR-A: EAST PD - 4 Avg. Flow Depth=0.10' Max Vel=1.88 fps Inflow=0.44 cfs 0.039 af
n=0.025 L=288.0' S=0.0247 '/' Capacity=119.08 cfs Outflow=0.41 cfs 0.039 af

Reach 4HR-B: EAST PD - 5 Avg. Flow Depth=0.20' Max Vel=3.75 fps Inflow=1.82 cfs 0.207 af
n=0.025 L=425.0' S=0.0438 '/' Capacity=158.67 cfs Outflow=1.79 cfs 0.207 af

Reach 4IR-A: EAST PD - 2 Avg. Flow Depth=0.12' Max Vel=1.80 fps Inflow=0.54 cfs 0.047 af
n=0.025 L=330.0' S=0.0176 '/' Capacity=100.55 cfs Outflow=0.50 cfs 0.047 af

Reach 4IR-B: EAST PD - 3 Avg. Flow Depth=0.41' Max Vel=3.98 fps Inflow=4.59 cfs 0.538 af
n=0.025 L=210.0' S=0.0224 '/' Capacity=113.47 cfs Outflow=4.54 cfs 0.538 af

Reach 4JR: EAST PD 1 Avg. Flow Depth=0.46' Max Vel=3.81 fps Inflow=5.10 cfs 0.610 af
n=0.025 L=183.0' S=0.0180 '/' Capacity=101.85 cfs Outflow=5.07 cfs 0.610 af

Reach 4R: DP-10 DITCH 3 Avg. Flow Depth=0.49' Max Vel=6.32 fps Inflow=9.29 cfs 1.147 af
n=0.025 L=260.0' S=0.0462 '/' Capacity=162.94 cfs Outflow=9.21 cfs 1.147 af

Reach 5R: NORTH PD-1 Avg. Flow Depth=0.40' Max Vel=4.57 fps Inflow=5.29 cfs 0.631 af
n=0.025 L=936.0' S=0.0299 '/' Capacity=131.18 cfs Outflow=5.14 cfs 0.631 af

Reach 6R: NORTH PD-2 Avg. Flow Depth=0.60' Max Vel=2.93 fps Inflow=5.70 cfs 0.693 af
n=0.025 L=364.0' S=0.0080 '/' Capacity=67.70 cfs Outflow=5.61 cfs 0.693 af

Reach 7R: DP-10R Avg. Flow Depth=0.19' Max Vel=1.50 fps Inflow=0.74 cfs 1.035 af
n=0.045 L=1,130.0' S=0.0248 '/' Capacity=88.21 cfs Outflow=0.74 cfs 1.035 af

Reach 8R: EAST PD - 6 Avg. Flow Depth=0.37' Max Vel=2.06 fps Inflow=4.40 cfs 0.538 af
n=0.025 L=360.0' S=0.0056 '/' Capacity=25.35 cfs Outflow=4.33 cfs 0.538 af

Reach 9R: LEVEL SPREADER Avg. Flow Depth=0.04' Max Vel=0.06 fps Inflow=0.05 cfs 0.399 af
n=0.800 L=273.0' S=0.0623 '/' Capacity=11.46 cfs Outflow=0.05 cfs 0.395 af

Reach 10R: Ditch 4B1 Avg. Flow Depth=0.50' Max Vel=2.76 fps Inflow=4.22 cfs 0.538 af
n=0.025 L=352.0' S=0.0085 '/' Capacity=70.02 cfs Outflow=4.17 cfs 0.538 af

Reach 11R: DP-11R Avg. Flow Depth=0.19' Max Vel=1.21 fps Inflow=0.61 cfs 1.030 af
n=0.045 L=1,050.0' S=0.0162 '/' Capacity=71.30 cfs Outflow=0.61 cfs 1.030 af

Reach 12R: 4FR Avg. Flow Depth=0.29' Max Vel=1.38 fps Inflow=1.29 cfs 0.313 af
n=0.045 L=1,523.0' S=0.0131 '/' Capacity=64.21 cfs Outflow=1.17 cfs 0.313 af

Reach 13R: Ex Ditch Avg. Flow Depth=0.59' Max Vel=3.47 fps Inflow=6.52 cfs 0.910 af
n=0.030 L=225.0' S=0.0164 '/' Capacity=81.05 cfs Outflow=6.47 cfs 0.910 af

Reach 14R: DP-10 DITCH 2 Avg. Flow Depth=0.38' Max Vel=4.82 fps Inflow=5.03 cfs 0.610 af
n=0.025 L=434.0' S=0.0357 '/' Capacity=143.33 cfs Outflow=4.97 cfs 0.610 af

Reach AP1: AP-1 Inflow=16.15 cfs 5.749 af
Outflow=16.15 cfs 5.749 af

Reach AP2: ANALYSIS POINT #2 Inflow=9.80 cfs 4.150 af
Outflow=9.80 cfs 4.150 af

Reach AP3: ANALYSIS POINT #3 Inflow=29.11 cfs 15.297 af
Outflow=29.11 cfs 15.297 af

Reach AP4: AP4 Inflow=33.41 cfs 18.774 af
Outflow=33.41 cfs 18.774 af

Reach AP5: ANALYSIS POINT #5 Inflow=5.71 cfs 2.453 af
Outflow=5.71 cfs 2.453 af

Reach E2R2: E2R2 Avg. Flow Depth=0.04' Max Vel=0.20 fps Inflow=0.64 cfs 0.095 af
n=0.080 L=4,356.0' S=0.0094 '/' Capacity=132.12 cfs Outflow=0.09 cfs 0.095 af

Reach E2R3: REACH TO AP Avg. Flow Depth=0.06' Max Vel=0.41 fps Inflow=0.05 cfs 0.395 af
n=0.045 L=2,170.0' S=0.0074 '/' Capacity=48.12 cfs Outflow=0.05 cfs 0.391 af

Reach E2R4: Reach to AP Avg. Flow Depth=0.20' Max Vel=0.57 fps Inflow=1.62 cfs 2.863 af
n=0.080 L=963.0' S=0.0094 '/' Capacity=131.94 cfs Outflow=1.60 cfs 2.858 af

Reach R-1D: Reach R-1D Avg. Flow Depth=0.11' Max Vel=0.95 fps Inflow=1.15 cfs 0.695 af
n=0.060 L=370.0' S=0.0324 '/' Capacity=67.93 cfs Outflow=1.15 cfs 0.695 af

Reach R-1E: LEVEL SPREADER R-1E Avg. Flow Depth=0.14' Max Vel=1.64 fps Inflow=3.92 cfs 0.569 af
n=0.060 L=210.0' S=0.0690 '/' Capacity=135.95 cfs Outflow=3.90 cfs 0.569 af

Reach R-1F: Reach R-1F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.060 L=940.0' S=0.0170 '/' Capacity=49.21 cfs Outflow=0.00 cfs 0.000 af

Reach R-1H: LEVEL SPREADER R-1H Avg. Flow Depth=0.05' Max Vel=1.50 fps Inflow=2.78 cfs 0.275 af
n=0.030 L=170.0' S=0.0471 '/' Capacity=411.95 cfs Outflow=2.73 cfs 0.275 af

Reach R-2F: Reach R2-F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=735.0' S=0.0020 '/' Capacity=151.21 cfs Outflow=0.00 cfs 0.000 af

Reach R1: Reach 1 Avg. Flow Depth=0.64' Max Vel=1.17 fps Inflow=12.53 cfs 4.357 af
n=0.030 L=700.0' S=0.0016 '/' Capacity=132.69 cfs Outflow=12.37 cfs 4.357 af

Reach R1B: LF TOE DITCH Avg. Flow Depth=0.54' Max Vel=3.22 fps Inflow=5.43 cfs 0.652 af
n=0.040 L=540.0' S=0.0278 '/' Capacity=79.00 cfs Outflow=5.35 cfs 0.652 af

Reach R2: Reach 2 Avg. Flow Depth=0.54' Max Vel=1.20 fps Inflow=10.32 cfs 2.699 af
n=0.030 L=1,050.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=9.88 cfs 2.699 af

Reach R2A: Reach 2A Avg. Flow Depth=0.05' Max Vel=0.35 fps Inflow=0.51 cfs 0.885 af
n=0.060 L=1,960.0' S=0.0138 '/' Capacity=1,358.84 cfs Outflow=0.49 cfs 0.884 af

Reach R3: Reach 3 Avg. Flow Depth=0.52' Max Vel=1.17 fps Inflow=9.57 cfs 2.130 af
n=0.030 L=800.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=9.24 cfs 2.130 af

Reach R5a: Grass Lined Ditch Avg. Flow Depth=0.21' Max Vel=4.30 fps Inflow=3.92 cfs 0.462 af
n=0.025 L=200.0' S=0.0500 '/' Capacity=572.96 cfs Outflow=3.88 cfs 0.462 af

Pond 1P: Culvert - 4JB & FJC Peak Elev=210.75' Storage=215 cf Inflow=5.02 cfs 0.610 af
24.0" Round Culvert x 2.00 n=0.011 L=73.0' S=0.0137 '/' Outflow=5.03 cfs 0.610 af

Pond 4IAC: Culvert - 4IA Peak Elev=213.23' Storage=112 cf Inflow=0.50 cfs 0.047 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0175 '/' Outflow=0.45 cfs 0.047 af

Pond 8P: Ex Pond Peak Elev=171.98' Storage=3,312 cf Inflow=0.74 cfs 1.103 af
Outflow=0.74 cfs 1.035 af

Pond C-2B-A: Culvert - 2BA Peak Elev=204.21' Storage=365 cf Inflow=5.75 cfs 0.693 af
Primary=5.70 cfs 0.693 af Secondary=0.00 cfs 0.000 af Outflow=5.70 cfs 0.693 af

Pond C-4F: Culvert - 4F Peak Elev=165.58' Storage=0.007 af Inflow=1.30 cfs 0.313 af
18.0" Round Culvert n=0.011 L=78.0' S=0.0385 '/' Outflow=1.29 cfs 0.313 af

Pond C-4K: Catch Basin - 4K Peak Elev=220.30' Storage=924 cf Inflow=4.33 cfs 0.538 af
Outflow=4.22 cfs 0.538 af

Pond C4B: Culvert - 4BA & 4BB Peak Elev=205.34' Storage=13 cf Inflow=7.52 cfs 1.099 af
24.0" Round Culvert x 2.00 n=0.011 L=78.0' S=0.0090 '/' Outflow=7.52 cfs 1.099 af

Pond C4H-A: Culvert 4H-A Peak Elev=202.17' Storage=190 cf Inflow=0.41 cfs 0.039 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0250 '/' Outflow=0.30 cfs 0.039 af

Pond C4N: Culvert 4N Peak Elev=184.40' Storage=0.001 af Inflow=0.64 cfs 0.095 af
18.0" Round Culvert n=0.011 L=33.0' S=0.0303 '/' Outflow=0.64 cfs 0.095 af

Pond CB-2B-B: Catch Basin - 2BB Peak Elev=200.21' Storage=4 cf Inflow=5.61 cfs 0.693 af
Outflow=5.61 cfs 0.693 af

Pond CB-4G: Catch Basin - 4G Peak Elev=181.40' Storage=92 cf Inflow=5.14 cfs 0.631 af
Outflow=5.14 cfs 0.631 af

Pond CB-4HB: Catch Basin - 4HB Peak Elev=183.50' Storage=12 cf Inflow=1.79 cfs 0.207 af
Outflow=1.77 cfs 0.207 af

Pond CB-4I: Catch Basin - 4I Peak Elev=207.97' Storage=0.003 af Inflow=4.54 cfs 0.538 af
Outflow=4.54 cfs 0.538 af

Pond CB-4JA: Catch Basin - 4JA Peak Elev=219.09' Storage=0.003 af Inflow=5.07 cfs 0.610 af
Outflow=5.08 cfs 0.610 af

Pond CB-4L: Catch Basin - 4L Peak Elev=215.30' Storage=458 cf Inflow=3.34 cfs 0.371 af
Outflow=3.31 cfs 0.371 af

Pond D-1G: (2)24" Culverts P-6h Peak Elev=183.81' Storage=136 cf Inflow=5.77 cfs 0.598 af
Primary=5.72 cfs 0.598 af Secondary=0.00 cfs 0.000 af Outflow=5.72 cfs 0.598 af

Pond D-1H: LF TOE DITCH - CULVERT Peak Elev=183.84' Storage=372 cf Inflow=2.81 cfs 0.275 af
18.0" Round Culvert n=0.013 L=60.0' S=0.0083 '/' Outflow=2.78 cfs 0.275 af

Pond DP-1: Detention Pond 1 Peak Elev=162.46' Storage=31,388 cf Inflow=10.24 cfs 1.253 af
Primary=1.15 cfs 0.695 af Secondary=0.00 cfs 0.000 af Outflow=1.15 cfs 0.695 af

Pond DP-10: DETENTION POND 10 Peak Elev=177.58' Storage=43,962 cf Inflow=12.05 cfs 1.516 af
Primary=0.00 cfs 0.000 af Secondary=0.74 cfs 1.103 af Tertiary=0.00 cfs 0.000 af Outflow=0.74 cfs 1.103 af

Pond DP-11: Detention Pond 11 Peak Elev=165.43' Storage=33,880 cf Inflow=7.66 cfs 1.182 af
Primary=0.00 cfs 0.000 af Secondary=0.61 cfs 1.030 af Outflow=0.61 cfs 1.030 af

Pond DP-12: DETENTION POND 12 Peak Elev=185.69' Storage=31,513 cf Inflow=5.88 cfs 1.043 af
Primary=0.00 cfs 0.000 af Secondary=0.51 cfs 0.885 af Outflow=0.51 cfs 0.885 af

Pond DP-1A: DP-1A (Former Leachate Peak Elev=164.81' Storage=213,981 cf Inflow=5.05 cfs 0.720 af
Outflow=0.00 cfs 0.000 af

Pond DP-2: DETENTION POND 2 Peak Elev=163.37' Storage=4,359 cf Inflow=5.49 cfs 0.569 af
Outflow=3.92 cfs 0.569 af

Pond DP-6: DETENTION POND 6 Peak Elev=174.86' Storage=67,549 cf Inflow=11.00 cfs 1.472 af
Primary=0.00 cfs 0.000 af Secondary=0.82 cfs 1.472 af Outflow=0.82 cfs 1.472 af

Pond DP-9: DETENTION POND 9 Peak Elev=188.57' Storage=103,321 cf Inflow=16.58 cfs 2.398 af
Primary=0.00 cfs 0.000 af Secondary=0.05 cfs 0.399 af Tertiary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.399 af

Summary for Subcatchment 1A: SC-1A

Runoff = 5.38 cfs @ 13.29 hrs, Volume= 1.392 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	10.120	70	Woods, Good, HSG C
	9.500	77	Woods, Good, HSG D
	2.560	71	Meadow, non-grazed, HSG C
	0.400	78	Meadow, non-grazed, HSG D
*	0.500	96	Gravel Road
	23.080	74	Weighted Average
	23.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.7	150	0.0260	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	1,839		1.46		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
88.1	2,249	Total			

Summary for Subcatchment 1B: SC-1B

Runoff = 5.43 cfs @ 12.29 hrs, Volume= 0.652 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
13.169	71	Meadow, non-grazed, HSG C
13.169		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	183	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.9	392	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	557	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.5	1,282	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 4.61 cfs @ 12.99 hrs, Volume= 0.963 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	6.100	77	Woods, Good, HSG D
	0.720	70	Woods, Good, HSG C
	3.100	78	Meadow, non-grazed, HSG D
	2.580	71	Meadow, non-grazed, HSG C
*	0.800	96	Gravel Road
	13.300	77	Weighted Average
	13.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.0	150	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.6	230	0.0133	0.58		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
16.7					**Direct Entry, Segment ID: C-D**
68.3	380	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 5.34 cfs @ 12.27 hrs, Volume= 0.601 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	9.230	71	Meadow, non-grazed, HSG C
*	0.590	96	Gravel Road/Berm
*	0.800	78	Pond, Meadow HSG D
	10.620	73	Weighted Average
	10.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	159	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.5	203	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	605	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035

16.9	1,117	Total

Summary for Subcatchment 1E: SC-1E

Runoff = 5.49 cfs @ 12.21 hrs, Volume= 0.569 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	10.495	71	Meadow, non-grazed, HSG C
*	0.250	96	Gravel Road/Berm
	10.745	72	Weighted Average
	10.745		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	150	0.1500	2.71		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.2	93	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	517	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	910	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 9.57 cfs @ 13.08 hrs, Volume= 2.130 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	13.200	77	Woods, Good, HSG D
	7.250	70	Woods, Good, HSG C
	7.670	78	Meadow, non-grazed, HSG D
	1.500	71	Meadow, non-grazed, HSG C
*	0.500	96	Gravel Road/Pad
*	0.600	98	Impervious / Structures
	0.500	98	Paved roads w/curbs & sewers, HSG C
	31.220	76	Weighted Average
	30.120		96.48% Pervious Area
	1.100		3.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	17	0.3300	0.23		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
2.4	300	0.0190	2.07		**Shallow Concentrated Flow, Segment ID: C-D** Grassed Waterway Kv= 15.0 fps
24.6	1,649	0.0500	1.12		**Shallow Concentrated Flow, Segment ID D-E** Woodland Kv= 5.0 fps
24.5					**Direct Entry, Segment ID: E-F**
73.2	2,066	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 5.77 cfs @ 12.21 hrs, Volume= 0.598 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	10.860	71	Meadow, non-grazed, HSG C
*	0.430	96	Gravel Road/Berm
	11.290	72	Weighted Average
	11.290		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	62	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.4	90	0.3300	4.02		**Shallow Concentrated Flow, Segment ID: C-D** Short Grass Pasture Kv= 7.0 fps
0.3	140	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	415	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	857	Total			

Summary for Subcatchment 1H: SC-1H

Runoff = 2.81 cfs @ 12.22 hrs, Volume= 0.275 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
1.830	71	Meadow, non-grazed, HSG C
1.200	96	Gravel Road/Berm
3.030	81	Weighted Average
3.030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.3300	0.36		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
8.4	609	0.0300	1.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
15.4	759	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 3.92 cfs @ 12.27 hrs, Volume= 0.462 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
9.334	71	Meadow, non-grazed, HSG C
9.334		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	146	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	218	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	570	0.3300	27.25	817.65	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 5.0 '/' Top.W=25.00' n= 0.035
16.8	1,084	Total			

Summary for Subcatchment 1J: SC-1J

Runoff = 4.30 cfs @ 12.50 hrs, Volume= 0.599 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (sf)	CN	Description
*	186,445	70	Woods, Good HSG C
	85,939	71	Meadow, non-grazed, HSG C
*	16,377	96	Gravel Road/Pad
*	72,000	98	Pond water surface
	360,761	77	Weighted Average
	288,761		80.04% Pervious Area
	72,000		19.96% 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 2A: SC-2A

Runoff = 9.80 cfs @ 13.86 hrs, Volume= 3.266 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	27.993	70	Woods, Good, HSG C
	21.380	77	Woods, Good, HSG D
	2.790	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area (New)
	1.600	98	Existing Waterbody
	54.143	74	Weighted Average
	52.163		96.34% Pervious Area
	1.980		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.9	150	0.0300	0.05		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
25.4	538	0.0200	0.35		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
37.5	534	0.0090	0.24		**Shallow Concentrated Flow, Segment C-D** Forest w/Heavy Litter Kv= 2.5 fps
15.3	1,213	0.0080	1.32	52.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=2.00' Z= 10.0 '/' Top.W=40.00' n= 0.100 Earth, dense brush, high stage
126.1	2,435	Total			

Summary for Subcatchment 2B: 2B

Runoff = 5.75 cfs @ 12.29 hrs, Volume= 0.693 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
13.996	71	Meadow, non-grazed, HSG C
13.996		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	187	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	431	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	450	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.6	1,218	Total			

Summary for Subcatchment 2C: 2C

Runoff = 1.40 cfs @ 13.20 hrs, Volume= 0.350 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
5.521	70	Woods, Good, HSG C
0.660	98	Water Surface, HSG C
6.181	73	Weighted Average
5.521		89.32% Pervious Area
0.660		10.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.2	289	0.0242	0.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	263	0.0114	0.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
80.7	702	Total			

Summary for Subcatchment 3: SC-3

Runoff = 29.11 cfs @ 15.72 hrs, Volume= 15.297 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	162.090	70	Woods, Good, HSG C
	102.790	77	Woods, Good, HSG D
	0.950	71	Meadow, non-grazed, HSG C
*	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
*	2.330	98	Existing Water Body
	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 4A: 4A

Runoff = 4.37 cfs @ 12.09 hrs, Volume= 0.327 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	0.740	89	Gravel roads, HSG C
	1.955	74	>75% Grass cover, Good, HSG C
*	0.088	98	ROOF
	1.497	71	Meadow, non-grazed, HSG C
	0.238	98	Paved roads w/curbs & sewers, HSG C
	4.518	77	Weighted Average
	4.192		92.78% Pervious Area
	0.326		7.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	150	0.0167	0.71		**Sheet Flow, Segment A-B** n= 0.023 P2= 2.70"
0.8	159	0.0410	3.26		**Shallow Concentrated Flow, Segment B-C** Unpaved Kv= 16.1 fps
0.8	70	0.0429	1.45		**Shallow Concentrated Flow, Segment C-D** Short Grass Pasture Kv= 7.0 fps
5.1	379	Total			

Summary for Subcatchment 4B: 4B

Runoff = 2.01 cfs @ 12.20 hrs, Volume= 0.189 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	1.040	70	Brush, Fair, HSG C
*	0.023	98	ROOF
	0.640	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
	0.240	98	Paved roads w/curbs & sewers, HSG C
	2.330	79	Weighted Average
	2.067		88.71% Pervious Area
	0.263		11.29% 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 4C: 4C

Runoff = 1.58 cfs @ 12.22 hrs, Volume= 0.151 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	0.511	74	>75% Grass cover, Good, HSG C
	0.070	98	Paved roads w/curbs & sewers, HSG C
*	0.250	98	Building/Concrete Slabs
*	0.456	91	Gravel Roads
	1.287	86	Weighted Average
	0.967		75.14% Pervious Area
	0.320		24.86% 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"
4.0	374	0.0107	1.55		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
15.4	496	Total			

Summary for Subcatchment 4D: 4D

Runoff = 6.17 cfs @ 12.47 hrs, Volume= 0.821 af, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	0.453	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.634	98	Pond
	0.136	98	Paved roads w/curbs & sewers, HSG C
	6.660	87	Weighted Average
	4.890		73.42% Pervious Area
	1.770		26.58% 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 4E: 4E

Runoff = 32.46 cfs @ 15.30 hrs, Volume= 15.916 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	152.615	77	Woods, Good, HSG D
	91.360	70	Woods, Good, HSG C
*	3.940	98	Paved roads w/curbs & sewers,
	247.915	75	Weighted Average
	243.975		98.41% Pervious Area
	3.940		1.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
127.0	2,625	0.0190	0.34		**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)**
225.6	6,090	Total			

Summary for Subcatchment 4F: 4F

Runoff = 1.30 cfs @ 13.07 hrs, Volume= 0.313 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
6.691	70	Woods, Good, HSG C
0.080	89	Gravel roads, HSG C
6.771	70	Weighted Average
6.771		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.6	144	0.0280	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.9	1,067	0.0290	0.85		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	17	0.0210	0.97	19.47	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.250
68.8	1,228	Total			

Summary for Subcatchment 4G: 4G

Runoff = 5.29 cfs @ 12.28 hrs, Volume= 0.631 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
12.750	71	Meadow, non-grazed, HSG C
12.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	98	0.0500	0.15		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.8	52	0.1000	0.18		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
1.1	150	0.1000	2.21		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.3	133	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	496	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	929	Total			

Summary for Subcatchment 4H: 4H

Runoff = 1.61 cfs @ 12.20 hrs, Volume= 0.168 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
3.400	71	Meadow, non-grazed, HSG C
3.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	75	0.1000	0.19		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.0	75	0.3300	0.31		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	150	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.7	285	0.0500	6.92	76.15	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 2.0 & 20.0 '/' Top.W=22.00' n= 0.030 Short grass
0.1	238	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00'

n= 0.035

11.9	823	Total

Summary for Subcatchment 4HA: 4HA

Runoff = 0.44 cfs @ 12.12 hrs, Volume= 0.039 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.780	71	Meadow, non-grazed, HSG C
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	142	0.3300	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4I: 4I

Runoff = 4.12 cfs @ 12.28 hrs, Volume= 0.492 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
9.930	71	Meadow, non-grazed, HSG C
9.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	200	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	290	0.0500	11.02	506.75	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=2.00' Z= 3.0 & 20.0 '/' Top.W=46.00' n= 0.030
0.3	442	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	1,082	Total			

Summary for Subcatchment 4IA: 4IA

Runoff = 0.54 cfs @ 12.11 hrs, Volume= 0.047 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.940	71	Meadow, non-grazed, HSG C
0.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	136	0.3333	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4J: 4J

Runoff = 5.10 cfs @ 12.28 hrs, Volume= 0.610 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
12.310	71	Meadow, non-grazed, HSG C
12.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	202	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.6	270	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	429	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.2	1,051	Total			

Summary for Subcatchment 4K: 4K

Runoff = 4.40 cfs @ 12.30 hrs, Volume= 0.538 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
10.870	71	Meadow, non-grazed, HSG C
10.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
2.7	268	0.0555	1.65		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.6	267	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	410	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
18.4	1,095	Total			

Summary for Subcatchment 4L: 4L

Runoff = 3.34 cfs @ 12.23 hrs, Volume= 0.371 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
7.500	71	Meadow, non-grazed, HSG C
7.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	23	0.0500	0.12		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
9.9	127	0.1000	0.21		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	252	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	494	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
14.1	896	Total			

Summary for Subcatchment 4M: 4M

Runoff = 1.86 cfs @ 12.80 hrs, Volume= 0.344 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
4.262	70	Woods, Good, HSG C
0.900	98	Water Surface, HSG C
0.190	89	Gravel roads, HSG C
5.352	75	Weighted Average
4.452		83.18% Pervious Area
0.900		16.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.9	150	0.0333	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
7.5	474	0.0440	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.1	18	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
53.5	642	Total			

Summary for Subcatchment 4N: 4N

Runoff = 0.64 cfs @ 12.50 hrs, Volume= 0.095 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.743	70	Woods, Good, HSG C
1.178	71	Meadow, non-grazed, HSG C
1.921	71	Weighted Average
1.921		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	150	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
9.0	580	0.0233	1.07		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
30.5	730	Total			

Summary for Subcatchment 4O: 4O

Runoff = 3.75 cfs @ 12.21 hrs, Volume= 0.369 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	3.900	70	Brush, Fair, HSG C
*	0.800	98	Paved and Gravel Shoulder
*	0.400	98	Detention Pond 10
	5.100	77	Weighted Average
	3.900		76.47% Pervious Area
	1.200		23.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	55	0.3000	0.28		**Sheet Flow, SEGMENT AB** Grass: Dense n= 0.240 P2= 2.70"
4.0	289	0.0300	1.21		**Shallow Concentrated Flow, SEGMENT BC** Short Grass Pasture Kv= 7.0 fps
6.9	319	0.0120	0.77		**Shallow Concentrated Flow, SEGMENT CD** Short Grass Pasture Kv= 7.0 fps
14.2	663	Total			

Summary for Subcatchment 5: SC-5

Runoff = 5.71 cfs @ 14.76 hrs, Volume= 2.453 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
28.410	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
35.960	76	Weighted Average
35.815		99.60% Pervious Area
0.145		0.40% 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 Subcatchment P1A: SC-P1A

Runoff = 4.03 cfs @ 12.00 hrs, Volume= 0.258 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (sf)	CN	Description
*	49,872	98	Pond and Liner
	1,012	89	Gravel roads, HSG C
	14,516	79	Pasture/grassland/range, Fair, HSG C
	65,400	94	Weighted Average
	15,528		23.74% Pervious Area
	49,872		76.26% Impervious Area

Summary for Reach 1R: DP-10 DITCH 1

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 5.08 cfs @ 12.31 hrs, Volume= 0.610 af
Outflow = 5.02 cfs @ 12.34 hrs, Volume= 0.610 af, Atten= 1%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.32 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.88 fps, Avg. Travel Time= 1.9 min

Peak Storage= 220 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 128.49 cfs

6.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 101.0' Slope= 0.0079 '/'
Inlet Invert= 212.30', Outlet Invert= 211.50'

Summary for Reach 2R: E2C-DP9

Inflow Area = 5.805 ac, 11.13% Impervious, Inflow Depth = 0.99" for 2-yr Storm event
Inflow = 5.47 cfs @ 12.10 hrs, Volume= 0.478 af
Outflow = 5.13 cfs @ 12.19 hrs, Volume= 0.478 af, Atten= 6%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.49 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.17 fps, Avg. Travel Time= 8.4 min

Peak Storage= 871 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 488.04 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= 590.0' Slope= 0.0169 '/'
Inlet Invert= 200.00', Outlet Invert= 190.00'

Summary for Reach 3R: Overland Flow

Inflow Area =	20.700 ac,	1.27% Impervious,	Inflow Depth = 0.64"	for 2-yr Storm event
Inflow =	7.52 cfs @	12.48 hrs, Volume=	1.099 af	
Outflow =	7.51 cfs @	12.49 hrs, Volume=	1.099 af, Atten= 0%, Lag= 0.6 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 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= 127 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.13'
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 4HR-A: EAST PD - 4

Inflow Area =	0.780 ac,	0.00% Impervious,	Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	0.44 cfs @	12.12 hrs, Volume=	0.039 af	
Outflow =	0.41 cfs @	12.20 hrs, Volume=	0.039 af, Atten= 7%, Lag= 5.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.88 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 6.2 min

Peak Storage= 64 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.08 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 288.0' Slope= 0.0247 '/'
Inlet Invert= 209.00', Outlet Invert= 201.90'

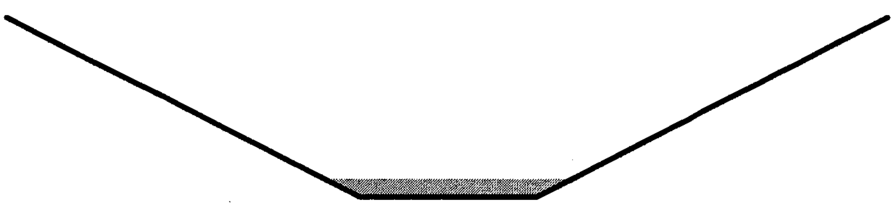
Summary for Reach 4HR-B: EAST PD - 5

Inflow Area =	4.180 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event	
Inflow =	1.82 cfs @	12.21 hrs, Volume=	0.207 af	
Outflow =	1.79 cfs @	12.27 hrs, Volume=	0.207 af,	Atten= 2%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.75 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.32 fps, Avg. Travel Time= 5.4 min

Peak Storage= 203 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 158.67 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 425.0' Slope= 0.0438 '/'
Inlet Invert= 201.90', Outlet Invert= 183.30'



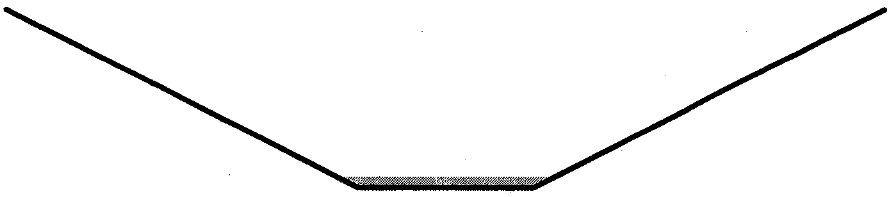
Summary for Reach 4IR-A: EAST PD - 2

Inflow Area =	0.940 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event	
Inflow =	0.54 cfs @	12.11 hrs, Volume=	0.047 af	
Outflow =	0.50 cfs @	12.21 hrs, Volume=	0.047 af,	Atten= 7%, Lag= 5.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.80 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 8.0 min

Peak Storage= 92 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 100.55 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 330.0' Slope= 0.0176 '/'
Inlet Invert= 218.70', Outlet Invert= 212.90'



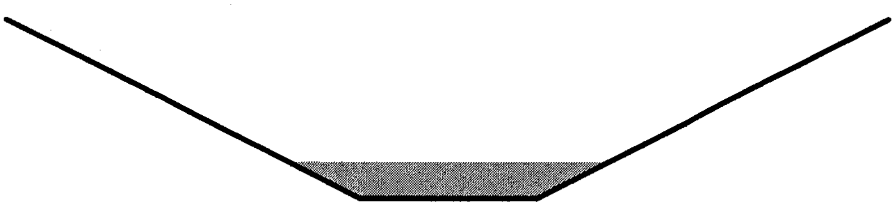
Summary for Reach 4IR-B: EAST PD - 3

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 4.59 cfs @ 12.27 hrs, Volume= 0.538 af
Outflow = 4.54 cfs @ 12.31 hrs, Volume= 0.538 af, Atten= 1%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.98 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.51 fps, Avg. Travel Time= 2.3 min

Peak Storage= 241 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 113.47 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 210.0' Slope= 0.0224 '/'
Inlet Invert= 212.20', Outlet Invert= 207.50'



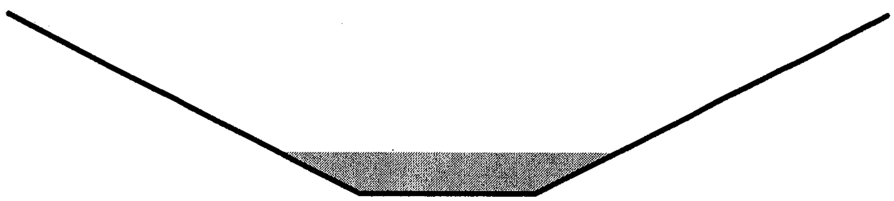
Summary for Reach 4JR: EAST PD 1

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 5.10 cfs @ 12.28 hrs, Volume= 0.610 af
Outflow = 5.07 cfs @ 12.31 hrs, Volume= 0.610 af, Atten= 1%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.81 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.62 fps, Avg. Travel Time= 1.9 min

Peak Storage= 245 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.46'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 101.85 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 183.0' Slope= 0.0180 '/'
Inlet Invert= 222.00', Outlet Invert= 218.70'



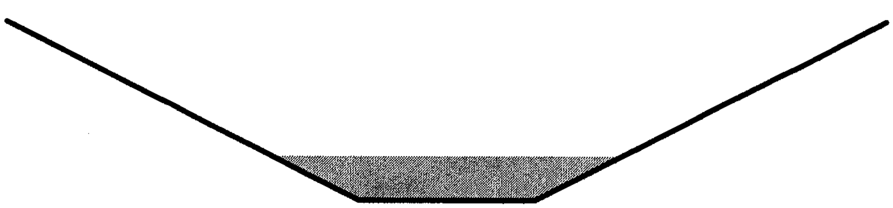
Summary for Reach 4R: DP-10 DITCH 3

Inflow Area =	23.180 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event	
Inflow =	9.29 cfs @	12.36 hrs, Volume=	1.147 af	
Outflow =	9.21 cfs @	12.39 hrs, Volume=	1.147 af,	Atten= 1%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.32 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 2.49 fps, Avg. Travel Time= 1.7 min

Peak Storage= 381 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 162.94 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 260.0' Slope= 0.0462 '/'
Inlet Invert= 191.00', Outlet Invert= 179.00'



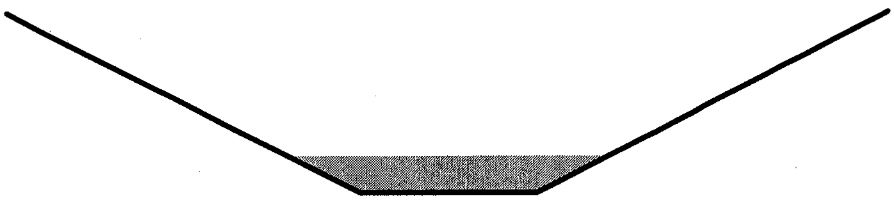
Summary for Reach 5R: NORTH PD-1

Inflow Area =	12.750 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event	
Inflow =	5.29 cfs @	12.28 hrs, Volume=	0.631 af	
Outflow =	5.14 cfs @	12.39 hrs, Volume=	0.631 af,	Atten= 3%, Lag= 6.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.57 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 1.82 fps, Avg. Travel Time= 8.6 min

Peak Storage= 1,055 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 131.18 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 936.0' Slope= 0.0299 '/'
Inlet Invert= 210.00', Outlet Invert= 182.00'



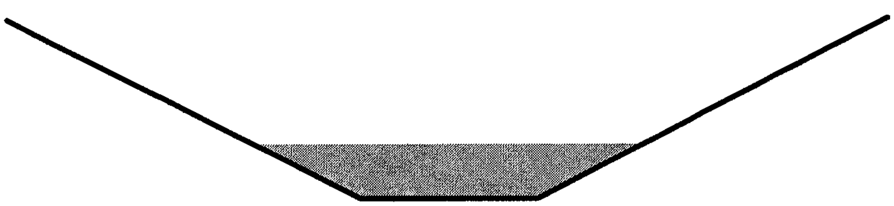
Summary for Reach 6R: NORTH PD-2

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.70 cfs @	12.31 hrs, Volume=	0.693 af
Outflow =	5.61 cfs @	12.38 hrs, Volume=	0.693 af, Atten= 2%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.93 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.22 fps, Avg. Travel Time= 5.0 min

Peak Storage= 701 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.70 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 364.0' Slope= 0.0080 '/'
Inlet Invert= 202.90', Outlet Invert= 200.00'



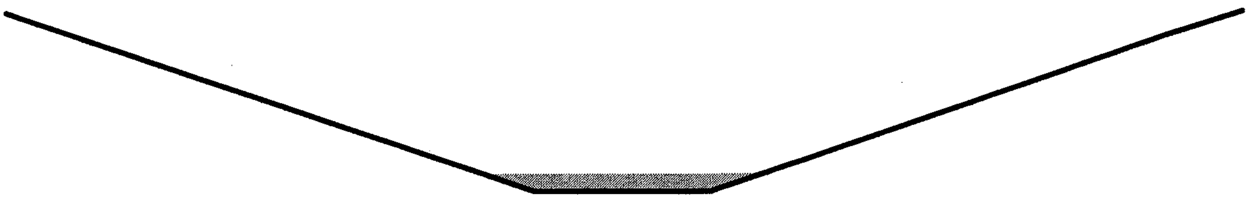
Summary for Reach 7R: DP-10R

Inflow Area =	28.280 ac,	4.24% Impervious, Inflow Depth > 0.44"	for 2-yr Storm event
Inflow =	0.74 cfs @	17.94 hrs, Volume=	1.035 af
Outflow =	0.74 cfs @	18.29 hrs, Volume=	1.035 af, Atten= 0%, Lag= 21.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 12.6 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 33.0 min

Peak Storage= 561 cf @ 18.08 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 88.21 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= 1,130.0' Slope= 0.0248 '/'
Inlet Invert= 170.00', Outlet Invert= 142.00'



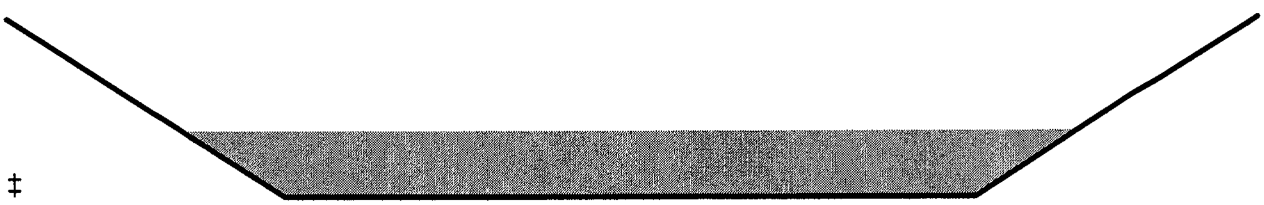
Summary for Reach 8R: EAST PD - 6

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	4.40 cfs @	12.30 hrs, Volume=	0.538 af
Outflow =	4.33 cfs @	12.39 hrs, Volume=	0.538 af, Atten= 2%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.06 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 8.6 min

Peak Storage= 758 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 25.35 cfs

5.00' x 1.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 360.0' Slope= 0.0056 '/'
Inlet Invert= 222.00', Outlet Invert= 220.00'



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Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area =	33.165 ac,	8.08% Impervious, Inflow Depth > 0.14"	for 2-yr Storm event
Inflow =	0.05 cfs @	24.97 hrs, Volume=	0.399 af
Outflow =	0.05 cfs @	27.93 hrs, Volume=	0.395 af, Atten= 1%, Lag= 177.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.06 fps, Min. Travel Time= 78.7 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 98.0 min

Peak Storage= 249 cf @ 26.62 hrs
Average Depth at Peak Storage= 0.04'
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'

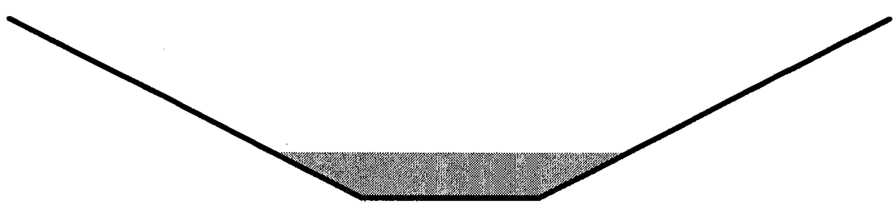
Summary for Reach 10R: Ditch 4B1

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 4.22 cfs @ 12.45 hrs, Volume= 0.538 af
Outflow = 4.17 cfs @ 12.51 hrs, Volume= 0.538 af, Atten= 1%, Lag= 4.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.76 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.07 fps, Avg. Travel Time= 5.5 min

Peak Storage= 535 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.50'
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'



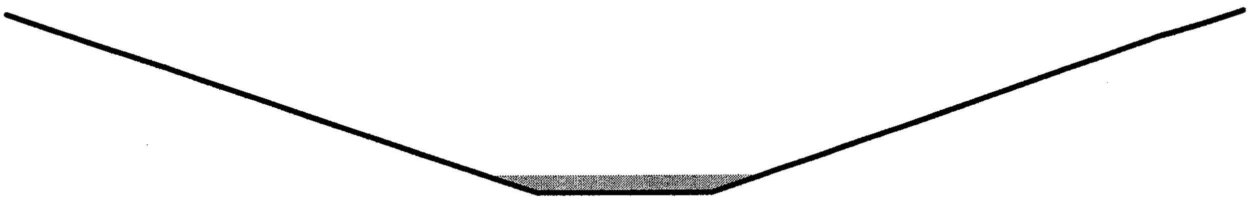
Summary for Reach 11R: DP-11R

Inflow Area = 22.282 ac, 4.04% Impervious, Inflow Depth > 0.55" for 2-yr Storm event
Inflow = 0.61 cfs @ 17.82 hrs, Volume= 1.030 af
Outflow = 0.61 cfs @ 18.23 hrs, Volume= 1.030 af, Atten= 0%, Lag= 24.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.21 fps, Min. Travel Time= 14.4 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 33.9 min

Peak Storage= 525 cf @ 17.99 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 71.30 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,050.0' Slope= 0.0162 '/'
Inlet Invert= 158.00', Outlet Invert= 141.00'



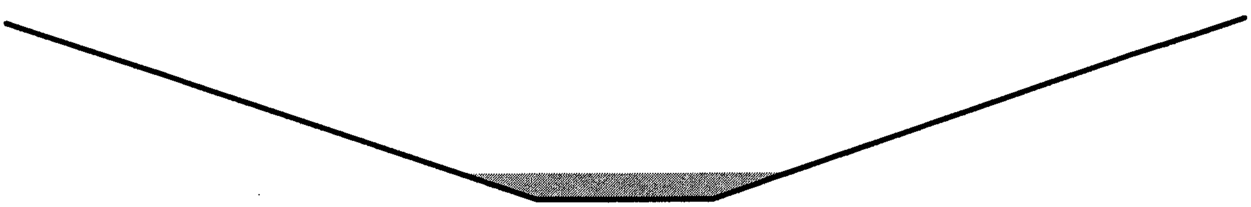
Summary for Reach 12R: 4FR

Inflow Area = 6.771 ac, 0.00% Impervious, Inflow Depth = 0.55" for 2-yr Storm event
Inflow = 1.29 cfs @ 13.12 hrs, Volume= 0.313 af
Outflow = 1.17 cfs @ 13.68 hrs, Volume= 0.313 af, Atten= 10%, Lag= 33.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.38 fps, Min. Travel Time= 18.4 min
Avg. Velocity = 0.56 fps, Avg. Travel Time= 45.2 min

Peak Storage= 1,291 cf @ 13.37 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 64.21 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,523.0' Slope= 0.0131 '/'
Inlet Invert= 161.00', Outlet Invert= 141.00'



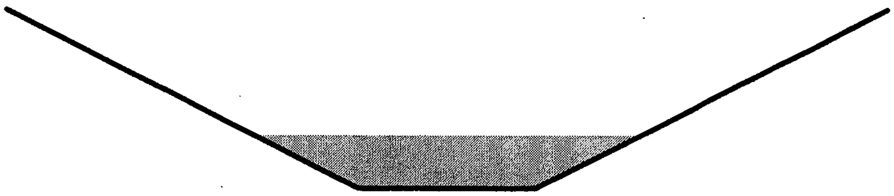
Summary for Reach 13R: Ex Ditch

Inflow Area = 18.370 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 6.52 cfs @ 12.47 hrs, Volume= 0.910 af
Outflow = 6.47 cfs @ 12.50 hrs, Volume= 0.910 af, Atten= 1%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.47 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.38 fps, Avg. Travel Time= 2.7 min

Peak Storage= 421 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.59'
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'



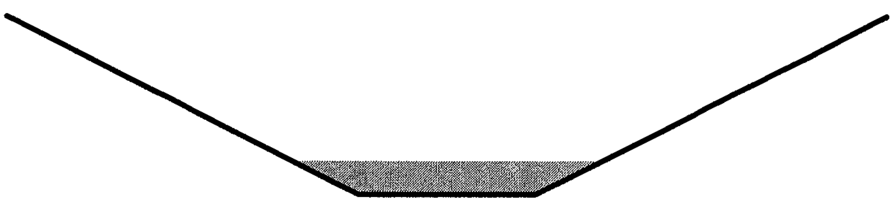
Summary for Reach 14R: DP-10 DITCH 2

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.03 cfs @	12.35 hrs, Volume=	0.610 af
Outflow =	4.97 cfs @	12.40 hrs, Volume=	0.610 af, Atten= 1%, Lag= 2.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.82 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.99 fps, Avg. Travel Time= 3.6 min

Peak Storage= 451 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 143.33 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 434.0' Slope= 0.0357 '/'
Inlet Invert= 209.00', Outlet Invert= 193.50'



Summary for Reach AP1: AP-1

Inflow Area =	135.571 ac,	2.88% Impervious, Inflow Depth = 0.51"	for 2-yr Storm event
Inflow =	16.15 cfs @	13.88 hrs, Volume=	5.749 af
Outflow =	16.15 cfs @	13.88 hrs, Volume=	5.749 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 74.320 ac, 3.55% Impervious, Inflow Depth > 0.67" for 2-yr Storm event
Inflow = 9.80 cfs @ 13.86 hrs, Volume= 4.150 af
Outflow = 9.80 cfs @ 13.86 hrs, Volume= 4.150 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 270.330 ac, 1.32% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 29.11 cfs @ 15.72 hrs, Volume= 15.297 af
Outflow = 29.11 cfs @ 15.72 hrs, Volume= 15.297 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 340.334 ac, 2.56% Impervious, Inflow Depth > 0.66" for 2-yr Storm event
Inflow = 33.41 cfs @ 15.30 hrs, Volume= 18.774 af
Outflow = 33.41 cfs @ 15.30 hrs, Volume= 18.774 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: ANALYSIS POINT #5

Inflow Area = 35.960 ac, 0.40% Impervious, Inflow Depth = 0.82" for 2-yr Storm event
Inflow = 5.71 cfs @ 14.76 hrs, Volume= 2.453 af
Outflow = 5.71 cfs @ 14.76 hrs, Volume= 2.453 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

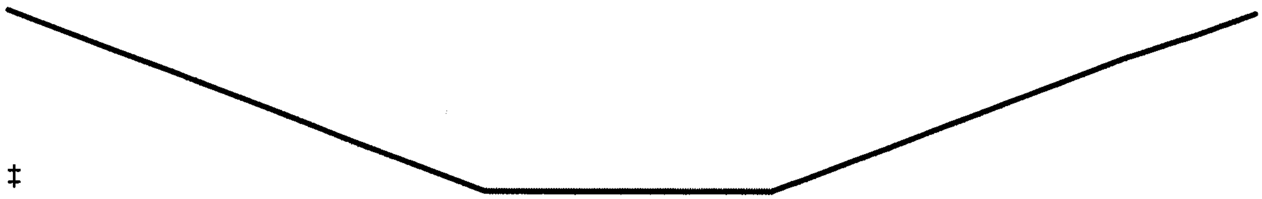
Summary for Reach E2R2: E2R2

Inflow Area = 1.921 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 0.64 cfs @ 12.52 hrs, Volume= 0.095 af
Outflow = 0.09 cfs @ 21.62 hrs, Volume= 0.095 af, Atten= 86%, Lag= 546.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.20 fps, Min. Travel Time= 364.8 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 525.4 min

Peak Storage= 1,963 cf @ 15.54 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 132.12 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 4,356.0' Slope= 0.0094 '/'
Inlet Invert= 182.00', Outlet Invert= 141.00'



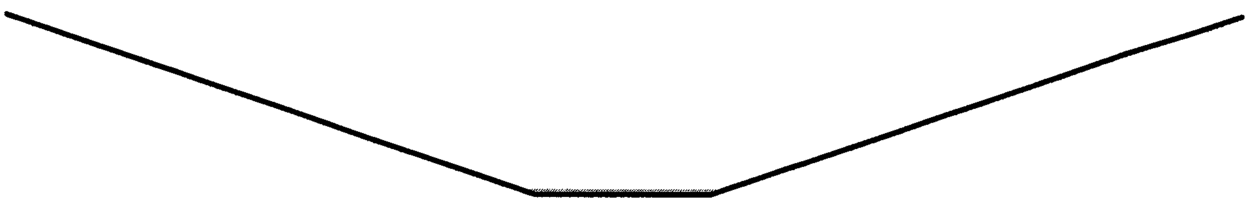
Summary for Reach E2R3: REACH TO AP

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth > 0.14" for 2-yr Storm event
Inflow = 0.05 cfs @ 27.93 hrs, Volume= 0.395 af
Outflow = 0.05 cfs @ 31.30 hrs, Volume= 0.391 af, Atten= 1%, Lag= 202.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.41 fps, Min. Travel Time= 88.8 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 107.6 min

Peak Storage= 279 cf @ 29.82 hrs
Average Depth at Peak Storage= 0.06'
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 E2R4: Reach to AP

Inflow Area = 92.419 ac, 5.17% Impervious, Inflow Depth > 0.37" for 2-yr Storm event
Inflow = 1.62 cfs @ 16.50 hrs, Volume= 2.863 af
Outflow = 1.60 cfs @ 17.65 hrs, Volume= 2.858 af, Atten= 1%, Lag= 69.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.57 fps, Min. Travel Time= 28.4 min
Avg. Velocity = 0.23 fps, Avg. Travel Time= 68.3 min

Peak Storage= 2,723 cf @ 17.17 hrs
Average Depth at Peak Storage= 0.20'
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 R-1D: Reach R-1D

Inflow Area = 34.624 ac, 3.31% Impervious, Inflow Depth = 0.24" for 2-yr Storm event
Inflow = 1.15 cfs @ 15.38 hrs, Volume= 0.695 af
Outflow = 1.15 cfs @ 15.56 hrs, Volume= 0.695 af, Atten= 0%, Lag= 10.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.95 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.25 fps, Avg. Travel Time= 24.3 min

Peak Storage= 446 cf @ 15.46 hrs
Average Depth at Peak Storage= 0.11'
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'

‡

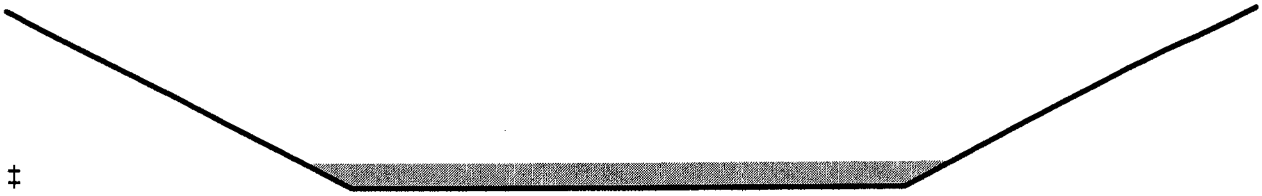
Summary for Reach R-1E: LEVEL SPREADER R-1E

Inflow Area = 10.745 ac, 0.00% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 3.92 cfs @ 12.40 hrs, Volume= 0.569 af
Outflow = 3.90 cfs @ 12.46 hrs, Volume= 0.569 af, Atten= 1%, Lag= 3.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.64 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 7.9 min

Peak Storage= 500 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 135.95 cfs

16.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 36.00'
Length= 210.0' Slope= 0.0690 '/'
Inlet Invert= 161.50', Outlet Invert= 147.00'



Summary for Reach R-1F: Reach R-1F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 2-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.21 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= 0.0170 '/'
Inlet Invert= 167.50', Outlet Invert= 151.50'

Summary for Reach R-1H: LEVEL SPREADER R-1H

Inflow Area = 3.030 ac, 0.00% Impervious, Inflow Depth = 1.09" for 2-yr Storm event
Inflow = 2.78 cfs @ 12.25 hrs, Volume= 0.275 af
Outflow = 2.73 cfs @ 12.31 hrs, Volume= 0.275 af, Atten= 2%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 5.1 min

Peak Storage= 312 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 1.00' Flow Area= 44.0 sf, Capacity= 411.95 cfs

34.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 54.00'
Length= 170.0' Slope= 0.0471 '/'
Inlet Invert= 182.00', Outlet Invert= 174.00'

Summary for Reach R-2F: Reach R2-F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 2-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
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'

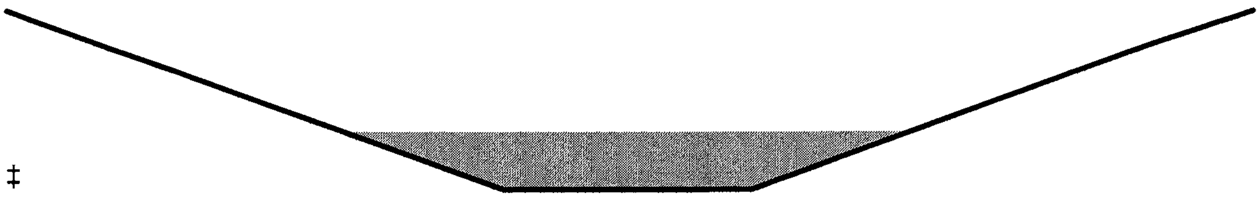
Summary for Reach R1: Reach 1

Inflow Area = 112.491 ac, 3.46% Impervious, Inflow Depth = 0.46" for 2-yr Storm event
Inflow = 12.53 cfs @ 13.74 hrs, Volume= 4.357 af
Outflow = 12.37 cfs @ 14.03 hrs, Volume= 4.357 af, Atten= 1%, Lag= 17.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.17 fps, Min. Travel Time= 10.0 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 57.6 min

Peak Storage= 7,397 cf @ 13.86 hrs
Average Depth at Peak Storage= 0.64'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 132.69 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= 0.0016 '/'
Inlet Invert= 146.30', Outlet Invert= 145.20'



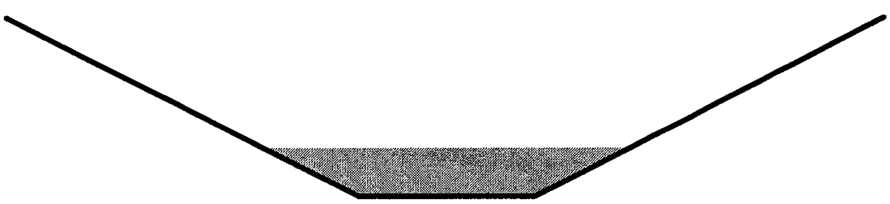
Summary for Reach R1B: LF TOE DITCH

Inflow Area = 13.169 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 5.43 cfs @ 12.29 hrs, Volume= 0.652 af
Outflow = 5.35 cfs @ 12.37 hrs, Volume= 0.652 af, Atten= 1%, Lag= 5.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.22 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.30 fps, Avg. Travel Time= 6.9 min

Peak Storage= 896 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.54'
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'



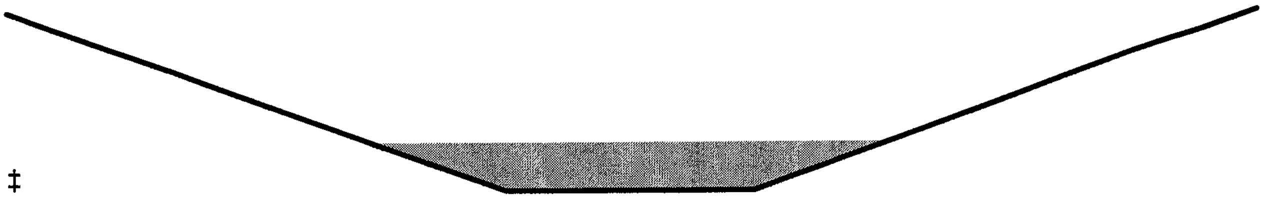
Summary for Reach R2: Reach 2

Inflow Area = 64.567 ac, 4.26% Impervious, Inflow Depth = 0.50" for 2-yr Storm event
Inflow = 10.32 cfs @ 13.37 hrs, Volume= 2.699 af
Outflow = 9.88 cfs @ 13.80 hrs, Volume= 2.699 af, Atten= 4%, Lag= 25.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.20 fps, Min. Travel Time= 14.6 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 49.5 min

Peak Storage= 8,672 cf @ 13.55 hrs
Average Depth at Peak Storage= 0.54'
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= 1,050.0' Slope= 0.0020 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'



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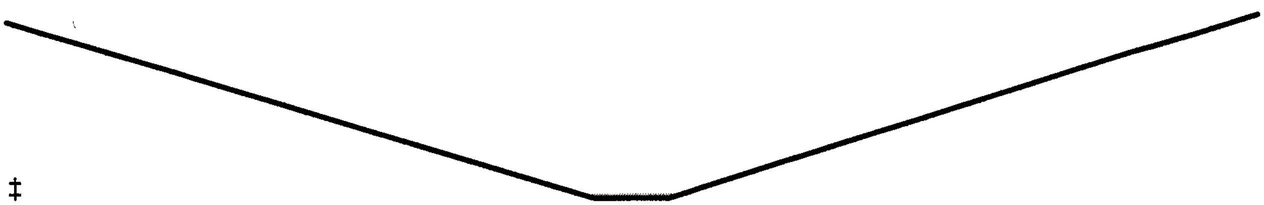
Summary for Reach R2A: Reach 2A

Inflow Area = 20.177 ac, 3.27% Impervious, Inflow Depth > 0.53" for 2-yr Storm event
Inflow = 0.51 cfs @ 18.19 hrs, Volume= 0.885 af
Outflow = 0.49 cfs @ 21.60 hrs, Volume= 0.884 af, Atten= 4%, Lag= 204.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.35 fps, Min. Travel Time= 93.1 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 152.9 min

Peak Storage= 2,756 cf @ 20.05 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,358.84 cfs

25.00' x 2.00' deep channel, n= 0.060
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,960.0' Slope= 0.0138 '/'
Inlet Invert= 179.00', Outlet Invert= 152.00'



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Summary for Reach R3: Reach 3

Inflow Area = 53.822 ac, 5.11% Impervious, Inflow Depth = 0.47" for 2-yr Storm event
Inflow = 9.57 cfs @ 13.08 hrs, Volume= 2.130 af
Outflow = 9.24 cfs @ 13.40 hrs, Volume= 2.130 af, Atten= 4%, Lag= 19.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.17 fps, Min. Travel Time= 11.4 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 32.7 min

Peak Storage= 6,300 cf @ 13.21 hrs
Average Depth at Peak Storage= 0.52'
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= 800.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 148.40'

‡

Summary for Reach R5a: Grass Lined Ditch

Inflow Area = 9.334 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 3.92 cfs @ 12.27 hrs, Volume= 0.462 af
Outflow = 3.88 cfs @ 12.30 hrs, Volume= 0.462 af, Atten= 1%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.30 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 1.9 min

Peak Storage= 181 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 572.96 cfs

4.00' x 3.00' deep channel, n= 0.025
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 Pond 1P: Culvert - 4JB & FJC

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 5.02 cfs @ 12.34 hrs, Volume= 0.610 af
Outflow = 5.03 cfs @ 12.35 hrs, Volume= 0.610 af, Atten= 0%, Lag= 0.8 min
Primary = 5.03 cfs @ 12.35 hrs, Volume= 0.610 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 210.75' @ 12.35 hrs Surf.Area= 530 sf Storage= 215 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.8 min (901.7 - 900.9)

Volume	Invert	Avail.Storage	Storage Description
#1	210.00'	3,853 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
210.00	43	0	0
212.00	1,340	1,383	1,383
213.00	3,600	2,470	3,853

Device	Routing	Invert	Outlet Devices
#1	Primary	210.00'	**24.0" Round Culvert X 2.00** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 210.00' / 209.00' S= 0.0137 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=5.02 cfs @ 12.35 hrs HW=210.75' (Free Discharge)
↑**1=Culvert** (Inlet Controls 5.02 cfs @ 2.33 fps)

Summary for Pond 4IAC: Culvert - 4IA

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 0.50 cfs @ 12.21 hrs, Volume= 0.047 af
Outflow = 0.45 cfs @ 12.26 hrs, Volume= 0.047 af, Atten= 9%, Lag= 3.3 min
Primary = 0.45 cfs @ 12.26 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 213.23' @ 12.26 hrs Surf.Area= 421 sf Storage= 112 cf

Plug-Flow detention time= 9.5 min calculated for 0.047 af (100% of inflow)
Center-of-Mass det. time= 9.5 min (904.7 - 895.2)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,559 cf	**2.00'W x 125.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.90'	**18.0" Round Culvert - 4IA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 212.90' / 212.20' S= 0.0175 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.45 cfs @ 12.26 hrs HW=213.23' (Free Discharge)
↑**1=Culvert - 4IA** (Inlet Controls 0.45 cfs @ 1.55 fps)

Summary for Pond 8P: Ex Pond

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth > 0.47" for 2-yr Storm event
Inflow = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af
Outflow = 0.74 cfs @ 17.94 hrs, Volume= 1.035 af, Atten= 0%, Lag= 5.8 min
Primary = 0.74 cfs @ 17.94 hrs, Volume= 1.035 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 171.98' @ 17.94 hrs Surf.Area= 4,583 sf Storage= 3,312 cf

Plug-Flow detention time= 489.8 min calculated for 1.035 af (94% of inflow)

Center-of-Mass det. time= 107.3 min (2,455.6 - 2,348.3)

Volume	Invert	Avail.Storage	Storage Description
#1	171.20'	4,765 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.20	3,900	0	0
172.00	4,600	3,400	3,400
172.30	4,500	1,365	4,765

Device	Routing	Invert	Outlet Devices
#1	Primary	171.90'	**12.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.74 cfs @ 17.94 hrs HW=171.98' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.74 cfs @ 0.77 fps)

Summary for Pond C-2B-A: Culvert - 2BA

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.75 cfs @	12.29 hrs, Volume=	0.693 af
Outflow =	5.70 cfs @	12.31 hrs, Volume=	0.693 af, Atten= 1%, Lag= 1.4 min
Primary =	5.70 cfs @	12.31 hrs, Volume=	0.693 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 204.21' @ 12.31 hrs Surf.Area= 737 sf Storage= 365 cf

Plug-Flow detention time= 0.6 min calculated for 0.693 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (896.9 - 896.3)

Volume	Invert	Avail.Storage	Storage Description
#1	203.50'	1,859 cf	**2.00'W x 150.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	203.20'	**36.0" Round Culvert - 2BA** L= 40.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 203.20' / 202.90' S= 0.0075 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	205.00'	**4.0' long x 2.0' breadth Southern Ditch High Water Outlet X 0.00** 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=5.67 cfs @ 12.31 hrs HW=204.20' (Free Discharge)
↑—**1=Culvert - 2BA** (Barrel Controls 5.67 cfs @ 4.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=203.50' (Free Discharge)
↑—**2=Southern Ditch High Water Outlet** (Controls 0.00 cfs)

Summary for Pond C-4F: Culvert - 4F

Inflow Area = 6.771 ac, 0.00% Impervious, Inflow Depth = 0.55" for 2-yr Storm event
Inflow = 1.30 cfs @ 13.07 hrs, Volume= 0.313 af
Outflow = 1.29 cfs @ 13.12 hrs, Volume= 0.313 af, Atten= 1%, Lag= 3.1 min
Primary = 1.29 cfs @ 13.12 hrs, Volume= 0.313 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 165.58' @ 13.12 hrs Surf.Area= 0.017 ac Storage= 0.007 af

Plug-Flow detention time= 6.7 min calculated for 0.313 af (100% of inflow)
Center-of-Mass det. time= 6.7 min (954.8 - 948.0)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	0.047 af	**4.00'W x 96.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**18.0" Round Culvert - 4F** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 165.00' / 162.00' S= 0.0385 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.29 cfs @ 13.12 hrs HW=165.58' (Free Discharge)
↑—**1=Culvert - 4F** (Inlet Controls 1.29 cfs @ 2.05 fps)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 4.33 cfs @ 12.39 hrs, Volume= 0.538 af
Outflow = 4.22 cfs @ 12.45 hrs, Volume= 0.538 af, Atten= 3%, Lag= 3.4 min
Primary = 4.22 cfs @ 12.45 hrs, Volume= 0.538 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 220.30' @ 12.45 hrs Surf.Area= 3,417 sf Storage= 924 cf

Plug-Flow detention time= 6.1 min calculated for 0.538 af (100% of inflow)
Center-of-Mass det. time= 6.1 min (911.7 - 905.6)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	3,865 cf	**5.00'W x 550.00'L x 1.00'H Prismatoid Z=2.0**

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' / 214.30' S= 0.0431 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	220.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.21 cfs @ 12.45 hrs HW=220.30' (Free Discharge)
└─**1=Culvert - 4K** (Passes 4.21 cfs of 25.31 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 4.21 cfs @ 1.79 fps)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area =	20.700 ac,	1.27% Impervious, Inflow Depth = 0.64"	for 2-yr Storm event	
Inflow =	7.52 cfs @	12.48 hrs, Volume=	1.099 af	
Outflow =	7.52 cfs @	12.48 hrs, Volume=	1.099 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.52 cfs @	12.48 hrs, Volume=	1.099 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 205.34' @ 12.48 hrs Surf.Area= 28 sf Storage= 13 cf

Plug-Flow detention time= 0.0 min calculated for 1.098 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (903.6 - 903.6)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,197 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	47	38	38
208.00	5,375	5,422	5,460
209.00	6,100	5,738	11,197

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0090 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=7.49 cfs @ 12.48 hrs HW=205.33' (Free Discharge)
└─**1=Culvert - 4B** (Inlet Controls 7.49 cfs @ 2.60 fps)

Summary for Pond C4H-A: Culvert 4H-A

Inflow Area =	0.780 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event	
Inflow =	0.41 cfs @	12.20 hrs, Volume=	0.039 af	
Outflow =	0.30 cfs @	12.33 hrs, Volume=	0.039 af,	Atten= 28%, Lag= 7.8 min
Primary =	0.30 cfs @	12.33 hrs, Volume=	0.039 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 202.17' @ 12.33 hrs Surf.Area= 862 sf Storage= 190 cf

Plug-Flow detention time= 24.1 min calculated for 0.039 af (100% of inflow)
Center-of-Mass det. time= 23.8 min (917.6 - 893.8)

Volume	Invert	Avail.Storage	Storage Description
#1	201.90'	3,419 cf	**2.00'W x 280.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	201.90'	**18.0" Round Culvert - 4HA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 201.90' / 200.90' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.29 cfs @ 12.33 hrs HW=202.17' (Free Discharge)
↑—**1=Culvert - 4HA** (Inlet Controls 0.29 cfs @ 1.39 fps)

Summary for Pond C4N: Culvert 4N

Inflow Area =	1.921 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	0.64 cfs @	12.50 hrs, Volume=	0.095 af
Outflow =	0.64 cfs @	12.52 hrs, Volume=	0.095 af, Atten= 0%, Lag= 1.0 min
Primary =	0.64 cfs @	12.52 hrs, Volume=	0.095 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.40' @ 12.52 hrs Surf.Area= 0.004 ac Storage= 0.001 af

Plug-Flow detention time= 2.8 min calculated for 0.095 af (100% of inflow)
Center-of-Mass det. time= 2.8 min (911.1 - 908.3)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	0.015 af	**2.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	184.00'	**18.0" Round 18-in Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.00' / 183.00' S= 0.0303 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.63 cfs @ 12.52 hrs HW=184.40' (Free Discharge)
↑—**1=18-in Culvert** (Inlet Controls 0.63 cfs @ 1.69 fps)

Summary for Pond CB-2B-B: Catch Basin - 2BB

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.61 cfs @	12.38 hrs, Volume=	0.693 af
Outflow =	5.61 cfs @	12.38 hrs, Volume=	0.693 af, Atten= 0%, Lag= 0.0 min
Primary =	5.61 cfs @	12.38 hrs, Volume=	0.693 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 200.21' @ 12.38 hrs Surf.Area= 408 sf Storage= 4 cf

Plug-Flow detention time= 0.0 min calculated for 0.693 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (902.6 - 902.5)

Volume	Invert	Avail.Storage	Storage Description
#1	200.20'	2,459 cf	**2.00'W x 200.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	**24.0" Round Culvert - 2BB** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.00' / 194.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	200.00'	**30.0" Horiz. Orifice/Grate** C= 0.600

Primary OutFlow Max=10.83 cfs @ 12.38 hrs HW=200.21' (Free Discharge)
↑—1=**Culvert - 2BB** (Passes 10.83 cfs of 31.04 cfs potential flow)
↑—2=**Orifice/Grate** (Orifice Controls 10.83 cfs @ 2.21 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area =	12.750 ac,	0.00% Impervious, Inflow Depth =	0.59"	for 2-yr Storm event
Inflow =	5.14 cfs @	12.39 hrs, Volume=	0.631 af	
Outflow =	5.14 cfs @	12.39 hrs, Volume=	0.631 af,	Atten= 0%, Lag= 0.3 min
Primary =	5.14 cfs @	12.39 hrs, Volume=	0.631 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 181.40' @ 12.39 hrs Surf.Area= 322 sf Storage= 92 cf

Plug-Flow detention time= 0.4 min calculated for 0.631 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (905.8 - 905.4)

Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	1,256 cf	**2.00'W x 71.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	175.00'	**24.0" Round Culvert - 4G** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.00' / 174.00' S= 0.0278 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	181.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.13 cfs @ 12.39 hrs HW=181.40' (Free Discharge)
↑—1=**Culvert - 4G** (Passes 5.13 cfs of 35.14 cfs potential flow)
↑—2=**Orifice/Grate** (Weir Controls 5.13 cfs @ 2.06 fps)

Summary for Pond CB-4HB: Catch Basin - 4HB

Inflow Area = 4.180 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 1.79 cfs @ 12.27 hrs, Volume= 0.207 af
Outflow = 1.77 cfs @ 12.28 hrs, Volume= 0.207 af, Atten= 1%, Lag= 0.1 min
Primary = 1.77 cfs @ 12.28 hrs, Volume= 0.207 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 183.50' @ 12.28 hrs Surf.Area= 72 sf Storage= 12 cf

Plug-Flow detention time= 0.2 min calculated for 0.207 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (901.7 - 901.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.30'	359 cf	**2.00'W x 25.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Device 2	183.30'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	178.50'	**18.0" Round Culvert - 4HB** L= 101.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 176.00' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.76 cfs @ 12.28 hrs HW=183.49' (Free Discharge)
↑—**2=Culvert - 4HB** (Passes 1.76 cfs of 17.53 cfs potential flow)
  ↑—**1=Orifice/Grate** (Weir Controls 1.76 cfs @ 1.44 fps)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 4.54 cfs @ 12.31 hrs, Volume= 0.538 af
Outflow = 4.54 cfs @ 12.31 hrs, Volume= 0.538 af, Atten= 0%, Lag= 0.3 min
Primary = 4.54 cfs @ 12.31 hrs, Volume= 0.538 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 207.97' @ 12.31 hrs Surf.Area= 0.009 ac Storage= 0.003 af

Plug-Flow detention time= 1.4 min calculated for 0.538 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (899.9 - 899.1)

Volume	Invert	Avail.Storage	Storage Description
#1	207.50'	0.029 af	**2.00'W x 100.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	202.50'	**18.0" Round Culvert - 4I** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 202.50' / 192.00' S= 0.1313 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	207.60'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.51 cfs @ 12.31 hrs HW=207.96' TW=193.96' (TW follows 14.00' below HW)
↑**1=Culvert - 4I** (Passes 4.51 cfs of 18.47 cfs potential flow)
↑**2=Orifice/Grate** (Weir Controls 4.51 cfs @ 1.97 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth =	0.59"	for 2-yr Storm event
Inflow =	5.07 cfs @	12.31 hrs, Volume=	0.610 af	
Outflow =	5.08 cfs @	12.31 hrs, Volume=	0.610 af,	Atten= 0%, Lag= 0.3 min
Primary =	5.08 cfs @	12.31 hrs, Volume=	0.610 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 219.09' @ 12.31 hrs Surf.Area= 0.009 ac Storage= 0.003 af

Plug-Flow detention time= 0.6 min calculated for 0.609 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (898.8 - 898.2)

Volume	Invert	Avail.Storage	Storage Description
#1	218.70'	0.032 af	**2.00'W x 113.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	214.00'	**18.0" Round Culvert - 4JA** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.00' / 212.30' S= 0.0283 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.04 cfs @ 12.31 hrs HW=219.09' TW=212.09' (TW follows 7.00' below HW)
↑**1=Culvert - 4JA** (Passes 5.04 cfs of 17.73 cfs potential flow)
↑**2=Orifice/Grate** (Weir Controls 5.04 cfs @ 2.05 fps)

Summary for Pond CB-4L: Catch Basin - 4L

Inflow Area =	7.500 ac,	0.00% Impervious, Inflow Depth =	0.59"	for 2-yr Storm event
Inflow =	3.34 cfs @	12.23 hrs, Volume=	0.371 af	
Outflow =	3.31 cfs @	12.26 hrs, Volume=	0.371 af,	Atten= 1%, Lag= 2.1 min
Primary =	3.31 cfs @	12.26 hrs, Volume=	0.371 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 215.30' @ 12.26 hrs Surf.Area= 1,596 sf Storage= 458 cf

Plug-Flow detention time= 4.2 min calculated for 0.371 af (100% of inflow)
Center-of-Mass det. time= 4.2 min (897.2 - 893.0)

Volume	Invert	Avail.Storage	Storage Description
#1	215.00'	3,683 cf	**30.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 211.00' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	215.00'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.27 cfs @ 12.26 hrs HW=215.29' (Free Discharge)
└─**1=Culvert 4L** (Passes 3.27 cfs of 10.57 cfs potential flow)
  └─**2=Orifice-Top of catch basin** (Weir Controls 3.27 cfs @ 1.77 fps)

Summary for Pond D-1G: (2)24" Culverts P-6h

Inflow Area =	11.290 ac,	0.00% Impervious, Inflow Depth = 0.64"	for 2-yr Storm event
Inflow =	5.77 cfs @	12.21 hrs, Volume=	0.598 af
Outflow =	5.72 cfs @	12.21 hrs, Volume=	0.598 af, Atten= 1%, Lag= 0.4 min
Primary =	5.72 cfs @	12.21 hrs, Volume=	0.598 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 183.81' @ 12.21 hrs Surf.Area= 326 sf Storage= 136 cf
Flood Elev= 185.00' Surf.Area= 800 sf Storage= 805 cf

Plug-Flow detention time= 0.5 min calculated for 0.598 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (888.1 - 887.6)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	3,305 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	10	0	0
184.00	400	205	205
186.00	1,200	1,600	1,805
187.00	1,800	1,500	3,305

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	184.50'	**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=5.65 cfs @ 12.21 hrs HW=183.80' (Free Discharge)
↑—**1=(2)24"-Culvert** (Barrel Controls 5.65 cfs @ 3.54 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond D-1H: LF TOE DITCH - CULVERT

Inflow Area =	3.030 ac,	0.00% Impervious, Inflow Depth = 1.09"	for 2-yr Storm event
Inflow =	2.81 cfs @	12.22 hrs, Volume=	0.275 af
Outflow =	2.78 cfs @	12.25 hrs, Volume=	0.275 af, Atten= 1%, Lag= 1.7 min
Primary =	2.78 cfs @	12.25 hrs, Volume=	0.275 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 183.84' @ 12.25 hrs Surf.Area= 259 sf Storage= 372 cf
Flood Elev= 186.00' Surf.Area= 858 sf Storage= 1,323 cf

Plug-Flow detention time= 6.3 min calculated for 0.275 af (100% of inflow)
Center-of-Mass det. time= 6.1 min (863.2 - 857.1)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	1,323 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	24	0	0
186.00	858	1,323	1,323

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**18.0" Round Culvert-C-1H** L= 60.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 183.00' / 182.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.78 cfs @ 12.25 hrs HW=183.84' (Free Discharge)
↑—**1=Culvert-C-1H** (Barrel Controls 2.78 cfs @ 3.92 fps)

Summary for Pond DP-1: Detention Pond 1

Inflow Area =	34.624 ac,	3.31% Impervious, Inflow Depth = 0.43"	for 2-yr Storm event
Inflow =	10.24 cfs @	12.33 hrs, Volume=	1.253 af
Outflow =	1.15 cfs @	15.38 hrs, Volume=	0.695 af, Atten= 89%, Lag= 183.0 min
Primary =	1.15 cfs @	15.38 hrs, Volume=	0.695 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 162.46' @ 15.38 hrs Surf.Area= 14,359 sf Storage= 31,388 cf

Plug-Flow detention time= 430.2 min calculated for 0.695 af (55% of inflow)
Center-of-Mass det. time= 297.7 min (1,193.7 - 896.1)

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	162.00'	**30.0" Round 30" Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.00' / 159.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	162.00'	**12.0" Vert. Orifice on side** C= 0.600
#3	Device 1	162.00'	**6.0" Vert. Orifice on side** C= 0.600
#4	Device 1	165.50'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**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=1.15 cfs @ 15.38 hrs HW=162.46' (Free Discharge)
└1=**30" Culvert** (Inlet Controls 1.15 cfs @ 1.83 fps)
 ├2=**Orifice on side** (Passes < 0.83 cfs potential flow)
 ├3=**Orifice on side** (Passes < 0.44 cfs potential flow)
 └4=**Orifice-Top of drop inlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└5=**Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 12.05 cfs @ 12.36 hrs, Volume= 1.516 af
Outflow = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af, Atten= 94%, Lag= 328.8 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 177.58' @ 17.84 hrs Surf.Area= 21,167 sf Storage= 43,962 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 1,554.9 min calculated for 1.103 af (73% of inflow)
Center-of-Mass det. time= 1,451.8 min (2,348.3 - 896.5)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**3=18-in Primary Culvert** (Controls 0.00 cfs)
  ├─**1=Orifice/Grate** (Controls 0.00 cfs)
  └─**2=6-in Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.74 cfs @ 17.84 hrs HW=177.58' (Free Discharge)
└─**4=6-in Culvert** (Passes 0.74 cfs of 1.37 cfs potential flow)
  ├─**5=Orifice Top** (Orifice Controls 0.67 cfs @ 3.68 fps)
  └─**6=Orifice Side** (Orifice Controls 0.07 cfs @ 5.53 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11: Detention Pond 11

Inflow Area = 22.282 ac, 4.04% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.66 cfs @ 12.40 hrs, Volume= 1.182 af
Outflow = 0.61 cfs @ 17.82 hrs, Volume= 1.030 af, Atten= 92%, Lag= 325.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.61 cfs @ 17.82 hrs, Volume= 1.030 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 165.43' @ 17.82 hrs Surf.Area= 27,580 sf Storage= 33,880 cf

Plug-Flow detention time= 1,598.2 min calculated for 1.030 af (87% of inflow)
Center-of-Mass det. time= 1,537.9 min (2,445.3 - 907.4)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
└─**3=18-In Culvert** (Controls 0.00 cfs)
  ├─**1=6-In Orifice Side (Riser)** (Controls 0.00 cfs)
  └─**2=Grate Top (Riser)** (Controls 0.00 cfs)

Secondary OutFlow Max=0.61 cfs @ 17.82 hrs HW=165.43' (Free Discharge)
└─**4=6-In Culvert** (Passes 0.61 cfs of 1.03 cfs potential flow)
  ├─**5=Orifice Top (6-in Culv)** (Orifice Controls 0.50 cfs @ 2.75 fps)
  └─**6=Orifice Side (6-in Culv)** (Orifice Controls 0.10 cfs @ 8.43 fps)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area =	20.177 ac,	3.27% Impervious, Inflow Depth = 0.62"	for 2-yr Storm event
Inflow =	5.88 cfs @	12.39 hrs, Volume=	1.043 af
Outflow =	0.51 cfs @	18.19 hrs, Volume=	0.885 af, Atten= 91%, Lag= 347.6 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Secondary =	0.51 cfs @	18.19 hrs, Volume=	0.885 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 185.69' @ 18.19 hrs Surf.Area= 26,018 sf Storage= 31,513 cf

Plug-Flow detention time= 1,647.6 min calculated for 0.884 af (85% of inflow)
Center-of-Mass det. time= 1,581.2 min (2,498.6 - 917.4)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-in Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=184.00' (Free Discharge)
└─**3=18- In Culvert** (Controls 0.00 cfs)
  ├─**1=Grate Top (Riser)** (Controls 0.00 cfs)
  └─**2=8-In Orifice (Riser Side)** (Controls 0.00 cfs)

Secondary OutFlow Max=0.51 cfs @ 18.19 hrs HW=185.69' (Free Discharge)
└─**6=6-In Culvert** (Passes 0.51 cfs of 1.48 cfs potential flow)
  ├─**4=Orifice Top (6-in Pipe)** (Orifice Controls 0.39 cfs @ 2.12 fps)
  └─**5=Orifice (Side of 6-in)** (Orifice Controls 0.13 cfs @ 5.12 fps)

Summary for Pond DP-1A: DP-1A (Former Leachate Pond)

Inflow Area =	10.835 ac, 10.57% Impervious,	Inflow Depth = 0.80"	for 2-yr Storm event	
Inflow =	5.05 cfs @	12.27 hrs, Volume=	0.720 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= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 164.00' Surf.Area= 37,429 sf Storage= 182,617 cf
Peak Elev= 164.81' @ 25.65 hrs Surf.Area= 39,695 sf Storage= 213,981 cf (31,364 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (80,429 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

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	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=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area =	10.745 ac,	0.00% Impervious, Inflow Depth =	0.64"	for 2-yr Storm event
Inflow =	5.49 cfs @	12.21 hrs, Volume=	0.569 af	
Outflow =	3.92 cfs @	12.40 hrs, Volume=	0.569 af,	Atten= 29%, Lag= 11.7 min
Primary =	3.92 cfs @	12.40 hrs, Volume=	0.569 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 162.30' Surf.Area= 2,326 sf Storage= 956 cf
Peak Elev= 163.37' @ 12.40 hrs Surf.Area= 3,640 sf Storage= 4,359 cf (3,402 cf above start)
Flood Elev= 166.60' Surf.Area= 12,071 sf Storage= 28,956 cf (27,999 cf above start)

Plug-Flow detention time= 60.2 min calculated for 0.547 af (96% of inflow)
Center-of-Mass det. time= 32.2 min (919.9 - 887.6)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	47,648 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,957	0	0
164.00	4,419	6,376	6,376
166.00	10,150	14,569	20,945
168.00	16,553	26,703	47,648

Device	Routing	Invert	Outlet Devices
#1	Primary	162.30'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.30' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	162.30'	**15.0" Vert. Orifice** C= 0.600
#3	Device 1	166.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.92 cfs @ 12.40 hrs HW=163.37' (Free Discharge)
└─1=**Culvert** (Passes 3.92 cfs of 4.88 cfs potential flow)
  ├─2=**Orifice** (Orifice Controls 3.92 cfs @ 3.52 fps)
  └─3=**Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area =	22.602 ac,	7.31% Impervious, Inflow Depth = 0.78"	for 2-yr Storm event
Inflow =	11.00 cfs @	12.31 hrs, Volume=	1.472 af
Outflow =	0.82 cfs @	16.92 hrs, Volume=	1.472 af, Atten= 93%, Lag= 276.7 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Secondary =	0.82 cfs @	16.92 hrs, Volume=	1.472 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 174.00' Surf.Area= 25,931 sf Storage= 29,566 cf
Peak Elev= 174.86' @ 16.92 hrs Surf.Area= 41,554 sf Storage= 67,549 cf (37,983 cf above start)
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (467,078 cf above start)

Plug-Flow detention time= 1,153.1 min calculated for 0.794 af (54% of inflow)
Center-of-Mass det. time= 628.6 min (1,512.9 - 884.3)

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	Secondary	169.00'	**6.0" Round Outlet Culvert 6"** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 169.00' / 168.00' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	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=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
└─**1=Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.82 cfs @ 16.92 hrs HW=174.86' (Free Discharge)
├─**2=Outlet Culvert 6"** (Passes 0.82 cfs of 1.47 cfs potential flow)
│ └─**3=Orifice** (Orifice Controls 0.82 cfs @ 4.47 fps)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area =	33.165 ac,	8.08% Impervious,	Inflow Depth = 0.87"	for 2-yr Storm event
Inflow =	16.58 cfs @	12.44 hrs, Volume=	2.398 af	
Outflow =	0.05 cfs @	24.97 hrs, Volume=	0.399 af,	Atten= 100%, Lag= 751.5 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Secondary =	0.05 cfs @	24.97 hrs, Volume=	0.399 af	
Tertiary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 188.57' @ 24.97 hrs Surf.Area= 80,617 sf Storage= 103,321 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 3,910.1 min calculated for 0.399 af (17% of inflow)
Center-of-Mass det. time= 3,748.6 min (4,626.7 - 878.2)

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
#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 @ 24.97 hrs HW=188.57' (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 @ 2.17 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: SC-1A Runoff Area=23.080 ac 0.00% Impervious Runoff Depth=1.67"
Flow Length=2,249' Slope=0.0260 '/' Tc=88.1 min CN=74 Runoff=13.58 cfs 3.212 af

Subcatchment 1B: SC-1B Runoff Area=13.169 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,282' Tc=17.5 min CN=71 Runoff=15.37 cfs 1.606 af

Subcatchment 1C: SC-1C Runoff Area=13.300 ac 0.00% Impervious Runoff Depth=1.89"
Flow Length=380' Tc=68.3 min CN=77 Runoff=10.58 cfs 2.095 af

Subcatchment 1D: SC-1D Runoff Area=10.620 ac 0.00% Impervious Runoff Depth=1.60"
Flow Length=1,117' Tc=16.9 min CN=73 Runoff=13.91 cfs 1.416 af

Subcatchment 1E: SC-1E Runoff Area=10.745 ac 0.00% Impervious Runoff Depth=1.53"
Flow Length=910' Tc=12.7 min CN=72 Runoff=14.84 cfs 1.371 af

Subcatchment 1F: SC-1F Runoff Area=31.220 ac 3.52% Impervious Runoff Depth=1.82"
Flow Length=2,066' Tc=73.2 min CN=76 Runoff=22.65 cfs 4.723 af

Subcatchment 1G: SC-1G Runoff Area=11.290 ac 0.00% Impervious Runoff Depth=1.53"
Flow Length=857' Tc=12.7 min CN=72 Runoff=15.60 cfs 1.440 af

Subcatchment 1H: SC-1H Runoff Area=3.030 ac 0.00% Impervious Runoff Depth=2.21"
Flow Length=759' Tc=15.4 min CN=81 Runoff=5.84 cfs 0.557 af

Subcatchment 1I: SC-1I Runoff Area=9.334 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,084' Tc=16.8 min CN=71 Runoff=11.05 cfs 1.138 af

Subcatchment 1J: SC-1J Runoff Area=360,761 sf 19.96% Impervious Runoff Depth=1.89"
Flow Length=593' Tc=33.0 min CN=77 Runoff=9.83 cfs 1.305 af

Subcatchment 2A: SC-2A Runoff Area=54.143 ac 3.66% Impervious Runoff Depth=1.67"
Flow Length=2,435' Tc=126.1 min CN=74 Runoff=24.61 cfs 7.535 af

Subcatchment 2B: 2B Runoff Area=13.996 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,218' Tc=17.6 min CN=71 Runoff=16.29 cfs 1.706 af

Subcatchment 2C: 2C Runoff Area=6.181 ac 10.68% Impervious Runoff Depth=1.60"
Flow Length=702' Tc=80.7 min CN=73 Runoff=3.65 cfs 0.824 af

Subcatchment 3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth=1.60"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=74.13 cfs 36.035 af

Subcatchment 4A: 4A Runoff Area=4.518 ac 7.22% Impervious Runoff Depth=1.89"
Flow Length=379' Tc=5.1 min CN=77 Runoff=9.95 cfs 0.712 af

Subcatchment 4B: 4B Runoff Area=2.330 ac 11.29% Impervious Runoff Depth=2.04"
Flow Length=667' Tc=13.2 min CN=79 Runoff=4.38 cfs 0.397 af

Subcatchment 4C: 4C Runoff Area=1.287 ac 24.86% Impervious Runoff Depth=2.64"
Flow Length=496' Tc=15.4 min CN=86 Runoff=2.96 cfs 0.283 af

Subcatchment 4D: 4D Runoff Area=6.660 ac 26.58% Impervious Runoff Depth=2.73"
Flow Length=824' Tc=33.9 min CN=87 Runoff=11.31 cfs 1.514 af

Subcatchment 4E: 4E Runoff Area=247.915 ac 1.59% Impervious Runoff Depth=1.74"
Flow Length=6,090' Tc=225.6 min CN=75 Runoff=77.97 cfs 35.990 af

Subcatchment 4F: 4F Runoff Area=6.771 ac 0.00% Impervious Runoff Depth=1.40"
Flow Length=1,228' Tc=68.8 min CN=70 Runoff=3.79 cfs 0.788 af

Subcatchment 4G: 4G Runoff Area=12.750 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=929' Tc=17.1 min CN=71 Runoff=14.99 cfs 1.554 af

Subcatchment 4H: 4H Runoff Area=3.400 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=823' Tc=11.9 min CN=71 Runoff=4.54 cfs 0.415 af

Subcatchment 4HA: 4HA Runoff Area=0.780 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=142' Slope=0.3300 '/' Tc=6.7 min CN=71 Runoff=1.24 cfs 0.095 af

Subcatchment 4I: 4I Runoff Area=9.930 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,082' Tc=17.1 min CN=71 Runoff=11.68 cfs 1.211 af

Subcatchment 4IA: 4IA Runoff Area=0.940 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=136' Slope=0.3333 '/' Tc=6.4 min CN=71 Runoff=1.51 cfs 0.115 af

Subcatchment 4J: 4J Runoff Area=12.310 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,051' Tc=17.2 min CN=71 Runoff=14.45 cfs 1.501 af

Subcatchment 4K: 4K Runoff Area=10.870 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,095' Tc=18.4 min CN=71 Runoff=12.44 cfs 1.325 af

Subcatchment 4L: 4L Runoff Area=7.500 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=896' Tc=14.1 min CN=71 Runoff=9.51 cfs 0.914 af

Subcatchment 4M: 4M Runoff Area=5.352 ac 16.82% Impervious Runoff Depth=1.74"
Flow Length=642' Tc=53.5 min CN=75 Runoff=4.51 cfs 0.777 af

Subcatchment 4N: 4N Runoff Area=1.921 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=730' Tc=30.5 min CN=71 Runoff=1.78 cfs 0.234 af

Subcatchment 4O: 4O Runoff Area=5.100 ac 23.53% Impervious Runoff Depth=1.89"
Flow Length=663' Tc=14.2 min CN=77 Runoff=8.61 cfs 0.803 af

Subcatchment 5: SC-5 Runoff Area=35.960 ac 0.40% Impervious Runoff Depth=1.82"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=13.44 cfs 5.440 af

Subcatchment P1A: SC-P1A Runoff Area=65,400 sf 76.26% Impervious Runoff Depth=3.42"
Tc=0.0 min CN=94 Runoff=6.50 cfs 0.428 af

Reach 1R: DP-10 DITCH 1 Avg. Flow Depth=0.60' Max Vel=3.31 fps Inflow=14.21 cfs 1.501 af
n=0.025 L=101.0' S=0.0079 '/' Capacity=128.49 cfs Outflow=14.10 cfs 1.501 af

Reach 2R: E2C-DP9 Avg. Flow Depth=0.48' Max Vel=4.49 fps Inflow=12.00 cfs 0.995 af
n=0.022 L=590.0' S=0.0169 '/' Capacity=488.04 cfs Outflow=11.40 cfs 0.995 af

Reach 3R: Overland Flow Avg. Flow Depth=0.35' Max Vel=9.99 fps Inflow=21.25 cfs 2.637 af
n=0.035 L=168.0' S=0.0554 '/' Capacity=119.87 cfs Outflow=21.22 cfs 2.637 af

Reach 4HR-A: EAST PD - 4 Avg. Flow Depth=0.19' Max Vel=2.69 fps Inflow=1.24 cfs 0.095 af
n=0.025 L=288.0' S=0.0247 '/' Capacity=119.08 cfs Outflow=1.17 cfs 0.095 af

Reach 4HR-B: EAST PD - 5 Avg. Flow Depth=0.37' Max Vel=5.30 fps Inflow=5.42 cfs 0.510 af
n=0.025 L=425.0' S=0.0438 '/' Capacity=158.67 cfs Outflow=5.29 cfs 0.510 af

Reach 4IR-A: EAST PD - 2 Avg. Flow Depth=0.23' Max Vel=2.55 fps Inflow=1.51 cfs 0.115 af
n=0.025 L=330.0' S=0.0176 '/' Capacity=100.55 cfs Outflow=1.41 cfs 0.115 af

Reach 4IR-B: EAST PD - 3 Avg. Flow Depth=0.71' Max Vel=5.36 fps Inflow=12.92 cfs 1.325 af
n=0.025 L=210.0' S=0.0224 '/' Capacity=113.47 cfs Outflow=12.84 cfs 1.325 af

Reach 4JR: EAST PD 1 Avg. Flow Depth=0.79' Max Vel=5.10 fps Inflow=14.45 cfs 1.501 af
n=0.025 L=183.0' S=0.0180 '/' Capacity=101.85 cfs Outflow=14.35 cfs 1.501 af

Reach 4R: DP-10 DITCH 3 Avg. Flow Depth=0.84' Max Vel=8.43 fps Inflow=26.13 cfs 2.826 af
n=0.025 L=260.0' S=0.0462 '/' Capacity=162.94 cfs Outflow=25.93 cfs 2.826 af

Reach 5R: NORTH PD-1 Avg. Flow Depth=0.70' Max Vel=6.16 fps Inflow=14.99 cfs 1.554 af
n=0.025 L=936.0' S=0.0299 '/' Capacity=131.18 cfs Outflow=14.64 cfs 1.554 af

Reach 6R: NORTH PD-2 Avg. Flow Depth=1.02' Max Vel=3.88 fps Inflow=15.99 cfs 1.706 af
n=0.025 L=364.0' S=0.0080 '/' Capacity=67.70 cfs Outflow=15.76 cfs 1.706 af

Reach 7R: DP-10R Avg. Flow Depth=0.53' Max Vel=2.60 fps Inflow=4.95 cfs 3.144 af
n=0.045 L=1,130.0' S=0.0248 '/' Capacity=88.21 cfs Outflow=4.91 cfs 3.143 af

Reach 8R: EAST PD - 6 Avg. Flow Depth=0.67' Max Vel=2.90 fps Inflow=12.44 cfs 1.325 af
n=0.025 L=360.0' S=0.0056 '/' Capacity=25.35 cfs Outflow=12.21 cfs 1.325 af

Reach 9R: LEVEL SPREADER Avg. Flow Depth=0.25' Max Vel=0.17 fps Inflow=0.99 cfs 2.949 af
n=0.800 L=273.0' S=0.0623 '/' Capacity=11.46 cfs Outflow=0.99 cfs 2.943 af

Reach 10R: Ditch 4B1 Avg. Flow Depth=0.87' Max Vel=3.69 fps Inflow=11.94 cfs 1.325 af
n=0.025 L=352.0' S=0.0085 '/' Capacity=70.02 cfs Outflow=11.80 cfs 1.325 af

Reach 11R: DP-11R Avg. Flow Depth=0.28' Max Vel=1.49 fps Inflow=1.18 cfs 2.687 af
n=0.045 L=1,050.0' S=0.0162 '/' Capacity=71.30 cfs Outflow=1.18 cfs 2.686 af

Reach 12R: 4FR Avg. Flow Depth=0.53' Max Vel=1.89 fps Inflow=3.77 cfs 0.788 af
n=0.045 L=1,523.0' S=0.0131 '/' Capacity=64.21 cfs Outflow=3.57 cfs 0.788 af

Reach 13R: Ex Ditch Avg. Flow Depth=1.00' Max Vel=4.62 fps Inflow=18.62 cfs 2.240 af
n=0.030 L=225.0' S=0.0164 '/' Capacity=81.05 cfs Outflow=18.53 cfs 2.240 af

Reach 14R: DP-10 DITCH 2 Avg. Flow Depth=0.65' Max Vel=6.49 fps Inflow=14.07 cfs 1.501 af
n=0.025 L=434.0' S=0.0357 '/' Capacity=143.33 cfs Outflow=13.95 cfs 1.501 af

Reach AP1: AP-1 Inflow=50.41 cfs 13.974 af
Outflow=50.41 cfs 13.974 af

Reach AP2: ANALYSIS POINT #2 Inflow=24.63 cfs 9.905 af
Outflow=24.63 cfs 9.905 af

Reach AP3: ANALYSIS POINT #3 Inflow=74.13 cfs 36.035 af
Outflow=74.13 cfs 36.035 af

Reach AP4: AP4 Inflow=84.71 cfs 45.769 af
Outflow=84.71 cfs 45.769 af

Reach AP5: ANALYSIS POINT #5 Inflow=13.44 cfs 5.440 af
Outflow=13.44 cfs 5.440 af

Reach E2R2: E2R2 Avg. Flow Depth=0.08' Max Vel=0.32 fps Inflow=1.77 cfs 0.234 af
n=0.080 L=4,356.0' S=0.0094 '/' Capacity=132.12 cfs Outflow=0.34 cfs 0.234 af

Reach E2R3: REACH TO AP Avg. Flow Depth=0.31' Max Vel=1.07 fps Inflow=0.99 cfs 2.943 af
n=0.045 L=2,170.0' S=0.0074 '/' Capacity=48.12 cfs Outflow=0.99 cfs 2.936 af

Reach E2R4: Reach to AP Avg. Flow Depth=0.52' Max Vel=0.97 fps Inflow=9.18 cfs 9.788 af
n=0.080 L=963.0' S=0.0094 '/' Capacity=131.94 cfs Outflow=8.62 cfs 9.779 af

Reach R-1D: Reach R-1D Avg. Flow Depth=0.28' Max Vel=1.66 fps Inflow=5.91 cfs 2.573 af
n=0.060 L=370.0' S=0.0324 '/' Capacity=67.93 cfs Outflow=5.91 cfs 2.573 af

Reach R-1E: LEVEL SPREADER R-1E Avg. Flow Depth=0.21' Max Vel=2.11 fps Inflow=7.89 cfs 1.371 af
n=0.060 L=210.0' S=0.0690 '/' Capacity=135.95 cfs Outflow=7.88 cfs 1.371 af

Reach R-1F: Reach R-1F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.060 L=940.0' S=0.0170 '/' Capacity=49.21 cfs Outflow=0.00 cfs 0.000 af

Reach R-1H: LEVEL SPREADER R-1H Avg. Flow Depth=0.08' Max Vel=2.01 fps Inflow=5.77 cfs 0.557 af
n=0.030 L=170.0' S=0.0471 '/' Capacity=411.95 cfs Outflow=5.67 cfs 0.557 af

Reach R-2F: Reach R2-F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=735.0' S=0.0020 '/' Capacity=151.21 cfs Outflow=0.00 cfs 0.000 af

Reach R1: Reach 1 Avg. Flow Depth=1.13' Max Vel=1.60 fps Inflow=38.57 cfs 10.762 af
n=0.030 L=700.0' S=0.0016 '/' Capacity=132.69 cfs Outflow=38.22 cfs 10.762 af

Reach R1B: LF TOE DITCH Avg. Flow Depth=0.92' Max Vel=4.29 fps Inflow=15.37 cfs 1.606 af
n=0.040 L=540.0' S=0.0278 '/' Capacity=79.00 cfs Outflow=15.08 cfs 1.606 af

Reach R2: Reach 2 Avg. Flow Depth=0.87' Max Vel=1.56 fps Inflow=26.10 cfs 6.094 af
n=0.030 L=1,050.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=25.30 cfs 6.094 af

Reach R2A: Reach 2A Avg. Flow Depth=0.08' Max Vel=0.48 fps Inflow=1.34 cfs 2.371 af
n=0.060 L=1,960.0' S=0.0138 '/' Capacity=1,358.84 cfs Outflow=1.33 cfs 2.370 af

Reach R3: Reach 3 Avg. Flow Depth=0.81' Max Vel=1.50 fps Inflow=22.65 cfs 4.723 af
n=0.030 L=800.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=22.18 cfs 4.723 af

Reach R5a: Grass Lined Ditch Avg. Flow Depth=0.38' Max Vel=6.16 fps Inflow=11.05 cfs 1.138 af
n=0.025 L=200.0' S=0.0500 '/' Capacity=572.96 cfs Outflow=10.99 cfs 1.138 af

Pond 1P: Culvert - 4JB & FJC Peak Elev=211.35' Storage=648 cf Inflow=14.10 cfs 1.501 af
24.0" Round Culvert x 2.00 n=0.011 L=73.0' S=0.0137 '/' Outflow=14.07 cfs 1.501 af

Pond 4IAC: Culvert - 4IA Peak Elev=213.49' Storage=236 cf Inflow=1.41 cfs 0.115 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0175 '/' Outflow=1.33 cfs 0.115 af

Pond 8P: Ex Pond Peak Elev=172.19' Storage=4,248 cf Inflow=4.96 cfs 3.212 af
Outflow=4.95 cfs 3.144 af

Pond C-2B-A: Culvert - 2BA Peak Elev=205.04' Storage=1,200 cf Inflow=16.29 cfs 1.706 af
Primary=15.99 cfs 1.706 af Secondary=0.00 cfs 0.000 af Outflow=15.99 cfs 1.706 af

Pond C-4F: Culvert - 4F Peak Elev=166.07' Storage=0.018 af Inflow=3.79 cfs 0.788 af
18.0" Round Culvert n=0.011 L=78.0' S=0.0385 '/' Outflow=3.77 cfs 0.788 af

Pond C-4K: Catch Basin - 4K Peak Elev=220.60' Storage=2,052 cf Inflow=12.21 cfs 1.325 af
Outflow=11.94 cfs 1.325 af

Pond C4B: Culvert - 4BA & 4BB Peak Elev=206.18' Storage=92 cf Inflow=21.27 cfs 2.637 af
24.0" Round Culvert x 2.00 n=0.011 L=78.0' S=0.0090 '/' Outflow=21.25 cfs 2.637 af

Pond C4H-A: Culvert 4H-A Peak Elev=202.39' Storage=414 cf Inflow=1.17 cfs 0.095 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0250 '/' Outflow=0.96 cfs 0.095 af

Pond C4N: Culvert 4N Peak Elev=184.69' Storage=0.003 af Inflow=1.78 cfs 0.234 af
18.0" Round Culvert n=0.011 L=33.0' S=0.0303 '/' Outflow=1.77 cfs 0.234 af

Pond CB-2B-B: Catch Basin - 2BB Peak Elev=200.44' Storage=121 cf Inflow=15.76 cfs 1.706 af
Outflow=15.73 cfs 1.706 af

Pond CB-4G: Catch Basin - 4G Peak Elev=181.93' Storage=331 cf Inflow=14.64 cfs 1.554 af
Outflow=14.58 cfs 1.554 af

Pond CB-4HB: Catch Basin - 4HB Peak Elev=183.70' Storage=29 cf Inflow=5.29 cfs 0.510 af
Outflow=5.29 cfs 0.510 af

Pond CB-4I: Catch Basin - 4I Peak Elev=208.33' Storage=0.007 af Inflow=12.84 cfs 1.325 af
Outflow=12.83 cfs 1.325 af

Pond CB-4JA: Catch Basin - 4JA Peak Elev=219.58' Storage=0.009 af Inflow=14.35 cfs 1.501 af
Outflow=14.21 cfs 1.501 af

Pond CB-4L: Catch Basin - 4L Peak Elev=215.59' Storage=946 cf Inflow=9.51 cfs 0.914 af
Outflow=9.37 cfs 0.914 af

Pond D-1G: (2)24" Culverts P-6h Peak Elev=184.43' Storage=416 cf Inflow=15.60 cfs 1.440 af
Primary=15.45 cfs 1.440 af Secondary=0.00 cfs 0.000 af Outflow=15.45 cfs 1.440 af

Pond D-1H: LF TOE DITCH - CULVERT Peak Elev=184.35' Storage=594 cf Inflow=5.84 cfs 0.557 af
18.0" Round Culvert n=0.013 L=60.0' S=0.0083 '/' Outflow=5.77 cfs 0.557 af

Pond DP-1: Detention Pond 1 Peak Elev=164.02' Storage=55,211 cf Inflow=28.22 cfs 3.131 af
Primary=5.91 cfs 2.573 af Secondary=0.00 cfs 0.000 af Outflow=5.91 cfs 2.573 af

Pond DP-10: DETENTION POND 10 Peak Elev=179.16' Storage=79,803 cf Inflow=32.93 cfs 3.629 af
Primary=3.56 cfs 1.042 af Secondary=1.40 cfs 2.169 af Tertiary=0.00 cfs 0.000 af Outflow=4.96 cfs 3.212 af

Pond DP-11: Detention Pond 11 Peak Elev=166.87' Storage=82,513 cf Inflow=21.28 cfs 2.841 af
Primary=0.00 cfs 0.000 af Secondary=1.18 cfs 2.687 af Outflow=1.18 cfs 2.687 af

Pond DP-12: DETENTION POND 12 Peak Elev=186.96' Storage=70,200 cf Inflow=16.74 cfs 2.530 af
Primary=0.09 cfs 0.026 af Secondary=1.25 cfs 2.344 af Outflow=1.34 cfs 2.371 af

Pond DP-1A: DP-1A (Former Leachate Peak Elev=165.63' Storage=247,127 cf Inflow=12.96 cfs 1.566 af
Outflow=0.33 cfs 0.110 af

Pond DP-2: DETENTION POND 2 Peak Elev=164.71' Storage=11,544 cf Inflow=14.84 cfs 1.371 af
Outflow=7.89 cfs 1.371 af

Pond DP-6: DETENTION POND 6 Peak Elev=176.12' Storage=127,302 cf Inflow=26.87 cfs 3.302 af
Primary=0.00 cfs 0.000 af Secondary=1.29 cfs 3.302 af Outflow=1.29 cfs 3.302 af

Pond DP-9: DETENTION POND 9 Peak Elev=189.59' Storage=187,879 cf Inflow=38.75 cfs 5.146 af
Primary=0.03 cfs 0.012 af Secondary=0.96 cfs 2.937 af Tertiary=0.00 cfs 0.000 af Outflow=0.99 cfs 2.949 af

Summary for Subcatchment 1A: SC-1A

Runoff = 13.58 cfs @ 13.22 hrs, Volume= 3.212 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	10.120	70	Woods, Good, HSG C
	9.500	77	Woods, Good, HSG D
	2.560	71	Meadow, non-grazed, HSG C
	0.400	78	Meadow, non-grazed, HSG D
*	0.500	96	Gravel Road
	23.080	74	Weighted Average
	23.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.7	150	0.0260	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	1,839		1.46		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
88.1	2,249	Total			

Summary for Subcatchment 1B: SC-1B

Runoff = 15.37 cfs @ 12.26 hrs, Volume= 1.606 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
13.169	71	Meadow, non-grazed, HSG C
13.169		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	183	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.9	392	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	557	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.5	1,282	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 10.58 cfs @ 12.95 hrs, Volume= 2.095 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	6.100	77	Woods, Good, HSG D
	0.720	70	Woods, Good, HSG C
	3.100	78	Meadow, non-grazed, HSG D
	2.580	71	Meadow, non-grazed, HSG C
*	0.800	96	Gravel Road
	13.300	77	Weighted Average
	13.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.0	150	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.6	230	0.0133	0.58		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
16.7					**Direct Entry, Segment ID: C-D**
68.3	380	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 13.91 cfs @ 12.25 hrs, Volume= 1.416 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	9.230	71	Meadow, non-grazed, HSG C
*	0.590	96	Gravel Road/Berm
*	0.800	78	Pond, Meadow HSG D
	10.620	73	Weighted Average
	10.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	159	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.5	203	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	605	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035

16.9	1,117	Total

Summary for Subcatchment 1E: SC-1E

Runoff = 14.84 cfs @ 12.19 hrs, Volume= 1.371 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	10.495	71	Meadow, non-grazed, HSG C
*	0.250	96	Gravel Road/Berm
	10.745	72	Weighted Average
	10.745		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	150	0.1500	2.71		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.2	93	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	517	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	910	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 22.65 cfs @ 13.00 hrs, Volume= 4.723 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	13.200	77	Woods, Good, HSG D
	7.250	70	Woods, Good, HSG C
	7.670	78	Meadow, non-grazed, HSG D
	1.500	71	Meadow, non-grazed, HSG C
*	0.500	96	Gravel Road/Pad
*	0.600	98	Impervious / Structures
	0.500	98	Paved roads w/curbs & sewers, HSG C
	31.220	76	Weighted Average
	30.120		96.48% Pervious Area
	1.100		3.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	17	0.3300	0.23		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
2.4	300	0.0190	2.07		**Shallow Concentrated Flow, Segment ID: C-D** Grassed Waterway Kv= 15.0 fps
24.6	1,649	0.0500	1.12		**Shallow Concentrated Flow, Segment ID D-E** Woodland Kv= 5.0 fps
24.5					**Direct Entry, Segment ID: E-F**
73.2	2,066	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 15.60 cfs @ 12.19 hrs, Volume= 1.440 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	10.860	71	Meadow, non-grazed, HSG C
*	0.430	96	Gravel Road/Berm
	11.290	72	Weighted Average
	11.290		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	62	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.4	90	0.3300	4.02		**Shallow Concentrated Flow, Segment ID: C-D** Short Grass Pasture Kv= 7.0 fps
0.3	140	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	415	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	857	Total			

Summary for Subcatchment 1H: SC-1H

Runoff = 5.84 cfs @ 12.22 hrs, Volume= 0.557 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
1.830	71	Meadow, non-grazed, HSG C
1.200	96	Gravel Road/Berm
3.030	81	Weighted Average
3.030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.3300	0.36		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
8.4	609	0.0300	1.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
15.4	759	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 11.05 cfs @ 12.25 hrs, Volume= 1.138 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
9.334	71	Meadow, non-grazed, HSG C
9.334		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	146	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	218	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	570	0.3300	27.25	817.65	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 5.0 '/' Top.W=25.00' n= 0.035
16.8	1,084	Total			

Summary for Subcatchment 1J: SC-1J

Runoff = 9.83 cfs @ 12.47 hrs, Volume= 1.305 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (sf)	CN	Description
*	186,445	70	Woods, Good HSG C
	85,939	71	Meadow, non-grazed, HSG C
*	16,377	96	Gravel Road/Pad
*	72,000	98	Pond water surface
	360,761	77	Weighted Average
	288,761		80.04% Pervious Area
	72,000		19.96% 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 2A: SC-2A

Runoff = 24.61 cfs @ 13.74 hrs, Volume= 7.535 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	27.993	70	Woods, Good, HSG C
	21.380	77	Woods, Good, HSG D
	2.790	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area (New)
	1.600	98	Existing Waterbody
	54.143	74	Weighted Average
	52.163		96.34% Pervious Area
	1.980		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.9	150	0.0300	0.05		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
25.4	538	0.0200	0.35		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
37.5	534	0.0090	0.24		**Shallow Concentrated Flow, Segment C-D** Forest w/Heavy Litter Kv= 2.5 fps
15.3	1,213	0.0080	1.32	52.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=2.00' Z= 10.0 '/' Top.W=40.00' n= 0.100 Earth, dense brush, high stage
126.1	2,435	Total			

Summary for Subcatchment 2B: 2B

Runoff = 16.29 cfs @ 12.26 hrs, Volume= 1.706 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
13.996	71	Meadow, non-grazed, HSG C
13.996		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	187	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	431	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	450	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.6	1,218	Total			

Summary for Subcatchment 2C: 2C

Runoff = 3.65 cfs @ 13.14 hrs, Volume= 0.824 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
5.521	70	Woods, Good, HSG C
0.660	98	Water Surface, HSG C
6.181	73	Weighted Average
5.521		89.32% Pervious Area
0.660		10.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.2	289	0.0242	0.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	263	0.0114	0.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
80.7	702	Total			

Summary for Subcatchment 3: SC-3

Runoff = 74.13 cfs @ 15.27 hrs, Volume= 36.035 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	162.090	70	Woods, Good, HSG C
	102.790	77	Woods, Good, HSG D
	0.950	71	Meadow, non-grazed, HSG C
*	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
*	2.330	98	Existing Water Body
	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 4A: 4A

Runoff = 9.95 cfs @ 12.08 hrs, Volume= 0.712 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	0.740	89	Gravel roads, HSG C
	1.955	74	>75% Grass cover, Good, HSG C
*	0.088	98	ROOF
	1.497	71	Meadow, non-grazed, HSG C
	0.238	98	Paved roads w/curbs & sewers, HSG C
	4.518	77	Weighted Average
	4.192		92.78% Pervious Area
	0.326		7.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	150	0.0167	0.71		**Sheet Flow, Segment A-B** n= 0.023 P2= 2.70"
0.8	159	0.0410	3.26		**Shallow Concentrated Flow, Segment B-C** Unpaved Kv= 16.1 fps
0.8	70	0.0429	1.45		**Shallow Concentrated Flow, Segment C-D** Short Grass Pasture Kv= 7.0 fps
5.1	379	Total			

Summary for Subcatchment 4B: 4B

Runoff = 4.38 cfs @ 12.19 hrs, Volume= 0.397 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	1.040	70	Brush, Fair, HSG C
*	0.023	98	ROOF
	0.640	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
	0.240	98	Paved roads w/curbs & sewers, HSG C
	2.330	79	Weighted Average
	2.067		88.71% Pervious Area
	0.263		11.29% 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 4C: 4C

Runoff = 2.96 cfs @ 12.21 hrs, Volume= 0.283 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	0.511	74	>75% Grass cover, Good, HSG C
	0.070	98	Paved roads w/curbs & sewers, HSG C
*	0.250	98	Building/Concrete Slabs
*	0.456	91	Gravel Roads
	1.287	86	Weighted Average
	0.967		75.14% Pervious Area
	0.320		24.86% 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"
4.0	374	0.0107	1.55		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
15.4	496	Total			

Summary for Subcatchment 4D: 4D

Runoff = 11.31 cfs @ 12.46 hrs, Volume= 1.514 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	0.453	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.634	98	Pond
	0.136	98	Paved roads w/curbs & sewers, HSG C
	6.660	87	Weighted Average
	4.890		73.42% Pervious Area
	1.770		26.58% 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 4E: 4E

Runoff = 77.97 cfs @ 15.24 hrs, Volume= 35.990 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	152.615	77	Woods, Good, HSG D
	91.360	70	Woods, Good, HSG C
*	3.940	98	Paved roads w/curbs & sewers,
	247.915	75	Weighted Average
	243.975		98.41% Pervious Area
	3.940		1.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
127.0	2,625	0.0190	0.34		**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)**
225.6	6,090	Total			

Summary for Subcatchment 4F: 4F

Runoff = 3.79 cfs @ 12.98 hrs, Volume= 0.788 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
6.691	70	Woods, Good, HSG C
0.080	89	Gravel roads, HSG C
6.771	70	Weighted Average
6.771		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.6	144	0.0280	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.9	1,067	0.0290	0.85		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	17	0.0210	0.97	19.47	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.250
68.8	1,228	Total			

Summary for Subcatchment 4G: 4G

Runoff = 14.99 cfs @ 12.25 hrs, Volume= 1.554 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
12.750	71	Meadow, non-grazed, HSG C
12.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	98	0.0500	0.15		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.8	52	0.1000	0.18		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
1.1	150	0.1000	2.21		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.3	133	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	496	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	929	Total			

Summary for Subcatchment 4H: 4H

Runoff = 4.54 cfs @ 12.18 hrs, Volume= 0.415 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
3.400	71	Meadow, non-grazed, HSG C
3.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	75	0.1000	0.19		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.0	75	0.3300	0.31		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	150	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.7	285	0.0500	6.92	76.15	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 2.0 & 20.0 '/' Top.W=22.00' n= 0.030 Short grass
0.1	238	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00'

n= 0.035

11.9	823	Total

Summary for Subcatchment 4HA: 4HA

Runoff = 1.24 cfs @ 12.11 hrs, Volume= 0.095 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
0.780	71	Meadow, non-grazed, HSG C
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	142	0.3300	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4I: 4I

Runoff = 11.68 cfs @ 12.25 hrs, Volume= 1.211 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
9.930	71	Meadow, non-grazed, HSG C
9.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	200	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	290	0.0500	11.02	506.75	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=2.00' Z= 3.0 & 20.0 '/' Top.W=46.00' n= 0.030
0.3	442	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	1,082	Total			

Summary for Subcatchment 4IA: 4IA

Runoff = 1.51 cfs @ 12.10 hrs, Volume= 0.115 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
0.940	71	Meadow, non-grazed, HSG C
0.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	136	0.3333	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4J: 4J

Runoff = 14.45 cfs @ 12.26 hrs, Volume= 1.501 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
12.310	71	Meadow, non-grazed, HSG C
12.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	202	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.6	270	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	429	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.2	1,051	Total			

Summary for Subcatchment 4K: 4K

Runoff = 12.44 cfs @ 12.27 hrs, Volume= 1.325 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
10.870	71	Meadow, non-grazed, HSG C
10.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
2.7	268	0.0555	1.65		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.6	267	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	410	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
18.4	1,095	Total			

Summary for Subcatchment 4L: 4L

Runoff = 9.51 cfs @ 12.21 hrs, Volume= 0.914 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
7.500	71	Meadow, non-grazed, HSG C
7.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	23	0.0500	0.12		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
9.9	127	0.1000	0.21		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	252	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	494	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
14.1	896	Total			

Summary for Subcatchment 4M: 4M

Runoff = 4.51 cfs @ 12.76 hrs, Volume= 0.777 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
4.262	70	Woods, Good, HSG C
0.900	98	Water Surface, HSG C
0.190	89	Gravel roads, HSG C
5.352	75	Weighted Average
4.452		83.18% Pervious Area
0.900		16.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.9	150	0.0333	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
7.5	474	0.0440	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.1	18	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
53.5	642	Total			

Summary for Subcatchment 4N: 4N

Runoff = 1.78 cfs @ 12.46 hrs, Volume= 0.234 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
0.743	70	Woods, Good, HSG C
1.178	71	Meadow, non-grazed, HSG C
1.921	71	Weighted Average
1.921		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	150	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
9.0	580	0.0233	1.07		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
30.5	730	Total			

Summary for Subcatchment 4O: 4O

Runoff = 8.61 cfs @ 12.20 hrs, Volume= 0.803 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	3.900	70	Brush, Fair, HSG C
*	0.800	98	Paved and Gravel Shoulder
*	0.400	98	Detention Pond 10
	5.100	77	Weighted Average
	3.900		76.47% Pervious Area
	1.200		23.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	55	0.3000	0.28		**Sheet Flow, SEGMENT AB** Grass: Dense n= 0.240 P2= 2.70"
4.0	289	0.0300	1.21		**Shallow Concentrated Flow, SEGMENT BC** Short Grass Pasture Kv= 7.0 fps
6.9	319	0.0120	0.77		**Shallow Concentrated Flow, SEGMENT CD** Short Grass Pasture Kv= 7.0 fps
14.2	663	Total			

Summary for Subcatchment 5: SC-5

Runoff = 13.44 cfs @ 14.71 hrs, Volume= 5.440 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
28.410	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
35.960	76	Weighted Average
35.815		99.60% Pervious Area
0.145		0.40% 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 Subcatchment P1A: SC-P1A

Runoff = 6.50 cfs @ 12.00 hrs, Volume= 0.428 af, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (sf)	CN	Description
*	49,872	98	Pond and Liner
	1,012	89	Gravel roads, HSG C
	14,516	79	Pasture/grassland/range, Fair, HSG C
	65,400	94	Weighted Average
	15,528		23.74% Pervious Area
	49,872		76.26% Impervious Area

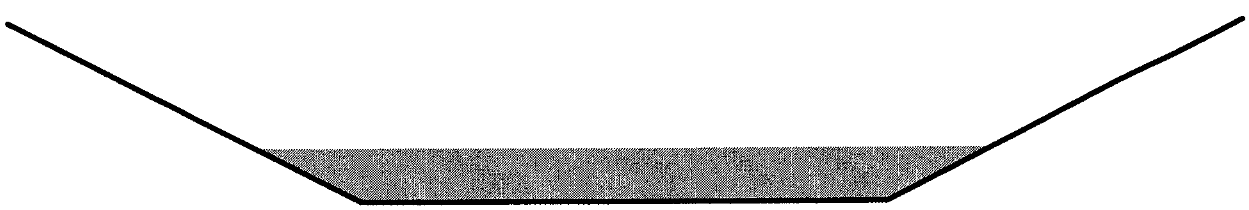
Summary for Reach 1R: DP-10 DITCH 1

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 14.21 cfs @ 12.30 hrs, Volume= 1.501 af
Outflow = 14.10 cfs @ 12.31 hrs, Volume= 1.501 af, Atten= 1%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.31 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.14 fps, Avg. Travel Time= 1.5 min

Peak Storage= 432 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 128.49 cfs

6.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 101.0' Slope= 0.0079 '/'
Inlet Invert= 212.30', Outlet Invert= 211.50'



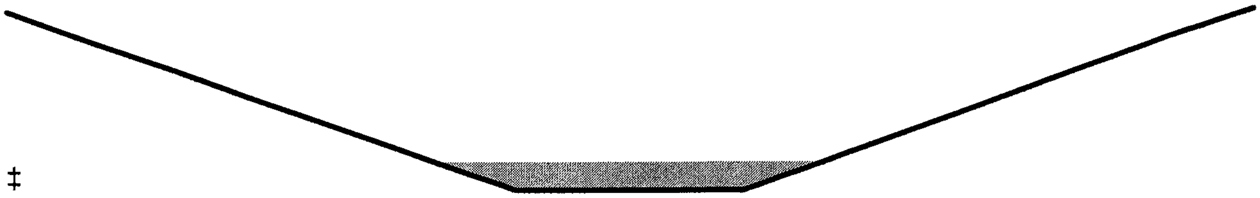
Summary for Reach 2R: E2C-DP9

Inflow Area = 5.805 ac, 11.13% Impervious, Inflow Depth = 2.06" for 10-yr Storm event
Inflow = 12.00 cfs @ 12.09 hrs, Volume= 0.995 af
Outflow = 11.40 cfs @ 12.16 hrs, Volume= 0.995 af, Atten= 5%, Lag= 4.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.49 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.40 fps, Avg. Travel Time= 7.0 min

Peak Storage= 1,521 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 488.04 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= 590.0' Slope= 0.0169 '/'
Inlet Invert= 200.00', Outlet Invert= 190.00'



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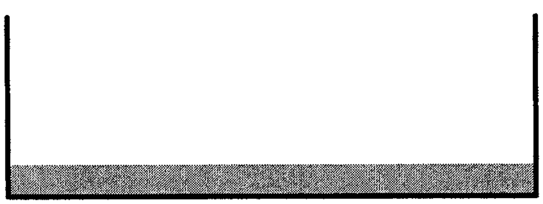
Summary for Reach 3R: Overland Flow

Inflow Area = 20.700 ac, 1.27% Impervious, Inflow Depth = 1.53" for 10-yr Storm event
Inflow = 21.25 cfs @ 12.39 hrs, Volume= 2.637 af
Outflow = 21.22 cfs @ 12.39 hrs, Volume= 2.637 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 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= 357 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.35'
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

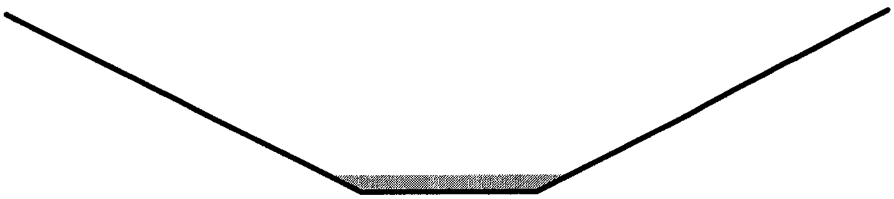
Summary for Reach 4HR-A: EAST PD - 4

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 1.24 cfs @ 12.11 hrs, Volume= 0.095 af
Outflow = 1.17 cfs @ 12.16 hrs, Volume= 0.095 af, Atten= 6%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.69 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 5.3 min

Peak Storage= 127 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.08 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 288.0' Slope= 0.0247 '/'
Inlet Invert= 209.00', Outlet Invert= 201.90'



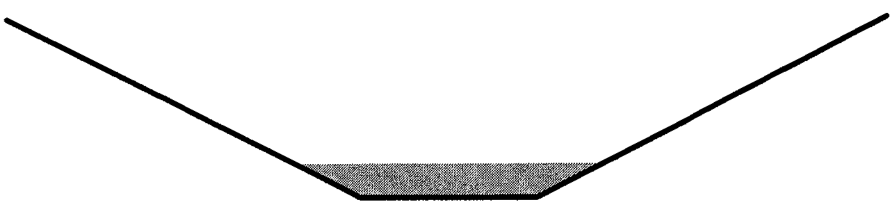
Summary for Reach 4HR-B: EAST PD - 5

Inflow Area =	4.180 ac,	0.00% Impervious,	Inflow Depth =	1.46"	for 10-yr Storm event
Inflow =	5.42 cfs @	12.19 hrs, Volume=	0.510 af		
Outflow =	5.29 cfs @	12.23 hrs, Volume=	0.510 af,	Atten= 2%,	Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.30 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.62 fps, Avg. Travel Time= 4.4 min

Peak Storage= 434 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 158.67 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 425.0' Slope= 0.0438 '/'
Inlet Invert= 201.90', Outlet Invert= 183.30'



Summary for Reach 4IR-A: EAST PD - 2

Inflow Area =	0.940 ac,	0.00% Impervious,	Inflow Depth =	1.46"	for 10-yr Storm event
Inflow =	1.51 cfs @	12.10 hrs, Volume=	0.115 af		
Outflow =	1.41 cfs @	12.17 hrs, Volume=	0.115 af,	Atten= 7%,	Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.55 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 6.5 min

Peak Storage= 185 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 100.55 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 330.0' Slope= 0.0176 '/'
Inlet Invert= 218.70', Outlet Invert= 212.90'

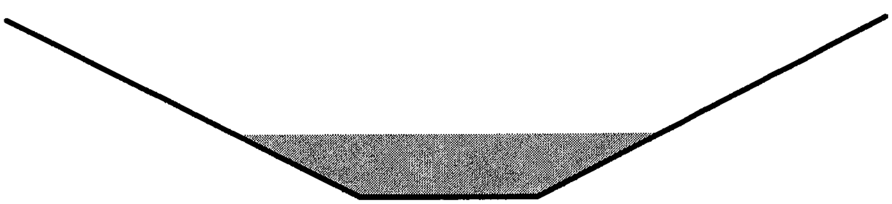
Summary for Reach 4IR-B: EAST PD - 3

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	12.92 cfs @	12.25 hrs, Volume=	1.325 af
Outflow =	12.84 cfs @	12.27 hrs, Volume=	1.325 af, Atten= 1%, Lag= 1.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.36 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.88 fps, Avg. Travel Time= 1.9 min

Peak Storage= 507 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.71'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 113.47 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 210.0' Slope= 0.0224 '/'
Inlet Invert= 212.20', Outlet Invert= 207.50'



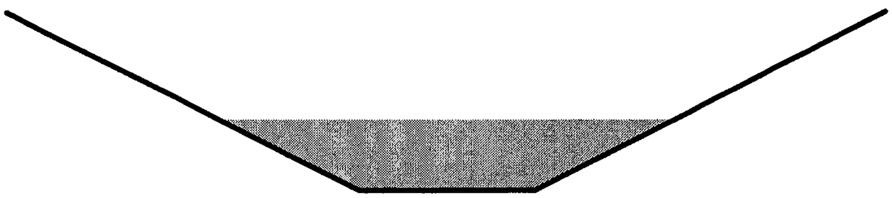
Summary for Reach 4JR: EAST PD 1

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	14.45 cfs @	12.26 hrs, Volume=	1.501 af
Outflow =	14.35 cfs @	12.27 hrs, Volume=	1.501 af, Atten= 1%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.10 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 2.04 fps, Avg. Travel Time= 1.5 min

Peak Storage= 518 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.79'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 101.85 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 183.0' Slope= 0.0180 '/'
Inlet Invert= 222.00', Outlet Invert= 218.70'



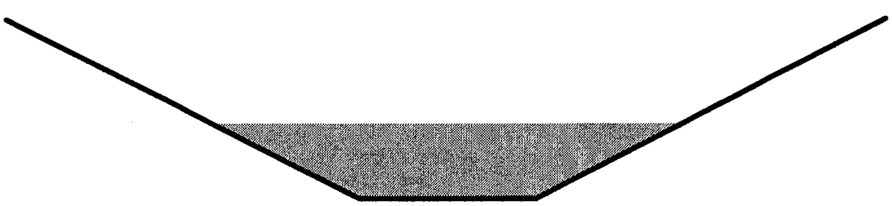
Summary for Reach 4R: DP-10 DITCH 3

Inflow Area = 23.180 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 26.13 cfs @ 12.32 hrs, Volume= 2.826 af
Outflow = 25.93 cfs @ 12.33 hrs, Volume= 2.826 af, Atten= 1%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.43 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 3.10 fps, Avg. Travel Time= 1.4 min

Peak Storage= 805 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.84'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 162.94 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 260.0' Slope= 0.0462 '/'
Inlet Invert= 191.00', Outlet Invert= 179.00'



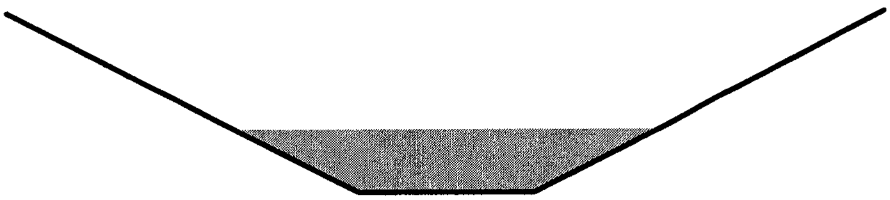
Summary for Reach 5R: NORTH PD-1

Inflow Area = 12.750 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 14.99 cfs @ 12.25 hrs, Volume= 1.554 af
Outflow = 14.64 cfs @ 12.33 hrs, Volume= 1.554 af, Atten= 2%, Lag= 4.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.16 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 2.28 fps, Avg. Travel Time= 6.8 min

Peak Storage= 2,233 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.70'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 131.18 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 936.0' Slope= 0.0299 '/'
Inlet Invert= 210.00', Outlet Invert= 182.00'



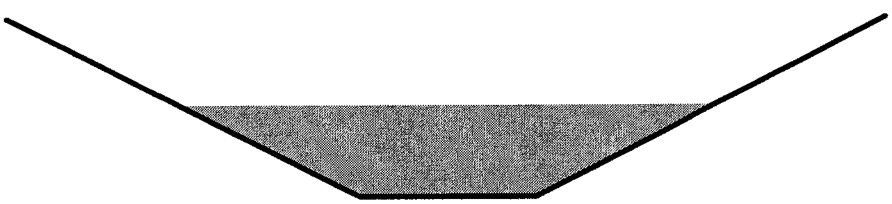
Summary for Reach 6R: NORTH PD-2

Inflow Area = 13.996 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 15.99 cfs @ 12.29 hrs, Volume= 1.706 af
Outflow = 15.76 cfs @ 12.34 hrs, Volume= 1.706 af, Atten= 1%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.88 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.52 fps, Avg. Travel Time= 4.0 min

Peak Storage= 1,493 cf @ 12.31 hrs
Average Depth at Peak Storage= 1.02'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.70 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 364.0' Slope= 0.0080 '/'
Inlet Invert= 202.90', Outlet Invert= 200.00'



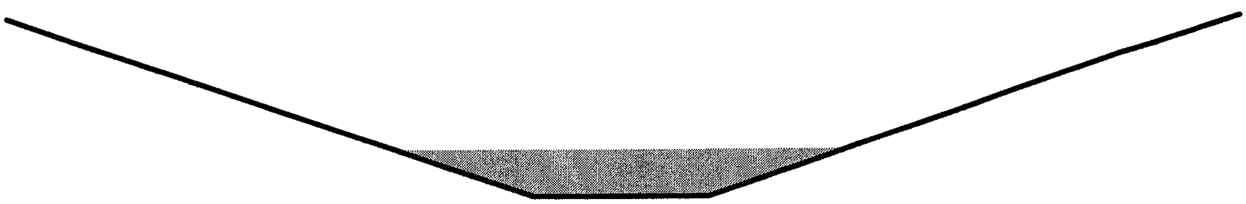
Summary for Reach 7R: DP-10R

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth > 1.33" for 10-yr Storm event
Inflow = 4.95 cfs @ 13.57 hrs, Volume= 3.144 af
Outflow = 4.91 cfs @ 13.81 hrs, Volume= 3.143 af, Atten= 1%, Lag= 14.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.60 fps, Min. Travel Time= 7.2 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 27.9 min

Peak Storage= 2,132 cf @ 13.69 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 88.21 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= 1,130.0' Slope= 0.0248 '/'
Inlet Invert= 170.00', Outlet Invert= 142.00'



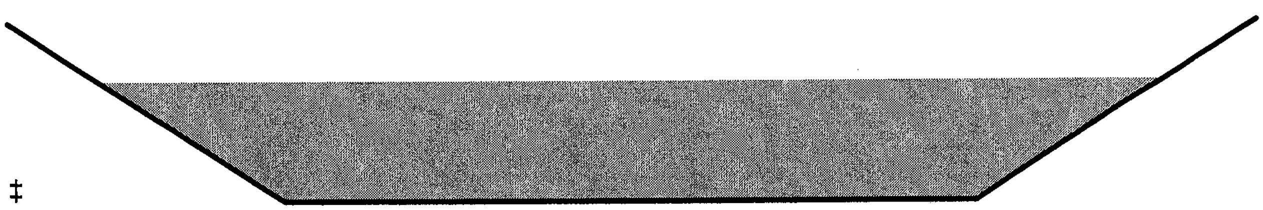
Summary for Reach 8R: EAST PD - 6

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	12.44 cfs @	12.27 hrs, Volume=	1.325 af
Outflow =	12.21 cfs @	12.34 hrs, Volume=	1.325 af, Atten= 2%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.90 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 6.6 min

Peak Storage= 1,527 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 25.35 cfs

5.00' x 1.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 360.0' Slope= 0.0056 '/'
Inlet Invert= 222.00', Outlet Invert= 220.00'



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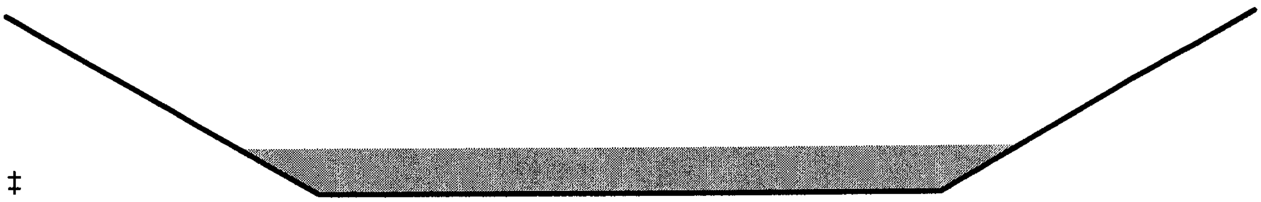
Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area =	33.165 ac,	8.08% Impervious, Inflow Depth > 1.07"	for 10-yr Storm event
Inflow =	0.99 cfs @	23.58 hrs, Volume=	2.949 af
Outflow =	0.99 cfs @	24.30 hrs, Volume=	2.943 af, Atten= 0%, Lag= 43.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.17 fps, Min. Travel Time= 26.3 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 53.9 min

Peak Storage= 1,567 cf @ 23.86 hrs
Average Depth at Peak Storage= 0.25'
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'



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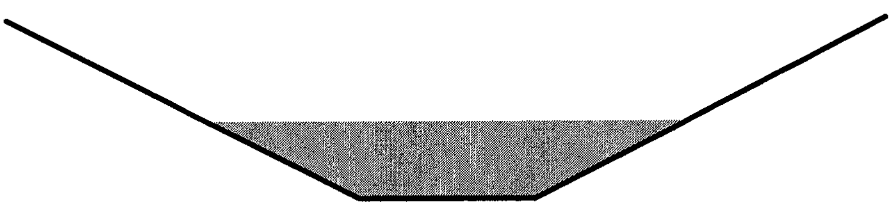
Summary for Reach 10R: Ditch 4B1

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	11.94 cfs @	12.38 hrs, Volume=	1.325 af
Outflow =	11.80 cfs @	12.43 hrs, Volume=	1.325 af, Atten= 1%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.69 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 4.4 min

Peak Storage= 1,138 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.87'
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'



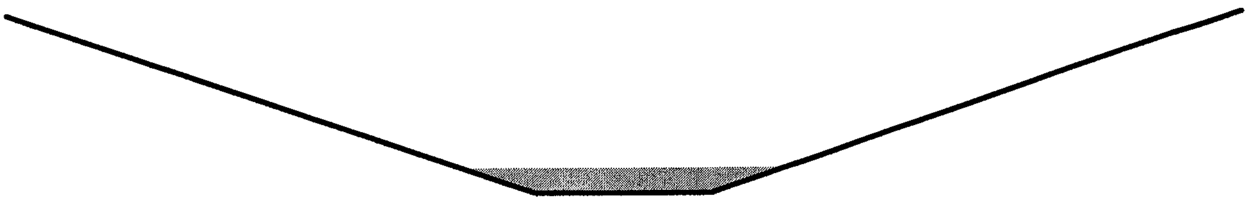
Summary for Reach 11R: DP-11R

Inflow Area =	22.282 ac,	4.04% Impervious, Inflow Depth > 1.45"	for 10-yr Storm event
Inflow =	1.18 cfs @	17.92 hrs, Volume=	2.687 af
Outflow =	1.18 cfs @	18.26 hrs, Volume=	2.686 af, Atten= 0%, Lag= 20.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.49 fps, Min. Travel Time= 11.8 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 27.4 min

Peak Storage= 831 cf @ 18.06 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 71.30 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,050.0' Slope= 0.0162 '/'
Inlet Invert= 158.00', Outlet Invert= 141.00'



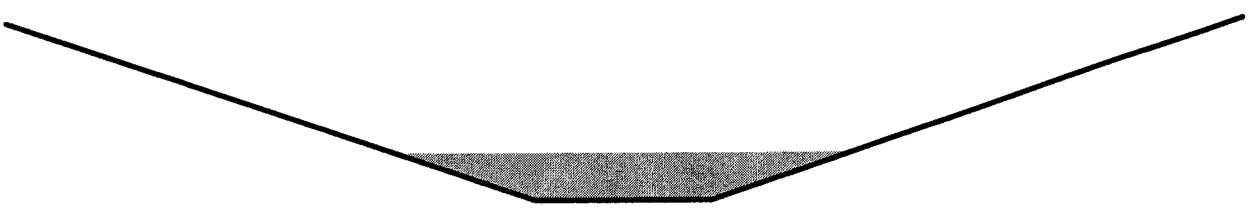
Summary for Reach 12R: 4FR

Inflow Area =	6.771 ac,	0.00% Impervious,	Inflow Depth =	1.40"	for 10-yr Storm event
Inflow =	3.77 cfs @	13.04 hrs,	Volume=	0.788 af	
Outflow =	3.57 cfs @	13.44 hrs,	Volume=	0.788 af,	Atten= 5%, Lag= 24.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.89 fps, Min. Travel Time= 13.4 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 37.2 min

Peak Storage= 2,873 cf @ 13.22 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 64.21 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,523.0' Slope= 0.0131 '/'
Inlet Invert= 161.00', Outlet Invert= 141.00'



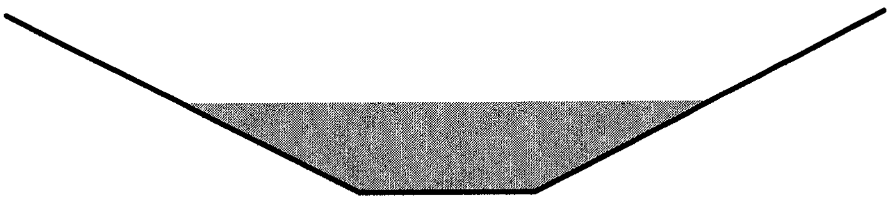
Summary for Reach 13R: Ex Ditch

Inflow Area =	18.370 ac,	0.00% Impervious,	Inflow Depth =	1.46"	for 10-yr Storm event
Inflow =	18.62 cfs @	12.38 hrs,	Volume=	2.240 af	
Outflow =	18.53 cfs @	12.40 hrs,	Volume=	2.240 af,	Atten= 0%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.62 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 2.2 min

Peak Storage= 906 cf @ 12.39 hrs
Average Depth at Peak Storage= 1.00'
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'



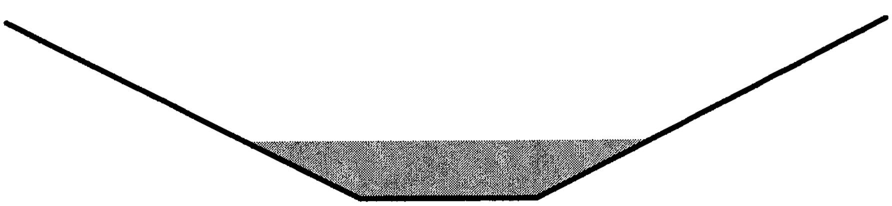
Summary for Reach 14R: DP-10 DITCH 2

Inflow Area =	12.310 ac,	0.00% Impervious,	Inflow Depth = 1.46"	for 10-yr Storm event	
Inflow =	14.07 cfs @	12.32 hrs,	Volume=	1.501 af	
Outflow =	13.95 cfs @	12.36 hrs,	Volume=	1.501 af,	Atten= 1%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.49 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 2.51 fps, Avg. Travel Time= 2.9 min

Peak Storage= 939 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.65'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 143.33 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 434.0' Slope= 0.0357 '/'
Inlet Invert= 209.00', Outlet Invert= 193.50'



Summary for Reach AP1: AP-1

Inflow Area =	135.571 ac,	2.88% Impervious,	Inflow Depth = 1.24"	for 10-yr Storm event	
Inflow =	50.41 cfs @	13.50 hrs,	Volume=	13.974 af	
Outflow =	50.41 cfs @	13.50 hrs,	Volume=	13.974 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 74.320 ac, 3.55% Impervious, Inflow Depth = 1.60" for 10-yr Storm event
Inflow = 24.63 cfs @ 13.74 hrs, Volume= 9.905 af
Outflow = 24.63 cfs @ 13.74 hrs, Volume= 9.905 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 270.330 ac, 1.32% Impervious, Inflow Depth = 1.60" for 10-yr Storm event
Inflow = 74.13 cfs @ 15.27 hrs, Volume= 36.035 af
Outflow = 74.13 cfs @ 15.27 hrs, Volume= 36.035 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 340.334 ac, 2.56% Impervious, Inflow Depth > 1.61" for 10-yr Storm event
Inflow = 84.71 cfs @ 15.06 hrs, Volume= 45.769 af
Outflow = 84.71 cfs @ 15.06 hrs, Volume= 45.769 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: ANALYSIS POINT #5

Inflow Area = 35.960 ac, 0.40% Impervious, Inflow Depth = 1.82" for 10-yr Storm event
Inflow = 13.44 cfs @ 14.71 hrs, Volume= 5.440 af
Outflow = 13.44 cfs @ 14.71 hrs, Volume= 5.440 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach E2R2: E2R2

Inflow Area = 1.921 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 1.77 cfs @ 12.47 hrs, Volume= 0.234 af
Outflow = 0.34 cfs @ 17.42 hrs, Volume= 0.234 af, Atten= 81%, Lag= 297.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.32 fps, Min. Travel Time= 223.8 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 484.8 min

Peak Storage= 4,526 cf @ 13.69 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 132.12 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 4,356.0' Slope= 0.0094 '/'
Inlet Invert= 182.00', Outlet Invert= 141.00'

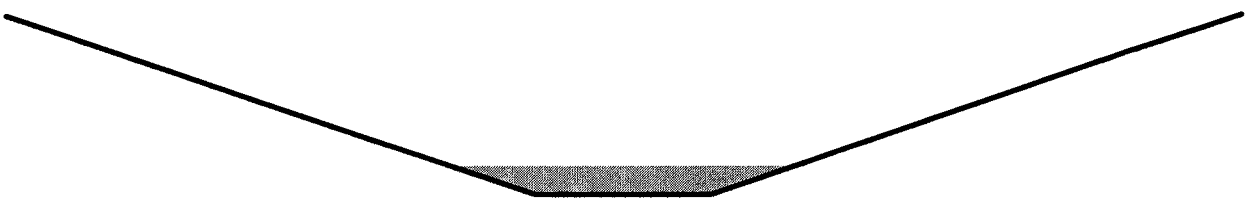
Summary for Reach E2R3: REACH TO AP

Inflow Area =	33.165 ac,	8.08% Impervious,	Inflow Depth > 1.06"	for 10-yr Storm event	
Inflow =	0.99 cfs @	24.30 hrs,	Volume=	2.943 af	
Outflow =	0.99 cfs @	25.22 hrs,	Volume=	2.936 af, Atten= 0%,	Lag= 55.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.07 fps, Min. Travel Time= 33.7 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 63.8 min

Peak Storage= 2,012 cf @ 24.66 hrs
Average Depth at Peak Storage= 0.31'
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'



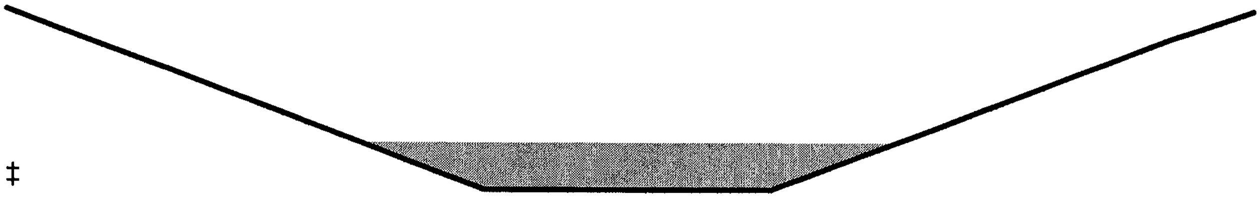
Summary for Reach E2R4: Reach to AP

Inflow Area =	92.419 ac,	5.17% Impervious,	Inflow Depth > 1.27"	for 10-yr Storm event	
Inflow =	9.18 cfs @	13.66 hrs,	Volume=	9.788 af	
Outflow =	8.62 cfs @	14.22 hrs,	Volume=	9.779 af, Atten= 6%,	Lag= 33.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.97 fps, Min. Travel Time= 16.5 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 49.2 min

Peak Storage= 8,549 cf @ 13.94 hrs
Average Depth at Peak Storage= 0.52'
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'



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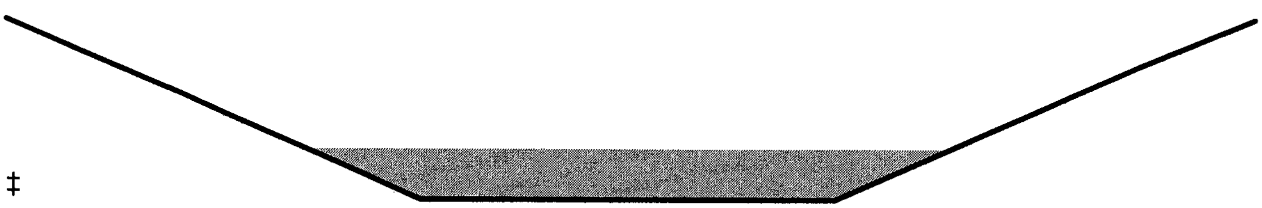
Summary for Reach R-1D: Reach R-1D

Inflow Area =	34.624 ac, 3.31% Impervious, Inflow Depth = 0.89"	for 10-yr Storm event
Inflow =	5.91 cfs @ 13.04 hrs, Volume=	2.573 af
Outflow =	5.91 cfs @ 13.15 hrs, Volume=	2.573 af, Atten= 0%, Lag= 6.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.66 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 20.9 min

Peak Storage= 1,314 cf @ 13.09 hrs
Average Depth at Peak Storage= 0.28'
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'



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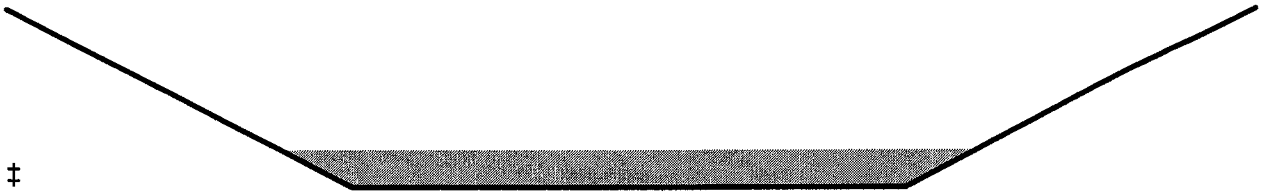
Summary for Reach R-1E: LEVEL SPREADER R-1E

Inflow Area =	10.745 ac, 0.00% Impervious, Inflow Depth = 1.53"	for 10-yr Storm event
Inflow =	7.89 cfs @ 12.47 hrs, Volume=	1.371 af
Outflow =	7.88 cfs @ 12.51 hrs, Volume=	1.371 af, Atten= 0%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.11 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 6.6 min

Peak Storage= 783 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 135.95 cfs

16.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 36.00'
Length= 210.0' Slope= 0.0690 '/'
Inlet Invert= 161.50', Outlet Invert= 147.00'



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Summary for Reach R-1F: Reach R-1F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 10-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.21 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= 0.0170 '/'
Inlet Invert= 167.50', Outlet Invert= 151.50'

‡

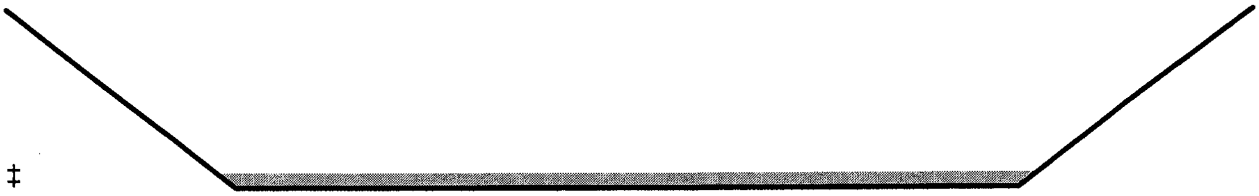
Summary for Reach R-1H: LEVEL SPREADER R-1H

Inflow Area = 3.030 ac, 0.00% Impervious, Inflow Depth = 2.21" for 10-yr Storm event
Inflow = 5.77 cfs @ 12.24 hrs, Volume= 0.557 af
Outflow = 5.67 cfs @ 12.28 hrs, Volume= 0.557 af, Atten= 2%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.01 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 4.7 min

Peak Storage= 488 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 44.0 sf, Capacity= 411.95 cfs

34.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 54.00'
Length= 170.0' Slope= 0.0471 '/'
Inlet Invert= 182.00', Outlet Invert= 174.00'



Summary for Reach R-2F: Reach R2-F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 10-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
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'

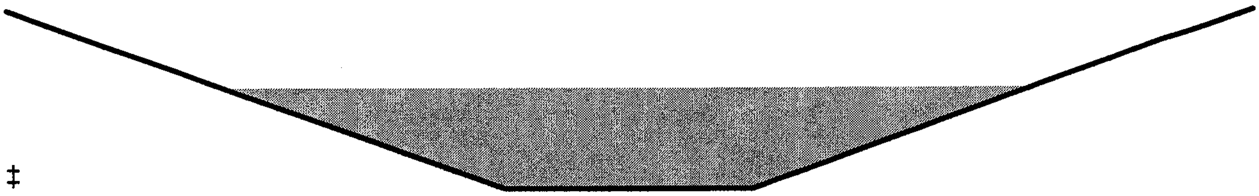
Summary for Reach R1: Reach 1

Inflow Area = 112.491 ac, 3.46% Impervious, Inflow Depth = 1.15" for 10-yr Storm event
Inflow = 38.57 cfs @ 13.37 hrs, Volume= 10.762 af
Outflow = 38.22 cfs @ 13.59 hrs, Volume= 10.762 af, Atten= 1%, Lag= 13.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.60 fps, Min. Travel Time= 7.3 min
Avg. Velocity = 0.23 fps, Avg. Travel Time= 51.9 min

Peak Storage= 16,759 cf @ 13.46 hrs
Average Depth at Peak Storage= 1.13'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 132.69 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= 0.0016 '/'
Inlet Invert= 146.30', Outlet Invert= 145.20'



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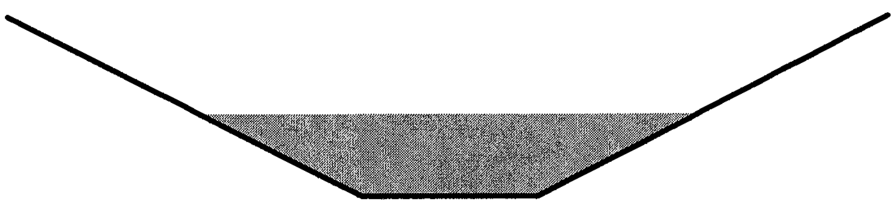
Summary for Reach R1B: LF TOE DITCH

Inflow Area = 13.169 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 15.37 cfs @ 12.26 hrs, Volume= 1.606 af
Outflow = 15.08 cfs @ 12.32 hrs, Volume= 1.606 af, Atten= 2%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.29 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.63 fps, Avg. Travel Time= 5.5 min

Peak Storage= 1,906 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.92'
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'



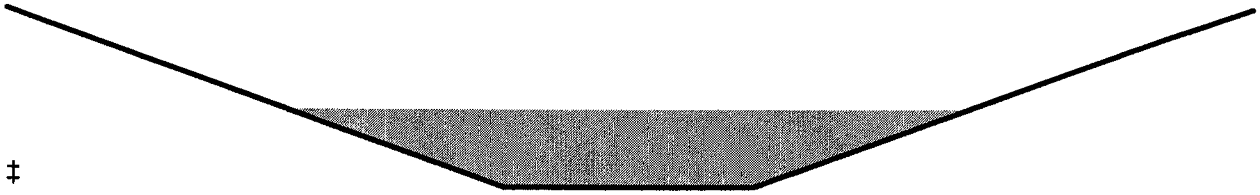
Summary for Reach R2: Reach 2

Inflow Area = 64.567 ac, 4.26% Impervious, Inflow Depth = 1.13" for 10-yr Storm event
Inflow = 26.10 cfs @ 13.15 hrs, Volume= 6.094 af
Outflow = 25.30 cfs @ 13.49 hrs, Volume= 6.094 af, Atten= 3%, Lag= 20.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.56 fps, Min. Travel Time= 11.2 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 42.2 min

Peak Storage= 17,037 cf @ 13.30 hrs
Average Depth at Peak Storage= 0.87'
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= 1,050.0' Slope= 0.0020 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'



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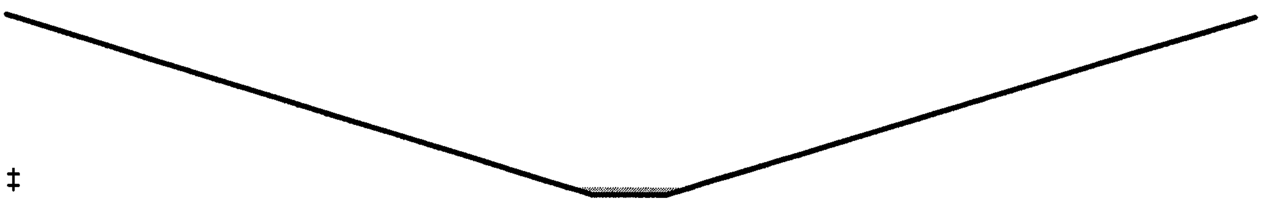
Summary for Reach R2A: Reach 2A

Inflow Area = 20.177 ac, 3.27% Impervious, Inflow Depth > 1.41" for 10-yr Storm event
Inflow = 1.34 cfs @ 17.11 hrs, Volume= 2.371 af
Outflow = 1.33 cfs @ 19.17 hrs, Volume= 2.370 af, Atten= 1%, Lag= 123.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.48 fps, Min. Travel Time= 68.2 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 136.7 min

Peak Storage= 5,426 cf @ 18.03 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,358.84 cfs

25.00' x 2.00' deep channel, n= 0.060
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,960.0' Slope= 0.0138 '/'
Inlet Invert= 179.00', Outlet Invert= 152.00'



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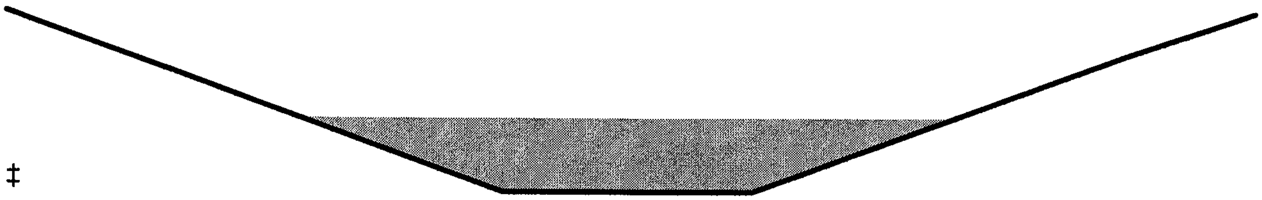
Summary for Reach R3: Reach 3

Inflow Area = 53.822 ac, 5.11% Impervious, Inflow Depth = 1.05" for 10-yr Storm event
Inflow = 22.65 cfs @ 13.00 hrs, Volume= 4.723 af
Outflow = 22.18 cfs @ 13.27 hrs, Volume= 4.723 af, Atten= 2%, Lag= 16.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 8.9 min
Avg. Velocity = 0.49 fps, Avg. Travel Time= 27.2 min

Peak Storage= 11,795 cf @ 13.13 hrs
Average Depth at Peak Storage= 0.81'
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= 800.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 148.40'



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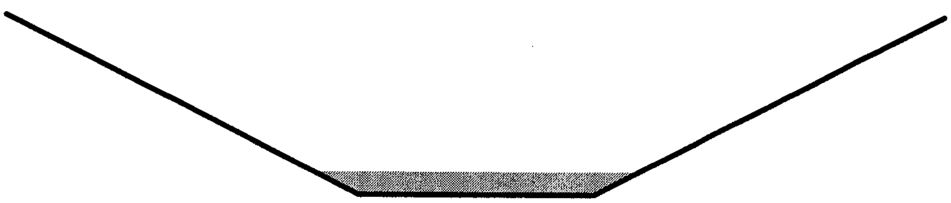
Summary for Reach R5a: Grass Lined Ditch

Inflow Area = 9.334 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 11.05 cfs @ 12.25 hrs, Volume= 1.138 af
Outflow = 10.99 cfs @ 12.26 hrs, Volume= 1.138 af, Atten= 1%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.16 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.21 fps, Avg. Travel Time= 1.5 min

Peak Storage= 359 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 572.96 cfs

4.00' x 3.00' deep channel, n= 0.025
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 Pond 1P: Culvert - 4JB & FJC

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 14.10 cfs @ 12.31 hrs, Volume= 1.501 af
Outflow = 14.07 cfs @ 12.32 hrs, Volume= 1.501 af, Atten= 0%, Lag= 0.9 min
Primary = 14.07 cfs @ 12.32 hrs, Volume= 1.501 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 211.35' @ 12.32 hrs Surf.Area= 918 sf Storage= 648 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.8 min (871.0 - 870.2)

Volume	Invert	Avail.Storage	Storage Description
#1	210.00'	3,853 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
210.00	43	0	0
212.00	1,340	1,383	1,383
213.00	3,600	2,470	3,853

Device	Routing	Invert	Outlet Devices
#1	Primary	210.00'	**24.0" Round Culvert X 2.00** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 210.00' / 209.00' S= 0.0137 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=13.97 cfs @ 12.32 hrs HW=211.34' (Free Discharge)
↑**1=Culvert** (Inlet Controls 13.97 cfs @ 3.11 fps)

Summary for Pond 4IAC: Culvert - 4IA

Inflow Area =	0.940 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	1.41 cfs @	12.17 hrs, Volume=	0.115 af
Outflow =	1.33 cfs @	12.21 hrs, Volume=	0.115 af, Atten= 6%, Lag= 2.4 min
Primary =	1.33 cfs @	12.21 hrs, Volume=	0.115 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 213.49' @ 12.21 hrs Surf.Area= 555 sf Storage= 236 cf

Plug-Flow detention time= 6.5 min calculated for 0.115 af (100% of inflow)
Center-of-Mass det. time= 6.5 min (869.8 - 863.3)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,559 cf	**2.00'W x 125.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.90'	**18.0" Round Culvert - 4IA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 212.90' / 212.20' S= 0.0175 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.31 cfs @ 12.21 hrs HW=213.48' (Free Discharge)
↑**1=Culvert - 4IA** (Inlet Controls 1.31 cfs @ 2.05 fps)

Summary for Pond 8P: Ex Pond

Inflow Area =	28.280 ac,	4.24% Impervious, Inflow Depth > 1.36"	for 10-yr Storm event
Inflow =	4.96 cfs @	13.51 hrs, Volume=	3.212 af
Outflow =	4.95 cfs @	13.57 hrs, Volume=	3.144 af, Atten= 0%, Lag= 3.4 min
Primary =	4.95 cfs @	13.57 hrs, Volume=	3.144 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 172.19' @ 13.57 hrs Surf.Area= 4,538 sf Storage= 4,248 cf

Plug-Flow detention time= 170.1 min calculated for 3.143 af (98% of inflow)

Center-of-Mass det. time= 24.5 min (1,612.8 - 1,588.3)

Volume	Invert	Avail.Storage	Storage Description
#1	171.20'	4,765 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.20	3,900	0	0
172.00	4,600	3,400	3,400
172.30	4,500	1,365	4,765

Device	Routing	Invert	Outlet Devices
#1	Primary	171.90'	**12.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=4.95 cfs @ 13.57 hrs HW=172.19' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 4.95 cfs @ 1.44 fps)

Summary for Pond C-2B-A: Culvert - 2BA

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	16.29 cfs @	12.26 hrs, Volume=	1.706 af
Outflow =	15.99 cfs @	12.29 hrs, Volume=	1.706 af, Atten= 2%, Lag= 1.6 min
Primary =	15.99 cfs @	12.29 hrs, Volume=	1.706 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 205.04' @ 12.29 hrs Surf.Area= 1,273 sf Storage= 1,200 cf

Plug-Flow detention time= 0.8 min calculated for 1.706 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (867.7 - 866.9)

Volume	Invert	Avail.Storage	Storage Description
#1	203.50'	1,859 cf	**2.00'W x 150.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	203.20'	**36.0" Round Culvert - 2BA** L= 40.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 203.20' / 202.90' S= 0.0075 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	205.00'	**4.0' long x 2.0' breadth Southern Ditch High Water Outlet X 0.00** 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=15.89 cfs @ 12.29 hrs HW=205.03' (Free Discharge)
↑—**1=Culvert - 2BA** (Barrel Controls 15.89 cfs @ 5.04 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=203.50' (Free Discharge)
↑—**2=Southern Ditch High Water Outlet** (Controls 0.00 cfs)

Summary for Pond C-4F: Culvert - 4F

Inflow Area = 6.771 ac, 0.00% Impervious, Inflow Depth = 1.40" for 10-yr Storm event
Inflow = 3.79 cfs @ 12.98 hrs, Volume= 0.788 af
Outflow = 3.77 cfs @ 13.04 hrs, Volume= 0.788 af, Atten= 1%, Lag= 3.6 min
Primary = 3.77 cfs @ 13.04 hrs, Volume= 0.788 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 166.07' @ 13.04 hrs Surf.Area= 0.025 ac Storage= 0.018 af

Plug-Flow detention time= 4.8 min calculated for 0.788 af (100% of inflow)
Center-of-Mass det. time= 4.9 min (922.1 - 917.3)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	0.047 af	**4.00'W x 96.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**18.0" Round Culvert - 4F** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 165.00' / 162.00' S= 0.0385 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=3.77 cfs @ 13.04 hrs HW=166.07' (Free Discharge)
↑—**1=Culvert - 4F** (Inlet Controls 3.77 cfs @ 2.78 fps)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 12.21 cfs @ 12.34 hrs, Volume= 1.325 af
Outflow = 11.94 cfs @ 12.38 hrs, Volume= 1.325 af, Atten= 2%, Lag= 2.5 min
Primary = 11.94 cfs @ 12.38 hrs, Volume= 1.325 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 220.60' @ 12.38 hrs Surf.Area= 4,088 sf Storage= 2,052 cf

Plug-Flow detention time= 4.7 min calculated for 1.325 af (100% of inflow)
Center-of-Mass det. time= 4.7 min (878.4 - 873.8)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	3,865 cf	**5.00'W x 550.00'L x 1.00'H Prismatoid Z=2.0**

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' / 214.30' S= 0.0431 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	220.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=11.87 cfs @ 12.38 hrs HW=220.60' (Free Discharge)
└1=**Culvert - 4K** (Passes 11.87 cfs of 26.62 cfs potential flow)
└2=**Orifice/Grate** (Weir Controls 11.87 cfs @ 2.53 fps)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area =	20.700 ac,	1.27% Impervious, Inflow Depth =	1.53"	for 10-yr Storm event
Inflow =	21.27 cfs @	12.38 hrs, Volume=	2.637 af	
Outflow =	21.25 cfs @	12.39 hrs, Volume=	2.637 af,	Atten= 0%, Lag= 0.5 min
Primary =	21.25 cfs @	12.39 hrs, Volume=	2.637 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 206.18' @ 12.39 hrs Surf.Area= 539 sf Storage= 92 cf

Plug-Flow detention time= 0.0 min calculated for 2.636 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (872.7 - 872.7)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,197 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	47	38	38
208.00	5,375	5,422	5,460
209.00	6,100	5,738	11,197

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0090 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=21.19 cfs @ 12.39 hrs HW=206.18' (Free Discharge)
└1=**Culvert - 4B** (Inlet Controls 21.19 cfs @ 3.59 fps)

Summary for Pond C4H-A: Culvert 4H-A

Inflow Area =	0.780 ac,	0.00% Impervious, Inflow Depth =	1.46"	for 10-yr Storm event
Inflow =	1.17 cfs @	12.16 hrs, Volume=	0.095 af	
Outflow =	0.96 cfs @	12.24 hrs, Volume=	0.095 af,	Atten= 18%, Lag= 4.8 min
Primary =	0.96 cfs @	12.24 hrs, Volume=	0.095 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 202.39' @ 12.24 hrs Surf.Area= 1,120 sf Storage= 414 cf

Plug-Flow detention time= 15.8 min calculated for 0.095 af (100% of inflow)
Center-of-Mass det. time= 15.9 min (878.4 - 862.4)

Volume	Invert	Avail.Storage	Storage Description
#1	201.90'	3,419 cf	**2.00'W x 280.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	201.90'	**18.0" Round Culvert - 4HA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 201.90' / 200.90' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.95 cfs @ 12.24 hrs HW=202.39' (Free Discharge)
1=Culvert - 4HA (Inlet Controls 0.95 cfs @ 1.88 fps)

Summary for Pond C4N: Culvert 4N

Inflow Area =	1.921 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event	
Inflow =	1.78 cfs @	12.46 hrs, Volume=	0.234 af	
Outflow =	1.77 cfs @	12.47 hrs, Volume=	0.234 af,	Atten= 0%, Lag= 0.9 min
Primary =	1.77 cfs @	12.47 hrs, Volume=	0.234 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.69' @ 12.47 hrs Surf.Area= 0.006 ac Storage= 0.003 af

Plug-Flow detention time= 2.0 min calculated for 0.234 af (100% of inflow)
Center-of-Mass det. time= 2.0 min (880.9 - 878.9)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	0.015 af	**2.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	184.00'	**18.0" Round 18-in Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.00' / 183.00' S= 0.0303 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.77 cfs @ 12.47 hrs HW=184.69' (Free Discharge)
1=18-in Culvert (Inlet Controls 1.77 cfs @ 2.23 fps)

Summary for Pond CB-2B-B: Catch Basin - 2BB

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event	
Inflow =	15.76 cfs @	12.34 hrs, Volume=	1.706 af	
Outflow =	15.73 cfs @	12.35 hrs, Volume=	1.706 af,	Atten= 0%, Lag= 0.5 min
Primary =	15.73 cfs @	12.35 hrs, Volume=	1.706 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 200.44' @ 12.35 hrs Surf.Area= 597 sf Storage= 121 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (872.0 - 872.0)

Volume	Invert	Avail.Storage	Storage Description
#1	200.20'	2,459 cf	**2.00'W x 200.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	**24.0" Round Culvert - 2BB** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.00' / 194.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	200.00'	**30.0" Horiz. Orifice/Grate** C= 0.600

Primary OutFlow Max=15.70 cfs @ 12.35 hrs HW=200.44' (Free Discharge)
└─**1=Culvert - 2BB** (Passes 15.70 cfs of 31.88 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 15.70 cfs @ 3.20 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area =	12.750 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	14.64 cfs @	12.33 hrs, Volume=	1.554 af
Outflow =	14.58 cfs @	12.35 hrs, Volume=	1.554 af, Atten= 0%, Lag= 1.3 min
Primary =	14.58 cfs @	12.35 hrs, Volume=	1.554 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 181.93' @ 12.35 hrs Surf.Area= 580 sf Storage= 331 cf

Plug-Flow detention time= 0.4 min calculated for 1.554 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (873.9 - 873.5)

Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	1,256 cf	**2.00'W x 71.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	175.00'	**24.0" Round Culvert - 4G** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.00' / 174.00' S= 0.0278 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	181.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=14.55 cfs @ 12.35 hrs HW=181.93' (Free Discharge)
└─**1=Culvert - 4G** (Passes 14.55 cfs of 36.82 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 14.55 cfs @ 4.63 fps)

Summary for Pond CB-4HB: Catch Basin - 4HB

Inflow Area = 4.180 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 5.29 cfs @ 12.23 hrs, Volume= 0.510 af
Outflow = 5.29 cfs @ 12.23 hrs, Volume= 0.510 af, Atten= 0%, Lag= 0.1 min
Primary = 5.29 cfs @ 12.23 hrs, Volume= 0.510 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 183.70' @ 12.23 hrs Surf.Area= 96 sf Storage= 29 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (868.9 - 868.7)

Volume	Invert	Avail.Storage	Storage Description
#1	183.30'	359 cf	**2.00'W x 25.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Device 2	183.30'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	178.50'	**18.0" Round Culvert - 4HB** L= 101.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 176.00' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=5.23 cfs @ 12.23 hrs HW=183.70' (Free Discharge)
↑—**2=Culvert - 4HB** (Passes 5.23 cfs of 17.95 cfs potential flow)
↑—**1=Orifice/Grate** (Weir Controls 5.23 cfs @ 2.07 fps)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 12.84 cfs @ 12.27 hrs, Volume= 1.325 af
Outflow = 12.83 cfs @ 12.27 hrs, Volume= 1.325 af, Atten= 0%, Lag= 0.3 min
Primary = 12.83 cfs @ 12.27 hrs, Volume= 1.325 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 208.33' @ 12.27 hrs Surf.Area= 0.013 ac Storage= 0.007 af

Plug-Flow detention time= 1.0 min calculated for 1.325 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (869.2 - 868.6)

Volume	Invert	Avail.Storage	Storage Description
#1	207.50'	0.029 af	**2.00'W x 100.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	202.50'	**18.0" Round Culvert - 4I** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 202.50' / 192.00' S= 0.1313 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	207.60'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=12.69 cfs @ 12.27 hrs HW=208.33' TW=194.33' (TW follows 14.00' below HW)
└─**1=Culvert - 4I** (Passes 12.69 cfs of 19.17 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 12.69 cfs @ 2.79 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area =	12.310 ac,	0.00% Impervious,	Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	14.35 cfs @	12.27 hrs, Volume=	1.501 af	
Outflow =	14.21 cfs @	12.30 hrs, Volume=	1.501 af,	Atten= 1%, Lag= 1.4 min
Primary =	14.21 cfs @	12.30 hrs, Volume=	1.501 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 219.58' @ 12.30 hrs Surf.Area= 0.015 ac Storage= 0.009 af

Plug-Flow detention time= 0.5 min calculated for 1.500 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (868.7 - 868.2)

Volume	Invert	Avail.Storage	Storage Description
#1	218.70'	0.032 af	**2.00'W x 113.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	214.00'	**18.0" Round Culvert - 4JA** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.00' / 212.30' S= 0.0283 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=14.18 cfs @ 12.30 hrs HW=219.58' TW=212.58' (TW follows 7.00' below HW)
└─**1=Culvert - 4JA** (Passes 14.18 cfs of 18.70 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 14.18 cfs @ 4.51 fps)

Summary for Pond CB-4L: Catch Basin - 4L

Inflow Area =	7.500 ac,	0.00% Impervious,	Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	9.51 cfs @	12.21 hrs, Volume=	0.914 af	
Outflow =	9.37 cfs @	12.23 hrs, Volume=	0.914 af,	Atten= 1%, Lag= 1.3 min
Primary =	9.37 cfs @	12.23 hrs, Volume=	0.914 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 215.59' @ 12.23 hrs Surf.Area= 1,695 sf Storage= 946 cf

Plug-Flow detention time= 3.1 min calculated for 0.914 af (100% of inflow)
Center-of-Mass det. time= 3.1 min (866.8 - 863.6)

Volume	Invert	Avail.Storage	Storage Description
#1	215.00'	3,683 cf	**30.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 211.00' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	215.00'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.27 cfs @ 12.23 hrs HW=215.59' (Free Discharge)
↑—**1=Culvert 4L** (Passes 9.27 cfs of 11.54 cfs potential flow)
↑—**2=Orifice-Top of catch basin** (Weir Controls 9.27 cfs @ 2.51 fps)

Summary for Pond D-1G: (2)24" Culverts P-6h

Inflow Area =	11.290 ac,	0.00% Impervious, Inflow Depth = 1.53"	for 10-yr Storm event
Inflow =	15.60 cfs @	12.19 hrs, Volume=	1.440 af
Outflow =	15.45 cfs @	12.20 hrs, Volume=	1.440 af, Atten= 1%, Lag= 0.6 min
Primary =	15.45 cfs @	12.20 hrs, Volume=	1.440 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 184.43' @ 12.20 hrs Surf.Area= 573 sf Storage= 416 cf
Flood Elev= 185.00' Surf.Area= 800 sf Storage= 805 cf

Plug-Flow detention time= 0.5 min calculated for 1.440 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (859.9 - 859.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	3,305 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	10	0	0
184.00	400	205	205
186.00	1,200	1,600	1,805
187.00	1,800	1,500	3,305

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	184.50'	**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=15.44 cfs @ 12.20 hrs HW=184.43' (Free Discharge)
1=(2)24"-Culvert (Barrel Controls 15.44 cfs @ 4.49 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond D-1H: LF TOE DITCH - CULVERT

Inflow Area = 3.030 ac, 0.00% Impervious, Inflow Depth = 2.21" for 10-yr Storm event
Inflow = 5.84 cfs @ 12.22 hrs, Volume= 0.557 af
Outflow = 5.77 cfs @ 12.24 hrs, Volume= 0.557 af, Atten= 1%, Lag= 1.4 min
Primary = 5.77 cfs @ 12.24 hrs, Volume= 0.557 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.35' @ 12.24 hrs Surf.Area= 399 sf Storage= 594 cf
Flood Elev= 186.00' Surf.Area= 858 sf Storage= 1,323 cf

Plug-Flow detention time= 4.6 min calculated for 0.557 af (100% of inflow)
Center-of-Mass det. time= 4.5 min (840.9 - 836.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	1,323 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	24	0	0
186.00	858	1,323	1,323

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**18.0" Round Culvert-C-1H** L= 60.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 183.00' / 182.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.73 cfs @ 12.24 hrs HW=184.34' (Free Discharge)
1=Culvert-C-1H (Barrel Controls 5.73 cfs @ 4.55 fps)

Summary for Pond DP-1: Detention Pond 1

Inflow Area = 34.624 ac, 3.31% Impervious, Inflow Depth = 1.09" for 10-yr Storm event
Inflow = 28.22 cfs @ 12.29 hrs, Volume= 3.131 af
Outflow = 5.91 cfs @ 13.04 hrs, Volume= 2.573 af, Atten= 79%, Lag= 45.1 min
Primary = 5.91 cfs @ 13.04 hrs, Volume= 2.573 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 164.02' @ 13.04 hrs Surf.Area= 17,108 sf Storage= 55,211 cf

Plug-Flow detention time= 222.9 min calculated for 2.573 af (82% of inflow)
Center-of-Mass det. time= 138.3 min (1,023.4 - 885.1)

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	162.00'	**30.0" Round 30" Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.00' / 159.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	162.00'	**12.0" Vert. Orifice on side** C= 0.600
#3	Device 1	162.00'	**6.0" Vert. Orifice on side** C= 0.600
#4	Device 1	165.50'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**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=5.91 cfs @ 13.04 hrs HW=164.02' (Free Discharge)
└─**1=30" Culvert** (Passes 5.91 cfs of 16.20 cfs potential flow)
  ├─**2=Orifice on side** (Orifice Controls 4.66 cfs @ 5.93 fps)
  ├─**3=Orifice on side** (Orifice Controls 1.26 cfs @ 6.40 fps)
  └─**4=Orifice-Top of drop inlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth = 1.54" for 10-yr Storm event
Inflow = 32.93 cfs @ 12.31 hrs, Volume= 3.629 af
Outflow = 4.96 cfs @ 13.51 hrs, Volume= 3.212 af, Atten= 85%, Lag= 72.2 min
Primary = 3.56 cfs @ 13.51 hrs, Volume= 1.042 af
Secondary = 1.40 cfs @ 13.51 hrs, Volume= 2.169 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 179.16' @ 13.51 hrs Surf.Area= 24,319 sf Storage= 79,803 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 773.3 min calculated for 3.211 af (88% of inflow)
Center-of-Mass det. time= 720.9 min (1,588.3 - 867.4)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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=3.52 cfs @ 13.51 hrs HW=179.16' (Free Discharge)
└─**3=18-in Primary Culvert** (Passes 3.52 cfs of 15.24 cfs potential flow)
  ├─**1=Orifice/Grate** (Weir Controls 2.62 cfs @ 1.31 fps)
  └─**2=6-in Orifice** (Orifice Controls 0.90 cfs @ 4.59 fps)

Secondary OutFlow Max=1.40 cfs @ 13.51 hrs HW=179.16' (Free Discharge)
└─**4=6-in Culvert** (Passes 1.40 cfs of 1.59 cfs potential flow)
  ├─**5=Orifice Top** (Orifice Controls 1.30 cfs @ 7.08 fps)
  └─**6=Orifice Side** (Orifice Controls 0.10 cfs @ 8.20 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11: Detention Pond 11

Inflow Area =	22.282 ac,	4.04% Impervious, Inflow Depth = 1.53"	for 10-yr Storm event
Inflow =	21.28 cfs @	12.35 hrs, Volume=	2.841 af
Outflow =	1.18 cfs @	17.92 hrs, Volume=	2.687 af, Atten= 94%, Lag= 334.6 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Secondary =	1.18 cfs @	17.92 hrs, Volume=	2.687 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 166.87' @ 17.92 hrs Surf.Area= 36,691 sf Storage= 82,513 cf

Plug-Flow detention time= 1,190.5 min calculated for 2.686 af (95% of inflow)
Center-of-Mass det. time= 1,163.6 min (2,040.7 - 877.1)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
└─**3=18-In Culvert** (Controls 0.00 cfs)
  ├─**1=6-In Orifice Side (Riser)** (Controls 0.00 cfs)
  └─**2=Grate Top (Riser)** (Controls 0.00 cfs)

Secondary OutFlow Max=1.18 cfs @ 17.92 hrs HW=166.87' (Free Discharge)
└─**4=6-In Culvert** (Barrel Controls 1.18 cfs @ 6.41 fps)
  ├─**5=Orifice Top (6-in Culv)** (Passes < 1.18 cfs potential flow)
  └─**6=Orifice Side (6-in Culv)** (Passes < 0.15 cfs potential flow)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area =	20.177 ac,	3.27% Impervious, Inflow Depth = 1.50"	for 10-yr Storm event
Inflow =	16.74 cfs @	12.36 hrs, Volume=	2.530 af
Outflow =	1.34 cfs @	17.11 hrs, Volume=	2.371 af, Atten= 92%, Lag= 285.2 min
Primary =	0.09 cfs @	17.11 hrs, Volume=	0.026 af
Secondary =	1.25 cfs @	17.11 hrs, Volume=	2.344 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 186.96' @ 17.11 hrs Surf.Area= 34,237 sf Storage= 70,200 cf

Plug-Flow detention time= 1,073.7 min calculated for 2.370 af (94% of inflow)
Center-of-Mass det. time= 1,042.8 min (1,930.3 - 887.5)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-in Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.09 cfs @ 17.11 hrs HW=186.96' (Free Discharge)
3=18- In Culvert (Passes 0.09 cfs of 8.79 cfs potential flow)
1=Grate Top (Riser) (Controls 0.00 cfs)
2=8-In Orifice (Riser Side) (Orifice Controls 0.09 cfs @ 1.37 fps)

Secondary OutFlow Max=1.25 cfs @ 17.11 hrs HW=186.96' (Free Discharge)
6=6-In Culvert (Passes 1.25 cfs of 1.70 cfs potential flow)
4=Orifice Top (6-in Pipe) (Orifice Controls 1.07 cfs @ 5.82 fps)
5=Orifice (Side of 6-in) (Orifice Controls 0.18 cfs @ 7.46 fps)

Summary for Pond DP-1A: DP-1A (Former Leachate Pond)

Inflow Area = 10.835 ac, 10.57% Impervious, Inflow Depth = 1.73" for 10-yr Storm event
Inflow = 12.96 cfs @ 12.25 hrs, Volume= 1.566 af
Outflow = 0.33 cfs @ 22.79 hrs, Volume= 0.110 af, Atten= 97%, Lag= 632.3 min
Primary = 0.33 cfs @ 22.79 hrs, Volume= 0.110 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 164.00' Surf.Area= 37,429 sf Storage= 182,617 cf
Peak Elev= 165.63' @ 22.79 hrs Surf.Area= 41,956 sf Storage= 247,127 cf (64,510 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (80,429 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 544.3 min (1,386.4 - 842.1)

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	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=0.19 cfs @ 22.79 hrs HW=165.63' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.19 cfs @ 0.41 fps)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 10.745 ac, 0.00% Impervious, Inflow Depth = 1.53" for 10-yr Storm event
Inflow = 14.84 cfs @ 12.19 hrs, Volume= 1.371 af
Outflow = 7.89 cfs @ 12.47 hrs, Volume= 1.371 af, Atten= 47%, Lag= 16.8 min
Primary = 7.89 cfs @ 12.47 hrs, Volume= 1.371 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 162.30' Surf.Area= 2,326 sf Storage= 956 cf
Peak Elev= 164.71' @ 12.47 hrs Surf.Area= 6,452 sf Storage= 11,544 cf (10,588 cf above start)
Flood Elev= 166.60' Surf.Area= 12,071 sf Storage= 28,956 cf (27,999 cf above start)

Plug-Flow detention time= 37.5 min calculated for 1.349 af (98% of inflow)
Center-of-Mass det. time= 24.6 min (884.1 - 859.5)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	47,648 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,957	0	0
164.00	4,419	6,376	6,376
166.00	10,150	14,569	20,945
168.00	16,553	26,703	47,648

Device	Routing	Invert	Outlet Devices
#1	Primary	162.30'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.30' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	162.30'	**15.0" Vert. Orifice** C= 0.600
#3	Device 1	166.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.89 cfs @ 12.47 hrs HW=164.71' (Free Discharge)
└─1=**Culvert** (Passes 7.89 cfs of 16.52 cfs potential flow)
  ├─2=**Orifice** (Orifice Controls 7.89 cfs @ 6.43 fps)
  └─3=**Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 1.75" for 10-yr Storm event
Inflow = 26.87 cfs @ 12.26 hrs, Volume= 3.302 af
Outflow = 1.29 cfs @ 17.77 hrs, Volume= 3.302 af, Atten= 95%, Lag= 331.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 1.29 cfs @ 17.77 hrs, Volume= 3.302 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 174.00' Surf.Area= 25,931 sf Storage= 29,566 cf
Peak Elev= 176.12' @ 17.77 hrs Surf.Area= 64,099 sf Storage= 127,302 cf (97,736 cf above start)
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (467,078 cf above start)

Plug-Flow detention time= 1,263.3 min calculated for 2.622 af (79% of inflow)
Center-of-Mass det. time= 953.2 min (1,812.4 - 859.2)

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	Secondary	169.00'	**6.0" Round Outlet Culvert 6"** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 169.00' / 168.00' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	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=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
└─**1=Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=1.29 cfs @ 17.77 hrs HW=176.12' (Free Discharge)
├─**2=Outlet Culvert 6"** (Passes 1.29 cfs of 1.61 cfs potential flow)
│ └─**3=Orifice** (Orifice Controls 1.29 cfs @ 7.02 fps)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area =	33.165 ac,	8.08% Impervious, Inflow Depth = 1.86"	for 10-yr Storm event
Inflow =	38.75 cfs @	12.38 hrs, Volume=	5.146 af
Outflow =	0.99 cfs @	23.58 hrs, Volume=	2.949 af, Atten= 97%, Lag= 672.1 min
Primary =	0.03 cfs @	23.58 hrs, Volume=	0.012 af
Secondary =	0.96 cfs @	23.58 hrs, Volume=	2.937 af
Tertiary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 189.59' @ 23.58 hrs Surf.Area= 84,965 sf Storage= 187,879 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,926.1 min calculated for 2.949 af (57% of inflow)
Center-of-Mass det. time= 1,808.6 min (2,664.1 - 855.5)

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
#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=0.03 cfs @ 23.58 hrs HW=189.59' (Free Discharge)
└─**1=12-In Outlet Culvert** (Inlet Controls 0.03 cfs @ 0.81 fps)

Secondary OutFlow Max=0.96 cfs @ 23.58 hrs HW=189.59' (Free Discharge)
└─**2=6-In Culvert** (Passes 0.96 cfs of 1.58 cfs potential flow)
  ├─**3=Orifice** (Orifice Controls 0.83 cfs @ 4.54 fps)
  └─**4=Orifice** (Orifice Controls 0.13 cfs @ 5.34 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: SC-1A Runoff Area=23.080 ac 0.00% Impervious Runoff Depth=2.21"
Flow Length=2,249' Slope=0.0260 '/' Tc=88.1 min CN=74 Runoff=18.21 cfs 4.242 af

Subcatchment1B: SC-1B Runoff Area=13.169 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,282' Tc=17.5 min CN=71 Runoff=21.08 cfs 2.158 af

Subcatchment1C: SC-1C Runoff Area=13.300 ac 0.00% Impervious Runoff Depth=2.46"
Flow Length=380' Tc=68.3 min CN=77 Runoff=13.85 cfs 2.723 af

Subcatchment1D: SC-1D Runoff Area=10.620 ac 0.00% Impervious Runoff Depth=2.12"
Flow Length=1,117' Tc=16.9 min CN=73 Runoff=18.76 cfs 1.880 af

Subcatchment1E: SC-1E Runoff Area=10.745 ac 0.00% Impervious Runoff Depth=2.05"
Flow Length=910' Tc=12.7 min CN=72 Runoff=20.18 cfs 1.831 af

Subcatchment1F: SC-1F Runoff Area=31.220 ac 3.52% Impervious Runoff Depth=2.37"
Flow Length=2,066' Tc=73.2 min CN=76 Runoff=29.90 cfs 6.170 af

Subcatchment1G: SC-1G Runoff Area=11.290 ac 0.00% Impervious Runoff Depth=2.05"
Flow Length=857' Tc=12.7 min CN=72 Runoff=21.20 cfs 1.924 af

Subcatchment1H: SC-1H Runoff Area=3.030 ac 0.00% Impervious Runoff Depth=2.81"
Flow Length=759' Tc=15.4 min CN=81 Runoff=7.45 cfs 0.709 af

Subcatchment1I: SC-1I Runoff Area=9.334 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,084' Tc=16.8 min CN=71 Runoff=15.16 cfs 1.530 af

Subcatchment1J: SC-1J Runoff Area=360,761 sf 19.96% Impervious Runoff Depth=2.46"
Flow Length=593' Tc=33.0 min CN=77 Runoff=12.86 cfs 1.695 af

Subcatchment2A: SC-2A Runoff Area=54.143 ac 3.66% Impervious Runoff Depth=2.21"
Flow Length=2,435' Tc=126.1 min CN=74 Runoff=33.02 cfs 9.952 af

Subcatchment2B: 2B Runoff Area=13.996 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,218' Tc=17.6 min CN=71 Runoff=22.34 cfs 2.294 af

Subcatchment2C: 2C Runoff Area=6.181 ac 10.68% Impervious Runoff Depth=2.12"
Flow Length=702' Tc=80.7 min CN=73 Runoff=4.92 cfs 1.094 af

Subcatchment3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth=2.12"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=100.29 cfs 47.866 af

Subcatchment4A: 4A Runoff Area=4.518 ac 7.22% Impervious Runoff Depth=2.46"
Flow Length=379' Tc=5.1 min CN=77 Runoff=12.99 cfs 0.925 af

Subcatchment4B: 4B Runoff Area=2.330 ac 11.29% Impervious Runoff Depth=2.63"
Flow Length=667' Tc=13.2 min CN=79 Runoff=5.65 cfs 0.511 af

Subcatchment 4C: 4C Runoff Area=1.287 ac 24.86% Impervious Runoff Depth=3.28"
Flow Length=496' Tc=15.4 min CN=86 Runoff=3.66 cfs 0.352 af

Subcatchment 4D: 4D Runoff Area=6.660 ac 26.58% Impervious Runoff Depth=3.38"
Flow Length=824' Tc=33.9 min CN=87 Runoff=13.92 cfs 1.876 af

Subcatchment 4E: 4E Runoff Area=247.915 ac 1.59% Impervious Runoff Depth=2.29"
Flow Length=6,090' Tc=225.6 min CN=75 Runoff=103.71 cfs 47.271 af

Subcatchment 4F: 4F Runoff Area=6.771 ac 0.00% Impervious Runoff Depth=1.89"
Flow Length=1,228' Tc=68.8 min CN=70 Runoff=5.26 cfs 1.066 af

Subcatchment 4G: 4G Runoff Area=12.750 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=929' Tc=17.1 min CN=71 Runoff=20.57 cfs 2.089 af

Subcatchment 4H: 4H Runoff Area=3.400 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=823' Tc=11.9 min CN=71 Runoff=6.28 cfs 0.557 af

Subcatchment 4HA: 4HA Runoff Area=0.780 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=142' Slope=0.3300 '/' Tc=6.7 min CN=71 Runoff=1.70 cfs 0.128 af

Subcatchment 4I: 4I Runoff Area=9.930 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,082' Tc=17.1 min CN=71 Runoff=16.02 cfs 1.627 af

Subcatchment 4IA: 4IA Runoff Area=0.940 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=136' Slope=0.3333 '/' Tc=6.4 min CN=71 Runoff=2.07 cfs 0.154 af

Subcatchment 4J: 4J Runoff Area=12.310 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,051' Tc=17.2 min CN=71 Runoff=19.82 cfs 2.017 af

Subcatchment 4K: 4K Runoff Area=10.870 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,095' Tc=18.4 min CN=71 Runoff=17.06 cfs 1.781 af

Subcatchment 4L: 4L Runoff Area=7.500 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=896' Tc=14.1 min CN=71 Runoff=13.04 cfs 1.229 af

Subcatchment 4M: 4M Runoff Area=5.352 ac 16.82% Impervious Runoff Depth=2.29"
Flow Length=642' Tc=53.5 min CN=75 Runoff=5.98 cfs 1.020 af

Subcatchment 4N: 4N Runoff Area=1.921 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=730' Tc=30.5 min CN=71 Runoff=2.43 cfs 0.315 af

Subcatchment 4O: 4O Runoff Area=5.100 ac 23.53% Impervious Runoff Depth=2.46"
Flow Length=663' Tc=14.2 min CN=77 Runoff=11.26 cfs 1.044 af

Subcatchment 5: SC-5 Runoff Area=35.960 ac 0.40% Impervious Runoff Depth=2.37"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=17.74 cfs 7.107 af

Subcatchment P1A: SC-P1A Runoff Area=65,400 sf 76.26% Impervious Runoff Depth=4.11"
Tc=0.0 min CN=94 Runoff=7.72 cfs 0.514 af

Reach 1R: DP-10 DITCH 1 Avg. Flow Depth=0.71' Max Vel=3.65 fps Inflow=19.17 cfs 2.017 af
n=0.025 L=101.0' S=0.0079 '/' Capacity=128.49 cfs Outflow=19.11 cfs 2.017 af

Reach 2R: E2C-DP9 Avg. Flow Depth=0.55' Max Vel=4.87 fps Inflow=15.53 cfs 1.277 af
n=0.022 L=590.0' S=0.0169 '/' Capacity=488.04 cfs Outflow=14.74 cfs 1.277 af

Reach 3R: Overland Flow Avg. Flow Depth=0.49' Max Vel=9.99 fps Inflow=29.11 cfs 3.521 af
n=0.035 L=168.0' S=0.0554 '/' Capacity=119.87 cfs Outflow=29.07 cfs 3.521 af

Reach 4HR-A: EAST PD - 4 Avg. Flow Depth=0.22' Max Vel=2.98 fps Inflow=1.70 cfs 0.128 af
n=0.025 L=288.0' S=0.0247 '/' Capacity=119.08 cfs Outflow=1.60 cfs 0.128 af

Reach 4HR-B: EAST PD - 5 Avg. Flow Depth=0.44' Max Vel=5.84 fps Inflow=7.49 cfs 0.685 af
n=0.025 L=425.0' S=0.0438 '/' Capacity=158.67 cfs Outflow=7.36 cfs 0.685 af

Reach 4IR-A: EAST PD - 2 Avg. Flow Depth=0.27' Max Vel=2.82 fps Inflow=2.07 cfs 0.154 af
n=0.025 L=330.0' S=0.0176 '/' Capacity=100.55 cfs Outflow=1.94 cfs 0.154 af

Reach 4IR-B: EAST PD - 3 Avg. Flow Depth=0.83' Max Vel=5.84 fps Inflow=17.71 cfs 1.781 af
n=0.025 L=210.0' S=0.0224 '/' Capacity=113.47 cfs Outflow=17.60 cfs 1.781 af

Reach 4JR: EAST PD 1 Avg. Flow Depth=0.93' Max Vel=5.56 fps Inflow=19.82 cfs 2.017 af
n=0.025 L=183.0' S=0.0180 '/' Capacity=101.85 cfs Outflow=19.70 cfs 2.017 af

Reach 4R: DP-10 DITCH 3 Avg. Flow Depth=0.98' Max Vel=9.15 fps Inflow=35.39 cfs 3.798 af
n=0.025 L=260.0' S=0.0462 '/' Capacity=162.94 cfs Outflow=35.24 cfs 3.798 af

Reach 5R: NORTH PD-1 Avg. Flow Depth=0.82' Max Vel=6.71 fps Inflow=20.57 cfs 2.089 af
n=0.025 L=936.0' S=0.0299 '/' Capacity=131.18 cfs Outflow=20.17 cfs 2.089 af

Reach 6R: NORTH PD-2 Avg. Flow Depth=1.18' Max Vel=4.22 fps Inflow=21.89 cfs 2.294 af
n=0.025 L=364.0' S=0.0080 '/' Capacity=67.70 cfs Outflow=21.59 cfs 2.294 af

Reach 7R: DP-10R Avg. Flow Depth=0.93' Max Vel=3.56 fps Inflow=18.32 cfs 4.357 af
n=0.045 L=1,130.0' S=0.0248 '/' Capacity=88.21 cfs Outflow=15.92 cfs 4.356 af

Reach 8R: EAST PD - 6 Avg. Flow Depth=0.80' Max Vel=3.20 fps Inflow=17.06 cfs 1.781 af
n=0.025 L=360.0' S=0.0056 '/' Capacity=25.35 cfs Outflow=16.80 cfs 1.781 af

Reach 9R: LEVEL SPREADER Avg. Flow Depth=0.39' Max Vel=0.22 fps Inflow=2.04 cfs 4.456 af
n=0.800 L=273.0' S=0.0623 '/' Capacity=11.46 cfs Outflow=2.04 cfs 4.450 af

Reach 10R: Ditch 4B1 Avg. Flow Depth=1.01' Max Vel=4.01 fps Inflow=16.45 cfs 1.781 af
n=0.025 L=352.0' S=0.0085 '/' Capacity=70.02 cfs Outflow=16.25 cfs 1.781 af

Reach 11R: DP-11R Avg. Flow Depth=0.31' Max Vel=1.57 fps Inflow=1.42 cfs 3.639 af
n=0.045 L=1,050.0' S=0.0162 '/' Capacity=71.30 cfs Outflow=1.42 cfs 3.638 af

Reach 12R: 4FR Avg. Flow Depth=0.62' Max Vel=2.07 fps Inflow=5.21 cfs 1.066 af
n=0.045 L=1,523.0' S=0.0131 '/' Capacity=64.21 cfs Outflow=4.99 cfs 1.066 af

Reach 13R: Ex Ditch Avg. Flow Depth=1.19' Max Vel=5.06 fps Inflow=26.42 cfs 3.010 af
n=0.030 L=225.0' S=0.0164 '/' Capacity=81.05 cfs Outflow=26.19 cfs 3.010 af

Reach 14R: DP-10 DITCH 2 Avg. Flow Depth=0.76' Max Vel=7.05 fps Inflow=19.00 cfs 2.017 af
n=0.025 L=434.0' S=0.0357 '/' Capacity=143.33 cfs Outflow=18.85 cfs 2.017 af

Reach AP1: AP-1 Inflow=68.29 cfs 19.050 af
Outflow=68.29 cfs 19.050 af

Reach AP2: ANALYSIS POINT #2 Inflow=33.15 cfs 13.180 af
Outflow=33.15 cfs 13.180 af

Reach AP3: ANALYSIS POINT #3 Inflow=100.29 cfs 47.866 af
Outflow=100.29 cfs 47.866 af

Reach AP4: AP4 Inflow=112.52 cfs 61.081 af
Outflow=112.52 cfs 61.081 af

Reach AP5: ANALYSIS POINT #5 Inflow=17.74 cfs 7.107 af
Outflow=17.74 cfs 7.107 af

Reach E2R2: E2R2 Avg. Flow Depth=0.11' Max Vel=0.38 fps Inflow=2.43 cfs 0.315 af
n=0.080 L=4,356.0' S=0.0094 '/' Capacity=132.12 cfs Outflow=0.53 cfs 0.315 af

Reach E2R3: REACH TO AP Avg. Flow Depth=0.46' Max Vel=1.32 fps Inflow=2.04 cfs 4.450 af
n=0.045 L=2,170.0' S=0.0074 '/' Capacity=48.12 cfs Outflow=2.03 cfs 4.443 af

Reach E2R4: Reach to AP Avg. Flow Depth=0.75' Max Vel=1.19 fps Inflow=20.22 cfs 13.818 af
n=0.080 L=963.0' S=0.0094 '/' Capacity=131.94 cfs Outflow=17.37 cfs 13.809 af

Reach R-1D: Reach R-1D Avg. Flow Depth=0.32' Max Vel=1.81 fps Inflow=7.74 cfs 4.068 af
n=0.060 L=370.0' S=0.0324 '/' Capacity=67.93 cfs Outflow=7.74 cfs 4.068 af

Reach R-1E: LEVEL SPREADER R-1E Avg. Flow Depth=0.23' Max Vel=2.26 fps Inflow=9.55 cfs 1.847 af
n=0.060 L=210.0' S=0.0690 '/' Capacity=135.95 cfs Outflow=9.54 cfs 1.847 af

Reach R-1F: Reach R-1F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.060 L=940.0' S=0.0170 '/' Capacity=49.21 cfs Outflow=0.00 cfs 0.000 af

Reach R-1H: LEVEL SPREADER R-1H Avg. Flow Depth=0.09' Max Vel=2.19 fps Inflow=7.28 cfs 0.709 af
n=0.030 L=170.0' S=0.0471 '/' Capacity=411.95 cfs Outflow=7.17 cfs 0.709 af

Reach R-2F: Reach R2-F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=735.0' S=0.0020 '/' Capacity=151.21 cfs Outflow=0.00 cfs 0.000 af

Reach R1: Reach 1 Avg. Flow Depth=1.30' Max Vel=1.73 fps Inflow=52.38 cfs 14.808 af
n=0.030 L=700.0' S=0.0016 '/' Capacity=132.69 cfs Outflow=52.01 cfs 14.808 af

Reach R1B: LF TOE DITCH Avg. Flow Depth=1.07' Max Vel=4.66 fps Inflow=21.08 cfs 2.158 af
n=0.040 L=540.0' S=0.0278 '/' Capacity=79.00 cfs Outflow=20.70 cfs 2.158 af

Reach R2: Reach 2 Avg. Flow Depth=1.02' Max Vel=1.71 fps Inflow=36.10 cfs 8.017 af
n=0.030 L=1,050.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=35.21 cfs 8.017 af

Reach R2A: Reach 2A Avg. Flow Depth=0.11' Max Vel=0.57 fps Inflow=2.44 cfs 3.228 af
n=0.060 L=1,960.0' S=0.0138 '/' Capacity=1,358.84 cfs Outflow=2.38 cfs 3.227 af

Reach R3: Reach 3 Avg. Flow Depth=0.93' Max Vel=1.62 fps Inflow=29.90 cfs 6.170 af
n=0.030 L=800.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=29.33 cfs 6.170 af

Reach R5a: Grass Lined Ditch Avg. Flow Depth=0.45' Max Vel=6.83 fps Inflow=15.16 cfs 1.530 af
n=0.025 L=200.0' S=0.0500 '/' Capacity=572.96 cfs Outflow=15.08 cfs 1.530 af

Pond 1P: Culvert - 4JB & FJC Peak Elev=211.64' Storage=944 cf Inflow=19.11 cfs 2.017 af
24.0" Round Culvert x 2.00 n=0.011 L=73.0' S=0.0137 '/' Outflow=19.00 cfs 2.017 af

Pond 4IAC: Culvert - 4IA Peak Elev=213.60' Storage=302 cf Inflow=1.94 cfs 0.154 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0175 '/' Outflow=1.82 cfs 0.154 af

Pond 8P: Ex Pond Peak Elev=172.57' Storage=4,765 cf Inflow=16.88 cfs 4.425 af
Outflow=18.32 cfs 4.357 af

Pond C-2B-A: Culvert - 2BA Peak Elev=205.43' Storage=1,750 cf Inflow=22.34 cfs 2.294 af
Primary=21.89 cfs 2.294 af Secondary=0.00 cfs 0.000 af Outflow=21.89 cfs 2.294 af

Pond C-4F: Culvert - 4F Peak Elev=166.34' Storage=0.025 af Inflow=5.26 cfs 1.066 af
18.0" Round Culvert n=0.011 L=78.0' S=0.0385 '/' Outflow=5.21 cfs 1.066 af

Pond C-4K: Catch Basin - 4K Peak Elev=220.74' Storage=2,659 cf Inflow=16.80 cfs 1.781 af
Outflow=16.45 cfs 1.781 af

Pond C4B: Culvert - 4BA & 4BB Peak Elev=206.89' Storage=1,124 cf Inflow=29.93 cfs 3.521 af
24.0" Round Culvert x 2.00 n=0.011 L=78.0' S=0.0090 '/' Outflow=29.11 cfs 3.521 af

Pond C4H-A: Culvert 4H-A Peak Elev=202.49' Storage=527 cf Inflow=1.60 cfs 0.128 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0250 '/' Outflow=1.33 cfs 0.128 af

Pond C4N: Culvert 4N Peak Elev=184.82' Storage=0.004 af Inflow=2.43 cfs 0.315 af
18.0" Round Culvert n=0.011 L=33.0' S=0.0303 '/' Outflow=2.43 cfs 0.315 af

Pond CB-2B-B: Catch Basin - 2BB Peak Elev=200.83' Storage=412 cf Inflow=21.59 cfs 2.294 af
Outflow=21.51 cfs 2.294 af

Pond CB-4G: Catch Basin - 4G Peak Elev=182.69' Storage=921 cf Inflow=20.17 cfs 2.089 af
Outflow=19.65 cfs 2.089 af

Pond CB-4HB: Catch Basin - 4HB Peak Elev=183.80' Storage=40 cf Inflow=7.36 cfs 0.685 af
Outflow=7.36 cfs 0.685 af

Pond CB-4I: Catch Basin - 4I Peak Elev=208.90' Storage=0.016 af Inflow=17.60 cfs 1.781 af
Outflow=17.28 cfs 1.781 af

Pond CB-4JA: Catch Basin - 4JA Peak Elev=220.31' Storage=0.022 af Inflow=19.70 cfs 2.017 af
Outflow=19.17 cfs 2.017 af

Pond CB-4L: Catch Basin - 4L Peak Elev=215.82' Storage=1,341 cf Inflow=13.04 cfs 1.229 af
Outflow=12.24 cfs 1.229 af

Pond D-1G: (2)24" Culverts P-6h Peak Elev=184.67' Storage=561 cf Inflow=21.20 cfs 1.924 af
Primary=19.42 cfs 1.908 af Secondary=1.63 cfs 0.015 af Outflow=21.06 cfs 1.924 af

Pond D-1H: LF TOE DITCH - CULVERT Peak Elev=184.69' Storage=746 cf Inflow=7.45 cfs 0.709 af
18.0" Round Culvert n=0.013 L=60.0' S=0.0083 '/' Outflow=7.28 cfs 0.709 af

Pond DP-1: Detention Pond 1 Peak Elev=165.13' Storage=75,820 cf Inflow=38.52 cfs 4.626 af
Primary=7.74 cfs 4.068 af Secondary=0.00 cfs 0.000 af Outflow=7.74 cfs 4.068 af

Pond DP-10: DETENTION POND 10 Peak Elev=179.51' Storage=88,504 cf Inflow=44.00 cfs 4.842 af
Primary=15.37 cfs 2.131 af Secondary=1.51 cfs 2.294 af Tertiary=0.00 cfs 0.000 af Outflow=16.88 cfs 4.425 af

Pond DP-11: Detention Pond 11 Peak Elev=167.75' Storage=115,942 cf Inflow=28.67 cfs 3.795 af
Primary=0.17 cfs 0.076 af Secondary=1.25 cfs 3.562 af Outflow=1.42 cfs 3.639 af

Pond DP-12: DETENTION POND 12 Peak Elev=187.48' Storage=88,740 cf Inflow=23.02 cfs 3.388 af
Primary=0.99 cfs 0.501 af Secondary=1.45 cfs 2.727 af Outflow=2.44 cfs 3.228 af

Pond DP-1A: DP-1A (Former Leachate Peak Elev=165.68' Storage=249,629 cf Inflow=17.45 cfs 2.044 af
Outflow=1.16 cfs 0.587 af

Pond DP-2: DETENTION POND 2 Peak Elev=165.54' Storage=17,590 cf Inflow=21.80 cfs 1.847 af
Outflow=9.55 cfs 1.847 af

Pond DP-6: DETENTION POND 6 Peak Elev=176.58' Storage=163,071 cf Inflow=34.84 cfs 4.313 af
Primary=0.00 cfs 0.000 af Secondary=1.42 cfs 4.313 af Outflow=1.42 cfs 4.313 af

Pond DP-9: DETENTION POND 9 Peak Elev=190.04' Storage=225,513 cf Inflow=50.65 cfs 6.673 af
Primary=0.86 cfs 0.727 af Secondary=1.18 cfs 3.729 af Tertiary=0.00 cfs 0.000 af Outflow=2.04 cfs 4.456 af

Summary for Subcatchment 1A: SC-1A

Runoff = 18.21 cfs @ 13.21 hrs, Volume= 4.242 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	10.120	70	Woods, Good, HSG C
	9.500	77	Woods, Good, HSG D
	2.560	71	Meadow, non-grazed, HSG C
	0.400	78	Meadow, non-grazed, HSG D
*	0.500	96	Gravel Road
	23.080	74	Weighted Average
	23.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.7	150	0.0260	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	1,839		1.46		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
88.1	2,249	Total			

Summary for Subcatchment 1B: SC-1B

Runoff = 21.08 cfs @ 12.25 hrs, Volume= 2.158 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
13.169	71	Meadow, non-grazed, HSG C
13.169		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	183	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.9	392	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	557	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.5	1,282	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 13.85 cfs @ 12.94 hrs, Volume= 2.723 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	6.100	77	Woods, Good, HSG D
	0.720	70	Woods, Good, HSG C
	3.100	78	Meadow, non-grazed, HSG D
	2.580	71	Meadow, non-grazed, HSG C
*	0.800	96	Gravel Road
	13.300	77	Weighted Average
	13.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.0	150	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.6	230	0.0133	0.58		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
16.7					**Direct Entry, Segment ID: C-D**
68.3	380	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 18.76 cfs @ 12.24 hrs, Volume= 1.880 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	9.230	71	Meadow, non-grazed, HSG C
*	0.590	96	Gravel Road/Berm
*	0.800	78	Pond, Meadow HSG D
	10.620	73	Weighted Average
	10.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	159	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.5	203	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	605	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035

16.9 1,117 Total

Summary for Subcatchment 1E: SC-1E

Runoff = 20.18 cfs @ 12.19 hrs, Volume= 1.831 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	10.495	71	Meadow, non-grazed, HSG C
*	0.250	96	Gravel Road/Berm
	10.745	72	Weighted Average
	10.745		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	150	0.1500	2.71		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.2	93	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	517	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	910	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 29.90 cfs @ 12.99 hrs, Volume= 6.170 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	13.200	77	Woods, Good, HSG D
	7.250	70	Woods, Good, HSG C
	7.670	78	Meadow, non-grazed, HSG D
	1.500	71	Meadow, non-grazed, HSG C
*	0.500	96	Gravel Road/Pad
*	0.600	98	Impervious / Structures
	0.500	98	Paved roads w/curbs & sewers, HSG C
	31.220	76	Weighted Average
	30.120		96.48% Pervious Area
	1.100		3.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	17	0.3300	0.23		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
2.4	300	0.0190	2.07		**Shallow Concentrated Flow, Segment ID: C-D** Grassed Waterway Kv= 15.0 fps
24.6	1,649	0.0500	1.12		**Shallow Concentrated Flow, Segment ID D-E** Woodland Kv= 5.0 fps
24.5					**Direct Entry, Segment ID: E-F**
73.2	2,066	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 21.20 cfs @ 12.19 hrs, Volume= 1.924 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	10.860	71	Meadow, non-grazed, HSG C
*	0.430	96	Gravel Road/Berm
	11.290	72	Weighted Average
	11.290		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	62	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.4	90	0.3300	4.02		**Shallow Concentrated Flow, Segment ID: C-D** Short Grass Pasture Kv= 7.0 fps
0.3	140	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	415	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	857	Total			

Summary for Subcatchment 1H: SC-1H

Runoff = 7.45 cfs @ 12.21 hrs, Volume= 0.709 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
1.830	71	Meadow, non-grazed, HSG C
1.200	96	Gravel Road/Berm
3.030	81	Weighted Average
3.030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.3300	0.36		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
8.4	609	0.0300	1.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
15.4	759	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 15.16 cfs @ 12.24 hrs, Volume= 1.530 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
9.334	71	Meadow, non-grazed, HSG C
9.334		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	146	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	218	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	570	0.3300	27.25	817.65	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 5.0 '/' Top.W=25.00' n= 0.035
16.8	1,084	Total			

Summary for Subcatchment 1J: SC-1J

Runoff = 12.86 cfs @ 12.47 hrs, Volume= 1.695 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (sf)	CN	Description
*	186,445	70	Woods, Good HSG C
	85,939	71	Meadow, non-grazed, HSG C
*	16,377	96	Gravel Road/Pad
*	72,000	98	Pond water surface
	360,761	77	Weighted Average
	288,761		80.04% Pervious Area
	72,000		19.96% 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 2A: SC-2A

Runoff = 33.02 cfs @ 13.71 hrs, Volume= 9.952 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	27.993	70	Woods, Good, HSG C
	21.380	77	Woods, Good, HSG D
	2.790	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area (New)
	1.600	98	Existing Waterbody
	54.143	74	Weighted Average
	52.163		96.34% Pervious Area
	1.980		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.9	150	0.0300	0.05		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
25.4	538	0.0200	0.35		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
37.5	534	0.0090	0.24		**Shallow Concentrated Flow, Segment C-D** Forest w/Heavy Litter Kv= 2.5 fps
15.3	1,213	0.0080	1.32	52.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=2.00' Z= 10.0 '/' Top.W=40.00' n= 0.100 Earth, dense brush, high stage
126.1	2,435	Total			

Summary for Subcatchment 2B: 2B

Runoff = 22.34 cfs @ 12.26 hrs, Volume= 2.294 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
13.996	71	Meadow, non-grazed, HSG C
13.996		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	187	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	431	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	450	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.6	1,218	Total			

Summary for Subcatchment 2C: 2C

Runoff = 4.92 cfs @ 13.12 hrs, Volume= 1.094 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
5.521	70	Woods, Good, HSG C
0.660	98	Water Surface, HSG C
6.181	73	Weighted Average
5.521		89.32% Pervious Area
0.660		10.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.2	289	0.0242	0.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	263	0.0114	0.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
80.7	702	Total			

Summary for Subcatchment 3: SC-3

Runoff = 100.29 cfs @ 15.24 hrs, Volume= 47.866 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	162.090	70	Woods, Good, HSG C
	102.790	77	Woods, Good, HSG D
	0.950	71	Meadow, non-grazed, HSG C
*	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
*	2.330	98	Existing Water Body
	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 4A: 4A

Runoff = 12.99 cfs @ 12.08 hrs, Volume= 0.925 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	0.740	89	Gravel roads, HSG C
	1.955	74	>75% Grass cover, Good, HSG C
*	0.088	98	ROOF
	1.497	71	Meadow, non-grazed, HSG C
	0.238	98	Paved roads w/curbs & sewers, HSG C
	4.518	77	Weighted Average
	4.192		92.78% Pervious Area
	0.326		7.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	150	0.0167	0.71		**Sheet Flow, Segment A-B** n= 0.023 P2= 2.70"
0.8	159	0.0410	3.26		**Shallow Concentrated Flow, Segment B-C** Unpaved Kv= 16.1 fps
0.8	70	0.0429	1.45		**Shallow Concentrated Flow, Segment C-D** Short Grass Pasture Kv= 7.0 fps
5.1	379	Total			

Summary for Subcatchment 4B: 4B

Runoff = 5.65 cfs @ 12.19 hrs, Volume= 0.511 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	1.040	70	Brush, Fair, HSG C
*	0.023	98	ROOF
	0.640	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
	0.240	98	Paved roads w/curbs & sewers, HSG C
	2.330	79	Weighted Average
	2.067		88.71% Pervious Area
	0.263		11.29% 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 4C: 4C

Runoff = 3.66 cfs @ 12.21 hrs, Volume= 0.352 af, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	0.511	74	>75% Grass cover, Good, HSG C
	0.070	98	Paved roads w/curbs & sewers, HSG C
*	0.250	98	Building/Concrete Slabs
*	0.456	91	Gravel Roads
	1.287	86	Weighted Average
	0.967		75.14% Pervious Area
	0.320		24.86% 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"
4.0	374	0.0107	1.55		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
15.4	496	Total			

Summary for Subcatchment 4D: 4D

Runoff = 13.92 cfs @ 12.46 hrs, Volume= 1.876 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	0.453	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.634	98	Pond
	0.136	98	Paved roads w/curbs & sewers, HSG C
	6.660	87	Weighted Average
	4.890		73.42% Pervious Area
	1.770		26.58% 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 4E: 4E

Runoff = 103.71 cfs @ 15.07 hrs, Volume= 47.271 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	152.615	77	Woods, Good, HSG D
	91.360	70	Woods, Good, HSG C
*	3.940	98	Paved roads w/curbs & sewers,
	247.915	75	Weighted Average
	243.975		98.41% Pervious Area
	3.940		1.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
127.0	2,625	0.0190	0.34		**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)**
225.6	6,090	Total			

Summary for Subcatchment 4F: 4F

Runoff = 5.26 cfs @ 12.96 hrs, Volume= 1.066 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
6.691	70	Woods, Good, HSG C
0.080	89	Gravel roads, HSG C
6.771	70	Weighted Average
6.771		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.6	144	0.0280	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.9	1,067	0.0290	0.85		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	17	0.0210	0.97	19.47	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.250
68.8	1,228	Total			

Summary for Subcatchment 4G: 4G

Runoff = 20.57 cfs @ 12.25 hrs, Volume= 2.089 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
12.750	71	Meadow, non-grazed, HSG C
12.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	98	0.0500	0.15		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.8	52	0.1000	0.18		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
1.1	150	0.1000	2.21		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.3	133	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	496	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	929	Total			

Summary for Subcatchment 4H: 4H

Runoff = 6.28 cfs @ 12.17 hrs, Volume= 0.557 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
3.400	71	Meadow, non-grazed, HSG C
3.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	75	0.1000	0.19		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.0	75	0.3300	0.31		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	150	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.7	285	0.0500	6.92	76.15	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 2.0 & 20.0 '/' Top.W=22.00' n= 0.030 Short grass
0.1	238	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00'

n= 0.035

11.9	823	Total

Summary for Subcatchment 4HA: 4HA

Runoff = 1.70 cfs @ 12.10 hrs, Volume= 0.128 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
0.780	71	Meadow, non-grazed, HSG C
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	142	0.3300	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4I: 4I

Runoff = 16.02 cfs @ 12.25 hrs, Volume= 1.627 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
9.930	71	Meadow, non-grazed, HSG C
9.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	200	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	290	0.0500	11.02	506.75	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=2.00' Z= 3.0 & 20.0 '/' Top.W=46.00' n= 0.030
0.3	442	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	1,082	Total			

Summary for Subcatchment 4IA: 4IA

Runoff = 2.07 cfs @ 12.10 hrs, Volume= 0.154 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
0.940	71	Meadow, non-grazed, HSG C
0.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	136	0.3333	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4J: 4J

Runoff = 19.82 cfs @ 12.25 hrs, Volume= 2.017 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
12.310	71	Meadow, non-grazed, HSG C
12.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	202	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.6	270	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	429	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.2	1,051	Total			

Summary for Subcatchment 4K: 4K

Runoff = 17.06 cfs @ 12.27 hrs, Volume= 1.781 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
10.870	71	Meadow, non-grazed, HSG C
10.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
2.7	268	0.0555	1.65		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.6	267	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	410	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
18.4	1,095	Total			

Summary for Subcatchment 4L: 4L

Runoff = 13.04 cfs @ 12.21 hrs, Volume= 1.229 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
7.500	71	Meadow, non-grazed, HSG C
7.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	23	0.0500	0.12		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
9.9	127	0.1000	0.21		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	252	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	494	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
14.1	896	Total			

Summary for Subcatchment 4M: 4M

Runoff = 5.98 cfs @ 12.75 hrs, Volume= 1.020 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
4.262	70	Woods, Good, HSG C
0.900	98	Water Surface, HSG C
0.190	89	Gravel roads, HSG C
5.352	75	Weighted Average
4.452		83.18% Pervious Area
0.900		16.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.9	150	0.0333	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
7.5	474	0.0440	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.1	18	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
53.5	642	Total			

Summary for Subcatchment 4N: 4N

Runoff = 2.43 cfs @ 12.45 hrs, Volume= 0.315 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
0.743	70	Woods, Good, HSG C
1.178	71	Meadow, non-grazed, HSG C
1.921	71	Weighted Average
1.921		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	150	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
9.0	580	0.0233	1.07		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
30.5	730	Total			

Summary for Subcatchment 4O: 4O

Runoff = 11.26 cfs @ 12.20 hrs, Volume= 1.044 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	3.900	70	Brush, Fair, HSG C
*	0.800	98	Paved and Gravel Shoulder
*	0.400	98	Detention Pond 10
	5.100	77	Weighted Average
	3.900		76.47% Pervious Area
	1.200		23.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	55	0.3000	0.28		**Sheet Flow, SEGMENT AB** Grass: Dense n= 0.240 P2= 2.70"
4.0	289	0.0300	1.21		**Shallow Concentrated Flow, SEGMENT BC** Short Grass Pasture Kv= 7.0 fps
6.9	319	0.0120	0.77		**Shallow Concentrated Flow, SEGMENT CD** Short Grass Pasture Kv= 7.0 fps
14.2	663	Total			

Summary for Subcatchment 5: SC-5

Runoff = 17.74 cfs @ 14.70 hrs, Volume= 7.107 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
28.410	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
35.960	76	Weighted Average
35.815		99.60% Pervious Area
0.145		0.40% 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 Subcatchment P1A: SC-P1A

Runoff = 7.72 cfs @ 12.00 hrs, Volume= 0.514 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (sf)	CN	Description
*	49,872	98	Pond and Liner
	1,012	89	Gravel roads, HSG C
	14,516	79	Pasture/grassland/range, Fair, HSG C
	65,400	94	Weighted Average
	15,528		23.74% Pervious Area
	49,872		76.26% Impervious Area

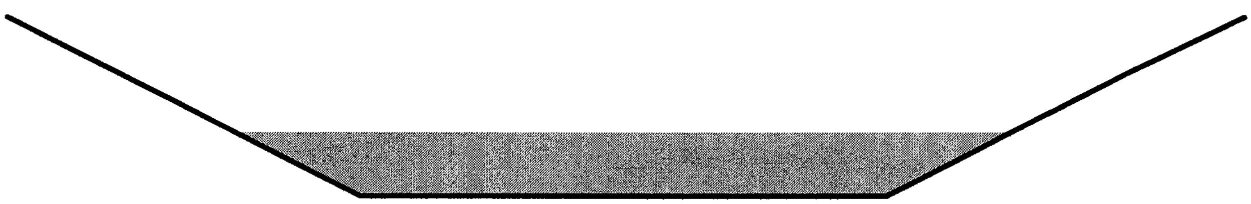
Summary for Reach 1R: DP-10 DITCH 1

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 19.17 cfs @ 12.31 hrs, Volume= 2.017 af
Outflow = 19.11 cfs @ 12.32 hrs, Volume= 2.017 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.65 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.24 fps, Avg. Travel Time= 1.4 min

Peak Storage= 531 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.71'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 128.49 cfs

6.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 101.0' Slope= 0.0079 '/'
Inlet Invert= 212.30', Outlet Invert= 211.50'



Summary for Reach 2R: E2C-DP9

Inflow Area = 5.805 ac, 11.13% Impervious, Inflow Depth = 2.64" for 25-yr Storm event
Inflow = 15.53 cfs @ 12.09 hrs, Volume= 1.277 af
Outflow = 14.74 cfs @ 12.15 hrs, Volume= 1.277 af, Atten= 5%, Lag= 3.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.87 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.49 fps, Avg. Travel Time= 6.6 min

Peak Storage= 1,827 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.55'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 488.04 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= 590.0' Slope= 0.0169 '/'
Inlet Invert= 200.00', Outlet Invert= 190.00'

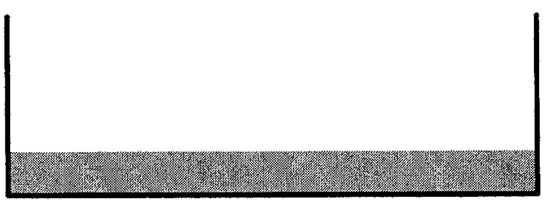
Summary for Reach 3R: Overland Flow

Inflow Area = 20.700 ac, 1.27% Impervious, Inflow Depth = 2.04" for 25-yr Storm event
Inflow = 29.11 cfs @ 12.40 hrs, Volume= 3.521 af
Outflow = 29.07 cfs @ 12.41 hrs, Volume= 3.521 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 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= 490 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.49'
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 4HR-A: EAST PD - 4

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 1.70 cfs @ 12.10 hrs, Volume= 0.128 af
Outflow = 1.60 cfs @ 12.16 hrs, Volume= 0.128 af, Atten= 6%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.98 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 4.9 min

Peak Storage= 158 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.08 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 288.0' Slope= 0.0247 '/'
Inlet Invert= 209.00', Outlet Invert= 201.90'

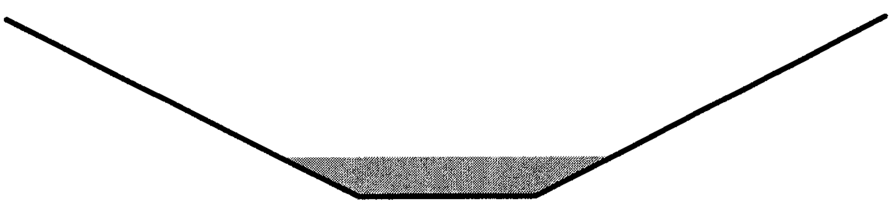
Summary for Reach 4HR-B: EAST PD - 5

Inflow Area =	4.180 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event	
Inflow =	7.49 cfs @	12.18 hrs, Volume=	0.685 af	
Outflow =	7.36 cfs @	12.22 hrs, Volume=	0.685 af, Atten= 2%, Lag= 2.3 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.84 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.74 fps, Avg. Travel Time= 4.1 min

Peak Storage= 545 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 158.67 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 425.0' Slope= 0.0438 '/'
Inlet Invert= 201.90', Outlet Invert= 183.30'



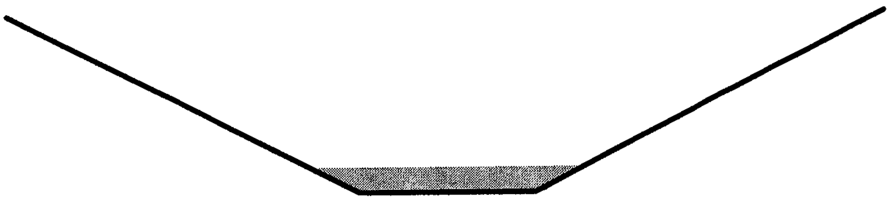
Summary for Reach 4IR-A: EAST PD - 2

Inflow Area =	0.940 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event	
Inflow =	2.07 cfs @	12.10 hrs, Volume=	0.154 af	
Outflow =	1.94 cfs @	12.16 hrs, Volume=	0.154 af, Atten= 6%, Lag= 3.6 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.82 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 6.0 min

Peak Storage= 231 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 100.55 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 330.0' Slope= 0.0176 '/'
Inlet Invert= 218.70', Outlet Invert= 212.90'



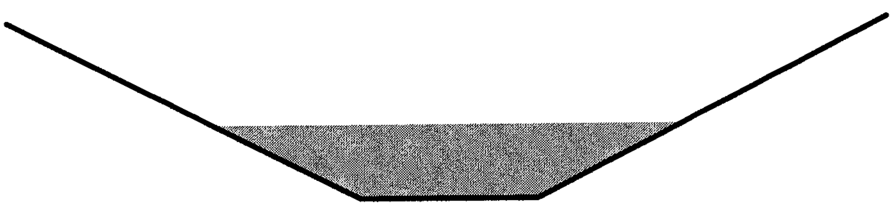
Summary for Reach 4IR-B: EAST PD - 3

Inflow Area =	10.870 ac,	0.00% Impervious,	Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	17.71 cfs @	12.24 hrs, Volume=	1.781 af	
Outflow =	17.60 cfs @	12.26 hrs, Volume=	1.781 af, Atten= 1%, Lag= 1.1 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.84 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 2.03 fps, Avg. Travel Time= 1.7 min

Peak Storage= 638 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 113.47 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 210.0' Slope= 0.0224 '/'
Inlet Invert= 212.20', Outlet Invert= 207.50'



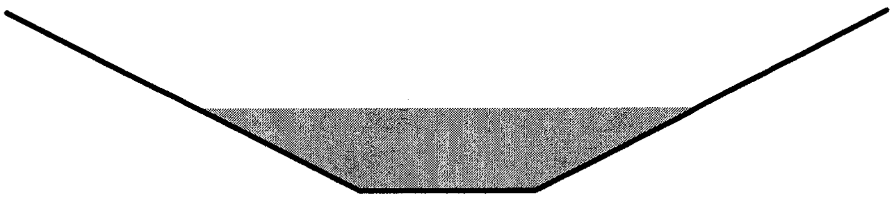
Summary for Reach 4JR: EAST PD 1

Inflow Area =	12.310 ac,	0.00% Impervious,	Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	19.82 cfs @	12.25 hrs, Volume=	2.017 af	
Outflow =	19.70 cfs @	12.27 hrs, Volume=	2.017 af, Atten= 1%, Lag= 1.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.56 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.19 fps, Avg. Travel Time= 1.4 min

Peak Storage= 653 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.93'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 101.85 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 183.0' Slope= 0.0180 '/'
Inlet Invert= 222.00', Outlet Invert= 218.70'



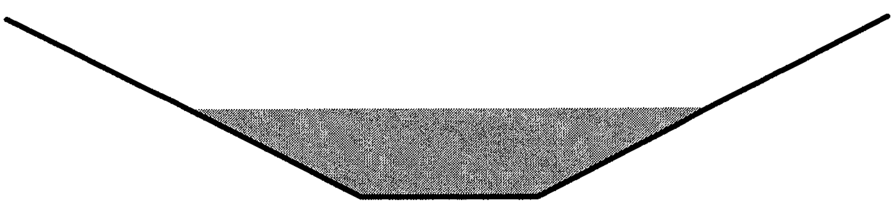
Summary for Reach 4R: DP-10 DITCH 3

Inflow Area =	23.180 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event	
Inflow =	35.39 cfs @ 12.33 hrs, Volume=	3.798 af
Outflow =	35.24 cfs @ 12.34 hrs, Volume=	3.798 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.15 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 3.34 fps, Avg. Travel Time= 1.3 min

Peak Storage= 1,005 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 162.94 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 260.0' Slope= 0.0462 '/'
Inlet Invert= 191.00', Outlet Invert= 179.00'



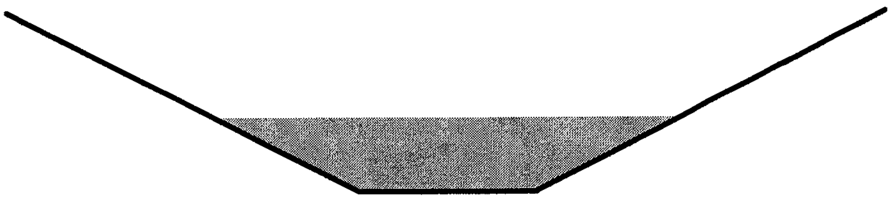
Summary for Reach 5R: NORTH PD-1

Inflow Area =	12.750 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event	
Inflow =	20.57 cfs @ 12.25 hrs, Volume=	2.089 af
Outflow =	20.17 cfs @ 12.32 hrs, Volume=	2.089 af, Atten= 2%, Lag= 4.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.71 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 2.45 fps, Avg. Travel Time= 6.4 min

Peak Storage= 2,816 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.82'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 131.18 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 936.0' Slope= 0.0299 '/'
Inlet Invert= 210.00', Outlet Invert= 182.00'



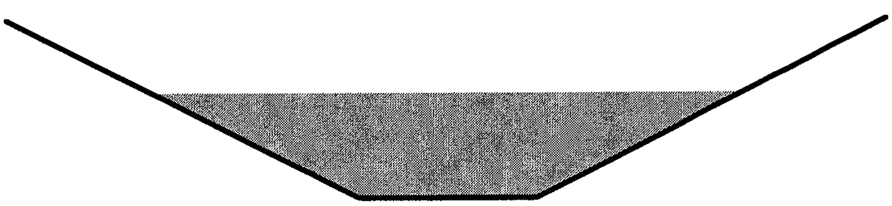
Summary for Reach 6R: NORTH PD-2

Inflow Area = 13.996 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 21.89 cfs @ 12.28 hrs, Volume= 2.294 af
Outflow = 21.59 cfs @ 12.33 hrs, Volume= 2.294 af, Atten= 1%, Lag= 2.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.22 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.64 fps, Avg. Travel Time= 3.7 min

Peak Storage= 1,884 cf @ 12.30 hrs
Average Depth at Peak Storage= 1.18'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.70 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 364.0' Slope= 0.0080 '/'
Inlet Invert= 202.90', Outlet Invert= 200.00'



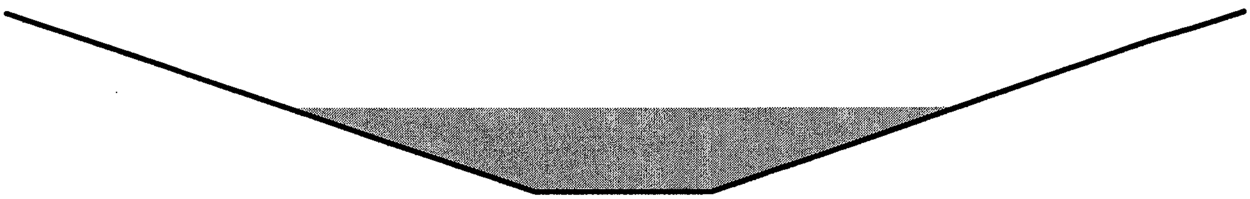
Summary for Reach 7R: DP-10R

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth > 1.85" for 25-yr Storm event
Inflow = 18.32 cfs @ 12.75 hrs, Volume= 4.357 af
Outflow = 15.92 cfs @ 12.96 hrs, Volume= 4.356 af, Atten= 13%, Lag= 12.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.56 fps, Min. Travel Time= 5.3 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 27.0 min

Peak Storage= 5,071 cf @ 12.87 hrs
Average Depth at Peak Storage= 0.93'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 88.21 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= 1,130.0' Slope= 0.0248 '/'
Inlet Invert= 170.00', Outlet Invert= 142.00'



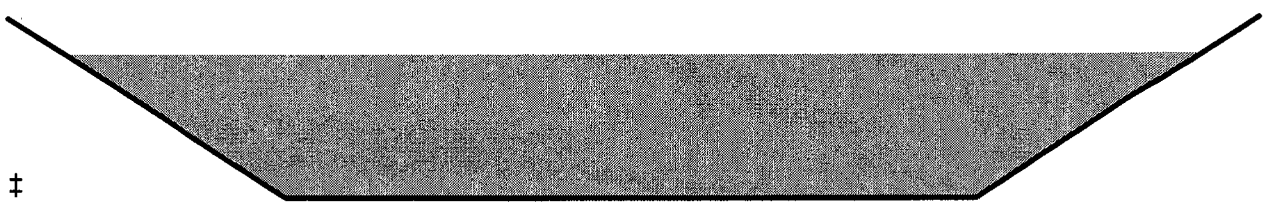
Summary for Reach 8R: EAST PD - 6

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 17.06 cfs @ 12.27 hrs, Volume= 1.781 af
Outflow = 16.80 cfs @ 12.32 hrs, Volume= 1.781 af, Atten= 2%, Lag= 3.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.20 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.98 fps, Avg. Travel Time= 6.1 min

Peak Storage= 1,899 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.80'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 25.35 cfs

5.00' x 1.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 360.0' Slope= 0.0056 '/'
Inlet Invert= 222.00', Outlet Invert= 220.00'



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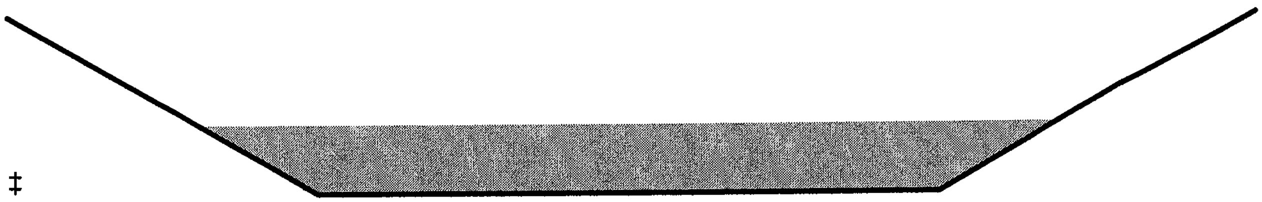
Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth > 1.61" for 25-yr Storm event
Inflow = 2.04 cfs @ 18.50 hrs, Volume= 4.456 af
Outflow = 2.04 cfs @ 19.12 hrs, Volume= 4.450 af, Atten= 0%, Lag= 37.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.22 fps, Min. Travel Time= 20.5 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 48.7 min

Peak Storage= 2,507 cf @ 18.78 hrs
Average Depth at Peak Storage= 0.39'
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'



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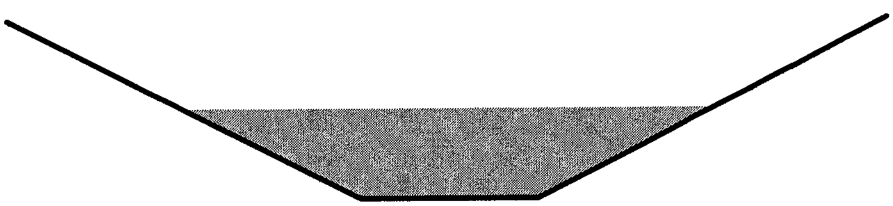
Summary for Reach 10R: Ditch 4B1

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	16.45 cfs @	12.37 hrs, Volume=	1.781 af
Outflow =	16.25 cfs @	12.41 hrs, Volume=	1.781 af, Atten= 1%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.01 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.43 fps, Avg. Travel Time= 4.1 min

Peak Storage= 1,436 cf @ 12.39 hrs
Average Depth at Peak Storage= 1.01'
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'



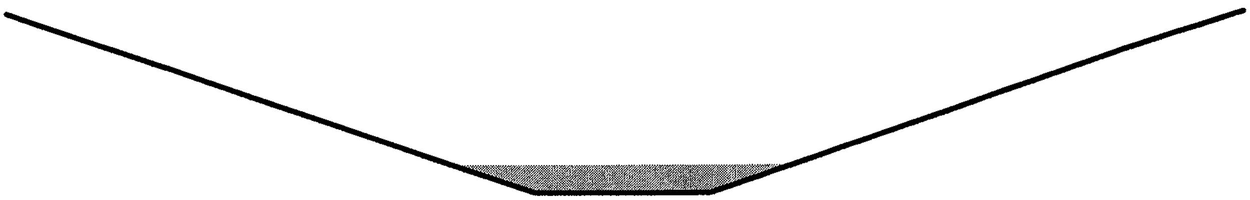
Summary for Reach 11R: DP-11R

Inflow Area =	22.282 ac,	4.04% Impervious, Inflow Depth > 1.96"	for 25-yr Storm event
Inflow =	1.42 cfs @	18.07 hrs, Volume=	3.639 af
Outflow =	1.42 cfs @	18.39 hrs, Volume=	3.638 af, Atten= 0%, Lag= 19.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.57 fps, Min. Travel Time= 11.1 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 24.9 min

Peak Storage= 950 cf @ 18.20 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 71.30 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,050.0' Slope= 0.0162 '/'
Inlet Invert= 158.00', Outlet Invert= 141.00'



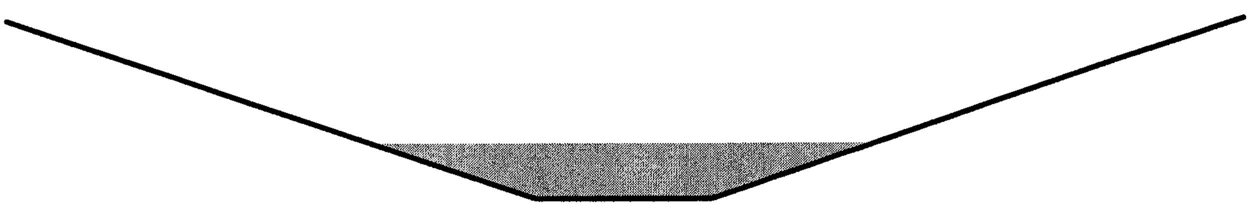
Summary for Reach 12R: 4FR

Inflow Area = 6.771 ac, 0.00% Impervious, Inflow Depth = 1.89" for 25-yr Storm event
Inflow = 5.21 cfs @ 13.04 hrs, Volume= 1.066 af
Outflow = 4.99 cfs @ 13.40 hrs, Volume= 1.066 af, Atten= 4%, Lag= 21.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.07 fps, Min. Travel Time= 12.2 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 34.9 min

Peak Storage= 3,665 cf @ 13.20 hrs
Average Depth at Peak Storage= 0.62'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 64.21 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,523.0' Slope= 0.0131 '/'
Inlet Invert= 161.00', Outlet Invert= 141.00'



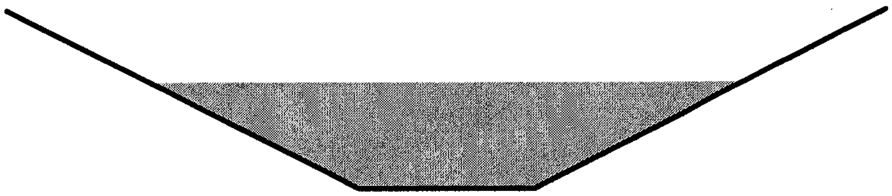
Summary for Reach 13R: Ex Ditch

Inflow Area = 18.370 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 26.42 cfs @ 12.35 hrs, Volume= 3.010 af
Outflow = 26.19 cfs @ 12.37 hrs, Volume= 3.010 af, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.06 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.83 fps, Avg. Travel Time= 2.0 min

Peak Storage= 1,173 cf @ 12.36 hrs
Average Depth at Peak Storage= 1.19'
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'



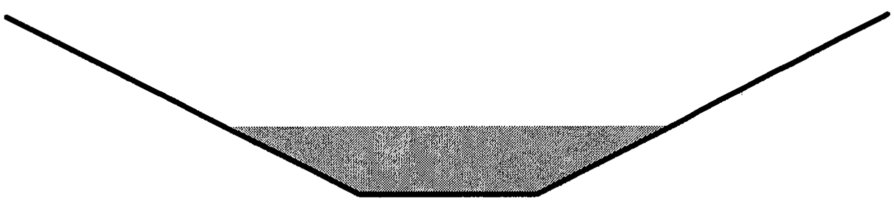
Summary for Reach 14R: DP-10 DITCH 2

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 19.00 cfs @ 12.34 hrs, Volume= 2.017 af
Outflow = 18.85 cfs @ 12.37 hrs, Volume= 2.017 af, Atten= 1%, Lag= 1.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.05 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.71 fps, Avg. Travel Time= 2.7 min

Peak Storage= 1,168 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 143.33 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 434.0' Slope= 0.0357 '/'
Inlet Invert= 209.00', Outlet Invert= 193.50'



Summary for Reach AP1: AP-1

Inflow Area = 135.571 ac, 2.88% Impervious, Inflow Depth = 1.69" for 25-yr Storm event
Inflow = 68.29 cfs @ 13.48 hrs, Volume= 19.050 af
Outflow = 68.29 cfs @ 13.48 hrs, Volume= 19.050 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 74.320 ac, 3.55% Impervious, Inflow Depth = 2.13" for 25-yr Storm event
Inflow = 33.15 cfs @ 13.73 hrs, Volume= 13.180 af
Outflow = 33.15 cfs @ 13.73 hrs, Volume= 13.180 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 270.330 ac, 1.32% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 100.29 cfs @ 15.24 hrs, Volume= 47.866 af
Outflow = 100.29 cfs @ 15.24 hrs, Volume= 47.866 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 340.334 ac, 2.56% Impervious, Inflow Depth > 2.15" for 25-yr Storm event
Inflow = 112.52 cfs @ 15.04 hrs, Volume= 61.081 af
Outflow = 112.52 cfs @ 15.04 hrs, Volume= 61.081 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: ANALYSIS POINT #5

Inflow Area = 35.960 ac, 0.40% Impervious, Inflow Depth = 2.37" for 25-yr Storm event
Inflow = 17.74 cfs @ 14.70 hrs, Volume= 7.107 af
Outflow = 17.74 cfs @ 14.70 hrs, Volume= 7.107 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach E2R2: E2R2

Inflow Area = 1.921 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 2.43 cfs @ 12.46 hrs, Volume= 0.315 af
Outflow = 0.53 cfs @ 16.57 hrs, Volume= 0.315 af, Atten= 78%, Lag= 246.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.38 fps, Min. Travel Time= 189.0 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 470.8 min

Peak Storage= 6,027 cf @ 13.43 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 132.12 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 4,356.0' Slope= 0.0094 '/'
Inlet Invert= 182.00', Outlet Invert= 141.00'

‡

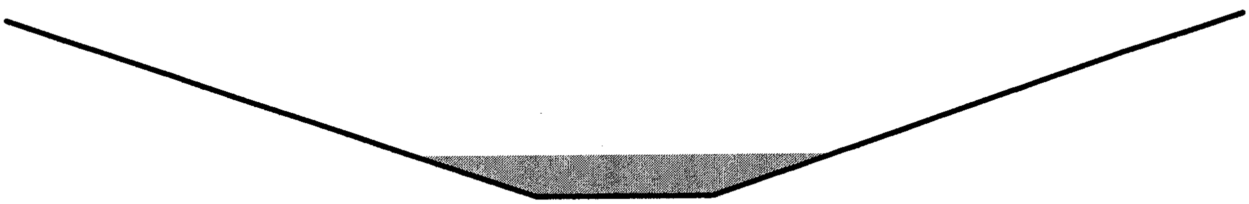
Summary for Reach E2R3: REACH TO AP

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth > 1.61" for 25-yr Storm event
Inflow = 2.04 cfs @ 19.12 hrs, Volume= 4.450 af
Outflow = 2.03 cfs @ 20.00 hrs, Volume= 4.443 af, Atten= 0%, Lag= 52.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 27.5 min
Avg. Velocity = 0.62 fps, Avg. Travel Time= 58.6 min

Peak Storage= 3,358 cf @ 19.54 hrs
Average Depth at Peak Storage= 0.46'
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'



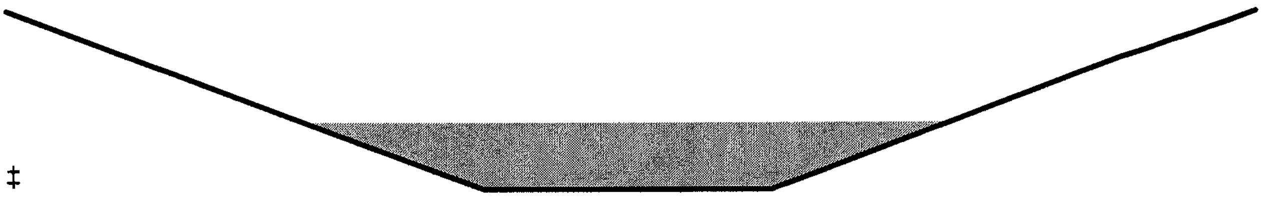
Summary for Reach E2R4: Reach to AP

Inflow Area = 92.419 ac, 5.17% Impervious, Inflow Depth > 1.79" for 25-yr Storm event
Inflow = 20.22 cfs @ 12.99 hrs, Volume= 13.818 af
Outflow = 17.37 cfs @ 13.49 hrs, Volume= 13.809 af, Atten= 14%, Lag= 29.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.19 fps, Min. Travel Time= 13.5 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 45.2 min

Peak Storage= 14,050 cf @ 13.26 hrs
Average Depth at Peak Storage= 0.75'
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'



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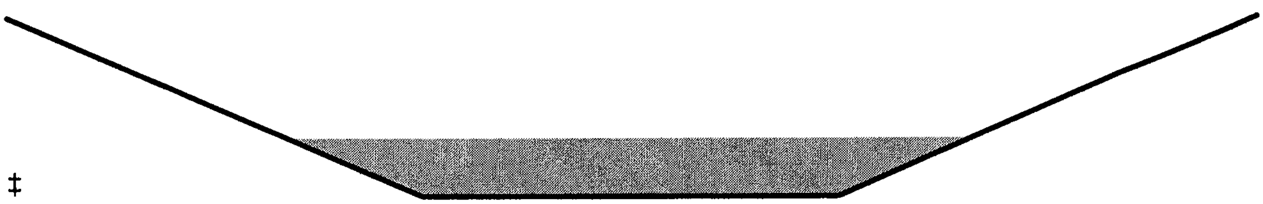
Summary for Reach R-1D: Reach R-1D

Inflow Area = 34.624 ac, 3.31% Impervious, Inflow Depth = 1.41" for 25-yr Storm event
Inflow = 7.74 cfs @ 13.03 hrs, Volume= 4.068 af
Outflow = 7.74 cfs @ 13.13 hrs, Volume= 4.068 af, Atten= 0%, Lag= 5.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.81 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 19.7 min

Peak Storage= 1,580 cf @ 13.07 hrs
Average Depth at Peak Storage= 0.32'
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'



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Summary for Reach R-1E: LEVEL SPREADER R-1E

Inflow Area = 10.745 ac, 0.00% Impervious, Inflow Depth = 2.06" for 25-yr Storm event
Inflow = 9.55 cfs @ 12.50 hrs, Volume= 1.847 af
Outflow = 9.54 cfs @ 12.54 hrs, Volume= 1.847 af, Atten= 0%, Lag= 2.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.26 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 6.1 min

Peak Storage= 887 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 135.95 cfs

16.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 36.00'
Length= 210.0' Slope= 0.0690 '/'
Inlet Invert= 161.50', Outlet Invert= 147.00'

‡

Summary for Reach R-1F: Reach R-1F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 25-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.21 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= 0.0170 '/'
Inlet Invert= 167.50', Outlet Invert= 151.50'

‡

Summary for Reach R-1H: LEVEL SPREADER R-1H

Inflow Area = 3.030 ac, 0.00% Impervious, Inflow Depth = 2.81" for 25-yr Storm event
Inflow = 7.28 cfs @ 12.25 hrs, Volume= 0.709 af
Outflow = 7.17 cfs @ 12.28 hrs, Volume= 0.709 af, Atten= 2%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.19 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 4.5 min

Peak Storage= 562 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 1.00' Flow Area= 44.0 sf, Capacity= 411.95 cfs

34.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 54.00'
Length= 170.0' Slope= 0.0471 '/'
Inlet Invert= 182.00', Outlet Invert= 174.00'

Summary for Reach R-2F: Reach R2-F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 25-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
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'

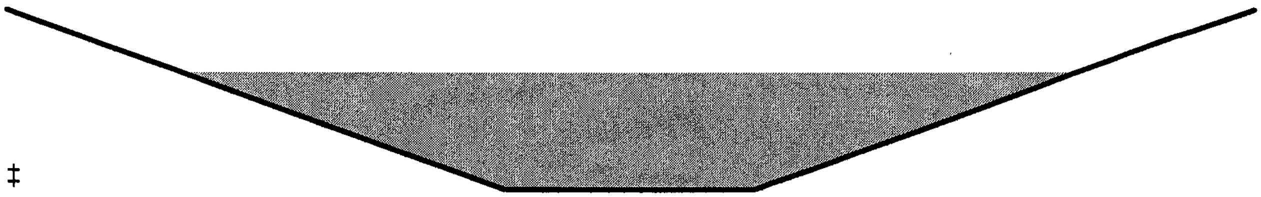
Summary for Reach R1: Reach 1

Inflow Area = 112.491 ac, 3.46% Impervious, Inflow Depth = 1.58" for 25-yr Storm event
Inflow = 52.38 cfs @ 13.38 hrs, Volume= 14.808 af
Outflow = 52.01 cfs @ 13.58 hrs, Volume= 14.808 af, Atten= 1%, Lag= 11.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.73 fps, Min. Travel Time= 6.7 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 49.5 min

Peak Storage= 21,013 cf @ 13.46 hrs
Average Depth at Peak Storage= 1.30'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 132.69 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= 0.0016 '/'
Inlet Invert= 146.30', Outlet Invert= 145.20'



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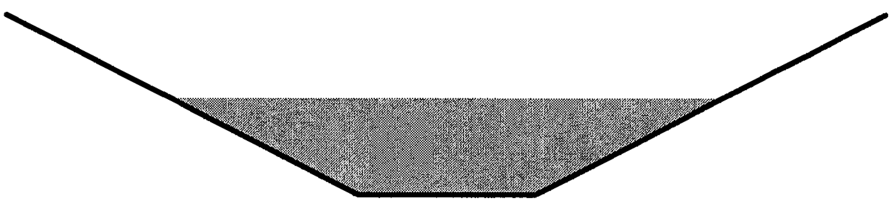
Summary for Reach R1B: LF TOE DITCH

Inflow Area = 13.169 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 21.08 cfs @ 12.25 hrs, Volume= 2.158 af
Outflow = 20.70 cfs @ 12.31 hrs, Volume= 2.158 af, Atten= 2%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.66 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 5.1 min

Peak Storage= 2,407 cf @ 12.28 hrs
Average Depth at Peak Storage= 1.07'
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'



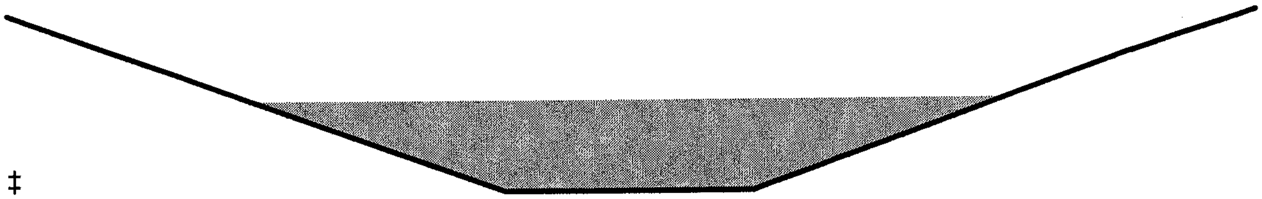
Summary for Reach R2: Reach 2

Inflow Area = 64.567 ac, 4.26% Impervious, Inflow Depth = 1.49" for 25-yr Storm event
Inflow = 36.10 cfs @ 13.19 hrs, Volume= 8.017 af
Outflow = 35.21 cfs @ 13.49 hrs, Volume= 8.017 af, Atten= 2%, Lag= 17.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.71 fps, Min. Travel Time= 10.3 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 39.7 min

Peak Storage= 21,682 cf @ 13.32 hrs
Average Depth at Peak Storage= 1.02'
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= 1,050.0' Slope= 0.0020 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'



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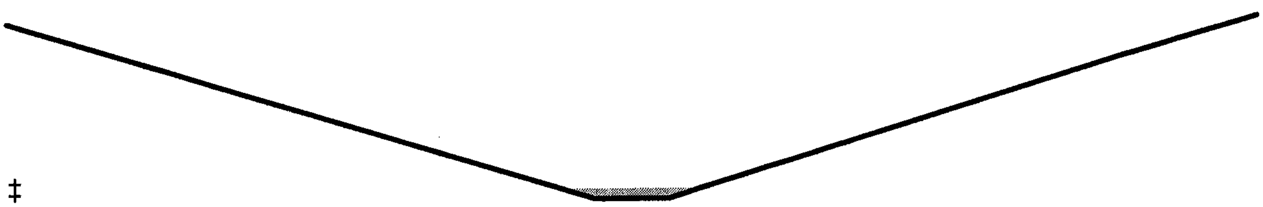
Summary for Reach R2A: Reach 2A

Inflow Area = 20.177 ac, 3.27% Impervious, Inflow Depth > 1.92" for 25-yr Storm event
Inflow = 2.44 cfs @ 15.88 hrs, Volume= 3.228 af
Outflow = 2.38 cfs @ 17.79 hrs, Volume= 3.227 af, Atten= 2%, Lag= 114.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.57 fps, Min. Travel Time= 57.1 min
Avg. Velocity = 0.25 fps, Avg. Travel Time= 131.9 min

Peak Storage= 8,164 cf @ 16.84 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,358.84 cfs

25.00' x 2.00' deep channel, n= 0.060
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,960.0' Slope= 0.0138 '/'
Inlet Invert= 179.00', Outlet Invert= 152.00'



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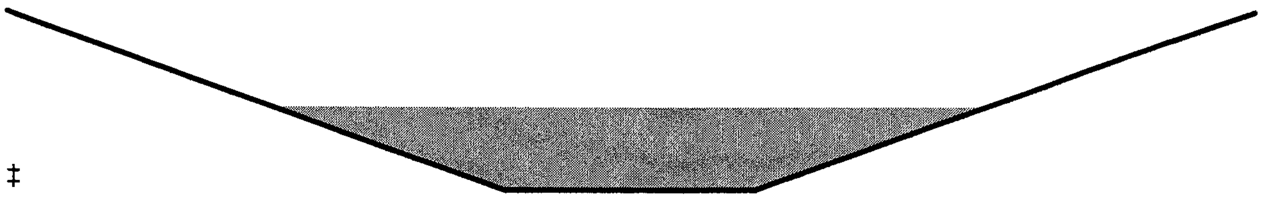
Summary for Reach R3: Reach 3

Inflow Area = 53.822 ac, 5.11% Impervious, Inflow Depth = 1.38" for 25-yr Storm event
Inflow = 29.90 cfs @ 12.99 hrs, Volume= 6.170 af
Outflow = 29.33 cfs @ 13.24 hrs, Volume= 6.170 af, Atten= 2%, Lag= 15.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.62 fps, Min. Travel Time= 8.2 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 25.5 min

Peak Storage= 14,458 cf @ 13.11 hrs
Average Depth at Peak Storage= 0.93'
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= 800.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 148.40'



Summary for Reach R5a: Grass Lined Ditch

Inflow Area = 9.334 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 15.16 cfs @ 12.24 hrs, Volume= 1.530 af
Outflow = 15.08 cfs @ 12.26 hrs, Volume= 1.530 af, Atten= 1%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.83 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.38 fps, Avg. Travel Time= 1.4 min

Peak Storage= 444 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.45'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 572.96 cfs

4.00' x 3.00' deep channel, n= 0.025
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 Pond 1P: Culvert - 4JB & FJC

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 19.11 cfs @ 12.32 hrs, Volume= 2.017 af
Outflow = 19.00 cfs @ 12.34 hrs, Volume= 2.017 af, Atten= 1%, Lag= 1.2 min
Primary = 19.00 cfs @ 12.34 hrs, Volume= 2.017 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 211.64' @ 12.34 hrs Surf.Area= 1,107 sf Storage= 944 cf

Plug-Flow detention time= 0.8 min calculated for 2.017 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (861.9 - 861.1)

Volume	Invert	Avail.Storage	Storage Description
#1	210.00'	3,853 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
210.00	43	0	0
212.00	1,340	1,383	1,383
213.00	3,600	2,470	3,853

Device	Routing	Invert	Outlet Devices
#1	Primary	210.00'	**24.0" Round Culvert X 2.00** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 210.00' / 209.00' S= 0.0137 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=18.92 cfs @ 12.34 hrs HW=211.64' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 18.92 cfs @ 3.44 fps)

Summary for Pond 4IAC: Culvert - 4IA

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 1.94 cfs @ 12.16 hrs, Volume= 0.154 af
Outflow = 1.82 cfs @ 12.20 hrs, Volume= 0.154 af, Atten= 6%, Lag= 2.4 min
Primary = 1.82 cfs @ 12.20 hrs, Volume= 0.154 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 213.60' @ 12.20 hrs Surf.Area= 614 sf Storage= 302 cf

Plug-Flow detention time= 5.8 min calculated for 0.154 af (100% of inflow)
Center-of-Mass det. time= 5.8 min (859.6 - 853.8)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,559 cf	**2.00'W x 125.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.90'	**18.0" Round Culvert - 4IA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 212.90' / 212.20' S= 0.0175 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.82 cfs @ 12.20 hrs HW=213.60' (Free Discharge)
↑—**1=Culvert - 4IA** (Inlet Controls 1.82 cfs @ 2.25 fps)

Summary for Pond 8P: Ex Pond

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth > 1.88" for 25-yr Storm event
Inflow = 16.88 cfs @ 12.75 hrs, Volume= 4.425 af
Outflow = 18.32 cfs @ 12.75 hrs, Volume= 4.357 af, Atten= 0%, Lag= 0.1 min
Primary = 18.32 cfs @ 12.75 hrs, Volume= 4.357 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 172.57' @ 12.75 hrs Surf.Area= 4,500 sf Storage= 4,765 cf

Plug-Flow detention time= 123.8 min calculated for 4.355 af (98% of inflow)

Center-of-Mass det. time= 15.8 min (1,420.6 - 1,404.8)

Volume	Invert	Avail.Storage	Storage Description
#1	171.20'	4,765 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.20	3,900	0	0
172.00	4,600	3,400	3,400
172.30	4,500	1,365	4,765

Device	Routing	Invert	Outlet Devices
#1	Primary	171.90'	**12.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=18.31 cfs @ 12.75 hrs HW=172.57' (Free Discharge)
└─**1=Broad-Crested Rectangular Weir** (Weir Controls 18.31 cfs @ 2.28 fps)

Summary for Pond C-2B-A: Culvert - 2BA

Inflow Area = 13.996 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 22.34 cfs @ 12.26 hrs, Volume= 2.294 af
Outflow = 21.89 cfs @ 12.28 hrs, Volume= 2.294 af, Atten= 2%, Lag= 1.7 min
Primary = 21.89 cfs @ 12.28 hrs, Volume= 2.294 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 205.43' @ 12.28 hrs Surf.Area= 1,533 sf Storage= 1,750 cf

Plug-Flow detention time= 0.9 min calculated for 2.294 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (858.9 - 858.0)

Volume	Invert	Avail.Storage	Storage Description
#1	203.50'	1,859 cf	**2.00'W x 150.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	203.20'	**36.0" Round Culvert - 2BA** L= 40.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 203.20' / 202.90' S= 0.0075 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	205.00'	**4.0' long x 2.0' breadth Southern Ditch High Water Outlet X 0.00** 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=21.74 cfs @ 12.28 hrs HW=205.42' (Free Discharge)
↑—**1=Culvert - 2BA** (Barrel Controls 21.74 cfs @ 5.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=203.50' (Free Discharge)
↑—**2=Southern Ditch High Water Outlet** (Controls 0.00 cfs)

Summary for Pond C-4F: Culvert - 4F

Inflow Area =	6.771 ac,	0.00% Impervious,	Inflow Depth = 1.89"	for 25-yr Storm event
Inflow =	5.26 cfs @	12.96 hrs, Volume=	1.066 af	
Outflow =	5.21 cfs @	13.04 hrs, Volume=	1.066 af, Atten= 1%, Lag= 4.5 min	
Primary =	5.21 cfs @	13.04 hrs, Volume=	1.066 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 166.34' @ 13.04 hrs Surf.Area= 0.029 ac Storage= 0.025 af

Plug-Flow detention time= 4.5 min calculated for 1.066 af (100% of inflow)
Center-of-Mass det. time= 4.5 min (912.7 - 908.1)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	0.047 af	**4.00'W x 96.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**18.0" Round Culvert - 4F** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 165.00' / 162.00' S= 0.0385 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=5.20 cfs @ 13.04 hrs HW=166.34' (Free Discharge)
↑—**1=Culvert - 4F** (Inlet Controls 5.20 cfs @ 3.12 fps)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area =	10.870 ac,	0.00% Impervious,	Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	16.80 cfs @	12.32 hrs, Volume=	1.781 af	
Outflow =	16.45 cfs @	12.37 hrs, Volume=	1.781 af, Atten= 2%, Lag= 2.5 min	
Primary =	16.45 cfs @	12.37 hrs, Volume=	1.781 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 220.74' @ 12.37 hrs Surf.Area= 4,409 sf Storage= 2,659 cf

Plug-Flow detention time= 4.3 min calculated for 1.781 af (100% of inflow)
Center-of-Mass det. time= 4.3 min (868.6 - 864.3)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	3,865 cf	**5.00'W x 550.00'L x 1.00'H Prismatoid Z=2.0**

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' / 214.30' S= 0.0431 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	220.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.33 cfs @ 12.37 hrs HW=220.74' (Free Discharge)
└─**1=Culvert - 4K** (Passes 16.33 cfs of 27.23 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 16.33 cfs @ 2.81 fps)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area =	20.700 ac,	1.27% Impervious, Inflow Depth =	2.04"	for 25-yr Storm event
Inflow =	29.93 cfs @	12.35 hrs, Volume=	3.521 af	
Outflow =	29.11 cfs @	12.40 hrs, Volume=	3.521 af,	Atten= 3%, Lag= 3.0 min
Primary =	29.11 cfs @	12.40 hrs, Volume=	3.521 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 206.89' @ 12.40 hrs Surf.Area= 2,406 sf Storage= 1,124 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (863.5 - 863.3)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,197 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	47	38	38
208.00	5,375	5,422	5,460
209.00	6,100	5,738	11,197

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0090 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=29.08 cfs @ 12.40 hrs HW=206.88' (Free Discharge)
└─**1=Culvert - 4B** (Inlet Controls 29.08 cfs @ 4.63 fps)

Summary for Pond C4H-A: Culvert 4H-A

Inflow Area =	0.780 ac,	0.00% Impervious, Inflow Depth =	1.97"	for 25-yr Storm event
Inflow =	1.60 cfs @	12.16 hrs, Volume=	0.128 af	
Outflow =	1.33 cfs @	12.23 hrs, Volume=	0.128 af,	Atten= 17%, Lag= 4.2 min
Primary =	1.33 cfs @	12.23 hrs, Volume=	0.128 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 202.49' @ 12.23 hrs Surf.Area= 1,230 sf Storage= 527 cf

Plug-Flow detention time= 14.1 min calculated for 0.128 af (100% of inflow)
Center-of-Mass det. time= 14.2 min (867.2 - 853.0)

Volume	Invert	Avail.Storage	Storage Description
#1	201.90'	3,419 cf	**2.00'W x 280.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	201.90'	**18.0" Round Culvert - 4HA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 201.90' / 200.90' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.32 cfs @ 12.23 hrs HW=202.49' (Free Discharge)
1=Culvert - 4HA (Inlet Controls 1.32 cfs @ 2.06 fps)

Summary for Pond C4N: Culvert 4N

Inflow Area =	1.921 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	2.43 cfs @	12.45 hrs, Volume=	0.315 af
Outflow =	2.43 cfs @	12.46 hrs, Volume=	0.315 af, Atten= 0%, Lag= 0.9 min
Primary =	2.43 cfs @	12.46 hrs, Volume=	0.315 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.82' @ 12.46 hrs Surf.Area= 0.006 ac Storage= 0.004 af

Plug-Flow detention time= 1.8 min calculated for 0.315 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (871.8 - 870.0)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	0.015 af	**2.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	184.00'	**18.0" Round 18-in Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.00' / 183.00' S= 0.0303 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.42 cfs @ 12.46 hrs HW=184.82' (Free Discharge)
1=18-in Culvert (Inlet Controls 2.42 cfs @ 2.44 fps)

Summary for Pond CB-2B-B: Catch Basin - 2BB

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	21.59 cfs @	12.33 hrs, Volume=	2.294 af
Outflow =	21.51 cfs @	12.35 hrs, Volume=	2.294 af, Atten= 0%, Lag= 1.2 min
Primary =	21.51 cfs @	12.35 hrs, Volume=	2.294 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 200.83' @ 12.35 hrs Surf.Area= 914 sf Storage= 412 cf

Plug-Flow detention time= 0.1 min calculated for 2.293 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (862.9 - 862.8)

Volume	Invert	Avail.Storage	Storage Description
#1	200.20'	2,459 cf	**2.00'W x 200.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	**24.0" Round Culvert - 2BB** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.00' / 194.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	200.00'	**30.0" Horiz. Orifice/Grate** C= 0.600

Primary OutFlow Max=21.51 cfs @ 12.35 hrs HW=200.83' (Free Discharge)
└─**1=Culvert - 2BB** (Passes 21.51 cfs of 33.24 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 21.51 cfs @ 4.38 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area =	12.750 ac,	0.00% Impervious, Inflow Depth =	1.97"	for 25-yr Storm event
Inflow =	20.17 cfs @	12.32 hrs, Volume=	2.089 af	
Outflow =	19.65 cfs @	12.36 hrs, Volume=	2.089 af,	Atten= 3%, Lag= 2.5 min
Primary =	19.65 cfs @	12.36 hrs, Volume=	2.089 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 182.69' @ 12.36 hrs Surf.Area= 983 sf Storage= 921 cf

Plug-Flow detention time= 0.4 min calculated for 2.089 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (864.4 - 864.0)

Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	1,256 cf	**2.00'W x 71.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	175.00'	**24.0" Round Culvert - 4G** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.00' / 174.00' S= 0.0278 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	181.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=19.55 cfs @ 12.36 hrs HW=182.67' (Free Discharge)
└─**1=Culvert - 4G** (Passes 19.55 cfs of 39.07 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 19.55 cfs @ 6.22 fps)

Summary for Pond CB-4HB: Catch Basin - 4HB

Inflow Area =	4.180 ac,	0.00% Impervious,	Inflow Depth = 1.97"	for 25-yr Storm event	
Inflow =	7.36 cfs @	12.22 hrs,	Volume=	0.685 af	
Outflow =	7.36 cfs @	12.22 hrs,	Volume=	0.685 af,	Atten= 0%, Lag= 0.1 min
Primary =	7.36 cfs @	12.22 hrs,	Volume=	0.685 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 183.80' @ 12.22 hrs Surf.Area= 109 sf Storage= 40 cf

Plug-Flow detention time= 0.1 min calculated for 0.685 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (859.2 - 859.0)

Volume	Invert	Avail.Storage	Storage Description
#1	183.30'	359 cf	**2.00'W x 25.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Device 2	183.30'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	178.50'	**18.0" Round Culvert - 4HB** L= 101.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 176.00' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=7.23 cfs @ 12.22 hrs HW=183.80' (Free Discharge)
└─**2=Culvert - 4HB** (Passes 7.23 cfs of 18.15 cfs potential flow)
  └─**1=Orifice/Grate** (Weir Controls 7.23 cfs @ 2.31 fps)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area =	10.870 ac,	0.00% Impervious,	Inflow Depth = 1.97"	for 25-yr Storm event	
Inflow =	17.60 cfs @	12.26 hrs,	Volume=	1.781 af	
Outflow =	17.28 cfs @	12.29 hrs,	Volume=	1.781 af,	Atten= 2%, Lag= 1.9 min
Primary =	17.28 cfs @	12.29 hrs,	Volume=	1.781 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 208.90' @ 12.29 hrs Surf.Area= 0.018 ac Storage= 0.016 af

Plug-Flow detention time= 0.9 min calculated for 1.781 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (860.0 - 859.4)

Volume	Invert	Avail.Storage	Storage Description
#1	207.50'	0.029 af	**2.00'W x 100.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	202.50'	**18.0" Round Culvert - 4I** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 202.50' / 192.00' S= 0.1313 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	207.60'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=17.20 cfs @ 12.29 hrs HW=208.89' TW=194.89' (TW follows 14.00' below HW)
↑—**1=Culvert - 4I** (Passes 17.20 cfs of 20.21 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 17.20 cfs @ 5.47 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 19.70 cfs @ 12.27 hrs, Volume= 2.017 af
Outflow = 19.17 cfs @ 12.31 hrs, Volume= 2.017 af, Atten= 3%, Lag= 2.5 min
Primary = 19.17 cfs @ 12.31 hrs, Volume= 2.017 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 220.31' @ 12.31 hrs Surf.Area= 0.023 ac Storage= 0.022 af

Plug-Flow detention time= 0.6 min calculated for 2.017 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (859.7 - 859.2)

Volume	Invert	Avail.Storage	Storage Description
#1	218.70'	0.032 af	**2.00'W x 113.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	214.00'	**18.0" Round Culvert - 4JA** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.00' / 212.30' S= 0.0283 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=19.10 cfs @ 12.31 hrs HW=220.29' TW=213.29' (TW follows 7.00' below HW)
↑—**1=Culvert - 4JA** (Passes 19.10 cfs of 20.03 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 19.10 cfs @ 6.08 fps)

Summary for Pond CB-4L: Catch Basin - 4L

Inflow Area = 7.500 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 13.04 cfs @ 12.21 hrs, Volume= 1.229 af
Outflow = 12.24 cfs @ 12.25 hrs, Volume= 1.229 af, Atten= 6%, Lag= 2.9 min
Primary = 12.24 cfs @ 12.25 hrs, Volume= 1.229 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 215.82' @ 12.25 hrs Surf.Area= 1,773 sf Storage= 1,341 cf

Plug-Flow detention time= 2.9 min calculated for 1.229 af (100% of inflow)
Center-of-Mass det. time= 2.9 min (857.7 - 854.8)

Volume	Invert	Avail.Storage	Storage Description
#1	215.00'	3,683 cf	**30.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 211.00' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	215.00'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=12.23 cfs @ 12.25 hrs HW=215.82' (Free Discharge)
└─**1=Culvert 4L** (Inlet Controls 12.23 cfs @ 6.92 fps)
  └─**2=Orifice-Top of catch basin** (Passes 12.23 cfs of 13.67 cfs potential flow)

Summary for Pond D-1G: (2)24" Culverts P-6h

Inflow Area =	11.290 ac,	0.00% Impervious, Inflow Depth = 2.05"	for 25-yr Storm event
Inflow =	21.20 cfs @	12.19 hrs, Volume=	1.924 af
Outflow =	21.06 cfs @	12.19 hrs, Volume=	1.924 af, Atten= 1%, Lag= 0.5 min
Primary =	19.42 cfs @	12.19 hrs, Volume=	1.908 af
Secondary =	1.63 cfs @	12.19 hrs, Volume=	0.015 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 184.67' @ 12.19 hrs Surf.Area= 667 sf Storage= 561 cf
Flood Elev= 185.00' Surf.Area= 800 sf Storage= 805 cf

Plug-Flow detention time= 0.4 min calculated for 1.923 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (851.3 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	3,305 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	10	0	0
184.00	400	205	205
186.00	1,200	1,600	1,805
187.00	1,800	1,500	3,305

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	184.50'	**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=19.33 cfs @ 12.19 hrs HW=184.66' (Free Discharge)
↑—**1=(2)24"-Culvert** (Inlet Controls 19.33 cfs @ 3.46 fps)

Secondary OutFlow Max=1.55 cfs @ 12.19 hrs HW=184.66' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.55 cfs @ 0.96 fps)

Summary for Pond D-1H: LF TOE DITCH - CULVERT

Inflow Area =	3.030 ac,	0.00% Impervious, Inflow Depth =	2.81"	for 25-yr Storm event
Inflow =	7.45 cfs @	12.21 hrs, Volume=	0.709 af	
Outflow =	7.28 cfs @	12.25 hrs, Volume=	0.709 af,	Atten= 2%, Lag= 2.0 min
Primary =	7.28 cfs @	12.25 hrs, Volume=	0.709 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.69' @ 12.25 hrs Surf.Area= 494 sf Storage= 746 cf
Flood Elev= 186.00' Surf.Area= 858 sf Storage= 1,323 cf

Plug-Flow detention time= 4.0 min calculated for 0.709 af (100% of inflow)
Center-of-Mass det. time= 4.0 min (833.6 - 829.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	1,323 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	24	0	0
186.00	858	1,323	1,323

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**18.0" Round Culvert-C-1H** L= 60.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 183.00' / 182.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=7.26 cfs @ 12.25 hrs HW=184.69' (Free Discharge)
↑—**1=Culvert-C-1H** (Inlet Controls 7.26 cfs @ 4.11 fps)

Summary for Pond DP-1: Detention Pond 1

Inflow Area =	34.624 ac,	3.31% Impervious, Inflow Depth =	1.60"	for 25-yr Storm event
Inflow =	38.52 cfs @	12.28 hrs, Volume=	4.626 af	
Outflow =	7.74 cfs @	13.03 hrs, Volume=	4.068 af,	Atten= 80%, Lag= 44.9 min
Primary =	7.74 cfs @	13.03 hrs, Volume=	4.068 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 165.13' @ 13.03 hrs Surf.Area= 19,571 sf Storage= 75,820 cf

Plug-Flow detention time= 185.8 min calculated for 4.068 af (88% of inflow)
Center-of-Mass det. time= 126.3 min (1,019.5 - 893.1)

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	162.00'	**30.0" Round 30" Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.00' / 159.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	162.00'	**12.0" Vert. Orifice on side** C= 0.600
#3	Device 1	162.00'	**6.0" Vert. Orifice on side** C= 0.600
#4	Device 1	165.50'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**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=7.74 cfs @ 13.03 hrs HW=165.13' (Free Discharge)
└─**1=30" Culvert** (Passes 7.74 cfs of 25.61 cfs potential flow)
  ├─**2=Orifice on side** (Orifice Controls 6.14 cfs @ 7.81 fps)
  ├─**3=Orifice on side** (Orifice Controls 1.61 cfs @ 8.18 fps)
  └─**4=Orifice-Top of drop inlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth = 2.05" for 25-yr Storm event
Inflow = 44.00 cfs @ 12.31 hrs, Volume= 4.842 af
Outflow = 16.88 cfs @ 12.75 hrs, Volume= 4.425 af, Atten= 62%, Lag= 26.0 min
Primary = 15.37 cfs @ 12.75 hrs, Volume= 2.131 af
Secondary = 1.51 cfs @ 12.75 hrs, Volume= 2.294 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 179.51' @ 12.75 hrs Surf.Area= 25,024 sf Storage= 88,504 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 587.4 min calculated for 4.423 af (91% of inflow)
Center-of-Mass det. time= 546.3 min (1,404.8 - 858.5)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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=16.06 cfs @ 12.75 hrs HW=179.51' (Free Discharge)
└─**3=18-in Primary Culvert** (Inlet Controls 16.06 cfs @ 9.09 fps)
  ├─**1=Orifice/Grate** (Passes < 15.05 cfs potential flow)
  └─**2=6-in Orifice** (Passes < 1.06 cfs potential flow)

Secondary OutFlow Max=1.51 cfs @ 12.75 hrs HW=179.51' (Free Discharge)
└─**4=6-in Culvert** (Passes 1.51 cfs of 1.64 cfs potential flow)
  ├─**5=Orifice Top** (Orifice Controls 1.40 cfs @ 7.63 fps)
  └─**6=Orifice Side** (Orifice Controls 0.11 cfs @ 8.68 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11: Detention Pond 11

Inflow Area =	22.282 ac,	4.04% Impervious,	Inflow Depth = 2.04"	for 25-yr Storm event
Inflow =	28.67 cfs @	12.35 hrs, Volume=	3.795 af	
Outflow =	1.42 cfs @	18.07 hrs, Volume=	3.639 af,	Atten= 95%, Lag= 343.1 min
Primary =	0.17 cfs @	18.07 hrs, Volume=	0.076 af	
Secondary =	1.25 cfs @	18.07 hrs, Volume=	3.562 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 167.75' @ 18.07 hrs Surf.Area= 39,116 sf Storage= 115,942 cf

Plug-Flow detention time= 1,275.7 min calculated for 3.639 af (96% of inflow)
Center-of-Mass det. time= 1,252.9 min (2,120.8 - 867.9)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

Primary OutFlow Max=0.17 cfs @ 18.07 hrs HW=167.75' (Free Discharge)
└─**3=18-In Culvert** (Passes 0.17 cfs of 11.04 cfs potential flow)
  ├─**1=6-In Orifice Side (Riser)** (Orifice Controls 0.17 cfs @ 1.71 fps)
  └─**2=Grate Top (Riser)** (Controls 0.00 cfs)

Secondary OutFlow Max=1.25 cfs @ 18.07 hrs HW=167.75' (Free Discharge)
└─**4=6-In Culvert** (Barrel Controls 1.25 cfs @ 6.84 fps)
  ├─**5=Orifice Top (6-in Culv)** (Passes < 1.44 cfs potential flow)
  └─**6=Orifice Side (6-in Culv)** (Passes < 0.17 cfs potential flow)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area =	20.177 ac,	3.27% Impervious, Inflow Depth =	2.01"	for 25-yr Storm event
Inflow =	23.02 cfs @	12.36 hrs, Volume=	3.388 af	
Outflow =	2.44 cfs @	15.88 hrs, Volume=	3.228 af,	Atten= 89%, Lag= 211.3 min
Primary =	0.99 cfs @	15.88 hrs, Volume=	0.501 af	
Secondary =	1.45 cfs @	15.88 hrs, Volume=	2.727 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 187.48' @ 15.88 hrs Surf.Area= 37,220 sf Storage= 88,740 cf

Plug-Flow detention time= 917.5 min calculated for 3.228 af (95% of inflow)
Center-of-Mass det. time= 891.6 min (1,770.2 - 878.5)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-in Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.99 cfs @ 15.88 hrs HW=187.48' (Free Discharge)
└─**3=18- In Culvert** (Passes 0.99 cfs of 10.04 cfs potential flow)
  ├─**1=Grate Top (Riser)** (Controls 0.00 cfs)
  └─**2=8-In Orifice (Riser Side)** (Orifice Controls 0.99 cfs @ 2.84 fps)

Secondary OutFlow Max=1.45 cfs @ 15.88 hrs HW=187.48' (Free Discharge)
└─**6=6-In Culvert** (Passes 1.45 cfs of 1.77 cfs potential flow)
  ├─**4=Orifice Top (6-in Pipe)** (Orifice Controls 1.24 cfs @ 6.78 fps)
  └─**5=Orifice (Side of 6-in)** (Orifice Controls 0.20 cfs @ 8.23 fps)

Summary for Pond DP-1A: DP-1A (Former Leachate Pond)

Inflow Area =		10.835 ac, 10.57% Impervious, Inflow Depth = 2.26"	for 25-yr Storm event	
Inflow	=	17.45 cfs @ 12.25 hrs, Volume=	2.044 af	
Outflow	=	1.16 cfs @ 15.89 hrs, Volume=	0.587 af,	Atten= 93%, Lag= 218.4 min
Primary	=	1.16 cfs @ 15.89 hrs, Volume=	0.587 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 164.00' Surf.Area= 37,429 sf Storage= 182,617 cf
Peak Elev= 165.68' @ 15.89 hrs Surf.Area= 42,122 sf Storage= 249,629 cf (67,013 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (80,429 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 298.1 min (1,134.3 - 836.2)

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	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=1.14 cfs @ 15.89 hrs HW=165.68' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 1.14 cfs @ 0.75 fps)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 10.745 ac, 0.00% Impervious, Inflow Depth = 2.06" for 25-yr Storm event
Inflow = 21.80 cfs @ 12.19 hrs, Volume= 1.847 af
Outflow = 9.55 cfs @ 12.50 hrs, Volume= 1.847 af, Atten= 56%, Lag= 18.6 min
Primary = 9.55 cfs @ 12.50 hrs, Volume= 1.847 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 162.30' Surf.Area= 2,326 sf Storage= 956 cf
Peak Elev= 165.54' @ 12.50 hrs Surf.Area= 8,830 sf Storage= 17,590 cf (16,633 cf above start)
Flood Elev= 166.60' Surf.Area= 12,071 sf Storage= 28,956 cf (27,999 cf above start)

Plug-Flow detention time= 35.3 min calculated for 1.825 af (99% of inflow)
Center-of-Mass det. time= 25.1 min (875.0 - 849.9)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	47,648 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,957	0	0
164.00	4,419	6,376	6,376
166.00	10,150	14,569	20,945
168.00	16,553	26,703	47,648

Device	Routing	Invert	Outlet Devices
#1	Primary	162.30'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.30' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	162.30'	**15.0" Vert. Orifice** C= 0.600
#3	Device 1	166.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.55 cfs @ 12.50 hrs HW=165.54' (Free Discharge)
└─**1=Culvert** (Passes 9.55 cfs of 22.12 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 9.55 cfs @ 7.78 fps)
  └─**3=Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area =	22.602 ac,	7.31% Impervious, Inflow Depth = 2.29"	for 25-yr Storm event
Inflow =	34.84 cfs @	12.27 hrs, Volume=	4.313 af
Outflow =	1.42 cfs @	18.23 hrs, Volume=	4.313 af, Atten= 96%, Lag= 357.5 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Secondary =	1.42 cfs @	18.23 hrs, Volume=	4.313 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 174.00' Surf.Area= 25,931 sf Storage= 29,566 cf
Peak Elev= 176.58' @ 18.23 hrs Surf.Area= 71,266 sf Storage= 163,071 cf (133,505 cf above start)
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (467,078 cf above start)

Plug-Flow detention time= 1,400.4 min calculated for 3.633 af (84% of inflow)
Center-of-Mass det. time= 1,130.4 min (1,982.0 - 851.6)

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	Secondary	169.00'	**6.0" Round Outlet Culvert 6"** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 169.00' / 168.00' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	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=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
└─**1=Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=1.42 cfs @ 18.23 hrs HW=176.58' (Free Discharge)
├─**2=Outlet Culvert 6"** (Passes 1.42 cfs of 1.66 cfs potential flow)
│ └─**3=Orifice** (Orifice Controls 1.42 cfs @ 7.74 fps)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth = 2.41" for 25-yr Storm event
Inflow = 50.65 cfs @ 12.39 hrs, Volume= 6.673 af
Outflow = 2.04 cfs @ 18.50 hrs, Volume= 4.456 af, Atten= 96%, Lag= 366.8 min
Primary = 0.86 cfs @ 18.50 hrs, Volume= 0.727 af
Secondary = 1.18 cfs @ 18.50 hrs, Volume= 3.729 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 190.04' @ 18.50 hrs Surf.Area= 86,892 sf Storage= 225,513 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,615.4 min calculated for 4.455 af (67% of inflow)
Center-of-Mass det. time= 1,513.6 min (2,361.6 - 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
#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=0.86 cfs @ 18.50 hrs HW=190.04' (Free Discharge)
└─**1=12-In Outlet Culvert** (Inlet Controls 0.86 cfs @ 1.98 fps)

Secondary OutFlow Max=1.18 cfs @ 18.50 hrs HW=190.04' (Free Discharge)
└─**2=6-In Culvert** (Passes 1.18 cfs of 1.65 cfs potential flow)
  ├─**3=Orifice** (Orifice Controls 1.02 cfs @ 5.58 fps)
  └─**4=Orifice** (Orifice Controls 0.15 cfs @ 6.24 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

APPENDIX C

DETENTION POND DESIGN

C-1 DETENTION TIME AND STAGE STORAGE CURVES

Summary for Pond DP-1: Detention Pond 1

Inflow Area = 34.624 ac, 3.31% Impervious, Inflow Depth = 0.43" for 2-yr Storm event
Inflow = 10.24 cfs @ 12.33 hrs, Volume= 1.253 af
Outflow = 1.15 cfs @ 15.38 hrs, Volume= 0.695 af, Atten= 89%, Lag= 183.0 min
Primary = 1.15 cfs @ 15.38 hrs, Volume= 0.695 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 162.46' @ 15.38 hrs Surf.Area= 14,359 sf Storage= 31,388 cf

Plug-Flow detention time= 430.2 min calculated for 0.695 af (55% of inflow)
Center-of-Mass det. time= 297.7 min (1,193.7 - 896.1)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	115,245 cf	**Custom Stage Data (Prismatic)**Listed below

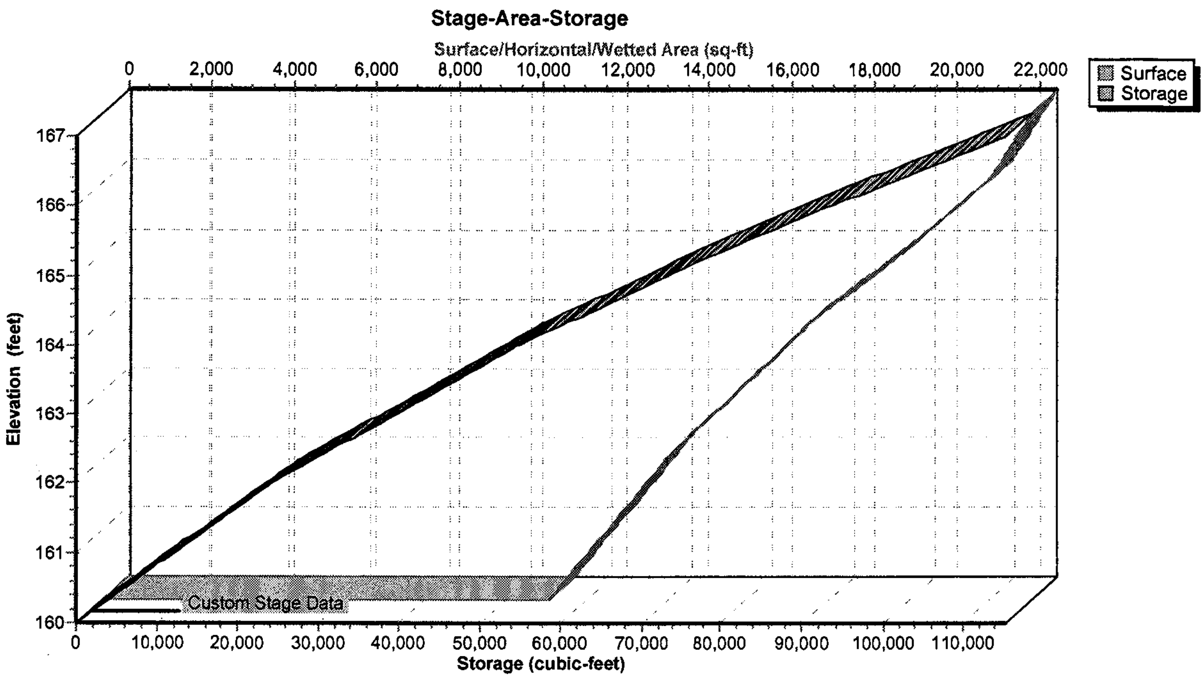
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	10,750	0	0
162.00	13,540	24,290	24,290
164.00	17,070	30,610	54,900
165.00	19,300	18,185	73,085
166.00	21,310	20,305	93,390
167.00	22,400	21,855	115,245

Device	Routing	Invert	Outlet Devices
#1	Primary	162.00'	**30.0" Round 30" Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.00' / 159.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	162.00'	**12.0" Vert. Orifice on side** C= 0.600
#3	Device 1	162.00'	**6.0" Vert. Orifice on side** C= 0.600
#4	Device 1	165.50'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**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=1.15 cfs @ 15.38 hrs HW=162.46' (Free Discharge)
└─**1=30" Culvert** (Inlet Controls 1.15 cfs @ 1.83 fps)
  ├─**2=Orifice on side** (Passes < 0.83 cfs potential flow)
  ├─**3=Orifice on side** (Passes < 0.44 cfs potential flow)
  └─**4=Orifice-Top of drop inlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond DP-1: Detention Pond 1



Summary for Pond DP-1A: DP-1A (Former Leachate Pond)

Inflow Area = 10.835 ac, 10.57% Impervious, Inflow Depth = 0.80" for 2-yr Storm event
Inflow = 5.05 cfs @ 12.27 hrs, Volume= 0.720 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= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 164.00' Surf.Area= 37,429 sf Storage= 182,617 cf
Peak Elev= 164.81' @ 25.65 hrs Surf.Area= 39,695 sf Storage= 213,981 cf (31,364 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (80,429 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

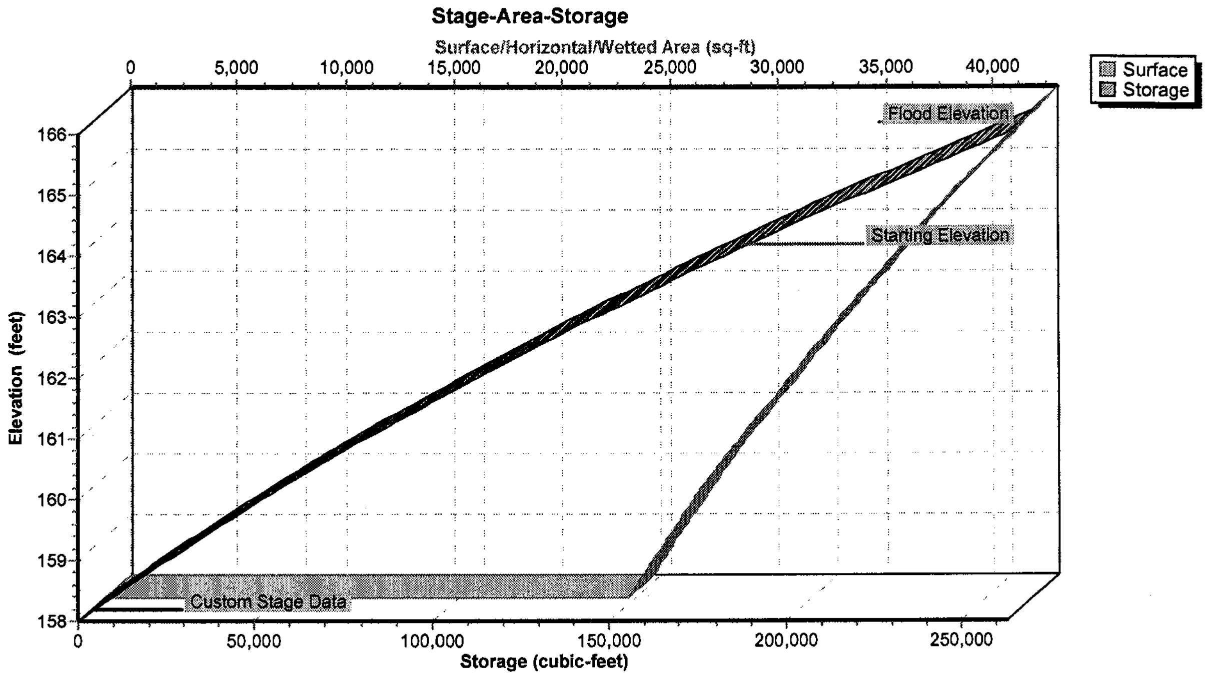
Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	263,046 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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	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=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond DP-1A: DP-1A (Former Leachate Pond)



Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 10.745 ac, 0.00% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 5.49 cfs @ 12.21 hrs, Volume= 0.569 af
Outflow = 3.92 cfs @ 12.40 hrs, Volume= 0.569 af, Atten= 29%, Lag= 11.7 min
Primary = 3.92 cfs @ 12.40 hrs, Volume= 0.569 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 162.30' Surf.Area= 2,326 sf Storage= 956 cf
Peak Elev= 163.37' @ 12.40 hrs Surf.Area= 3,640 sf Storage= 4,359 cf (3,402 cf above start)
Flood Elev= 166.60' Surf.Area= 12,071 sf Storage= 28,956 cf (27,999 cf above start)

Plug-Flow detention time= 60.2 min calculated for 0.547 af (96% of inflow)
Center-of-Mass det. time= 32.2 min (919.9 - 887.6)

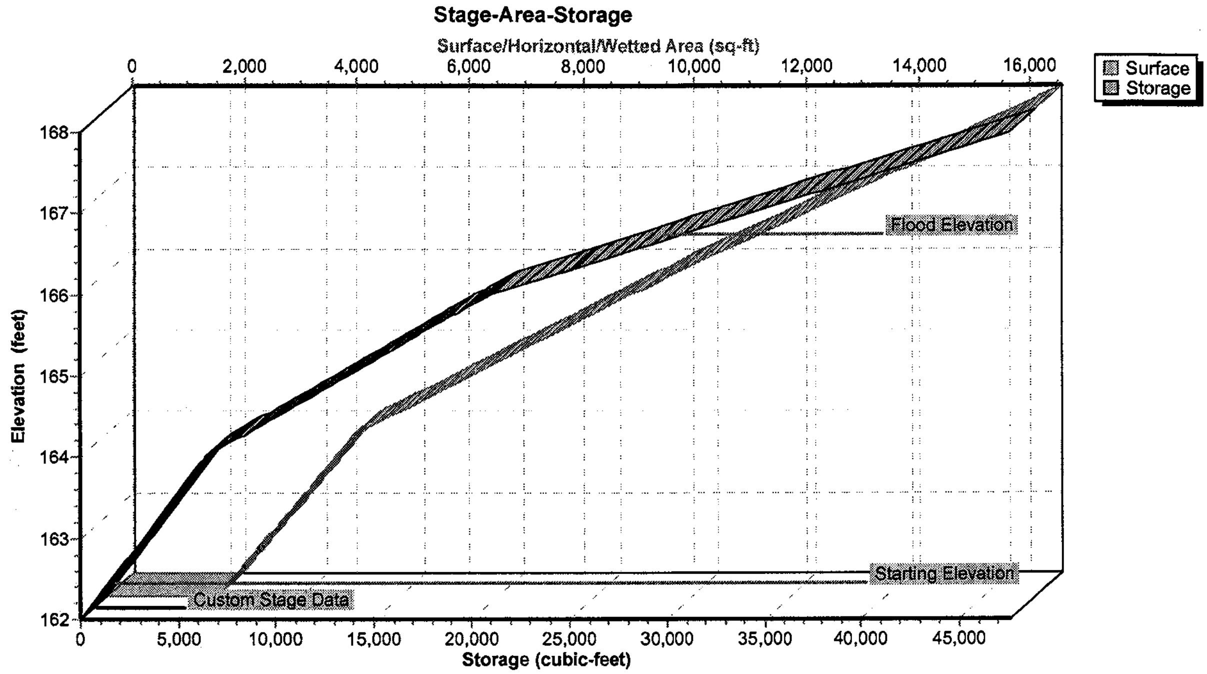
Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	47,648 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,957	0	0
164.00	4,419	6,376	6,376
166.00	10,150	14,569	20,945
168.00	16,553	26,703	47,648

Device	Routing	Invert	Outlet Devices
#1	Primary	162.30'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.30' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	162.30'	**15.0" Vert. Orifice** C= 0.600
#3	Device 1	166.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.92 cfs @ 12.40 hrs HW=163.37' (Free Discharge)
└─**1=Culvert** (Passes 3.92 cfs of 4.88 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 3.92 cfs @ 3.52 fps)
  └─**3=Grate** (Controls 0.00 cfs)

Pond DP-2: DETENTION POND 2



Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.78" for 2-yr Storm event
Inflow = 11.00 cfs @ 12.31 hrs, Volume= 1.472 af
Outflow = 0.82 cfs @ 16.92 hrs, Volume= 1.472 af, Atten= 93%, Lag= 276.7 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.82 cfs @ 16.92 hrs, Volume= 1.472 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 174.00' Surf.Area= 25,931 sf Storage= 29,566 cf
Peak Elev= 174.86' @ 16.92 hrs Surf.Area= 41,554 sf Storage= 67,549 cf (37,983 cf above start)
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (467,078 cf above start)

Plug-Flow detention time= 1,153.1 min calculated for 0.794 af (54% of inflow)
Center-of-Mass det. time= 628.6 min (1,512.9 - 884.3)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)**Listed below

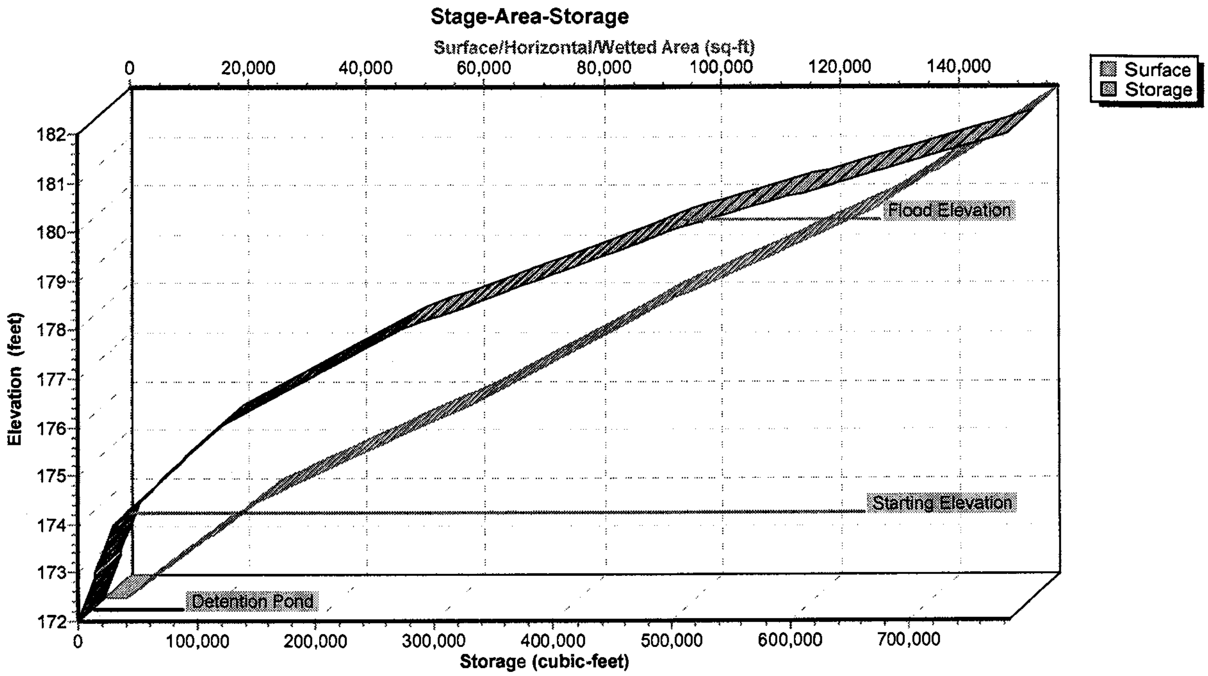
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

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	Secondary	169.00'	**6.0" Round Outlet Culvert 6"** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 169.00' / 168.00' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	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=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
└─**1=Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.82 cfs @ 16.92 hrs HW=174.86' (Free Discharge)
├─**2=Outlet Culvert 6"** (Passes 0.82 cfs of 1.47 cfs potential flow)
│ └─**3=Orifice** (Orifice Controls 0.82 cfs @ 4.47 fps)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP-6: DETENTION POND 6



Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth = 0.87" for 2-yr Storm event
Inflow = 16.58 cfs @ 12.44 hrs, Volume= 2.398 af
Outflow = 0.05 cfs @ 24.97 hrs, Volume= 0.399 af, Atten= 100%, Lag= 751.5 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.05 cfs @ 24.97 hrs, Volume= 0.399 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 188.57' @ 24.97 hrs Surf.Area= 80,617 sf Storage= 103,321 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 3,910.1 min calculated for 0.399 af (17% of inflow)
Center-of-Mass det. time= 3,748.6 min (4,626.7 - 878.2)

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

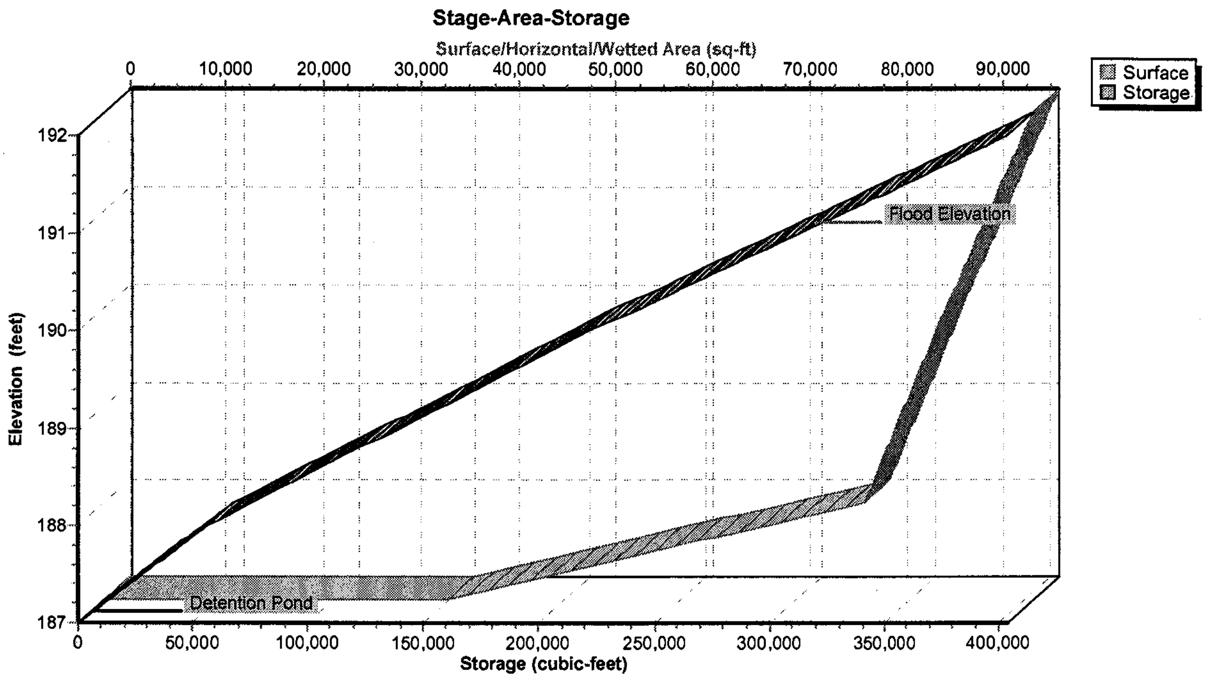
Device	Routing	Invert	Outlet Devices
#1	Primary	189.50'	**12.0" Round 12-In Outlet Culvert** L= 48.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.50' / 180.50' S= 0.1875 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	184.21'	**5.8" Round 6-In Culvert** L= 60.0' CPP, projecting, 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
#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 @ 24.97 hrs HW=188.57' (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 @ 2.17 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP-9: DETENTION POND 9



Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 12.05 cfs @ 12.36 hrs, Volume= 1.516 af
Outflow = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af, Atten= 94%, Lag= 328.8 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 177.58' @ 17.84 hrs Surf.Area= 21,167 sf Storage= 43,962 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 1,554.9 min calculated for 1.103 af (73% of inflow)
Center-of-Mass det. time= 1,451.8 min (2,348.3 - 896.5)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

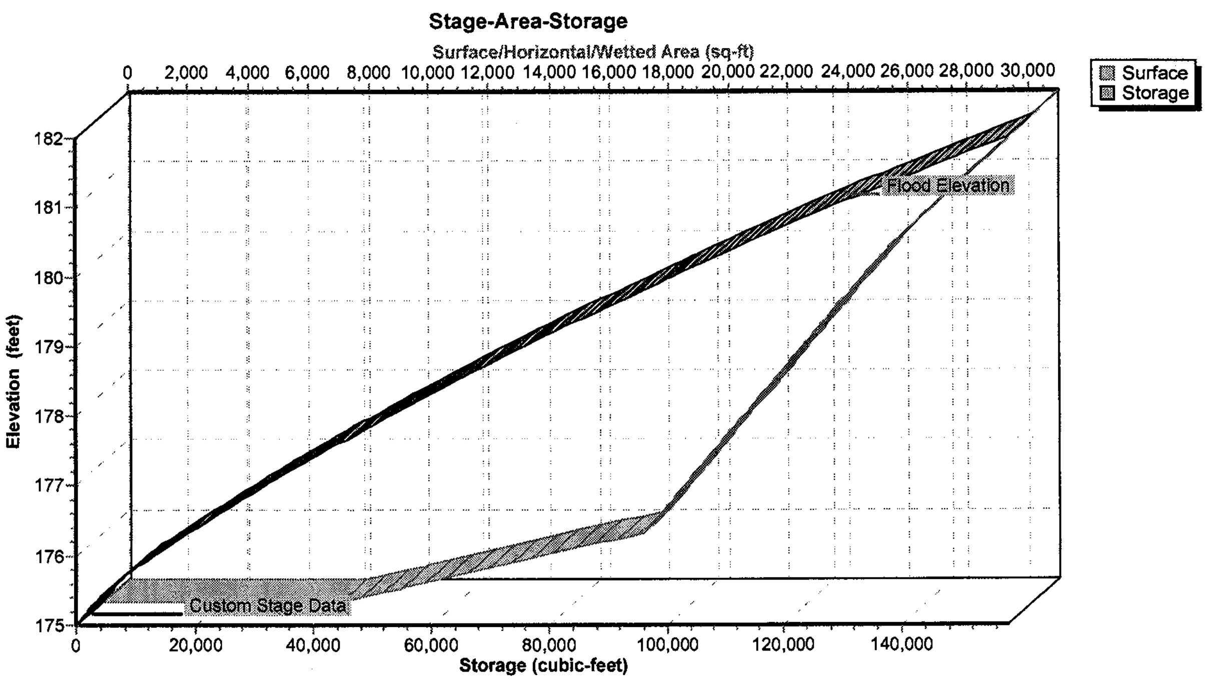
Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**3=18-in Primary Culvert** (Controls 0.00 cfs)
  ├─**1=Orifice/Grate** (Controls 0.00 cfs)
  └─**2=6-in Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.74 cfs @ 17.84 hrs HW=177.58' (Free Discharge)
└─**4=6-in Culvert** (Passes 0.74 cfs of 1.37 cfs potential flow)
  ├─**5=Orifice Top** (Orifice Controls 0.67 cfs @ 3.68 fps)
  └─**6=Orifice Side** (Orifice Controls 0.07 cfs @ 5.53 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**7=E-Spillway Weir** (Controls 0.00 cfs)

Pond DP-10: DETENTION POND 10



Summary for Pond DP-11: Detention Pond 11

Inflow Area = 22.282 ac, 4.04% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.66 cfs @ 12.40 hrs, Volume= 1.182 af
Outflow = 0.61 cfs @ 17.82 hrs, Volume= 1.030 af, Atten= 92%, Lag= 325.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.61 cfs @ 17.82 hrs, Volume= 1.030 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 165.43' @ 17.82 hrs Surf.Area= 27,580 sf Storage= 33,880 cf

Plug-Flow detention time= 1,598.2 min calculated for 1.030 af (87% of inflow)
Center-of-Mass det. time= 1,537.9 min (2,445.3 - 907.4)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

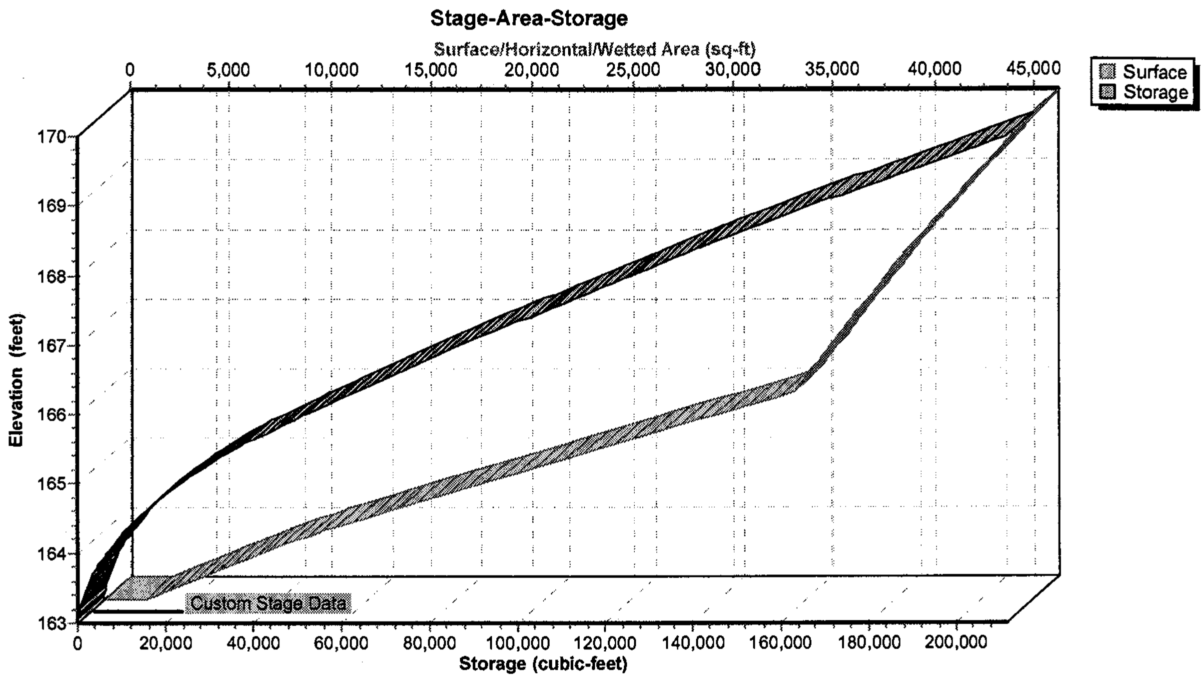
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
└─**3=18-In Culvert** (Controls 0.00 cfs)
  ├─**1=6-In Orifice Side (Riser)** (Controls 0.00 cfs)
  └─**2=Grate Top (Riser)** (Controls 0.00 cfs)

Secondary OutFlow Max=0.61 cfs @ 17.82 hrs HW=165.43' (Free Discharge)
└─**4=6-In Culvert** (Passes 0.61 cfs of 1.03 cfs potential flow)
  ├─**5=Orifice Top (6-in Culv)** (Orifice Controls 0.50 cfs @ 2.75 fps)
  └─**6=Orifice Side (6-in Culv)** (Orifice Controls 0.10 cfs @ 8.43 fps)

Pond DP-11: Detention Pond 11



Summary for Pond DP-12: DETENTION POND 12

Inflow Area =	20.177 ac,	3.27% Impervious,	Inflow Depth = 0.62"	for 2-yr Storm event
Inflow =	5.88 cfs @	12.39 hrs, Volume=	1.043 af	
Outflow =	0.51 cfs @	18.19 hrs, Volume=	0.885 af,	Atten= 91%, Lag= 347.6 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Secondary =	0.51 cfs @	18.19 hrs, Volume=	0.885 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 185.69' @ 18.19 hrs Surf.Area= 26,018 sf Storage= 31,513 cf

Plug-Flow detention time= 1,647.6 min calculated for 0.884 af (85% of inflow)
Center-of-Mass det. time= 1,581.2 min (2,498.6 - 917.4)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

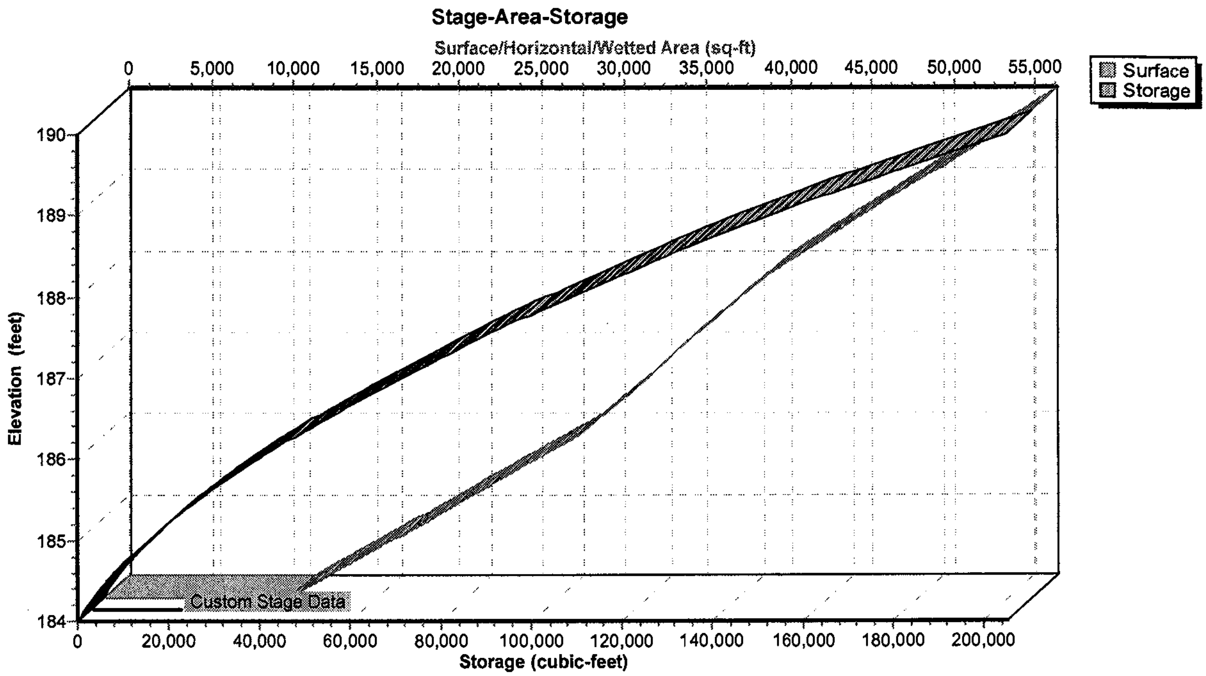
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-in Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=184.00' (Free Discharge)
└─**3=18- In Culvert** (Controls 0.00 cfs)
  ├─**1=Grate Top (Riser)** (Controls 0.00 cfs)
  └─**2=8-In Orifice (Riser Side)** (Controls 0.00 cfs)

Secondary OutFlow Max=0.51 cfs @ 18.19 hrs HW=185.69' (Free Discharge)
└─**6=6-In Culvert** (Passes 0.51 cfs of 1.48 cfs potential flow)
  ├─**4=Orifice Top (6-in Pipe)** (Orifice Controls 0.39 cfs @ 2.12 fps)
  └─**5=Orifice (Side of 6-in)** (Orifice Controls 0.13 cfs @ 5.12 fps)

Pond DP-12: DETENTION POND 12



C-2 ANTI-SEEP COLLAR & FLOTATION DESIGN

Pipe Anti-Seep Collar Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/10/2015
Chk. By: PCM

OBJECTIVE: Design anti-seep collars for dentention pound pipe outlets.

DESIGN CRITERIA

1. Reference is Maryland Specifications for Soil Erosion and Sediment Control, Maryland Department of Environment, 1994.

DESIGN ANALYSIS

Step 1: Calculate Length of Pipe In Saturated Zone (LS) (See table below and attached sketches)

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 embakment as a ratio of Z feet horizontal to one foot vertical. (In this case approximately one due to outlet structure)
U	=	Upstream invert of pipe (feet)
H	=	Highest normal water level expected (feet)
N	=	Number of Collars
D	=	Collar Size (ft)
LS	=	$Y(z+4)/(1-4S_0)$

Step 2: Determine Number and Size of Anti-Seep Collar to be used. (See attached Table 16 and Calculations)

Step 3: Choose one size for anti-seep collars that will fit all situations

All Anti-Seep Collars shall extend beyond pipe by 1.75' (minimum).

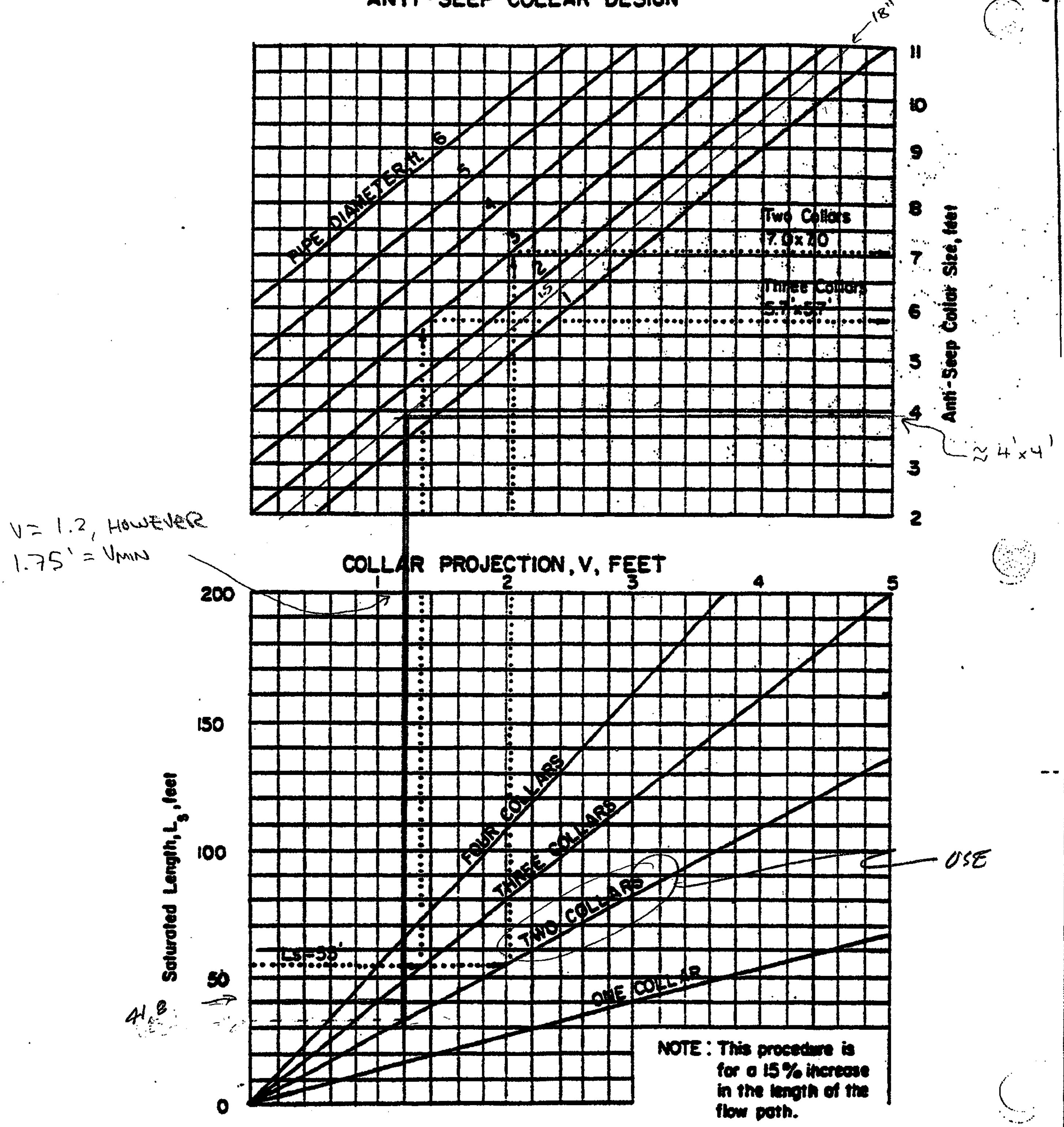
JUNIPER RIDGE LANDFILL EXPANSION

DETENTION POND OCS TABLE

POND I.D.	FLOOD ELEV		STRUCTURE		OUTLET PIPE		ANTI SEEP		
DP-10	POND BOTTOM	175.00	DIA.	4-FOOT	DIA.	18-INCH	Ls=Y(Z+4)/(1-4So)	41.8	Ls=SATURATED LENGTH (ft)
	POND BERM	182.00	TOP ELEV	179.00	INLET ELEV	175.20	V =	1.75	V = Collar Projection (ft), Table 16
	2 YEAR	177.60	ORIFICE DIA.	6-INCH	OUTLET ELEV	172.00	N =	2	N = # of Collars, Table 16
	10 YEAR	179.20	ORIFICE ELEV	178.00	LENGTH (FT)	52	SIZE	4-FEET	Table 16
	25 YEAR	179.50	SPILLWAY ELEV	180.00	SLOPE	0.0615	SPACING=Ls/(N+1)	14	
									USE 2 COLLARS,4.0-FEET, S=11'
DP-11	POND BOTTOM	163.00	DIA.	4-FOOT	DIA.	18-INCH	Ls=Y(Z+4)/(1-4So)	36.9	Ls=SATURATED LENGTH (ft)
	POND BERM	170.30	TOP ELEV	168.40	INLET ELEV	164.30	V =	1.75	V = Collar Projection (ft), Table 16
	2 YEAR	165.43	ORIFICE DIA.	6-INCH	OUTLET ELEV	162.00	N =	2	N = # of Collars, Table 16
	10 YEAR	166.87	ORIFICE ELEV	167.50	LENGTH (FT)	92	SIZE	4-FEET	Table 16
	25 YEAR	167.75	SPILLWAY ELEV	168.40	SLOPE	0.0250	SPACING=Ls/(N+1)	12	
									USE 2 COLLARS, 4.0-FEET, S=10'
DP-12	POND BOTTOM	184.00	DIA.	4-FOOT	DIA.	18-INCH	Ls=Y(Z+4)/(1-4So)	31.4	Ls=SATURATED LENGTH (ft)
	POND BERM	190.30	TOP ELEV	188.00	INLET ELEV	184.50	V =	1.75	V = Collar Projection (ft), Table 16
	2 YEAR	185.69	ORIFICE DIA.	8-INCH	OUTLET ELEV	180.00	N =	2	N = # of Collars, Table 16
	10 YEAR	186.96	ORIFICE ELEV	186.80	LENGTH (FT)	80	SIZE	4-FEET	Table 16
	25 YEAR	187.48	SPILLWAY ELEV	188.00	SLOPE	0.0563	SPACING=Ls/(N+1)	10	
									USE 2 COLLARS, 4.0-FEET, S=10'

Table 16

ANTI-SEEP COLLAR DESIGN



POND	OUTLET DIA	Ls
DP-10	18"	41.8 ← MAX
DP-11	18"	36.9
DP-12	18"	31.4

Structure Flotation Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/9/2015
Chk. By: PCM

DP-10

OBJECTIVE: Design Detention Pond Outlet Structures to Resist Floatation.

DESIGN CRITERIA

1. Design Outlet Structures to resist flotation neglecting all soil friction along sides of structure (conservative).

DESIGN ANALYSIS

Outlet Structure	25-YR EL (ft)	INV OUT (ft)	BARREL TOP (ft)	HYDRAULIC DIFF. (ft)
DP-10	179.50	175.20	179.00	3.80

Step 2: Calculate uplift on structure.

Calculate Weight of Water Displaced

Difference =	3.80	ft (Max anticipated water height - Inv. Out Elev)		
Sump Depth =	0.5	ft	top concrete fill:	174.70
Thickness of Structure Bottom =	6	Inches	bot concrete fill:	174.20
Thickness of Concrete Fill =	6	Inches		
Total Depth =	5.30	ft		
Unit Weight of Water =	62.4	lb/ft^3		
Pressure at Total Depth =	331	lb/ft^2		
Manhole Outer Dia. =	4.83	ft		
Pi =	3.1416			
Manhole Outer Area =	18.32	ft^2		
Total Uplift Pressure =	Pressure at Total Depth x $A_{manhole}$			
Total Uplift Pressure =	**6,060**	lb		

Step 3: Determine Weight of Structure without concrete footing:

Unit Weight of Water = 62.4 lb/ft^3
Unit Weight of Concrete = 150 lb/ft^3

Frame and Grate Weight =	0	lb
Cover Thickness =	0	Inches
Cover Weight =	0	lb
Concrete Bottom Weight=	2748	lb
Concrete Barrel Weight =	863	lb/vft
Barrel Top El =	179.00	ft
Barrel Bottom El =	174.7	ft
Difference =	4.3	ft
Weight of Barrels =	3713	lb
Manhole Inner Dia. =	4.0	ft
Pi =	3.1416	
Manhole Inner Area =	12.57	ft^2
Volume Displaced in Sump =	6.28	ft^3
Weight of Water in Sump =	392	lb
Total Structure Weight =	**6,853**	lb
Differential =	794	lb
Factor of Safety =	**1.13**	(Desired Factor of Safety is 1.1) No concrete fill required

Structure Flotation Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/11/2015
Chk. By: PCM

DP-11

OBJECTIVE: Design Detention Pond Outlet Structures to Resist Floatation.

DESIGN CRITERIA

1. Design Outlet Structures to resist flotation neglecting all soil friction along sides of structure (conservative).

DESIGN ANALYSIS

Outlet Structure	25-YR EL (ft)	INV OUT (ft)	BARREL TOP (ft)	HYDRAULIC DIFF. (ft)
DP-11	167.75	164.30	168.40	4.10

Step 2: Calculate uplift on structure.

Calculate Weight of Water Displaced

Difference = 4.10 ft (Max anticipated water height - Inv. Out Elev)
Sump Depth = 0.3 ft — top concrete fill: 164.00
Thickness of Structure Bottom = 6 Inches — bot concrete fill: 163.50
Thickness of Concrete Fill = 6 Inches
Total Depth = 5.40 ft
Unit Weight of Water = 62.4 lb/ft^3
Pressure at Total Depth = 337 lb/ft^2
Manhole Outer Dia. = 4.83 ft
Pi = 3.1416
Manhole Outer Area = 18.32 ft^2
Total Uplift Pressure = Pressure at Total Depth x $A_{manhole}$
Total Uplift Pressure = **6,174** lb

Step 3: Determine Weight of Structure without concrete footing:

Frame and Grate Weight = 0 lb
Cover Thickness = 0 Inches
Cover Weight = 0 lb
Concrete Bottom Weight= 2748 lb
Concrete Barrel Weight = 863 lb/vft
Barrel Top El = 168.40 ft
Barrel Bottom El = 164.0 ft
Difference = 4.4 ft
Weight of Barrels = 3799 lb
Manhole Inner Dia. = 4.0 ft
Pi = 3.1416
Manhole Inner Area = 12.57 ft^2
Volume Displaced in Sump = 3.77 ft^3
Weight of Water in Sump = 235 lb
Total Structure Weight = **6,783** lb

Unit Weight of Water = 62.4 lb/ft^3
Unit Weight of Concrete = 150 lb/ft^3

Differential = 609 lb

Factor of Safety = **1.10** (Desired Factor of Safety is 1.1)
No concrete fill required

Structure Flotation Design

DP-12

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/3/2015
Chk. By: PCM

OBJECTIVE: Design Detention Pond Outlet Structures to Resist Floatation.

DESIGN CRITERIA

1. Design Outlet Structures to resist flotation neglecting all soil friction along sides of structure (conservative).

DESIGN ANALYSIS

Outlet Structure	25-YR EL (ft)	INV OUT (ft)	BARREL TOP (ft)	HYDRAULIC DIFF. (ft)
DP-12	187.48	184.50	188.00	3.50

Step 2: Calculate uplift on structure.

Calculate Weight of Water Displaced

Difference = 3.50 ft (Max anticipated water height - Inv. Out Elev)
Sump Depth = 0.5 ft — top concrete fill: 184.00
Thickness of Structure Bottom = 6 Inches — bot concrete fill: 183.50
Thickness of Concrete Fill = 6 Inches
Total Depth = 5.00 ft
Unit Weight of Water = 62.4 lb/ft^3
Pressure at Total Depth = 312 lb/ft^2
Manhole Outer Dia. = 4.83 ft
Pi = 3.1416
Manhole Outer Area = 18.32 ft^2
Total Uplift Pressure = Pressure at Total Depth x $A_{manhole}$
Total Uplift Pressure = 5,717 lb

Step 3: Determine Weight of Structure without concrete footing:

Frame and Grate Weight = 0 lb
Cover Thickness = 0 Inches
Cover Weight = 0 lb
Concrete Bottom Weight= 2748 lb
Concrete Barrel Weight = 863 lb/vft
Barrel Top El = 188.00 ft
Barrel Bottom El = 184.0 ft
Difference = 4 ft
Weight of Barrels = 3454 lb
Manhole Inner Dia. = 4.0 ft
Pi = 3.1416
Manhole Inner Area = 12.57 ft^2
Volume Displaced in Sump = 6.28 ft^3
Weight of Water in Sump = 392 lb
Total Structure Weight = 6,594 lb

Unit Weight of Water = 62.4 lb/ft^3
Unit Weight of Concrete = 150 lb/ft^3

Differential = 877 lb

Factor of Safety = 1.15 (Desired Factor of Safety is 1.1)
No concrete fill required

C-3 PLUNGE POOL DESIGN

PLUNGE POOL DESIGN

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/3/2015
Chk. By: FCH

OBJECTIVE: Design plunge pool to protect the outlet of culverts from scour and deterioration.

REFERENCES:

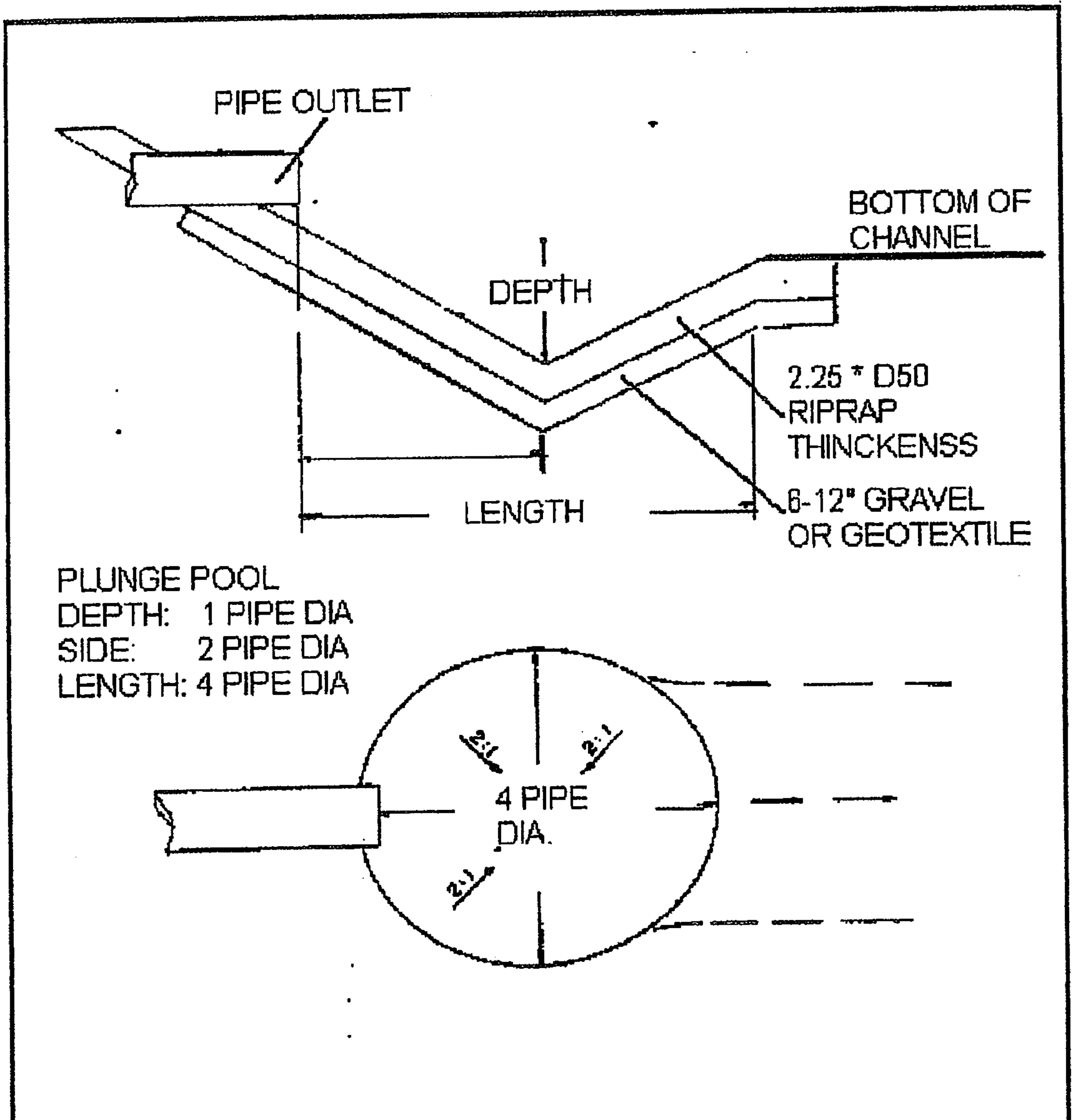
1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, March 2003
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System, Version 7.0, Chocorua, New Hampshire, 2001

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)
10	Pond DP-10	16.9	18	8	18	6	6
11	Pond DP-11	1.4	18	4	9	6	6
12	Pond DP-12	2.4	18	4	9	6	6



OUTLET PLUNGE POOL

OUTLET PROTECTION
FOR A PIPE FLOWING FULL WITH LOW TAILWATER

RIPRAP SIZE - D50 (Inches)
PIPE DIAMETER

DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	4											
5cfs	4											
8cfs	5	4										
10cfs	6	5	4									
12cfs	8	6	6									
15cfs	8	6	8	5								
17cfs		8	8	5								
20cfs		10	10	6	5							
25cfs		12	12	6	6							
30cfs				8	8	6						
40cfs				12	10	8	6					
50cfs				16	12	10	8	6				
60cfs				18	16	12	10	8				
70cfs					18	15	12	8				
80cfs					20	16	15	10	8			
90cfs						18	16	12	10			
100cfs						20	18	12	10			
125cfs						24	20	16	12	10		
150cfs							24	20	16	12	10	
200cfs								24	20	18	15	12

MINIMUM LENGTH OF APRON (FEET)
PIPE DIAMETER

DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	8											
5cfs	8											
8cfs	11	10										
10cfs	14	12	10									
15cfs	18	16	14	12								
20cfs		18	18	16	12							
30cfs			22	20	18	16						
40cfs			26	24	24	20	18					
50cfs				26	26	24	22	18				
70cfs					30	30	28	25				
100cfs						36	36	33	27			
150cfs						42	42	42	38	33	28	
200cfs								48	45	42	37	32

From USDA Soil Conservation Service

C-4 LEVEL SPREADER DESIGN

Standard Level Spreader Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/10/2015
Chk. By: RM

OBJECTIVE: Design level spreaders in accordance with Erosion and Sediment Control Standards.

DESIGN CRITERIA

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'

DESIGN ANALYSIS

Level Spreader Designation	Discharge From	Q_{10} (cfs)	Rqd Rate (cfs/ft)	Min. Rqd. Length (ft)	Specified Length (ft)
10	Pond DP-10	4.9	0.25	19.8	20
11	Pond DP-11	1.2	0.25	4.7	15
12	Pond DP-12	1.3	0.25	5.4	15

C-5 EMERGENCY SPILLWAY DESIGN

EMERGENCY SPILLWAY EVALUATION
EXPANDED POND 9

Summary for Pond DP-9: DETENTION POND 9

Inflow Area =	33.165 ac,	8.08% Impervious,	Inflow Depth = 3.25"	for 100-yr Storm event
Inflow =	64.87 cfs @	12.43 hrs, Volume=	8.970 af	
Outflow =	4.63 cfs @	16.13 hrs, Volume=	6.741 af,	Atten= 93%, Lag= 222.2 min
Primary =	2.32 cfs @	16.13 hrs, Volume=	2.271 af	
Secondary =	1.40 cfs @	16.13 hrs, Volume=	4.277 af	
Tertiary =	0.91 cfs @	16.13 hrs, Volume=	0.193 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 190.60' @ 16.13 hrs Surf.Area= 89,426 sf Storage= 276,765 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,283.3 min calculated for 6.741 af (75% of inflow)
Center-of-Mass det. time= 1,194.6 min (2,034.4 - 839.8)

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
#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

192.0 = TOP OF BERM
190.6 = 100 YR PEAK
1.4 ' = FREEBOARD

Primary OutFlow Max=2.32 cfs @ 16.13 hrs HW=190.60' (Free Discharge)
└1=**12-In Outlet Culvert** (Inlet Controls 2.32 cfs @ 2.96 fps)

Secondary OutFlow Max=1.40 cfs @ 16.13 hrs HW=190.60' (Free Discharge)
└2=**6-In Culvert** (Passes 1.40 cfs of 1.73 cfs potential flow)
  ├3=**Orifice** (Orifice Controls 1.22 cfs @ 6.64 fps)
  └4=**Orifice** (Orifice Controls 0.18 cfs @ 7.21 fps)

Tertiary OutFlow Max=0.90 cfs @ 16.13 hrs HW=190.60' (Free Discharge)
└5=**Broad-Crested Rectangular Weir** (Weir Controls 0.90 cfs @ 0.87 fps)

EMERGENCY SPILLWAY EVALUATION
POND 10

Summary for Pond DP-10: DETENTION POND 10

Inflow Area =	28.280 ac, 4.24% Impervious, Inflow Depth = 2.84"	for 100-yr Storm event
Inflow =	59.36 cfs @ 12.35 hrs, Volume=	6.692 af
Outflow =	27.71 cfs @ 12.72 hrs, Volume=	6.274 af, Atten= 53%, Lag= 22.0 min
Primary =	18.03 cfs @ 12.72 hrs, Volume=	3.582 af
Secondary =	1.74 cfs @ 12.72 hrs, Volume=	2.452 af
Tertiary =	7.94 cfs @ 12.72 hrs, Volume=	0.240 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 180.44' @ 12.72 hrs Surf.Area= 27,104 sf Storage= 112,674 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 439.2 min calculated for 6.272 af (94% of inflow)
Center-of-Mass det. time= 408.3 min (1,259.2 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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

182.0 = TOP OF BERM
180.4 = 100 YR PEAK
1.6 ' = FREEBOARD

Primary OutFlow Max=18.03 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└—**3=18-in Primary Culvert** (Inlet Controls 18.03 cfs @ 10.20 fps)
  ├—**1=Orifice/Grate** (Passes < 70.84 cfs potential flow)
  └—**2=6-in Orifice** (Passes < 1.40 cfs potential flow)

Secondary OutFlow Max=1.74 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└—**4=6-in Culvert** (Barrel Controls 1.74 cfs @ 9.51 fps)
  ├—**5=Orifice Top** (Passes < 1.64 cfs potential flow)
  └—**6=Orifice Side** (Passes < 0.12 cfs potential flow)

Tertiary OutFlow Max=7.82 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└—**7=E-Spillway Weir** (Weir Controls 7.82 cfs @ 1.79 fps)

EMERGENCY SPILLWAY EVALUATION
POND 11

Summary for Pond DP-11: Detention Pond 11

Inflow Area = 22.282 ac, 4.04% Impervious, Inflow Depth = 2.83" for 100-yr Storm event
Inflow = 42.15 cfs @ 12.30 hrs, Volume= 5.252 af
Outflow = 3.99 cfs @ 15.24 hrs, Volume= 5.094 af, Atten= 91%, Lag= 176.4 min
Primary = 2.67 cfs @ 15.24 hrs, Volume= 1.081 af
Secondary = 1.32 cfs @ 15.24 hrs, Volume= 4.013 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 168.53' @ 15.24 hrs Surf.Area= 41,482 sf Storage= 147,109 cf

Plug-Flow detention time= 1,111.8 min calculated for 5.093 af (97% of inflow)
Center-of-Mass det. time= 1,096.9 min (1,954.3 - 857.4)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

170. = TOP OF ROAD
168.5 = 100 YR PEAK
1.5 ' = FREEBOARD

Primary OutFlow Max=2.66 cfs @ 15.24 hrs HW=168.53' (Free Discha
└3=18-In Culvert (Passes 2.66 cfs of 12.52 cfs potential flow)
  ├1=6-In Orifice Side (Riser) (Orifice Controls 0.83 cfs @ 4.24 fps)
  └2=Grate Top (Riser) (Weir Controls 1.83 cfs @ 1.16 fps)

Secondary OutFlow Max=1.32 cfs @ 15.24 hrs HW=168.53' (Free Discharge)
└4=6-In Culvert (Barrel Controls 1.32 cfs @ 7.19 fps)
  ├5=Orifice Top (6-in Culv) (Passes < 1.64 cfs potential flow)
  └6=Orifice Side (6-in Culv) (Passes < 0.19 cfs potential flow)

EMERGENCY SPILLWAY EVALUATION
POND 12

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 20.177 ac, 3.27% Impervious, Inflow Depth = 2.80" for 100-yr Storm event
Inflow = 32.91 cfs @ 12.35 hrs, Volume= 4.700 af
Outflow = 5.20 cfs @ 14.55 hrs, Volume= 4.540 af, Atten= 84%, Lag= 132.4 min
Primary = 3.54 cfs @ 14.55 hrs, Volume= 1.439 af
Secondary = 1.65 cfs @ 14.55 hrs, Volume= 3.101 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 188.13' @ 14.55 hrs Surf.Area= 41,214 sf Storage= 113,928 cf

Plug-Flow detention time= 756.5 min calculated for 4.538 af (97% of inflow)
Center-of-Mass det. time= 739.3 min (1,611.6 - 872.3)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-In Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-In) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=3.51 cfs @ 14.55 hrs HW=188.13' (Free Discharge)
└─**3=18- In Culvert** (Passes 3.51 cfs of 11.39 cfs potential flow)
  ├─**1=Grate Top (Riser)** (Weir Controls 1.84 cfs @ 1.16 fps)
  └─**2=8-In Orifice (Riser Side)** (Orifice Controls 1.67 cfs @ 4.80 fps)

190.0 = TOP OF ROAD
188.1 = 100 YR PEAK
1.9 ' = FREEBOARD

Secondary OutFlow Max=1.65 cfs @ 14.55 hrs HW=188.13' (Free Discharge)
└─**6=6-In Culvert** (Passes 1.65 cfs of 1.85 cfs potential flow)
  ├─**4=Orifice Top (6-In Pipe)** (Orifice Controls 1.43 cfs @ 7.80 fps)
  └─**5=Orifice (Side of 6-In)** (Orifice Controls 0.22 cfs @ 9.09 fps)

APPENDIX D

FINAL SITE DRAINAGE PLAN AND DETENTION POND DETAILS

LEGEND

WETLAND DELINEATED

WETLAND PHOTO INTERPRETED

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC., NORRIDGEWOCK, MAINE. PHOTO DATE 12/31/14. VERTICAL DATUM: BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY PLISGA & DAY LAND SURVEYORS, BANGOR, MAINE. STANDARD PRACTICE DICTATES THAT PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. SITE BENCHMARK INFORMATION:

   PLUG 1 IS A BRASS PLUG ON FORMER LEACHATE POND PUMP STATION LOCATED AT COORDINATES NORTHING 478242.05, EASTING 925376.35 ELEVATION 167.93

2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004 AND STANTEC CONSULTING SERVICES 2008, 2014 AND 2015.
3. PERMITTED LANDFILL FINAL WASTE GRADES REPRESENT GRADES PRIOR TO CONSTRUCTION OF FINAL COVER SYSTEM.
4. PROPOSED FINAL WASTE GRADES REPRESENT GRADES PRIOR TO CONSTRUCTION OF FINAL COVER SYSTEM.
5. CULVERT SCHEDULE IS SHOWN ON DRAWING C-306. CULVERT SCHEDULE INCLUDES CULVERTS FOR DETENTION BASIN OUTLET STRUCTURES.

REV.	BY	DATE	STATUS
		7/15	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

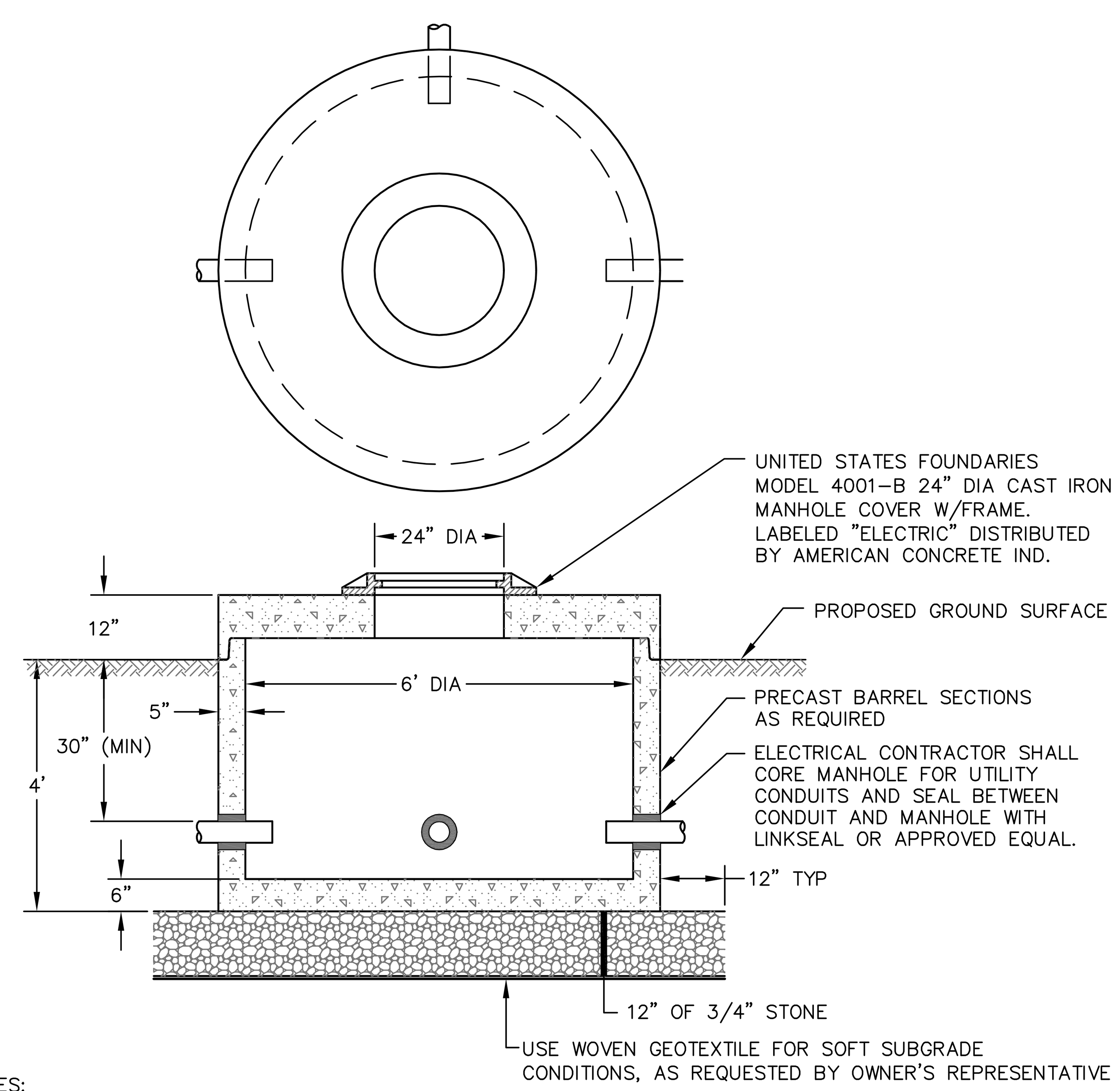
FINAL SITE DRAINAGE PLAN

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DESIGN BY:	PCM
DRAWN BY:	SJM
DATE:	3/4/2015
CHECKED BY:	
LMN:	FINAL-DRAIN
CTB:	SME-STD

JOB NO. 14101.00 DWG FILE BASE

C-107

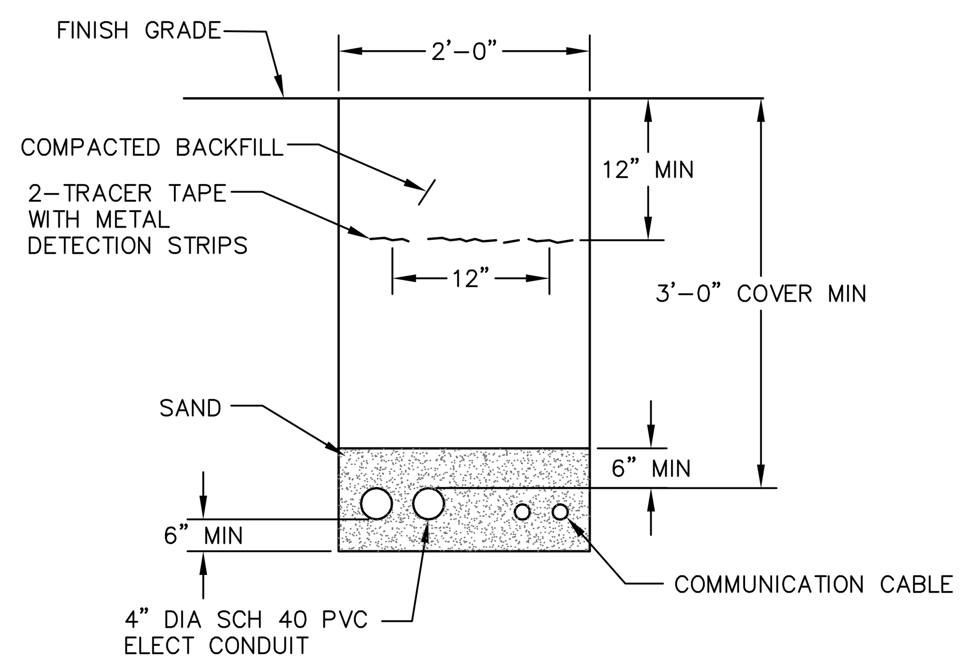


NOTES:

1. 6' DIA MANHOLE AS MANUFACTURED BY AMERICAN CONCRETE INDUSTRIES OR ENGINEER APPROVED EQUAL.
2. 4000 PSI CONCRETE AT 28 DAYS.
3. DESIGNED FOR H-20 WHEEL LOADING.
4. CONFORMS TO ASTM C-478 SPECIFICATIONS.
5. REINFORCED TO 0.12 IN SQ/LF.
6. SHIPLAP JOINTS SEALED WITH BUTYL RUBBER.
7. EXTERIOR COATED WITH ASPHALTIC PROTECTIVE DAMPROOFING.
8. BOTTOM MIN 5'-0" BELOW FINISH GRADE.
9. PRECAST CONCRETE VAULT MANUFACTURER TO PROVIDE ANTI-FLOATATION EXTENDED BASE SLAB AS NECESSARY. ANTI-FLOATATION DESIGN AND SHOP DRAWINGS SHALL BE PREPARED BY THE MANUFACTURER AND SUBMITTED TO THE ENGINEER FOR APPROVAL.

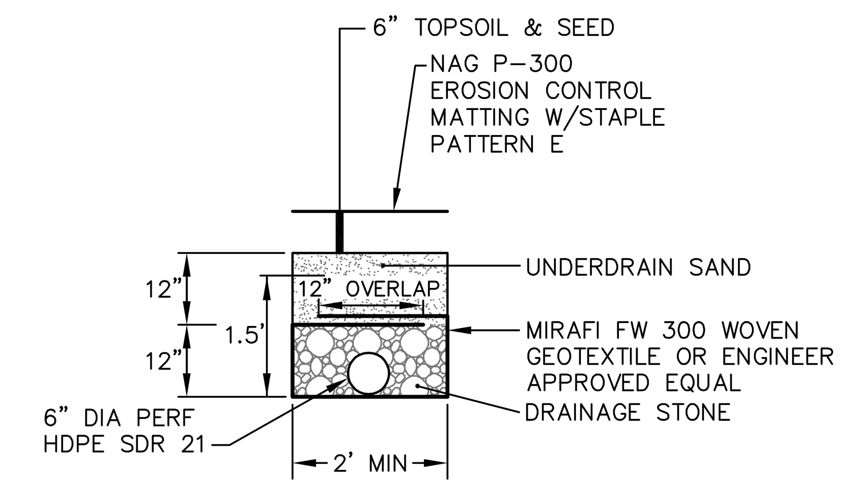
ELECTRIC UTILITY MANHOLE

NTS



UNDERGROUND ELECTRIC AND COMMUNICATION TRENCH

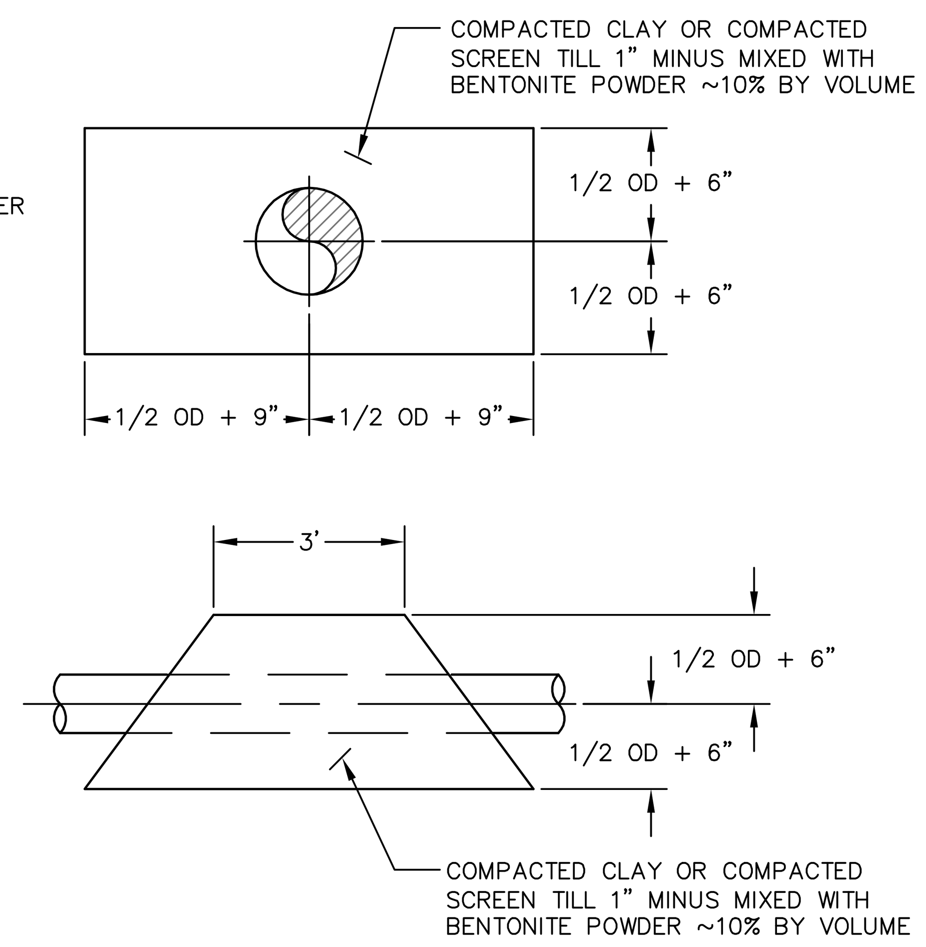
NTS



POND UNDERDRAIN

NTS

NOTE: DAMS SPACED AT 150' ALONG FORCE MAIN AND AT LOCATION SHOWN ON PLAN DRAWINGS



PIPE DAM

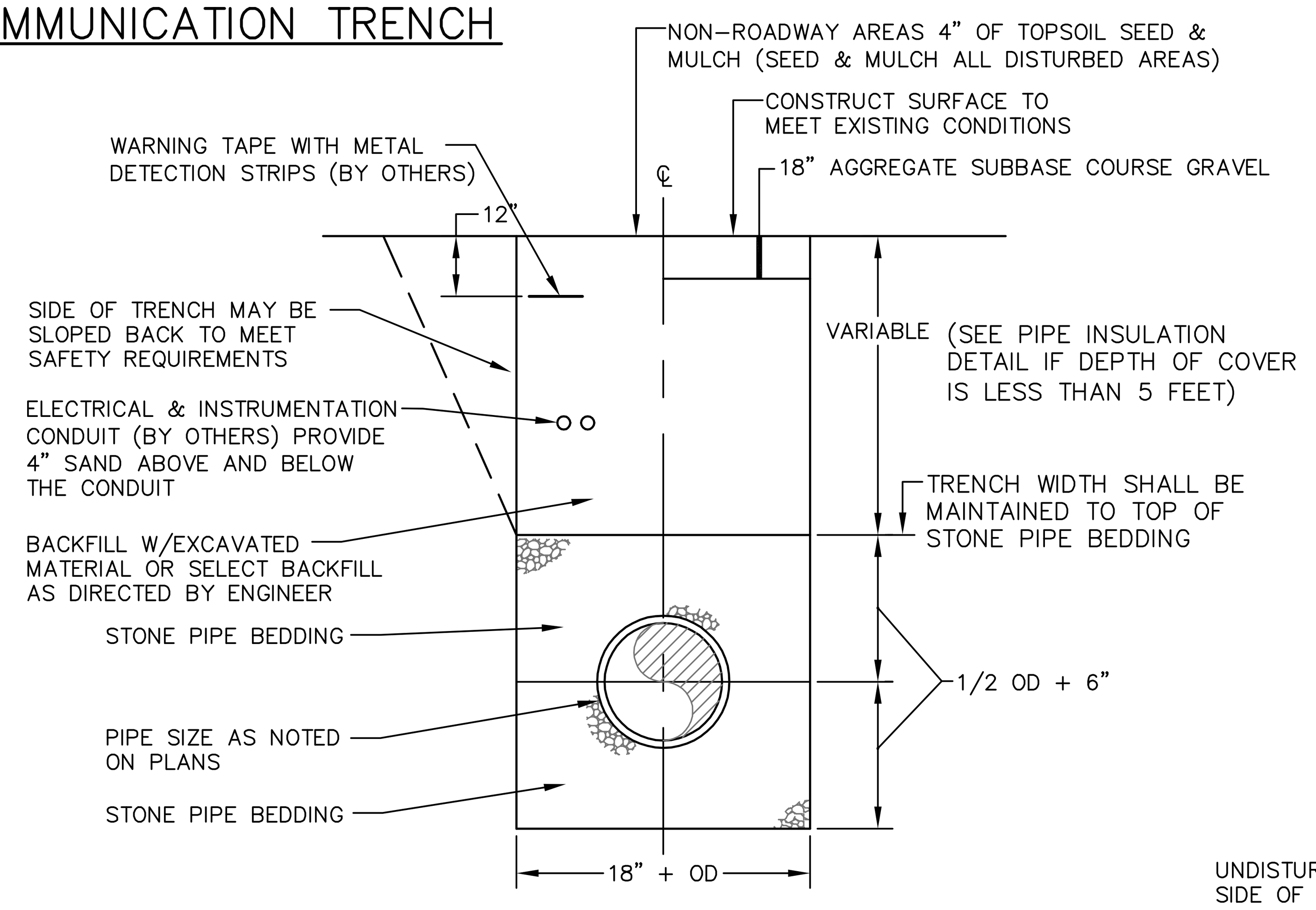
NTS

SIZE REQUIREMENTS FOR CONCRETE THRUST BLOCKS					
		BEARING ON UNDISTURBED SOIL (SQ FT)			
FITTINGS		90° BENDS	45° BENDS	TEES & PLUGS	HYDRANTS
PIPE SIZE	4"	2.0	1.0	1.0	N/A
	6"	3.0	2.0	2.0	6.0
	8"	5.0	3.0	4.0	N/A
	10"	7.0	4.0	5.0	N/A
	12"	10.0	6.0	7.0	N/A
	14"	13.0	7.0	10.0	N/A
	16"	17.0	9.0	12.0	N/A

CULVERTS	DIAMETER (IN)	LENGTH (FT)	SLOPE (FT/FT)	INV IN (FT)	INV OUT (FT)
C-2BA	24.00	40.00	0.02	203.90	203.00
C-2BB	24.00	96.00	0.01	195.00	194.00
C-4BA	24.00	78.00	0.01	204.40	203.70
C-4BB	24.00	78.00	0.01	204.40	203.70
C-4F	18.00	78.00	0.01	163.00	162.00
C-4G	24.00	36.00	0.03	175.00	174.00
C-4HA	18.00	40.00	0.03	203.50	202.50
C-4HB	18.00	101.00	0.03	178.50	176.00
C-4I	18.00	80.00	0.13	202.50	192.00
C-4IA	18.00	40.00	0.02	214.80	213.90
C-4JA	18.00	60.00	0.07	214.00	210.00
C-4JB	24.00	73.00	0.02	211.50	210.00
C-4JC	24.00	73.00	0.02	211.50	210.00
C-4K	24.00	51.00	0.04	216.50	214.30
C-4L	18.00	121.00	0.02	213.00	211.00
C-4N	18.00	33.00	0.03	184.00	183.00

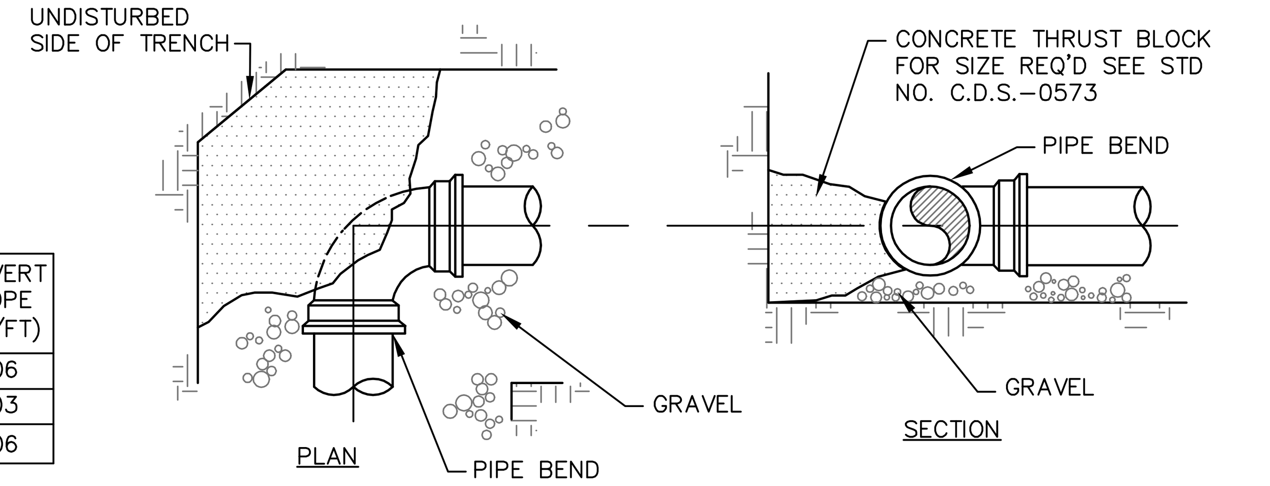
CULVERT SCHEDULE

NTS



PIPE TRENCH

NTS



TYPICAL THRUST BLOCK PLACEMENT ON BENDS

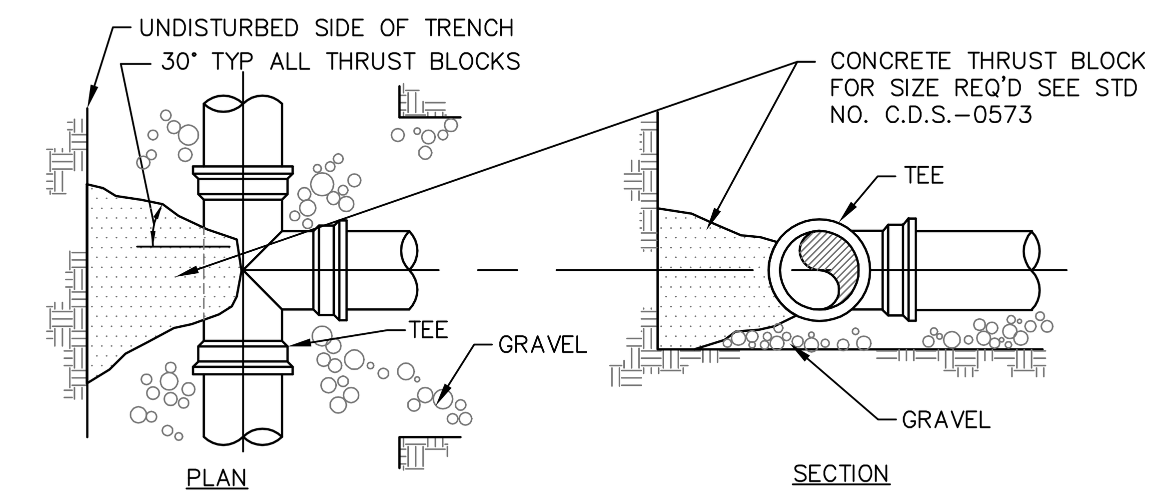
NTS

OUTLET CONTROL STRUCTURE SCHEDULE

STRUCTURE DESIGNATION	BOTTOM OF CONCRETE EL "A" (FT)	TOP OF CONCRETE EL "B" (FT)	OUTLET INV EL "C" (FT)	ORIFICE DIA "D" (IN)	ORIFICE INV EL "E" (FT)	RIM EL "F" (FT)	OUTLET (C) CULVERT DIAMETER (IN)	CULVERT LENGTH (FT)	CULVERT SLOPE (FT/FT)
DP-10	174.2	174.7	175.2	6	178.3	179.0	18 HDPE	52	0.06
DP-11	163.5	164.0	164.3	6	167.5	168.4	18 HDPE	92	0.03
DP-12	183.5	184.0	184.5	8	186.8	188.0	18 HDPE	80	0.06

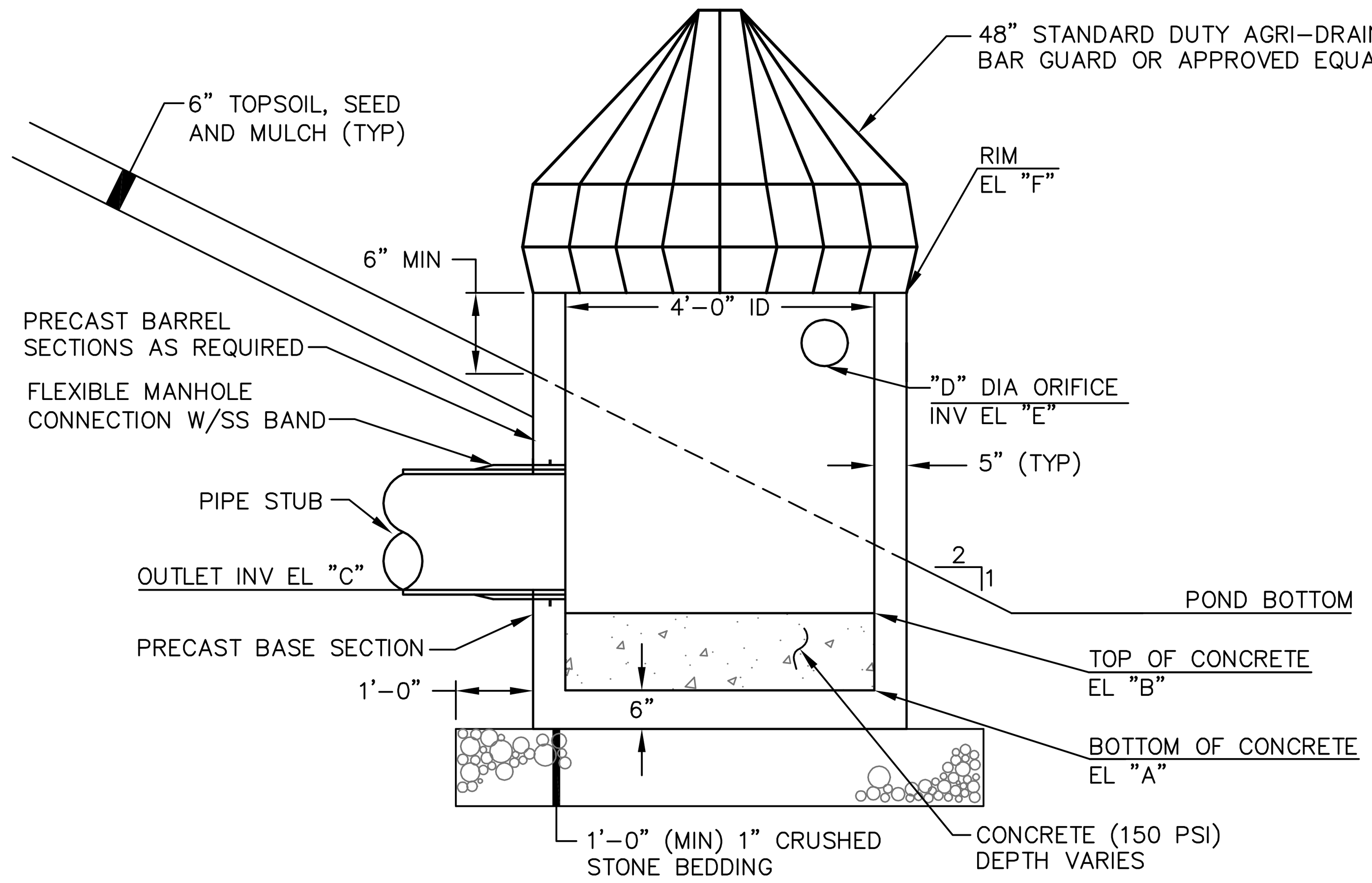
CATCH BASIN SCHEDULE A

CATCH BASIN DESIGNATION	PIPE INV EL "A" (FT)	RIM EL "B" (FT)	PIPE DIA "C" (IN)	TOP OPENING DIA "D" (IN)
CB-2BB	195.0	201.0	24"	30"
CB-4G	175.0	181.0	24"	24"
CB-4HB	178.5	184.0	18"	24"
CB-4I	202.5	208.0	18"	24"
CB-4JA	214.0	219.5	18"	24"



TYPICAL THRUST BLOCK PLACEMENT ON TEES

NTS

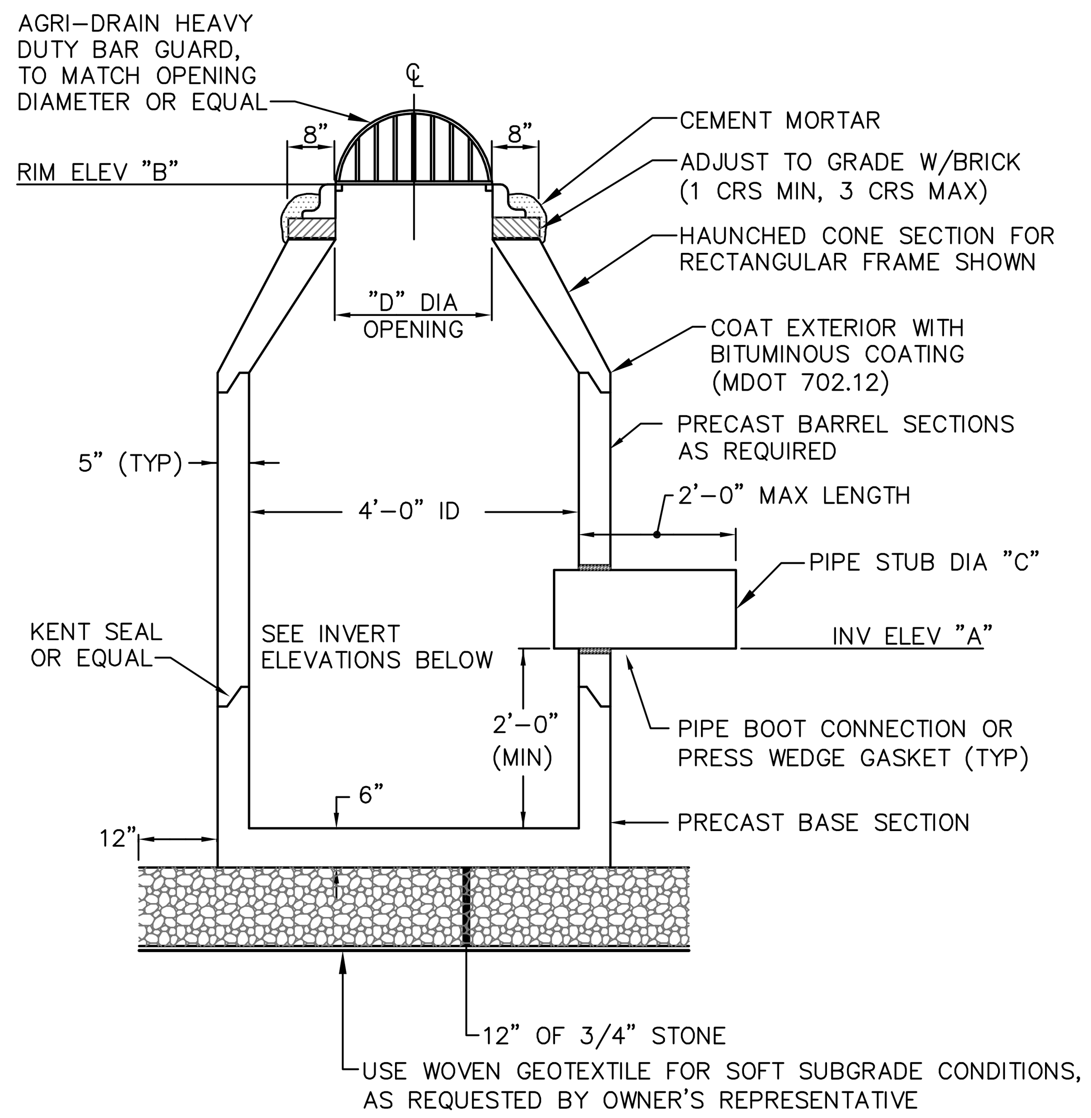


OUTLET CONTROL STRUCTURE

NTS

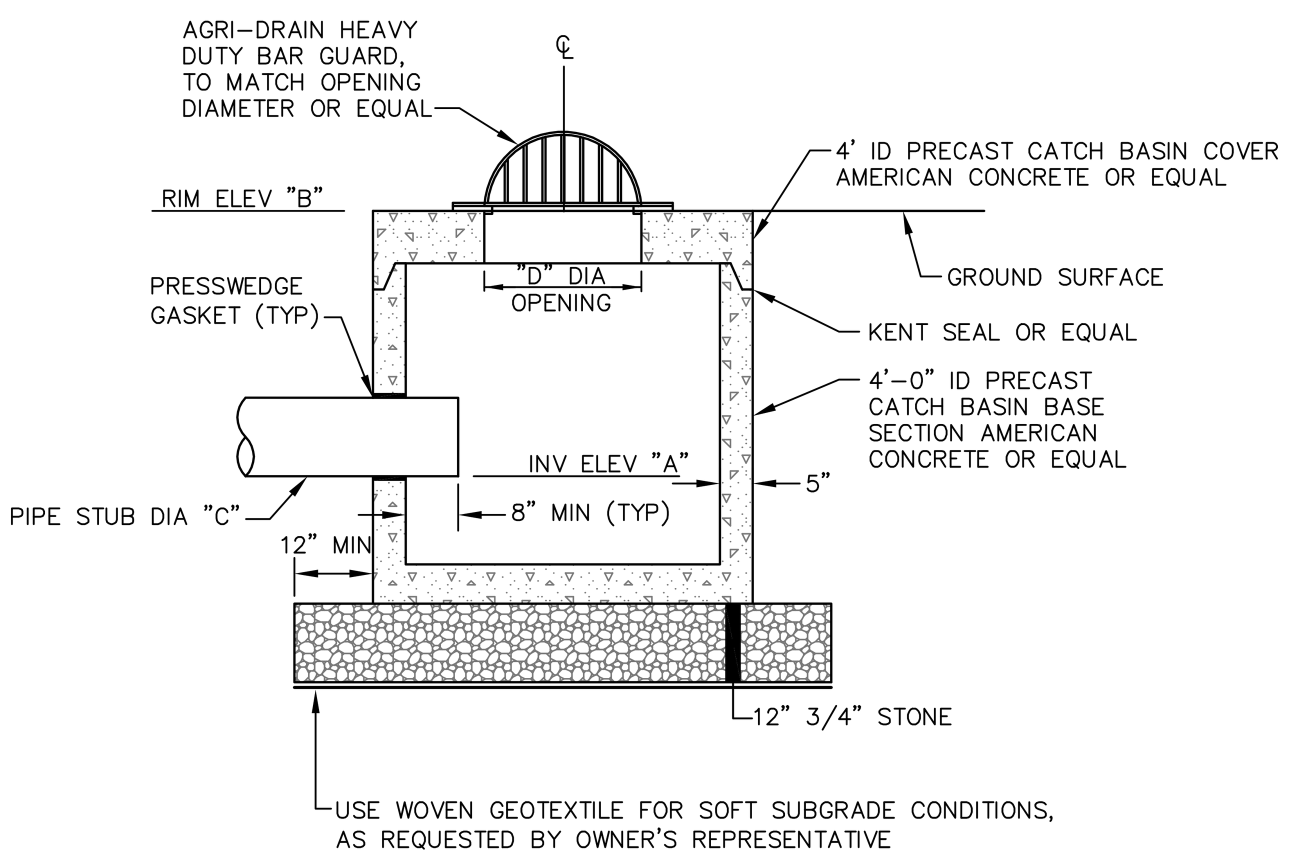
CATCH BASIN SCHEDULE B

CATCH BASIN DESIGNATION	PIPE INV EL "A" (FT)	RIM EL "B" (FT)	PIPE DIA "C" (IN)	TOP OPENING DIA "D" (IN)
CB-4K	216.5	220.0	24"	30"
CB-4L	213.0	215.0	18"	24"



CATCH BASINS 2BB, 4G, 4HB, 4I, & 4JA

NTS



CATCH BASINS 4K & 4L

NTS

REV.	BY	DATE	STATUS
		7/15	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SECTIONS AND DETAILS

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DESIGN BY: PCM
DRAWN BY: SJM
DATE: 12/5/2014
CHECKED BY:
LMN: NONE
CTB: SME-STD

JOB NO. 14101.00 DWG FILE DETAILS

C-306

APPENDIX A

PRE-DEVELOPMENT STORMWATER ANALYSIS

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'

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)
DP–1	POND/STRUCTURE DESIGNATION (HYDROCAD)
tc(1)	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 ANY DEVELOPMENT WHICH PREDATES THE TOPOGRAPHY SHOWN.

150 0 300 600 FEET

REV.	BY	DATE	STATUS
		1/1/07	SUBMITTED TO CLIENT

JUNIPER RIDGE LANDFILL
EXPANSION PROJECT
OLD TOWN, MAINE

STORMWATER MANAGEMENT PLAN
PRE–DEVELOPMENT ANALYSIS

SME
Sevee & Maher Engineers, Inc.
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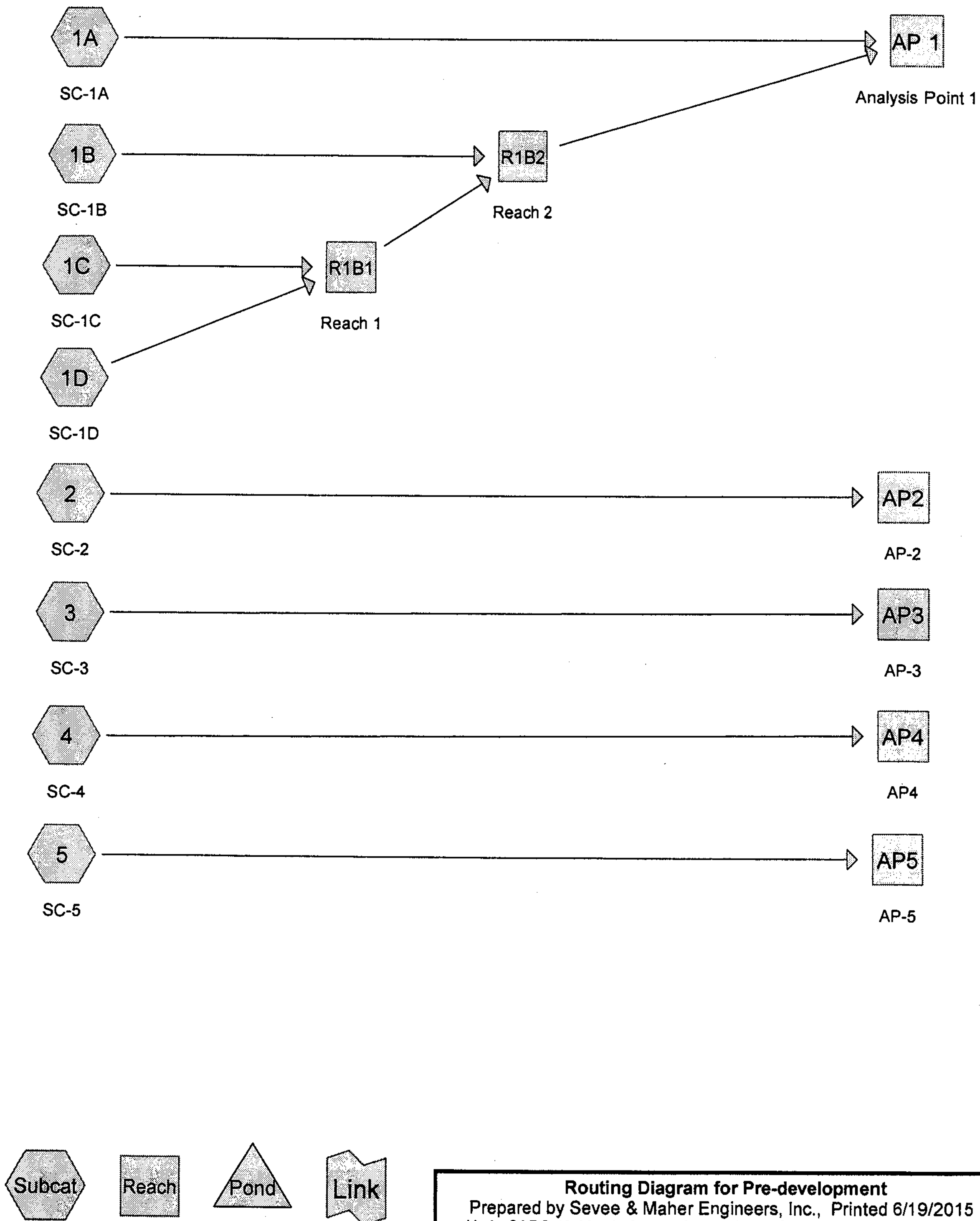
DESIGN BY: HME
DRAWN BY: HME
DATE: 4/08
CHECKED BY:
LMN:
CTB: SMP

JOB NO. 08097.00 DWG FILE SMP–PRE

D–100



Routing Diagram for Pre-development
Prepared by Sevee & Maher Engineers, Inc., Printed 6/19/2015
HydroCAD® 10.00 s/n 01260 © 2012 HydroCAD Software Solutions LLC

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)

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchr Numbers
0.000	0.000	0.000	0.000	2.330	2.330	Existing Water Body	
0.000	0.000	0.000	0.000	1.600	1.600	Existing Waterbody	
0.000	0.000	0.950	0.000	0.000	0.950	Meadow, non-grazed	
0.000	0.000	0.000	0.000	0.320	0.320	Paved Areas (New)	
0.000	0.000	0.000	2.140	0.000	2.140	Paved roads w/open ditches, 50% imp	
0.000	0.000	503.481	345.129	0.000	848.610	Woods, Good	

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: SC-1A Runoff Area=66.270 ac 0.00% Impervious Runoff Depth>0.58"
Flow Length=1,580' Tc=64.5 min CN=71 Runoff=14.56 cfs 3.211 af

Subcatchment 1B: SC-1B Runoff Area=32.390 ac 0.00% Impervious Runoff Depth>0.67"
Flow Length=1,350' Tc=61.4 min CN=73 Runoff=8.79 cfs 1.798 af

Subcatchment 1C: SC-1C Runoff Area=33.510 ac 0.00% Impervious Runoff Depth>0.54"
Flow Length=540' Tc=53.1 min CN=70 Runoff=7.55 cfs 1.520 af

Subcatchment 1D: SC-1D Runoff Area=46.550 ac 0.00% Impervious Runoff Depth>0.62"
Flow Length=1,890' Tc=66.2 min CN=72 Runoff=11.03 cfs 2.414 af

Subcatchment 2: SC-2 Runoff Area=61.430 ac 2.60% Impervious Runoff Depth>0.65"
Flow Length=2,738' Tc=127.3 min CN=73 Runoff=10.22 cfs 3.326 af

Subcatchment 3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth>0.62"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=29.11 cfs 13.855 af

Subcatchment 4: SC-4 Runoff Area=306.400 ac 0.00% Impervious Runoff Depth>0.63"
Flow Length=6,254' Tc=209.4 min CN=73 Runoff=36.11 cfs 15.981 af

Subcatchment 5: SC-5 Runoff Area=39.070 ac 0.37% Impervious Runoff Depth>0.77"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=6.20 cfs 2.493 af

Reach AP 1: Analysis Point 1 Inflow=29.50 cfs 8.776 af
Outflow=29.50 cfs 8.776 af

Reach AP2: AP-2 Inflow=10.22 cfs 3.326 af
Outflow=10.22 cfs 3.326 af

Reach AP3: AP-3 Inflow=29.11 cfs 13.855 af
Outflow=29.11 cfs 13.855 af

Reach AP4: AP4 Inflow=36.11 cfs 15.981 af
Outflow=36.11 cfs 15.981 af

Reach AP5: AP-5 Inflow=6.20 cfs 2.493 af
Outflow=6.20 cfs 2.493 af

Reach R1B1: Reach 1 Avg. Flow Depth=0.68' Max Vel=1.36 fps Inflow=18.27 cfs 3.933 af
n=0.030 L=1,850.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=15.50 cfs 3.815 af

Reach R1B2: Reach 2 Avg. Flow Depth=0.78' Max Vel=1.47 fps Inflow=20.68 cfs 5.613 af
n=0.030 L=570.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=20.49 cfs 5.565 af

Summary for Subcatchment 1A: SC-1A

Runoff = 14.56 cfs @ 12.99 hrs, Volume= 3.211 af, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 8.79 cfs @ 12.92 hrs, Volume= 1.798 af, Depth> 0.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 7.55 cfs @ 12.84 hrs, Volume= 1.520 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 11.03 cfs @ 13.01 hrs, Volume= 2.414 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 10.22 cfs @ 13.87 hrs, Volume= 3.326 af, Depth> 0.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 29.11 cfs @ 15.72 hrs, Volume= 13.855 af, Depth> 0.62"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 36.11 cfs @ 15.13 hrs, Volume= 15.981 af, Depth> 0.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 6.20 cfs @ 14.76 hrs, Volume= 2.493 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 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 = 29.50 cfs @ 13.55 hrs, Volume= 8.776 af
Outflow = 29.50 cfs @ 13.55 hrs, Volume= 8.776 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 > 0.65" for 2-Yr event
Inflow = 10.22 cfs @ 13.87 hrs, Volume= 3.326 af
Outflow = 10.22 cfs @ 13.87 hrs, Volume= 3.326 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 > 0.62" for 2-Yr event
Inflow = 29.11 cfs @ 15.72 hrs, Volume= 13.855 af
Outflow = 29.11 cfs @ 15.72 hrs, Volume= 13.855 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 > 0.63" for 2-Yr event
Inflow = 36.11 cfs @ 15.13 hrs, Volume= 15.981 af
Outflow = 36.11 cfs @ 15.13 hrs, Volume= 15.981 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 > 0.77" for 2-Yr event
Inflow = 6.20 cfs @ 14.76 hrs, Volume= 2.493 af
Outflow = 6.20 cfs @ 14.76 hrs, Volume= 2.493 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

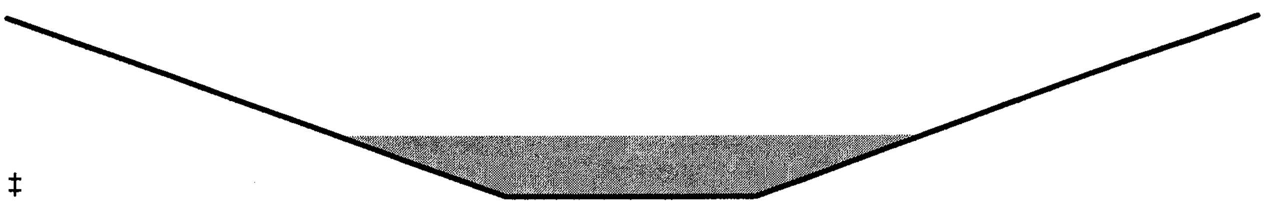
Summary for Reach R1B1: Reach 1

Inflow Area = 80.060 ac, 0.00% Impervious, Inflow Depth > 0.59" for 2-Yr event
Inflow = 18.27 cfs @ 12.92 hrs, Volume= 3.933 af
Outflow = 15.50 cfs @ 13.62 hrs, Volume= 3.815 af, Atten= 15%, Lag= 41.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.36 fps, Min. Travel Time= 22.6 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 38.4 min

Peak Storage= 21,074 cf @ 13.24 hrs
Average Depth at Peak Storage= 0.68'
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'



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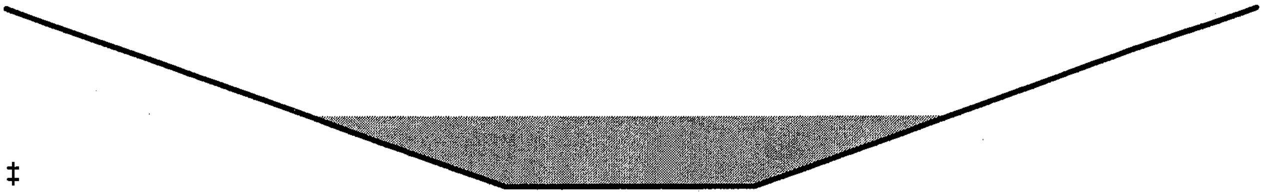
Summary for Reach R1B2: Reach 2

Inflow Area = 112.450 ac, 0.00% Impervious, Inflow Depth > 0.60" for 2-Yr event
Inflow = 20.68 cfs @ 13.52 hrs, Volume= 5.613 af
Outflow = 20.49 cfs @ 13.71 hrs, Volume= 5.565 af, Atten= 1%, Lag= 11.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.47 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 10.6 min

Peak Storage= 7,939 cf @ 13.60 hrs
Average Depth at Peak Storage= 0.78'
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'



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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: SC-1A Runoff Area=66.270 ac 0.00% Impervious Runoff Depth>1.44"
Flow Length=1,580' Tc=64.5 min CN=71 Runoff=40.77 cfs 7.940 af

Subcatchment 1B: SC-1B Runoff Area=32.390 ac 0.00% Impervious Runoff Depth>1.57"
Flow Length=1,350' Tc=61.4 min CN=73 Runoff=22.82 cfs 4.250 af

Subcatchment 1C: SC-1C Runoff Area=33.510 ac 0.00% Impervious Runoff Depth>1.38"
Flow Length=540' Tc=53.1 min CN=70 Runoff=22.00 cfs 3.845 af

Subcatchment 1D: SC-1D Runoff Area=46.550 ac 0.00% Impervious Runoff Depth>1.50"
Flow Length=1,890' Tc=66.2 min CN=72 Runoff=29.72 cfs 5.834 af

Subcatchment 2: SC-2 Runoff Area=61.430 ac 2.60% Impervious Runoff Depth>1.54"
Flow Length=2,738' Tc=127.3 min CN=73 Runoff=26.63 cfs 7.899 af

Subcatchment 3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth>1.48"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=74.13 cfs 33.230 af

Subcatchment 4: SC-4 Runoff Area=306.400 ac 0.00% Impervious Runoff Depth>1.50"
Flow Length=6,254' Tc=209.4 min CN=73 Runoff=92.12 cfs 38.214 af

Subcatchment 5: SC-5 Runoff Area=39.070 ac 0.37% Impervious Runoff Depth>1.72"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=14.61 cfs 5.590 af

Reach AP 1: Analysis Point 1 Inflow=92.64 cfs 21.615 af
Outflow=92.64 cfs 21.615 af

Reach AP2: AP-2 Inflow=26.63 cfs 7.899 af
Outflow=26.63 cfs 7.899 af

Reach AP3: AP-3 Inflow=74.13 cfs 33.230 af
Outflow=74.13 cfs 33.230 af

Reach AP4: AP4 Inflow=92.12 cfs 38.214 af
Outflow=92.12 cfs 38.214 af

Reach AP5: AP-5 Inflow=14.61 cfs 5.590 af
Outflow=14.61 cfs 5.590 af

Reach R1B1: Reach 1 Avg. Flow Depth=1.16' Max Vel=1.83 fps Inflow=50.91 cfs 9.679 af
n=0.030 L=1,850.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=45.97 cfs 9.498 af

Reach R1B2: Reach 2 Avg. Flow Depth=1.33' Max Vel=1.98 fps Inflow=62.14 cfs 13.747 af
n=0.030 L=570.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=61.72 cfs 13.675 af

Summary for Subcatchment 1A: SC-1A

Runoff = 40.77 cfs @ 12.92 hrs, Volume= 7.940 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

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 = 22.82 cfs @ 12.88 hrs, Volume= 4.250 af, Depth> 1.57"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

	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 = 22.00 cfs @ 12.78 hrs, Volume= 3.845 af, Depth> 1.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

	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 = 29.72 cfs @ 12.93 hrs, Volume= 5.834 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

	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 = 26.63 cfs @ 13.75 hrs, Volume= 7.899 af, Depth> 1.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

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 = 74.13 cfs @ 15.27 hrs, Volume= 33.230 af, Depth> 1.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

	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 = 92.12 cfs @ 14.91 hrs, Volume= 38.214 af, Depth> 1.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

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 = 14.61 cfs @ 14.71 hrs, Volume= 5.590 af, Depth> 1.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Yr Rainfall=4.10"

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 > 1.45" for 10-Yr event
Inflow = 92.64 cfs @ 13.25 hrs, Volume= 21.615 af
Outflow = 92.64 cfs @ 13.25 hrs, Volume= 21.615 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 > 1.54" for 10-Yr event
Inflow = 26.63 cfs @ 13.75 hrs, Volume= 7.899 af
Outflow = 26.63 cfs @ 13.75 hrs, Volume= 7.899 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 > 1.48" for 10-Yr event
Inflow = 74.13 cfs @ 15.27 hrs, Volume= 33.230 af
Outflow = 74.13 cfs @ 15.27 hrs, Volume= 33.230 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 > 1.50" for 10-Yr event
Inflow = 92.12 cfs @ 14.91 hrs, Volume= 38.214 af
Outflow = 92.12 cfs @ 14.91 hrs, Volume= 38.214 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 > 1.72" for 10-Yr event
Inflow = 14.61 cfs @ 14.71 hrs, Volume= 5.590 af
Outflow = 14.61 cfs @ 14.71 hrs, Volume= 5.590 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

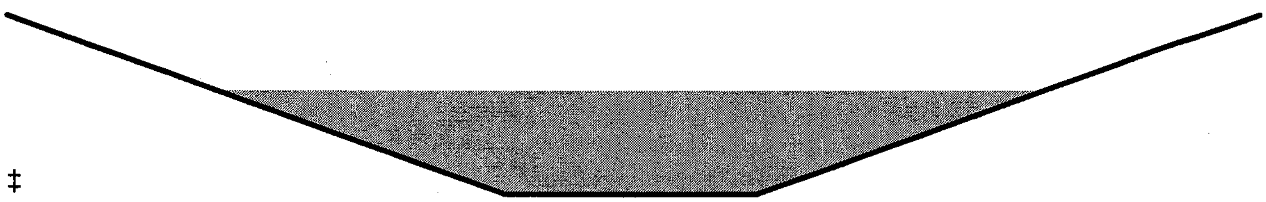
Summary for Reach R1B1: Reach 1

Inflow Area = 80.060 ac, 0.00% Impervious, Inflow Depth > 1.45" for 10-Yr event
Inflow = 50.91 cfs @ 12.86 hrs, Volume= 9.679 af
Outflow = 45.97 cfs @ 13.36 hrs, Volume= 9.498 af, Atten= 10%, Lag= 30.2 min

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= 16.8 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 31.8 min

Peak Storage= 46,438 cf @ 13.08 hrs
Average Depth at Peak Storage= 1.16'
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= 1,850.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 146.30'



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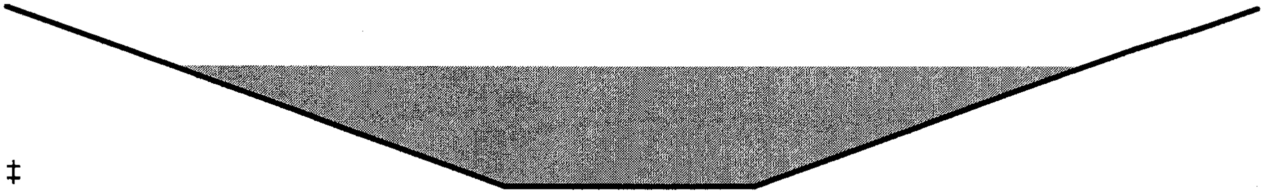
Summary for Reach R1B2: Reach 2

Inflow Area = 112.450 ac, 0.00% Impervious, Inflow Depth > 1.47" for 10-Yr event
Inflow = 62.14 cfs @ 13.26 hrs, Volume= 13.747 af
Outflow = 61.72 cfs @ 13.40 hrs, Volume= 13.675 af, Atten= 1%, Lag= 8.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.98 fps, Min. Travel Time= 4.8 min
Avg. Velocity = 1.07 fps, Avg. Travel Time= 8.9 min

Peak Storage= 17,767 cf @ 13.32 hrs
Average Depth at Peak Storage= 1.33'
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'



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Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: SC-1A Runoff Area=66.270 ac 0.00% Impervious Runoff Depth>1.93"
Flow Length=1,580' Tc=64.5 min CN=71 Runoff=55.97 cfs 10.685 af

Subcatchment1B: SC-1B Runoff Area=32.390 ac 0.00% Impervious Runoff Depth>2.09"
Flow Length=1,350' Tc=61.4 min CN=73 Runoff=30.76 cfs 5.651 af

Subcatchment1C: SC-1C Runoff Area=33.510 ac 0.00% Impervious Runoff Depth>1.86"
Flow Length=540' Tc=53.1 min CN=70 Runoff=30.43 cfs 5.206 af

Subcatchment1D: SC-1D Runoff Area=46.550 ac 0.00% Impervious Runoff Depth>2.01"
Flow Length=1,890' Tc=66.2 min CN=72 Runoff=40.50 cfs 7.804 af

Subcatchment2: SC-2 Runoff Area=61.430 ac 2.60% Impervious Runoff Depth>2.05"
Flow Length=2,738' Tc=127.3 min CN=73 Runoff=36.03 cfs 10.515 af

Subcatchment3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth>1.97"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=100.29 cfs 44.356 af

Subcatchment4: SC-4 Runoff Area=306.400 ac 0.00% Impervious Runoff Depth>2.00"
Flow Length=6,254' Tc=209.4 min CN=73 Runoff=124.52 cfs 50.967 af

Subcatchment5: SC-5 Runoff Area=39.070 ac 0.37% Impervious Runoff Depth>2.25"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=19.28 cfs 7.326 af

Reach AP 1: Analysis Point 1 Inflow=130.92 cfs 29.050 af
Outflow=130.92 cfs 29.050 af

Reach AP2: AP-2 Inflow=36.03 cfs 10.515 af
Outflow=36.03 cfs 10.515 af

Reach AP3: AP-3 Inflow=100.29 cfs 44.356 af
Outflow=100.29 cfs 44.356 af

Reach AP4: AP4 Inflow=124.52 cfs 50.967 af
Outflow=124.52 cfs 50.967 af

Reach AP5: AP-5 Inflow=19.28 cfs 7.326 af
Outflow=19.28 cfs 7.326 af

Reach R1B1: Reach 1 Avg. Flow Depth=1.36' Max Vel=2.00 fps Inflow=69.81 cfs 13.009 af
n=0.030 L=1,850.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=63.99 cfs 12.799 af

Reach R1B2: Reach 2 Avg. Flow Depth=1.56' Max Vel=2.16 fps Inflow=86.96 cfs 18.449 af
n=0.030 L=570.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=86.38 cfs 18.365 af

Summary for Subcatchment 1A: SC-1A

Runoff = 55.97 cfs @ 12.90 hrs, Volume= 10.685 af, Depth> 1.93"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

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 = 30.76 cfs @ 12.86 hrs, Volume= 5.651 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

	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 = 30.43 cfs @ 12.76 hrs, Volume= 5.206 af, Depth> 1.86"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

	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 = 40.50 cfs @ 12.92 hrs, Volume= 7.804 af, Depth> 2.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

	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 = 36.03 cfs @ 13.73 hrs, Volume= 10.515 af, Depth> 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

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 = 100.29 cfs @ 15.24 hrs, Volume= 44.356 af, Depth> 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

	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 = 124.52 cfs @ 14.88 hrs, Volume= 50.967 af, Depth> 2.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

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 = 19.28 cfs @ 14.70 hrs, Volume= 7.326 af, Depth> 2.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Yr Rainfall=4.80"

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 > 1.95" for 25-Yr event
Inflow = 130.92 cfs @ 13.19 hrs, Volume= 29.050 af
Outflow = 130.92 cfs @ 13.19 hrs, Volume= 29.050 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 > 2.05" for 25-Yr event
Inflow = 36.03 cfs @ 13.73 hrs, Volume= 10.515 af
Outflow = 36.03 cfs @ 13.73 hrs, Volume= 10.515 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 > 1.97" for 25-Yr event
Inflow = 100.29 cfs @ 15.24 hrs, Volume= 44.356 af
Outflow = 100.29 cfs @ 15.24 hrs, Volume= 44.356 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 > 2.00" for 25-Yr event
Inflow = 124.52 cfs @ 14.88 hrs, Volume= 50.967 af
Outflow = 124.52 cfs @ 14.88 hrs, Volume= 50.967 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 > 2.25" for 25-Yr event
Inflow = 19.28 cfs @ 14.70 hrs, Volume= 7.326 af
Outflow = 19.28 cfs @ 14.70 hrs, Volume= 7.326 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

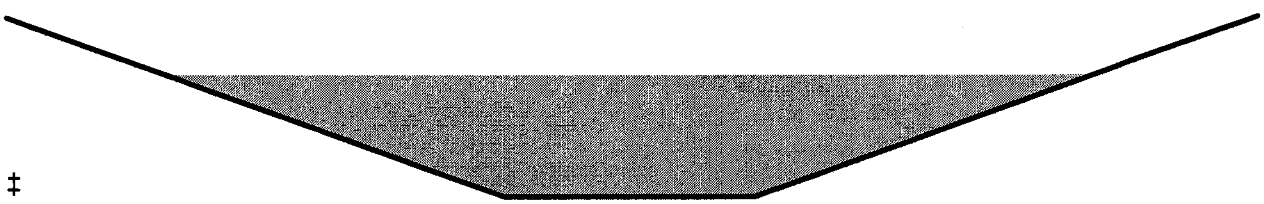
Summary for Reach R1B1: Reach 1

Inflow Area =	80.060 ac,	0.00% Impervious,	Inflow Depth > 1.95"	for 25-Yr event	
Inflow =	69.81 cfs @	12.85 hrs, Volume=	13.009 af		
Outflow =	63.99 cfs @	13.30 hrs, Volume=	12.799 af,	Atten= 8%,	Lag= 27.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.00 fps, Min. Travel Time= 15.4 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 29.9 min

Peak Storage= 59,202 cf @ 13.05 hrs
Average Depth at Peak Storage= 1.36'
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'



‡

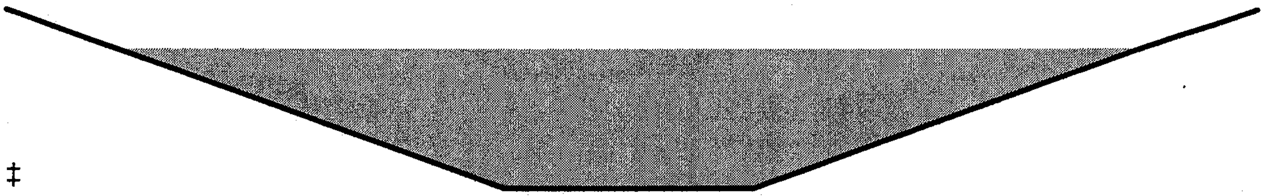
Summary for Reach R1B2: Reach 2

Inflow Area =	112.450 ac,	0.00% Impervious,	Inflow Depth > 1.97"	for 25-Yr event	
Inflow =	86.96 cfs @	13.20 hrs, Volume=	18.449 af		
Outflow =	86.38 cfs @	13.34 hrs, Volume=	18.365 af,	Atten= 1%,	Lag= 7.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.16 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 1.13 fps, Avg. Travel Time= 8.4 min

Peak Storage= 22,774 cf @ 13.26 hrs
Average Depth at Peak Storage= 1.56'
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'



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APPENDIX B

POST-DEVELOPMENT STORMWATER ANALYSIS

TIME OF CONCENTRATION

SUBCATCHMENT 1A
A – B: Sht L=150', S=0.020
B – C: Direct Entry, L=1840'
C – D: Direct Entry, L=260'

SUBCATCHMENT 1B
A – B: Sht L=150', S=0.050
B – C: ShC L=185', S=0.100
C – D: Ch L=390', S=0.050
D – E: Ch L=560', S=0.330

SUBCATCHMENT 1C
A – B: Sht L=150', S=0.035
B – C: ShC L=230', S=0.013
C – D: Direct Entry

SUBCATCHMENT 1D
A – B: Sht L=150', S=0.050
B – C: ShC L=160', S=0.100
C – D: Ch L=200', S=0.050
D – E: Ch L=605', S=0.330

SUBCATCHMENT 1E
A – B: Sht L=150', S=0.100
B – C: ShC L=150', S=0.150
C – D: Ch L=93', S=0.050
D – E: Ch L=517', S=0.330

SUBCATCHMENT 1F
A – B: Sht L=100', S=0.010
B – C: Sht L=17', S=0.330
C – D: ShC L=300, S=0.019
D – E: ShC L=1649', S=0.050
E – F: Direct Entry

SUBCATCHMENT 1G
A – B: Sht L=150', S=0.100
B – C: ShC L=62', S=0.100
C – D: ShC L=90', S=0.330
D – E: Ch L=140', S=0.500
E – F: Ch L=415', S=0.330

SUBCATCHMENT 1H
A – B: Sht L=150', S=0.330
B – C: Ch L=610', S=0.030

SUBCATCHMENT 1i
A – B: Sht L=150', S=0.050
B – C: ShC L=150', S=0.100
C – D: Ch L=220', S=0.050
D – E: Ch L=570', S=0.330

SUBCATCHMENT 1J
A – B: Sht L=100', S=0.040
B – C: ShC L=123', S=0.057
C – D: Ch L=370', S=0.019

SUBCATCHMENT 2A
A – B: Sht L=150', S=0.030
B – C: ShC L=540', S=0.020
C – D: ShC L=530', S=0.009
D – E: Cf L=1213', S=0.008

SUBCATCHMENT 2B
A – B: Sht L=150', S=0.050
B – C: ShC L=190', S=0.100
C – D: Ch L=430', S=0.050
D – E: Ch L=450', S=0.330

SUBCATCHMENT 2C
A – B: Sht L=150', S=0.013
B – C: ShC L=290', S=0.024
C – D: Ch L=260', S=0.011

SUBCATCHMENT 3
A – B: Sht L=150', S=0.020
B – C: ShC L=1120', S=0.005
C – D: Direct Entry, L=3070'

SUBCATCHMENT 4A
A – B: Sht L=150', S=0.017
B – C: ShC L=160', S=0.041
C – D: ShC L=70', S=0.043

SUBCATCHMENT 4B
A – B: Sht L=24', S=0.020
B – C: Sht L=19', S=0.500
C – D: ShC L=584', S=0.014
D – E: Ch L=40', S=0.025

SUBCATCHMENT 4C
A – B: Sht L=61', S=0.020
B – C: Sht L=61', S=0.020
C – D: ShC L=374', S=0.011

SUBCATCHMENT 4D
A – B: Sht L=125', S=0.022
B – C: Sht L=25', S=0.052
C – D: ShC L=270', S=0.019
D – E: ShC L=40', S=0.330
E – F: ShC L=100', S=0.015
F – G: ShC L=258', S=0.003

SUBCATCHMENT 4E
A – B: Sht L=150', S=0.013
B – C: ShC L=2625', S=0.019
C – D: Direct Entry L=1590'
D – E: Direct Entry, L=760'
E – F: Direct Entry, L=960'

SUBCATCHMENT 4F
A – B: Sht L=140', S=0.028
B – C: ShC L=1067', S=0.029
C – D: Ch L=20', S=0.021

SUBCATCHMENT 4G
A – B: Sht L=100', S=0.050
B – C: Sht L=50', S=0.100
C – D: ShC L=150', S=0.100
D – E: Ch L=130', S=0.050
D – F: Ch L=500', S=0.330

SUBCATCHMENT 4H
A – B: Sht L=75', S=0.100
B – C: Sht L=75', S=0.330
C – D: ShC L=150', S=0.330
D – E: Ch L=290', S=0.050
E – D: Ch L=240', S=0.330

SUBCATCHMENT 4HA
A – B: Sht L=140', S=0.330

SUBCATCHMENT 4i
A – B: Sht L=150', S=0.050
B – C: ShC L=200', S=0.100
C – D: Ch L=290', S=0.050
D – E: Ch L=440', S=0.330

SUBCATCHMENT 4iA
A – B: Sht L=140', S=0.333

SUBCATCHMENT 4J
A – B: Sht L=150', S=0.050
B – C: ShC L=200', S=0.100
C – D: Ch L=270', S=0.050
D – E: Ch L=430', S=0.330

SUBCATCHMENT 4K
A – B: Sht L=150', S=0.050
B – C: ShC L=270', S=0.055
C – D: Ch L=270', S=0.050
D – E: Ch L=410', S=0.330

SUBCATCHMENT 4L
A – B: Sht L=20', S=0.050
B – C: ShC L=130', S=0.100
C – D: Ch L=250', S=0.050
D – E: Ch L=490', S=0.330

SUBCATCHMENT 4M
A – B: Sht L=150', S=0.330
B – C: ShC L=470', S=0.044
C – D: ShC L=20', S=0.330

SUBCATCHMENT 4N
A – B: Sht L=150', S=0.020
B – C: ShC L=580', S=0.023

SUBCATCHMENT 4O
A – B: Sht L=55', S=0.300
B – C: ShC L=289', S=0.030
C – D: ShC L=319, S=0.012

SUBCATCHMENT 5
A – B: Sht L=150', S=0.013
B – C: ShC L=1930', S=0.011
C – D: Direct Entry, L=275'

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)
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.

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REV.	BY	DATE	STATUS

CASELLA
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

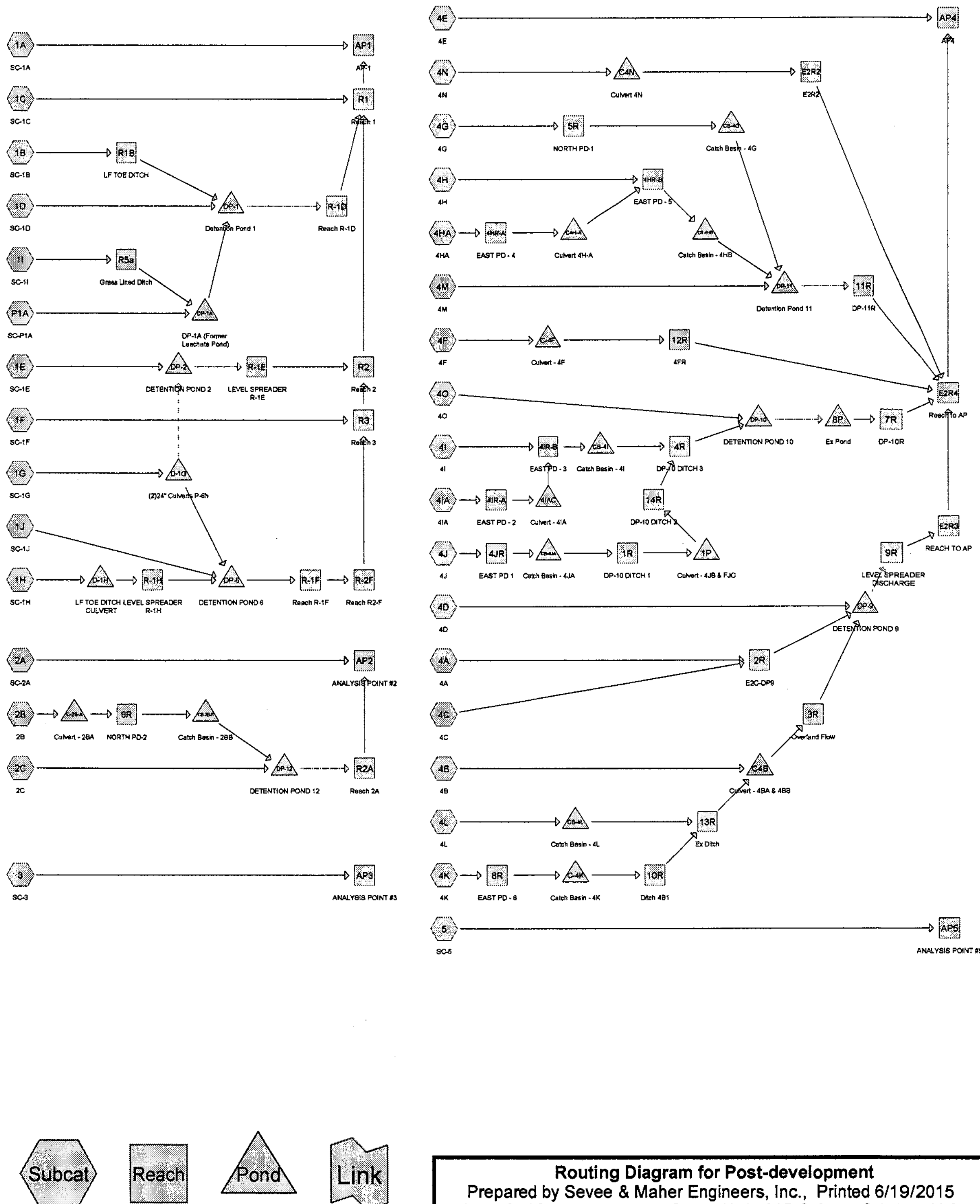
STORMWATER MANAGEMENT PLAN
POST DEVELPOMENT ANALYSIS

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DESIGN BY: MNA
DRAWN BY: SJM
DATE: 2/15
CHECKED BY:
LMN: SMP–POST
CTB: SME–STD

JOB NO. 14101.00 DWG FILE SMP–POST

D–101



Routing Diagram for Post-development
Prepared by Sevee & Maher Engineers, Inc., Printed 6/19/2015
HydroCAD® 10.00 s/n 01260 © 2012 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.157	74	>75% Grass cover, Good, HSG C (4A, 4B, 4C, 4D)
4.940	70	Brush, Fair, HSG C (4B, 4O)
0.250	98	Building/Concrete Slabs (4C)
0.400	98	Detention Pond 10 (4O)
2.330	98	Existing Water Body (3)
1.600	98	Existing Waterbody (2A)
2.133	91	Gravel (4D)
1.300	96	Gravel Road (1A, 1C)
2.470	96	Gravel Road/Berm (1D, 1E, 1G, 1H)
0.876	96	Gravel Road/Pad (1F, 1J)
0.456	91	Gravel Roads (4C)
2.126	89	Gravel roads, HSG C (4A, 4B, 4D, 4F, 4M, P1A)
0.600	98	Impervious / Structures (1F)
142.422	71	Meadow, non-grazed, HSG C (1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 2A, 2B, 3, 4A, 4G, 4H, 4HA, 4I, 4IA, 4J, 4K, 4L, 4N)
11.170	78	Meadow, non-grazed, HSG D (1A, 1C, 1F)
0.333	79	Pasture/grassland/range, Fair, HSG C (P1A)
0.380	98	Paved Area (New) (2A)
0.320	98	Paved Areas (New) (3)
0.800	98	Paved and Gravel Shoulder (4O)
3.940	98	Paved roads w/curbs & sewers, (4E)
1.184	98	Paved roads w/curbs & sewers, HSG C (1F, 4A, 4B, 4C, 4D)
2.140	93	Paved roads w/open ditches, 50% imp, HSG D (3, 5)
1.634	98	Pond (4D)
1.145	98	Pond and Liner (P1A)
1.653	98	Pond water surface (1J)
0.800	78	Pond, Meadow HSG D (1D)
0.111	98	ROOF (4A, 4B)
1.560	98	Water Surface, HSG C (2C, 4M)
4.280	70	Woods, Good HSG C (1J)
324.010	70	Woods, Good, HSG C (1A, 1C, 1F, 2A, 2C, 3, 4E, 4F, 4M, 4N, 5)
333.995	77	Woods, Good, HSG D (1A, 1C, 1F, 2A, 3, 4E, 5)

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchr Numbers
0.000	0.000	5.157	0.000	0.000	5.157	>75% Grass cover, Good	
0.000	0.000	4.940	0.000	0.000	4.940	Brush, Fair	
0.000	0.000	0.000	0.000	0.250	0.250	Building/Concrete Slabs	
0.000	0.000	0.000	0.000	0.400	0.400	Detention Pond 10	
0.000	0.000	0.000	0.000	2.330	2.330	Existing Water Body	
0.000	0.000	0.000	0.000	1.600	1.600	Existing Waterbody	
0.000	0.000	0.000	0.000	2.133	2.133	Gravel	
0.000	0.000	0.000	0.000	1.300	1.300	Gravel Road	
0.000	0.000	0.000	0.000	2.470	2.470	Gravel Road/Berm	
0.000	0.000	0.000	0.000	0.876	0.876	Gravel Road/Pad	
0.000	0.000	0.000	0.000	0.456	0.456	Gravel Roads	
0.000	0.000	2.126	0.000	0.000	2.126	Gravel roads	
0.000	0.000	0.000	0.000	0.600	0.600	Impervious / Structures	
0.000	0.000	142.422	11.170	0.000	153.592	Meadow, non-grazed	
0.000	0.000	0.333	0.000	0.000	0.333	Pasture/grassland/range, Fair	
0.000	0.000	0.000	0.000	0.380	0.380	Paved Area (New)	
0.000	0.000	0.000	0.000	0.320	0.320	Paved Areas (New)	
0.000	0.000	0.000	0.000	0.800	0.800	Paved and Gravel Shoulder	
0.000	0.000	1.184	0.000	0.000	1.184	Paved roads w/curbs & sewers	
0.000	0.000	0.000	0.000	3.940	3.940	Paved roads w/curbs & sewers,	
0.000	0.000	0.000	2.140	0.000	2.140	Paved roads w/open ditches, 50% imp	
0.000	0.000	0.000	0.000	1.634	1.634	Pond	
0.000	0.000	0.000	0.000	1.145	1.145	Pond and Liner	
0.000	0.000	0.000	0.000	1.653	1.653	Pond water surface	
0.000	0.000	0.000	0.800	0.000	0.800	Pond, Meadow	
0.000	0.000	0.000	0.000	0.111	0.111	ROOF	
0.000	0.000	1.560	0.000	0.000	1.560	Water Surface	
0.000	0.000	328.290	333.995	0.000	662.285	Woods, Good	

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: SC-1A Runoff Area=23.080 ac 0.00% Impervious Runoff Depth=0.72"
Flow Length=2,249' Slope=0.0260 '/' Tc=88.1 min CN=74 Runoff=5.38 cfs 1.392 af

Subcatchment 1B: SC-1B Runoff Area=13.169 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,282' Tc=17.5 min CN=71 Runoff=5.43 cfs 0.652 af

Subcatchment 1C: SC-1C Runoff Area=13.300 ac 0.00% Impervious Runoff Depth=0.87"
Flow Length=380' Tc=68.3 min CN=77 Runoff=4.61 cfs 0.963 af

Subcatchment 1D: SC-1D Runoff Area=10.620 ac 0.00% Impervious Runoff Depth=0.68"
Flow Length=1,117' Tc=16.9 min CN=73 Runoff=5.34 cfs 0.601 af

Subcatchment 1E: SC-1E Runoff Area=10.745 ac 0.00% Impervious Runoff Depth=0.64"
Flow Length=910' Tc=12.7 min CN=72 Runoff=5.49 cfs 0.569 af

Subcatchment 1F: SC-1F Runoff Area=31.220 ac 3.52% Impervious Runoff Depth=0.82"
Flow Length=2,066' Tc=73.2 min CN=76 Runoff=9.57 cfs 2.130 af

Subcatchment 1G: SC-1G Runoff Area=11.290 ac 0.00% Impervious Runoff Depth=0.64"
Flow Length=857' Tc=12.7 min CN=72 Runoff=5.77 cfs 0.598 af

Subcatchment 1H: SC-1H Runoff Area=3.030 ac 0.00% Impervious Runoff Depth=1.09"
Flow Length=759' Tc=15.4 min CN=81 Runoff=2.81 cfs 0.275 af

Subcatchment 1I: SC-1I Runoff Area=9.334 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,084' Tc=16.8 min CN=71 Runoff=3.92 cfs 0.462 af

Subcatchment 1J: SC-1J Runoff Area=360,761 sf 19.96% Impervious Runoff Depth=0.87"
Flow Length=593' Tc=33.0 min CN=77 Runoff=4.30 cfs 0.599 af

Subcatchment 2A: SC-2A Runoff Area=54.143 ac 3.66% Impervious Runoff Depth=0.72"
Flow Length=2,435' Tc=126.1 min CN=74 Runoff=9.80 cfs 3.266 af

Subcatchment 2B: 2B Runoff Area=13.996 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,218' Tc=17.6 min CN=71 Runoff=5.75 cfs 0.693 af

Subcatchment 2C: 2C Runoff Area=6.181 ac 10.68% Impervious Runoff Depth=0.68"
Flow Length=702' Tc=80.7 min CN=73 Runoff=1.40 cfs 0.350 af

Subcatchment 3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth=0.68"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=29.11 cfs 15.297 af

Subcatchment 4A: 4A Runoff Area=4.518 ac 7.22% Impervious Runoff Depth=0.87"
Flow Length=379' Tc=5.1 min CN=77 Runoff=4.37 cfs 0.327 af

Subcatchment 4B: 4B Runoff Area=2.330 ac 11.29% Impervious Runoff Depth=0.97"
Flow Length=667' Tc=13.2 min CN=79 Runoff=2.01 cfs 0.189 af

Subcatchment 4C: 4C Runoff Area=1.287 ac 24.86% Impervious Runoff Depth=1.41"
Flow Length=496' Tc=15.4 min CN=86 Runoff=1.58 cfs 0.151 af

Subcatchment 4D: 4D Runoff Area=6.660 ac 26.58% Impervious Runoff Depth=1.48"
Flow Length=824' Tc=33.9 min CN=87 Runoff=6.17 cfs 0.821 af

Subcatchment 4E: 4E Runoff Area=247.915 ac 1.59% Impervious Runoff Depth=0.77"
Flow Length=6,090' Tc=225.6 min CN=75 Runoff=32.46 cfs 15.916 af

Subcatchment 4F: 4F Runoff Area=6.771 ac 0.00% Impervious Runoff Depth=0.55"
Flow Length=1,228' Tc=68.8 min CN=70 Runoff=1.30 cfs 0.313 af

Subcatchment 4G: 4G Runoff Area=12.750 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=929' Tc=17.1 min CN=71 Runoff=5.29 cfs 0.631 af

Subcatchment 4H: 4H Runoff Area=3.400 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=823' Tc=11.9 min CN=71 Runoff=1.61 cfs 0.168 af

Subcatchment 4HA: 4HA Runoff Area=0.780 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=142' Slope=0.3300 '/' Tc=6.7 min CN=71 Runoff=0.44 cfs 0.039 af

Subcatchment 4I: 4I Runoff Area=9.930 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,082' Tc=17.1 min CN=71 Runoff=4.12 cfs 0.492 af

Subcatchment 4IA: 4IA Runoff Area=0.940 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=136' Slope=0.3333 '/' Tc=6.4 min CN=71 Runoff=0.54 cfs 0.047 af

Subcatchment 4J: 4J Runoff Area=12.310 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,051' Tc=17.2 min CN=71 Runoff=5.10 cfs 0.610 af

Subcatchment 4K: 4K Runoff Area=10.870 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=1,095' Tc=18.4 min CN=71 Runoff=4.40 cfs 0.538 af

Subcatchment 4L: 4L Runoff Area=7.500 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=896' Tc=14.1 min CN=71 Runoff=3.34 cfs 0.371 af

Subcatchment 4M: 4M Runoff Area=5.352 ac 16.82% Impervious Runoff Depth=0.77"
Flow Length=642' Tc=53.5 min CN=75 Runoff=1.86 cfs 0.344 af

Subcatchment 4N: 4N Runoff Area=1.921 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=730' Tc=30.5 min CN=71 Runoff=0.64 cfs 0.095 af

Subcatchment 4O: 4O Runoff Area=5.100 ac 23.53% Impervious Runoff Depth=0.87"
Flow Length=663' Tc=14.2 min CN=77 Runoff=3.75 cfs 0.369 af

Subcatchment 5: SC-5 Runoff Area=35.960 ac 0.40% Impervious Runoff Depth=0.82"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=5.71 cfs 2.453 af

Subcatchment P1A: SC-P1A Runoff Area=65,400 sf 76.26% Impervious Runoff Depth=2.06"
Tc=0.0 min CN=94 Runoff=4.03 cfs 0.258 af

Reach 1R: DP-10 DITCH 1 Avg. Flow Depth=0.33' Max Vel=2.32 fps Inflow=5.08 cfs 0.610 af
n=0.025 L=101.0' S=0.0079 '/' Capacity=128.49 cfs Outflow=5.02 cfs 0.610 af

Reach 2R: E2C-DP9 Avg. Flow Depth=0.30' Max Vel=3.49 fps Inflow=5.47 cfs 0.478 af
n=0.022 L=590.0' S=0.0169 '/' Capacity=488.04 cfs Outflow=5.13 cfs 0.478 af

Reach 3R: Overland Flow Avg. Flow Depth=0.13' Max Vel=9.99 fps Inflow=7.52 cfs 1.099 af
n=0.035 L=168.0' S=0.0554 '/' Capacity=119.87 cfs Outflow=7.51 cfs 1.099 af

Reach 4HR-A: EAST PD - 4 Avg. Flow Depth=0.10' Max Vel=1.88 fps Inflow=0.44 cfs 0.039 af
n=0.025 L=288.0' S=0.0247 '/' Capacity=119.08 cfs Outflow=0.41 cfs 0.039 af

Reach 4HR-B: EAST PD - 5 Avg. Flow Depth=0.20' Max Vel=3.75 fps Inflow=1.82 cfs 0.207 af
n=0.025 L=425.0' S=0.0438 '/' Capacity=158.67 cfs Outflow=1.79 cfs 0.207 af

Reach 4IR-A: EAST PD - 2 Avg. Flow Depth=0.12' Max Vel=1.80 fps Inflow=0.54 cfs 0.047 af
n=0.025 L=330.0' S=0.0176 '/' Capacity=100.55 cfs Outflow=0.50 cfs 0.047 af

Reach 4IR-B: EAST PD - 3 Avg. Flow Depth=0.41' Max Vel=3.98 fps Inflow=4.59 cfs 0.538 af
n=0.025 L=210.0' S=0.0224 '/' Capacity=113.47 cfs Outflow=4.54 cfs 0.538 af

Reach 4JR: EAST PD 1 Avg. Flow Depth=0.46' Max Vel=3.81 fps Inflow=5.10 cfs 0.610 af
n=0.025 L=183.0' S=0.0180 '/' Capacity=101.85 cfs Outflow=5.07 cfs 0.610 af

Reach 4R: DP-10 DITCH 3 Avg. Flow Depth=0.49' Max Vel=6.32 fps Inflow=9.29 cfs 1.147 af
n=0.025 L=260.0' S=0.0462 '/' Capacity=162.94 cfs Outflow=9.21 cfs 1.147 af

Reach 5R: NORTH PD-1 Avg. Flow Depth=0.40' Max Vel=4.57 fps Inflow=5.29 cfs 0.631 af
n=0.025 L=936.0' S=0.0299 '/' Capacity=131.18 cfs Outflow=5.14 cfs 0.631 af

Reach 6R: NORTH PD-2 Avg. Flow Depth=0.60' Max Vel=2.93 fps Inflow=5.70 cfs 0.693 af
n=0.025 L=364.0' S=0.0080 '/' Capacity=67.70 cfs Outflow=5.61 cfs 0.693 af

Reach 7R: DP-10R Avg. Flow Depth=0.19' Max Vel=1.50 fps Inflow=0.74 cfs 1.035 af
n=0.045 L=1,130.0' S=0.0248 '/' Capacity=88.21 cfs Outflow=0.74 cfs 1.035 af

Reach 8R: EAST PD - 6 Avg. Flow Depth=0.37' Max Vel=2.06 fps Inflow=4.40 cfs 0.538 af
n=0.025 L=360.0' S=0.0056 '/' Capacity=25.35 cfs Outflow=4.33 cfs 0.538 af

Reach 9R: LEVEL SPREADER Avg. Flow Depth=0.04' Max Vel=0.06 fps Inflow=0.05 cfs 0.399 af
n=0.800 L=273.0' S=0.0623 '/' Capacity=11.46 cfs Outflow=0.05 cfs 0.395 af

Reach 10R: Ditch 4B1 Avg. Flow Depth=0.50' Max Vel=2.76 fps Inflow=4.22 cfs 0.538 af
n=0.025 L=352.0' S=0.0085 '/' Capacity=70.02 cfs Outflow=4.17 cfs 0.538 af

Reach 11R: DP-11R Avg. Flow Depth=0.19' Max Vel=1.21 fps Inflow=0.61 cfs 1.030 af
n=0.045 L=1,050.0' S=0.0162 '/' Capacity=71.30 cfs Outflow=0.61 cfs 1.030 af

Reach 12R: 4FR Avg. Flow Depth=0.29' Max Vel=1.38 fps Inflow=1.29 cfs 0.313 af
n=0.045 L=1,523.0' S=0.0131 '/' Capacity=64.21 cfs Outflow=1.17 cfs 0.313 af

Reach 13R: Ex Ditch Avg. Flow Depth=0.59' Max Vel=3.47 fps Inflow=6.52 cfs 0.910 af
n=0.030 L=225.0' S=0.0164 '/' Capacity=81.05 cfs Outflow=6.47 cfs 0.910 af

Reach 14R: DP-10 DITCH 2 Avg. Flow Depth=0.38' Max Vel=4.82 fps Inflow=5.03 cfs 0.610 af
n=0.025 L=434.0' S=0.0357 '/' Capacity=143.33 cfs Outflow=4.97 cfs 0.610 af

Reach AP1: AP-1 Inflow=16.15 cfs 5.749 af
Outflow=16.15 cfs 5.749 af

Reach AP2: ANALYSIS POINT #2 Inflow=9.80 cfs 4.150 af
Outflow=9.80 cfs 4.150 af

Reach AP3: ANALYSIS POINT #3 Inflow=29.11 cfs 15.297 af
Outflow=29.11 cfs 15.297 af

Reach AP4: AP4 Inflow=33.41 cfs 18.774 af
Outflow=33.41 cfs 18.774 af

Reach AP5: ANALYSIS POINT #5 Inflow=5.71 cfs 2.453 af
Outflow=5.71 cfs 2.453 af

Reach E2R2: E2R2 Avg. Flow Depth=0.04' Max Vel=0.20 fps Inflow=0.64 cfs 0.095 af
n=0.080 L=4,356.0' S=0.0094 '/' Capacity=132.12 cfs Outflow=0.09 cfs 0.095 af

Reach E2R3: REACH TO AP Avg. Flow Depth=0.06' Max Vel=0.41 fps Inflow=0.05 cfs 0.395 af
n=0.045 L=2,170.0' S=0.0074 '/' Capacity=48.12 cfs Outflow=0.05 cfs 0.391 af

Reach E2R4: Reach to AP Avg. Flow Depth=0.20' Max Vel=0.57 fps Inflow=1.62 cfs 2.863 af
n=0.080 L=963.0' S=0.0094 '/' Capacity=131.94 cfs Outflow=1.60 cfs 2.858 af

Reach R-1D: Reach R-1D Avg. Flow Depth=0.11' Max Vel=0.95 fps Inflow=1.15 cfs 0.695 af
n=0.060 L=370.0' S=0.0324 '/' Capacity=67.93 cfs Outflow=1.15 cfs 0.695 af

Reach R-1E: LEVEL SPREADER R-1E Avg. Flow Depth=0.14' Max Vel=1.64 fps Inflow=3.92 cfs 0.569 af
n=0.060 L=210.0' S=0.0690 '/' Capacity=135.95 cfs Outflow=3.90 cfs 0.569 af

Reach R-1F: Reach R-1F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.060 L=940.0' S=0.0170 '/' Capacity=49.21 cfs Outflow=0.00 cfs 0.000 af

Reach R-1H: LEVEL SPREADER R-1H Avg. Flow Depth=0.05' Max Vel=1.50 fps Inflow=2.78 cfs 0.275 af
n=0.030 L=170.0' S=0.0471 '/' Capacity=411.95 cfs Outflow=2.73 cfs 0.275 af

Reach R-2F: Reach R2-F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=735.0' S=0.0020 '/' Capacity=151.21 cfs Outflow=0.00 cfs 0.000 af

Reach R1: Reach 1 Avg. Flow Depth=0.64' Max Vel=1.17 fps Inflow=12.53 cfs 4.357 af
n=0.030 L=700.0' S=0.0016 '/' Capacity=132.69 cfs Outflow=12.37 cfs 4.357 af

Reach R1B: LF TOE DITCH Avg. Flow Depth=0.54' Max Vel=3.22 fps Inflow=5.43 cfs 0.652 af
n=0.040 L=540.0' S=0.0278 '/' Capacity=79.00 cfs Outflow=5.35 cfs 0.652 af

Reach R2: Reach 2 Avg. Flow Depth=0.54' Max Vel=1.20 fps Inflow=10.32 cfs 2.699 af
n=0.030 L=1,050.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=9.88 cfs 2.699 af

Reach R2A: Reach 2A Avg. Flow Depth=0.05' Max Vel=0.35 fps Inflow=0.51 cfs 0.885 af
n=0.060 L=1,960.0' S=0.0138 '/' Capacity=1,358.84 cfs Outflow=0.49 cfs 0.884 af

Reach R3: Reach 3 Avg. Flow Depth=0.52' Max Vel=1.17 fps Inflow=9.57 cfs 2.130 af
n=0.030 L=800.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=9.24 cfs 2.130 af

Reach R5a: Grass Lined Ditch Avg. Flow Depth=0.21' Max Vel=4.30 fps Inflow=3.92 cfs 0.462 af
n=0.025 L=200.0' S=0.0500 '/' Capacity=572.96 cfs Outflow=3.88 cfs 0.462 af

Pond 1P: Culvert - 4JB & FJC Peak Elev=210.75' Storage=215 cf Inflow=5.02 cfs 0.610 af
24.0" Round Culvert x 2.00 n=0.011 L=73.0' S=0.0137 '/' Outflow=5.03 cfs 0.610 af

Pond 4IAC: Culvert - 4IA Peak Elev=213.23' Storage=112 cf Inflow=0.50 cfs 0.047 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0175 '/' Outflow=0.45 cfs 0.047 af

Pond 8P: Ex Pond Peak Elev=171.98' Storage=3,312 cf Inflow=0.74 cfs 1.103 af
Outflow=0.74 cfs 1.035 af

Pond C-2B-A: Culvert - 2BA Peak Elev=204.21' Storage=365 cf Inflow=5.75 cfs 0.693 af
Primary=5.70 cfs 0.693 af Secondary=0.00 cfs 0.000 af Outflow=5.70 cfs 0.693 af

Pond C-4F: Culvert - 4F Peak Elev=165.58' Storage=0.007 af Inflow=1.30 cfs 0.313 af
18.0" Round Culvert n=0.011 L=78.0' S=0.0385 '/' Outflow=1.29 cfs 0.313 af

Pond C-4K: Catch Basin - 4K Peak Elev=220.30' Storage=924 cf Inflow=4.33 cfs 0.538 af
Outflow=4.22 cfs 0.538 af

Pond C4B: Culvert - 4BA & 4BB Peak Elev=205.34' Storage=13 cf Inflow=7.52 cfs 1.099 af
24.0" Round Culvert x 2.00 n=0.011 L=78.0' S=0.0090 '/' Outflow=7.52 cfs 1.099 af

Pond C4H-A: Culvert 4H-A Peak Elev=202.17' Storage=190 cf Inflow=0.41 cfs 0.039 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0250 '/' Outflow=0.30 cfs 0.039 af

Pond C4N: Culvert 4N Peak Elev=184.40' Storage=0.001 af Inflow=0.64 cfs 0.095 af
18.0" Round Culvert n=0.011 L=33.0' S=0.0303 '/' Outflow=0.64 cfs 0.095 af

Pond CB-2B-B: Catch Basin - 2BB Peak Elev=200.21' Storage=4 cf Inflow=5.61 cfs 0.693 af
Outflow=5.61 cfs 0.693 af

Pond CB-4G: Catch Basin - 4G Peak Elev=181.40' Storage=92 cf Inflow=5.14 cfs 0.631 af
Outflow=5.14 cfs 0.631 af

Pond CB-4HB: Catch Basin - 4HB Peak Elev=183.50' Storage=12 cf Inflow=1.79 cfs 0.207 af
Outflow=1.77 cfs 0.207 af

Pond CB-4I: Catch Basin - 4I Peak Elev=207.97' Storage=0.003 af Inflow=4.54 cfs 0.538 af
Outflow=4.54 cfs 0.538 af

Pond CB-4JA: Catch Basin - 4JA Peak Elev=219.09' Storage=0.003 af Inflow=5.07 cfs 0.610 af
Outflow=5.08 cfs 0.610 af

Pond CB-4L: Catch Basin - 4L Peak Elev=215.30' Storage=458 cf Inflow=3.34 cfs 0.371 af
Outflow=3.31 cfs 0.371 af

Pond D-1G: (2)24" Culverts P-6h Peak Elev=183.81' Storage=136 cf Inflow=5.77 cfs 0.598 af
Primary=5.72 cfs 0.598 af Secondary=0.00 cfs 0.000 af Outflow=5.72 cfs 0.598 af

Pond D-1H: LF TOE DITCH - CULVERT Peak Elev=183.84' Storage=372 cf Inflow=2.81 cfs 0.275 af
18.0" Round Culvert n=0.013 L=60.0' S=0.0083 '/' Outflow=2.78 cfs 0.275 af

Pond DP-1: Detention Pond 1 Peak Elev=162.46' Storage=31,388 cf Inflow=10.24 cfs 1.253 af
Primary=1.15 cfs 0.695 af Secondary=0.00 cfs 0.000 af Outflow=1.15 cfs 0.695 af

Pond DP-10: DETENTION POND 10 Peak Elev=177.58' Storage=43,962 cf Inflow=12.05 cfs 1.516 af
Primary=0.00 cfs 0.000 af Secondary=0.74 cfs 1.103 af Tertiary=0.00 cfs 0.000 af Outflow=0.74 cfs 1.103 af

Pond DP-11: Detention Pond 11 Peak Elev=165.43' Storage=33,880 cf Inflow=7.66 cfs 1.182 af
Primary=0.00 cfs 0.000 af Secondary=0.61 cfs 1.030 af Outflow=0.61 cfs 1.030 af

Pond DP-12: DETENTION POND 12 Peak Elev=185.69' Storage=31,513 cf Inflow=5.88 cfs 1.043 af
Primary=0.00 cfs 0.000 af Secondary=0.51 cfs 0.885 af Outflow=0.51 cfs 0.885 af

Pond DP-1A: DP-1A (Former Leachate Peak Elev=164.81' Storage=213,981 cf Inflow=5.05 cfs 0.720 af
Outflow=0.00 cfs 0.000 af

Pond DP-2: DETENTION POND 2 Peak Elev=163.37' Storage=4,359 cf Inflow=5.49 cfs 0.569 af
Outflow=3.92 cfs 0.569 af

Pond DP-6: DETENTION POND 6 Peak Elev=174.86' Storage=67,549 cf Inflow=11.00 cfs 1.472 af
Primary=0.00 cfs 0.000 af Secondary=0.82 cfs 1.472 af Outflow=0.82 cfs 1.472 af

Pond DP-9: DETENTION POND 9 Peak Elev=188.57' Storage=103,321 cf Inflow=16.58 cfs 2.398 af
Primary=0.00 cfs 0.000 af Secondary=0.05 cfs 0.399 af Tertiary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.399 af

Summary for Subcatchment 1A: SC-1A

Runoff = 5.38 cfs @ 13.29 hrs, Volume= 1.392 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	10.120	70	Woods, Good, HSG C
	9.500	77	Woods, Good, HSG D
	2.560	71	Meadow, non-grazed, HSG C
	0.400	78	Meadow, non-grazed, HSG D
*	0.500	96	Gravel Road
	23.080	74	Weighted Average
	23.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.7	150	0.0260	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	1,839		1.46		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
88.1	2,249	Total			

Summary for Subcatchment 1B: SC-1B

Runoff = 5.43 cfs @ 12.29 hrs, Volume= 0.652 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
13.169	71	Meadow, non-grazed, HSG C
13.169		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	183	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.9	392	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	557	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.5	1,282	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 4.61 cfs @ 12.99 hrs, Volume= 0.963 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	6.100	77	Woods, Good, HSG D
	0.720	70	Woods, Good, HSG C
	3.100	78	Meadow, non-grazed, HSG D
	2.580	71	Meadow, non-grazed, HSG C
*	0.800	96	Gravel Road
	13.300	77	Weighted Average
	13.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.0	150	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.6	230	0.0133	0.58		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
16.7					**Direct Entry, Segment ID: C-D**
68.3	380	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 5.34 cfs @ 12.27 hrs, Volume= 0.601 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	9.230	71	Meadow, non-grazed, HSG C
*	0.590	96	Gravel Road/Berm
*	0.800	78	Pond, Meadow HSG D
	10.620	73	Weighted Average
	10.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	159	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.5	203	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	605	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035

16.9 1,117 Total

Summary for Subcatchment 1E: SC-1E

Runoff = 5.49 cfs @ 12.21 hrs, Volume= 0.569 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	10.495	71	Meadow, non-grazed, HSG C
*	0.250	96	Gravel Road/Berm
	10.745	72	Weighted Average
	10.745		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	150	0.1500	2.71		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.2	93	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	517	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	910	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 9.57 cfs @ 13.08 hrs, Volume= 2.130 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	13.200	77	Woods, Good, HSG D
	7.250	70	Woods, Good, HSG C
	7.670	78	Meadow, non-grazed, HSG D
	1.500	71	Meadow, non-grazed, HSG C
*	0.500	96	Gravel Road/Pad
*	0.600	98	Impervious / Structures
	0.500	98	Paved roads w/curbs & sewers, HSG C
	31.220	76	Weighted Average
	30.120		96.48% Pervious Area
	1.100		3.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	17	0.3300	0.23		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
2.4	300	0.0190	2.07		**Shallow Concentrated Flow, Segment ID: C-D** Grassed Waterway Kv= 15.0 fps
24.6	1,649	0.0500	1.12		**Shallow Concentrated Flow, Segment ID D-E** Woodland Kv= 5.0 fps
24.5					**Direct Entry, Segment ID: E-F**
73.2	2,066	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 5.77 cfs @ 12.21 hrs, Volume= 0.598 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	10.860	71	Meadow, non-grazed, HSG C
*	0.430	96	Gravel Road/Berm
	11.290	72	Weighted Average
	11.290		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	62	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.4	90	0.3300	4.02		**Shallow Concentrated Flow, Segment ID: C-D** Short Grass Pasture Kv= 7.0 fps
0.3	140	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	415	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	857	Total			

Summary for Subcatchment 1H: SC-1H

Runoff = 2.81 cfs @ 12.22 hrs, Volume= 0.275 af, Depth= 1.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
1.830	71	Meadow, non-grazed, HSG C
1.200	96	Gravel Road/Berm
3.030	81	Weighted Average
3.030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.3300	0.36		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
8.4	609	0.0300	1.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
15.4	759	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 3.92 cfs @ 12.27 hrs, Volume= 0.462 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
9.334	71	Meadow, non-grazed, HSG C
9.334		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	146	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	218	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	570	0.3300	27.25	817.65	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 5.0 '/' Top.W=25.00' n= 0.035
16.8	1,084	Total			

Summary for Subcatchment 1J: SC-1J

Runoff = 4.30 cfs @ 12.50 hrs, Volume= 0.599 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (sf)	CN	Description
*	186,445	70	Woods, Good HSG C
	85,939	71	Meadow, non-grazed, HSG C
*	16,377	96	Gravel Road/Pad
*	72,000	98	Pond water surface
	360,761	77	Weighted Average
	288,761		80.04% Pervious Area
	72,000		19.96% 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 2A: SC-2A

Runoff = 9.80 cfs @ 13.86 hrs, Volume= 3.266 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	27.993	70	Woods, Good, HSG C
	21.380	77	Woods, Good, HSG D
	2.790	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area (New)
	1.600	98	Existing Waterbody
	54.143	74	Weighted Average
	52.163		96.34% Pervious Area
	1.980		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.9	150	0.0300	0.05		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
25.4	538	0.0200	0.35		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
37.5	534	0.0090	0.24		**Shallow Concentrated Flow, Segment C-D** Forest w/Heavy Litter Kv= 2.5 fps
15.3	1,213	0.0080	1.32	52.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=2.00' Z= 10.0 '/' Top.W=40.00' n= 0.100 Earth, dense brush, high stage
126.1	2,435	Total			

Summary for Subcatchment 2B: 2B

Runoff = 5.75 cfs @ 12.29 hrs, Volume= 0.693 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
13.996	71	Meadow, non-grazed, HSG C
13.996		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	187	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	431	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	450	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.6	1,218	Total			

Summary for Subcatchment 2C: 2C

Runoff = 1.40 cfs @ 13.20 hrs, Volume= 0.350 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
5.521	70	Woods, Good, HSG C
0.660	98	Water Surface, HSG C
6.181	73	Weighted Average
5.521		89.32% Pervious Area
0.660		10.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.2	289	0.0242	0.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	263	0.0114	0.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
80.7	702	Total			

Summary for Subcatchment 3: SC-3

Runoff = 29.11 cfs @ 15.72 hrs, Volume= 15.297 af, Depth= 0.68"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	162.090	70	Woods, Good, HSG C
	102.790	77	Woods, Good, HSG D
	0.950	71	Meadow, non-grazed, HSG C
*	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
*	2.330	98	Existing Water Body
	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 4A: 4A

Runoff = 4.37 cfs @ 12.09 hrs, Volume= 0.327 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	0.740	89	Gravel roads, HSG C
	1.955	74	>75% Grass cover, Good, HSG C
*	0.088	98	ROOF
	1.497	71	Meadow, non-grazed, HSG C
	0.238	98	Paved roads w/curbs & sewers, HSG C
	4.518	77	Weighted Average
	4.192		92.78% Pervious Area
	0.326		7.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	150	0.0167	0.71		**Sheet Flow, Segment A-B** n= 0.023 P2= 2.70"
0.8	159	0.0410	3.26		**Shallow Concentrated Flow, Segment B-C** Unpaved Kv= 16.1 fps
0.8	70	0.0429	1.45		**Shallow Concentrated Flow, Segment C-D** Short Grass Pasture Kv= 7.0 fps
5.1	379	Total			

Summary for Subcatchment 4B: 4B

Runoff = 2.01 cfs @ 12.20 hrs, Volume= 0.189 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	1.040	70	Brush, Fair, HSG C
*	0.023	98	ROOF
	0.640	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
	0.240	98	Paved roads w/curbs & sewers, HSG C
	2.330	79	Weighted Average
	2.067		88.71% Pervious Area
	0.263		11.29% 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 4C: 4C

Runoff = 1.58 cfs @ 12.22 hrs, Volume= 0.151 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	0.511	74	>75% Grass cover, Good, HSG C
	0.070	98	Paved roads w/curbs & sewers, HSG C
*	0.250	98	Building/Concrete Slabs
*	0.456	91	Gravel Roads
	1.287	86	Weighted Average
	0.967		75.14% Pervious Area
	0.320		24.86% 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"
4.0	374	0.0107	1.55		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
15.4	496	Total			

Summary for Subcatchment 4D: 4D

Runoff = 6.17 cfs @ 12.47 hrs, Volume= 0.821 af, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	0.453	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.634	98	Pond
	0.136	98	Paved roads w/curbs & sewers, HSG C
	6.660	87	Weighted Average
	4.890		73.42% Pervious Area
	1.770		26.58% 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 4E: 4E

Runoff = 32.46 cfs @ 15.30 hrs, Volume= 15.916 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	152.615	77	Woods, Good, HSG D
	91.360	70	Woods, Good, HSG C
*	3.940	98	Paved roads w/curbs & sewers,
	247.915	75	Weighted Average
	243.975		98.41% Pervious Area
	3.940		1.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
127.0	2,625	0.0190	0.34		**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)**
225.6	6,090	Total			

Summary for Subcatchment 4F: 4F

Runoff = 1.30 cfs @ 13.07 hrs, Volume= 0.313 af, Depth= 0.55"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
6.691	70	Woods, Good, HSG C
0.080	89	Gravel roads, HSG C
6.771	70	Weighted Average
6.771		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.6	144	0.0280	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.9	1,067	0.0290	0.85		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	17	0.0210	0.97	19.47	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.250
68.8	1,228	Total			

Summary for Subcatchment 4G: 4G

Runoff = 5.29 cfs @ 12.28 hrs, Volume= 0.631 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
12.750	71	Meadow, non-grazed, HSG C
12.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	98	0.0500	0.15		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.8	52	0.1000	0.18		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
1.1	150	0.1000	2.21		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.3	133	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	496	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	929	Total			

Summary for Subcatchment 4H: 4H

Runoff = 1.61 cfs @ 12.20 hrs, Volume= 0.168 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
3.400	71	Meadow, non-grazed, HSG C
3.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	75	0.1000	0.19		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.0	75	0.3300	0.31		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	150	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.7	285	0.0500	6.92	76.15	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 2.0 & 20.0 '/' Top.W=22.00' n= 0.030 Short grass
0.1	238	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00'

n= 0.035

11.9	823	Total

Summary for Subcatchment 4HA: 4HA

Runoff = 0.44 cfs @ 12.12 hrs, Volume= 0.039 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.780	71	Meadow, non-grazed, HSG C
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	142	0.3300	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4I: 4I

Runoff = 4.12 cfs @ 12.28 hrs, Volume= 0.492 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
9.930	71	Meadow, non-grazed, HSG C
9.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	200	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	290	0.0500	11.02	506.75	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=2.00' Z= 3.0 & 20.0 '/' Top.W=46.00' n= 0.030
0.3	442	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	1,082	Total			

Summary for Subcatchment 4IA: 4IA

Runoff = 0.54 cfs @ 12.11 hrs, Volume= 0.047 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.940	71	Meadow, non-grazed, HSG C
0.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	136	0.3333	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4J: 4J

Runoff = 5.10 cfs @ 12.28 hrs, Volume= 0.610 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
12.310	71	Meadow, non-grazed, HSG C
12.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	202	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.6	270	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	429	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.2	1,051	Total			

Summary for Subcatchment 4K: 4K

Runoff = 4.40 cfs @ 12.30 hrs, Volume= 0.538 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
10.870	71	Meadow, non-grazed, HSG C
10.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
2.7	268	0.0555	1.65		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.6	267	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	410	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
18.4	1,095	Total			

Summary for Subcatchment 4L: 4L

Runoff = 3.34 cfs @ 12.23 hrs, Volume= 0.371 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
7.500	71	Meadow, non-grazed, HSG C
7.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	23	0.0500	0.12		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
9.9	127	0.1000	0.21		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	252	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	494	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
14.1	896	Total			

Summary for Subcatchment 4M: 4M

Runoff = 1.86 cfs @ 12.80 hrs, Volume= 0.344 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
4.262	70	Woods, Good, HSG C
0.900	98	Water Surface, HSG C
0.190	89	Gravel roads, HSG C
5.352	75	Weighted Average
4.452		83.18% Pervious Area
0.900		16.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.9	150	0.0333	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
7.5	474	0.0440	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.1	18	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
53.5	642	Total			

Summary for Subcatchment 4N: 4N

Runoff = 0.64 cfs @ 12.50 hrs, Volume= 0.095 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
0.743	70	Woods, Good, HSG C
1.178	71	Meadow, non-grazed, HSG C
1.921	71	Weighted Average
1.921		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	150	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
9.0	580	0.0233	1.07		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
30.5	730	Total			

Summary for Subcatchment 4O: 4O

Runoff = 3.75 cfs @ 12.21 hrs, Volume= 0.369 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (ac)	CN	Description
	3.900	70	Brush, Fair, HSG C
*	0.800	98	Paved and Gravel Shoulder
*	0.400	98	Detention Pond 10
	5.100	77	Weighted Average
	3.900		76.47% Pervious Area
	1.200		23.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	55	0.3000	0.28		**Sheet Flow, SEGMENT AB** Grass: Dense n= 0.240 P2= 2.70"
4.0	289	0.0300	1.21		**Shallow Concentrated Flow, SEGMENT BC** Short Grass Pasture Kv= 7.0 fps
6.9	319	0.0120	0.77		**Shallow Concentrated Flow, SEGMENT CD** Short Grass Pasture Kv= 7.0 fps
14.2	663	Total			

Summary for Subcatchment 5: SC-5

Runoff = 5.71 cfs @ 14.76 hrs, Volume= 2.453 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
28.410	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
35.960	76	Weighted Average
35.815		99.60% Pervious Area
0.145		0.40% 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 Subcatchment P1A: SC-P1A

Runoff = 4.03 cfs @ 12.00 hrs, Volume= 0.258 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Storm Rainfall=2.70"

	Area (sf)	CN	Description
*	49,872	98	Pond and Liner
	1,012	89	Gravel roads, HSG C
	14,516	79	Pasture/grassland/range, Fair, HSG C
	65,400	94	Weighted Average
	15,528		23.74% Pervious Area
	49,872		76.26% Impervious Area

Summary for Reach 1R: DP-10 DITCH 1

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 5.08 cfs @ 12.31 hrs, Volume= 0.610 af
Outflow = 5.02 cfs @ 12.34 hrs, Volume= 0.610 af, Atten= 1%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.32 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 0.88 fps, Avg. Travel Time= 1.9 min

Peak Storage= 220 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.33'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 128.49 cfs

6.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 101.0' Slope= 0.0079 '/'
Inlet Invert= 212.30', Outlet Invert= 211.50'

Summary for Reach 2R: E2C-DP9

Inflow Area = 5.805 ac, 11.13% Impervious, Inflow Depth = 0.99" for 2-yr Storm event
Inflow = 5.47 cfs @ 12.10 hrs, Volume= 0.478 af
Outflow = 5.13 cfs @ 12.19 hrs, Volume= 0.478 af, Atten= 6%, Lag= 5.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.49 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.17 fps, Avg. Travel Time= 8.4 min

Peak Storage= 871 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.30'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 488.04 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= 590.0' Slope= 0.0169 '/'
Inlet Invert= 200.00', Outlet Invert= 190.00'

Summary for Reach 3R: Overland Flow

Inflow Area =	20.700 ac,	1.27% Impervious, Inflow Depth = 0.64"	for 2-yr Storm event
Inflow =	7.52 cfs @	12.48 hrs, Volume=	1.099 af
Outflow =	7.51 cfs @	12.49 hrs, Volume=	1.099 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 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= 127 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.13'
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 4HR-A: EAST PD - 4

Inflow Area =	0.780 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	0.44 cfs @	12.12 hrs, Volume=	0.039 af
Outflow =	0.41 cfs @	12.20 hrs, Volume=	0.039 af, Atten= 7%, Lag= 5.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.88 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 0.77 fps, Avg. Travel Time= 6.2 min

Peak Storage= 64 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.10'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.08 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 288.0' Slope= 0.0247 '/'
Inlet Invert= 209.00', Outlet Invert= 201.90'

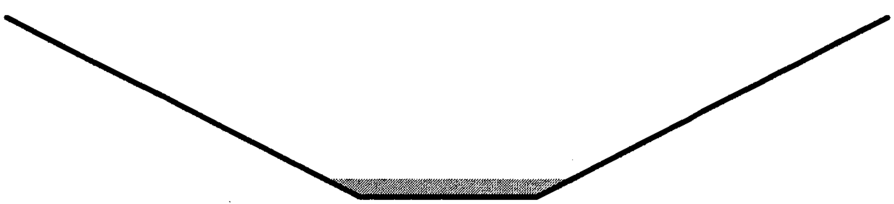
Summary for Reach 4HR-B: EAST PD - 5

Inflow Area =	4.180 ac,	0.00% Impervious, Inflow Depth = 0.59"		for 2-yr Storm event
Inflow =	1.82 cfs @	12.21 hrs, Volume=	0.207 af	
Outflow =	1.79 cfs @	12.27 hrs, Volume=	0.207 af, Atten= 2%, Lag= 3.6 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.75 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.32 fps, Avg. Travel Time= 5.4 min

Peak Storage= 203 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 158.67 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 425.0' Slope= 0.0438 '/'
Inlet Invert= 201.90', Outlet Invert= 183.30'



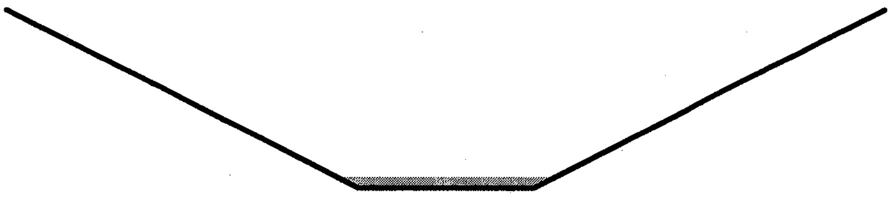
Summary for Reach 4IR-A: EAST PD - 2

Inflow Area =	0.940 ac,	0.00% Impervious, Inflow Depth = 0.59"		for 2-yr Storm event
Inflow =	0.54 cfs @	12.11 hrs, Volume=	0.047 af	
Outflow =	0.50 cfs @	12.21 hrs, Volume=	0.047 af, Atten= 7%, Lag= 5.6 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.80 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 8.0 min

Peak Storage= 92 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 100.55 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 330.0' Slope= 0.0176 '/'
Inlet Invert= 218.70', Outlet Invert= 212.90'



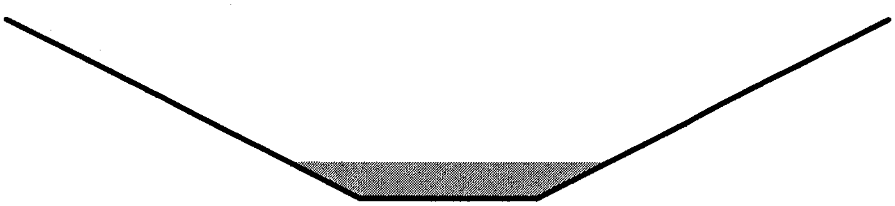
Summary for Reach 4IR-B: EAST PD - 3

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	4.59 cfs @	12.27 hrs, Volume=	0.538 af
Outflow =	4.54 cfs @	12.31 hrs, Volume=	0.538 af, Atten= 1%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.98 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.51 fps, Avg. Travel Time= 2.3 min

Peak Storage= 241 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 113.47 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 210.0' Slope= 0.0224 '/'
Inlet Invert= 212.20', Outlet Invert= 207.50'



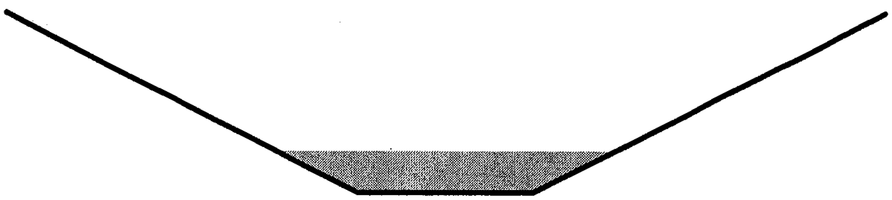
Summary for Reach 4JR: EAST PD 1

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.10 cfs @	12.28 hrs, Volume=	0.610 af
Outflow =	5.07 cfs @	12.31 hrs, Volume=	0.610 af, Atten= 1%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.81 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.62 fps, Avg. Travel Time= 1.9 min

Peak Storage= 245 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.46'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 101.85 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 183.0' Slope= 0.0180 '/'
Inlet Invert= 222.00', Outlet Invert= 218.70'



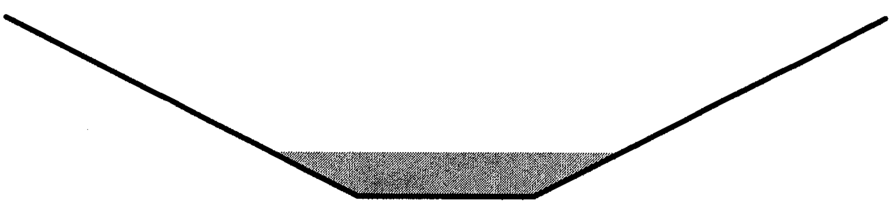
Summary for Reach 4R: DP-10 DITCH 3

Inflow Area =	23.180 ac, 0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	9.29 cfs @ 12.36 hrs, Volume=	1.147 af
Outflow =	9.21 cfs @ 12.39 hrs, Volume=	1.147 af, Atten= 1%, Lag= 1.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.32 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 2.49 fps, Avg. Travel Time= 1.7 min

Peak Storage= 381 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.49'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 162.94 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 260.0' Slope= 0.0462 '/'
Inlet Invert= 191.00', Outlet Invert= 179.00'



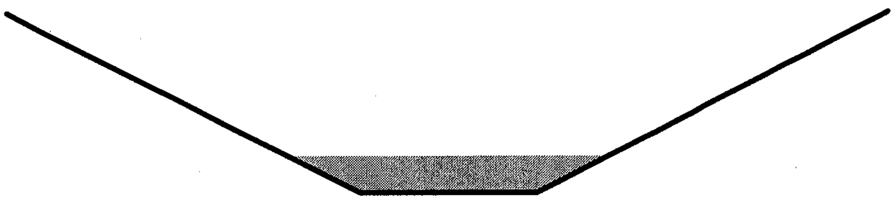
Summary for Reach 5R: NORTH PD-1

Inflow Area =	12.750 ac, 0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.29 cfs @ 12.28 hrs, Volume=	0.631 af
Outflow =	5.14 cfs @ 12.39 hrs, Volume=	0.631 af, Atten= 3%, Lag= 6.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.57 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 1.82 fps, Avg. Travel Time= 8.6 min

Peak Storage= 1,055 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 131.18 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 936.0' Slope= 0.0299 '/'
Inlet Invert= 210.00', Outlet Invert= 182.00'



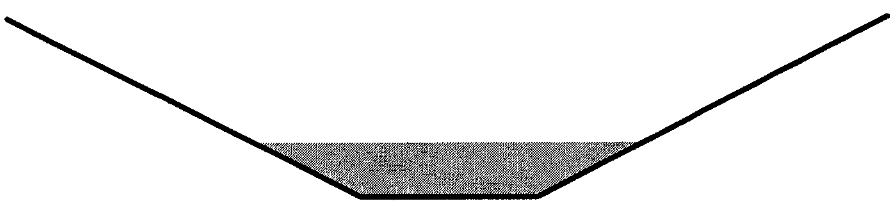
Summary for Reach 6R: NORTH PD-2

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.70 cfs @	12.31 hrs, Volume=	0.693 af
Outflow =	5.61 cfs @	12.38 hrs, Volume=	0.693 af, Atten= 2%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.93 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.22 fps, Avg. Travel Time= 5.0 min

Peak Storage= 701 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.70 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 364.0' Slope= 0.0080 '/'
Inlet Invert= 202.90', Outlet Invert= 200.00'



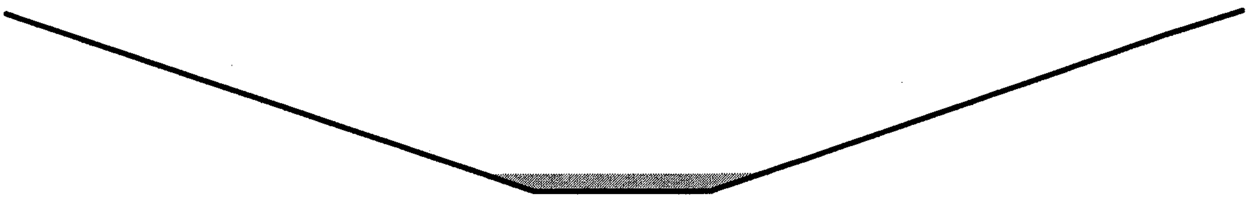
Summary for Reach 7R: DP-10R

Inflow Area =	28.280 ac,	4.24% Impervious, Inflow Depth > 0.44"	for 2-yr Storm event
Inflow =	0.74 cfs @	17.94 hrs, Volume=	1.035 af
Outflow =	0.74 cfs @	18.29 hrs, Volume=	1.035 af, Atten= 0%, Lag= 21.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 12.6 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 33.0 min

Peak Storage= 561 cf @ 18.08 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 88.21 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= 1,130.0' Slope= 0.0248 '/'
Inlet Invert= 170.00', Outlet Invert= 142.00'



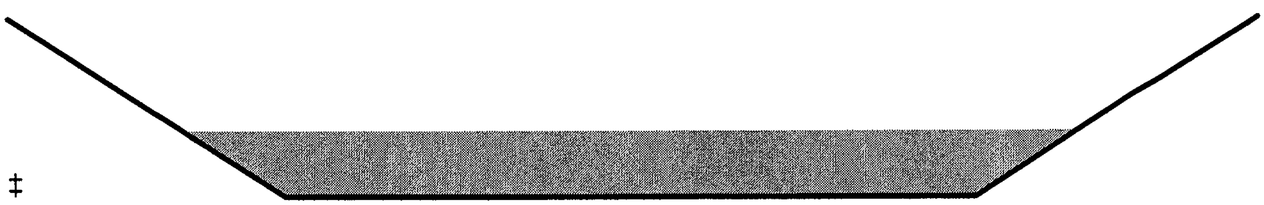
Summary for Reach 8R: EAST PD - 6

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event	
Inflow =	4.40 cfs @	12.30 hrs, Volume=	0.538 af	
Outflow =	4.33 cfs @	12.39 hrs, Volume=	0.538 af, Atten= 2%, Lag= 5.2 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.06 fps, Min. Travel Time= 2.9 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 8.6 min

Peak Storage= 758 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 25.35 cfs

5.00' x 1.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 360.0' Slope= 0.0056 '/'
Inlet Invert= 222.00', Outlet Invert= 220.00'



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Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area =	33.165 ac,	8.08% Impervious, Inflow Depth > 0.14"	for 2-yr Storm event	
Inflow =	0.05 cfs @	24.97 hrs, Volume=	0.399 af	
Outflow =	0.05 cfs @	27.93 hrs, Volume=	0.395 af, Atten= 1%, Lag= 177.4 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.06 fps, Min. Travel Time= 78.7 min
Avg. Velocity = 0.05 fps, Avg. Travel Time= 98.0 min

Peak Storage= 249 cf @ 26.62 hrs
Average Depth at Peak Storage= 0.04'
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'

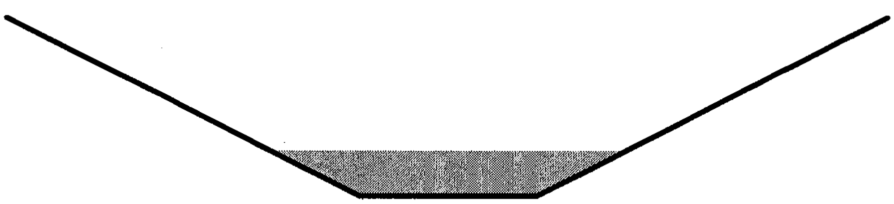
Summary for Reach 10R: Ditch 4B1

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event	
Inflow =	4.22 cfs @	12.45 hrs, Volume=	0.538 af	
Outflow =	4.17 cfs @	12.51 hrs, Volume=	0.538 af,	Atten= 1%, Lag= 4.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.76 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.07 fps, Avg. Travel Time= 5.5 min

Peak Storage= 535 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.50'
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'



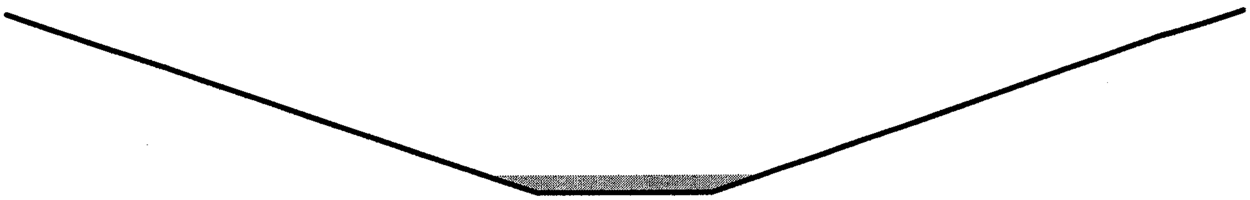
Summary for Reach 11R: DP-11R

Inflow Area =	22.282 ac,	4.04% Impervious, Inflow Depth > 0.55"	for 2-yr Storm event	
Inflow =	0.61 cfs @	17.82 hrs, Volume=	1.030 af	
Outflow =	0.61 cfs @	18.23 hrs, Volume=	1.030 af,	Atten= 0%, Lag= 24.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.21 fps, Min. Travel Time= 14.4 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 33.9 min

Peak Storage= 525 cf @ 17.99 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 71.30 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,050.0' Slope= 0.0162 '/'
Inlet Invert= 158.00', Outlet Invert= 141.00'



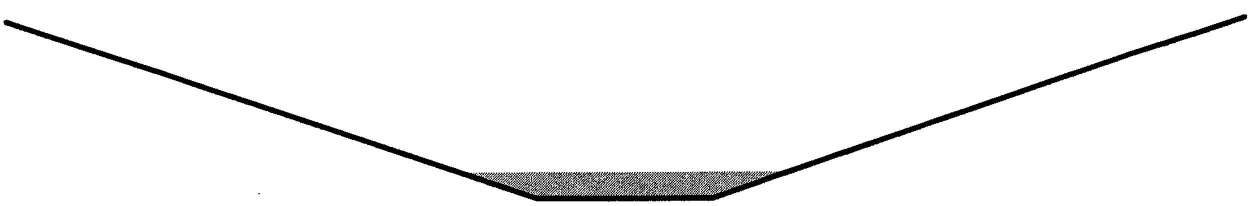
Summary for Reach 12R: 4FR

Inflow Area = 6.771 ac, 0.00% Impervious, Inflow Depth = 0.55" for 2-yr Storm event
Inflow = 1.29 cfs @ 13.12 hrs, Volume= 0.313 af
Outflow = 1.17 cfs @ 13.68 hrs, Volume= 0.313 af, Atten= 10%, Lag= 33.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.38 fps, Min. Travel Time= 18.4 min
Avg. Velocity = 0.56 fps, Avg. Travel Time= 45.2 min

Peak Storage= 1,291 cf @ 13.37 hrs
Average Depth at Peak Storage= 0.29'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 64.21 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,523.0' Slope= 0.0131 '/'
Inlet Invert= 161.00', Outlet Invert= 141.00'



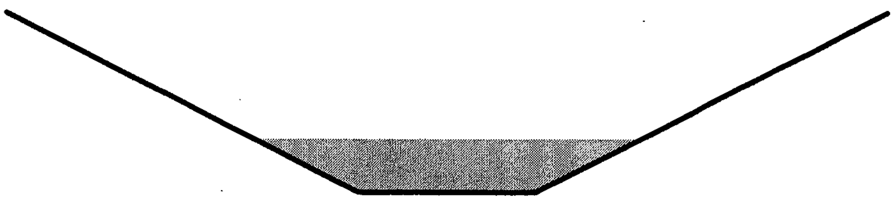
Summary for Reach 13R: Ex Ditch

Inflow Area = 18.370 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 6.52 cfs @ 12.47 hrs, Volume= 0.910 af
Outflow = 6.47 cfs @ 12.50 hrs, Volume= 0.910 af, Atten= 1%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.47 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.38 fps, Avg. Travel Time= 2.7 min

Peak Storage= 421 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.59'
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'



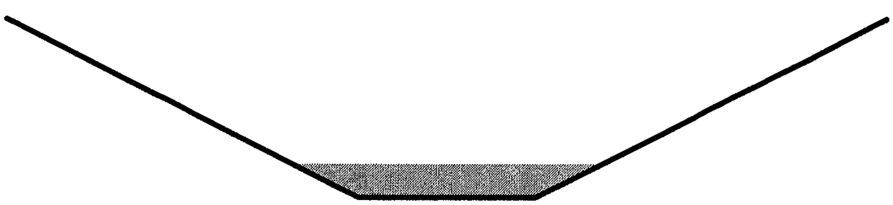
Summary for Reach 14R: DP-10 DITCH 2

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.03 cfs @	12.35 hrs, Volume=	0.610 af
Outflow =	4.97 cfs @	12.40 hrs, Volume=	0.610 af, Atten= 1%, Lag= 2.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.82 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.99 fps, Avg. Travel Time= 3.6 min

Peak Storage= 451 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 143.33 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 434.0' Slope= 0.0357 '/'
Inlet Invert= 209.00', Outlet Invert= 193.50'



Summary for Reach AP1: AP-1

Inflow Area =	135.571 ac,	2.88% Impervious, Inflow Depth = 0.51"	for 2-yr Storm event
Inflow =	16.15 cfs @	13.88 hrs, Volume=	5.749 af
Outflow =	16.15 cfs @	13.88 hrs, Volume=	5.749 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 74.320 ac, 3.55% Impervious, Inflow Depth > 0.67" for 2-yr Storm event
Inflow = 9.80 cfs @ 13.86 hrs, Volume= 4.150 af
Outflow = 9.80 cfs @ 13.86 hrs, Volume= 4.150 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 270.330 ac, 1.32% Impervious, Inflow Depth = 0.68" for 2-yr Storm event
Inflow = 29.11 cfs @ 15.72 hrs, Volume= 15.297 af
Outflow = 29.11 cfs @ 15.72 hrs, Volume= 15.297 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 340.334 ac, 2.56% Impervious, Inflow Depth > 0.66" for 2-yr Storm event
Inflow = 33.41 cfs @ 15.30 hrs, Volume= 18.774 af
Outflow = 33.41 cfs @ 15.30 hrs, Volume= 18.774 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: ANALYSIS POINT #5

Inflow Area = 35.960 ac, 0.40% Impervious, Inflow Depth = 0.82" for 2-yr Storm event
Inflow = 5.71 cfs @ 14.76 hrs, Volume= 2.453 af
Outflow = 5.71 cfs @ 14.76 hrs, Volume= 2.453 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

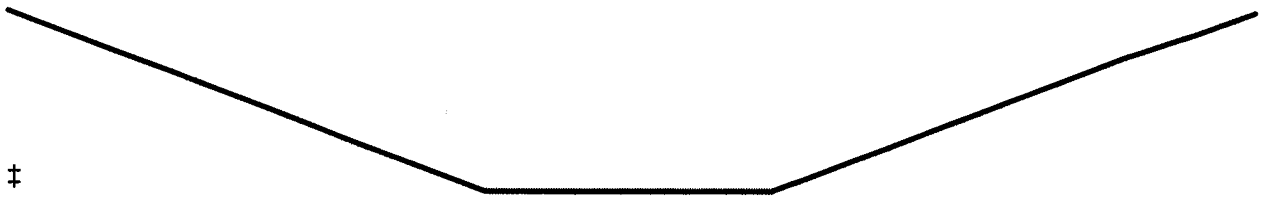
Summary for Reach E2R2: E2R2

Inflow Area = 1.921 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 0.64 cfs @ 12.52 hrs, Volume= 0.095 af
Outflow = 0.09 cfs @ 21.62 hrs, Volume= 0.095 af, Atten= 86%, Lag= 546.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.20 fps, Min. Travel Time= 364.8 min
Avg. Velocity = 0.14 fps, Avg. Travel Time= 525.4 min

Peak Storage= 1,963 cf @ 15.54 hrs
Average Depth at Peak Storage= 0.04'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 132.12 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 4,356.0' Slope= 0.0094 '/'
Inlet Invert= 182.00', Outlet Invert= 141.00'



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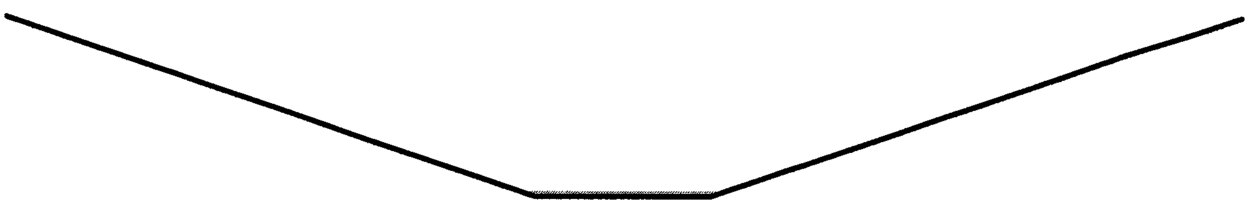
Summary for Reach E2R3: REACH TO AP

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth > 0.14" for 2-yr Storm event
Inflow = 0.05 cfs @ 27.93 hrs, Volume= 0.395 af
Outflow = 0.05 cfs @ 31.30 hrs, Volume= 0.391 af, Atten= 1%, Lag= 202.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.41 fps, Min. Travel Time= 88.8 min
Avg. Velocity = 0.34 fps, Avg. Travel Time= 107.6 min

Peak Storage= 279 cf @ 29.82 hrs
Average Depth at Peak Storage= 0.06'
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 E2R4: Reach to AP

Inflow Area = 92.419 ac, 5.17% Impervious, Inflow Depth > 0.37" for 2-yr Storm event
Inflow = 1.62 cfs @ 16.50 hrs, Volume= 2.863 af
Outflow = 1.60 cfs @ 17.65 hrs, Volume= 2.858 af, Atten= 1%, Lag= 69.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.57 fps, Min. Travel Time= 28.4 min
Avg. Velocity = 0.23 fps, Avg. Travel Time= 68.3 min

Peak Storage= 2,723 cf @ 17.17 hrs
Average Depth at Peak Storage= 0.20'
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 R-1D: Reach R-1D

Inflow Area =	34.624 ac,	3.31% Impervious, Inflow Depth = 0.24"	for 2-yr Storm event
Inflow =	1.15 cfs @	15.38 hrs, Volume=	0.695 af
Outflow =	1.15 cfs @	15.56 hrs, Volume=	0.695 af, Atten= 0%, Lag= 10.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.95 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 0.25 fps, Avg. Travel Time= 24.3 min

Peak Storage= 446 cf @ 15.46 hrs
Average Depth at Peak Storage= 0.11'
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'

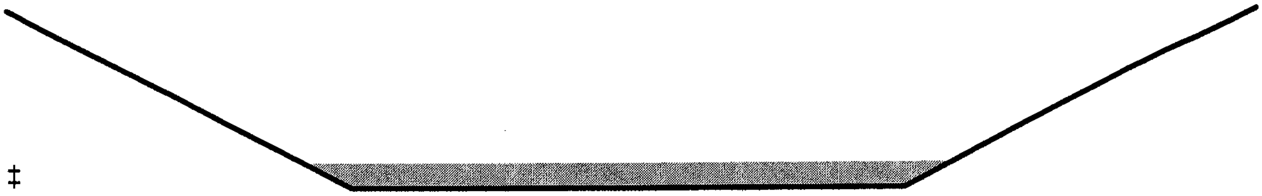
Summary for Reach R-1E: LEVEL SPREADER R-1E

Inflow Area =	10.745 ac,	0.00% Impervious, Inflow Depth = 0.64"	for 2-yr Storm event
Inflow =	3.92 cfs @	12.40 hrs, Volume=	0.569 af
Outflow =	3.90 cfs @	12.46 hrs, Volume=	0.569 af, Atten= 1%, Lag= 3.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.64 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 7.9 min

Peak Storage= 500 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.14'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 135.95 cfs

16.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 36.00'
Length= 210.0' Slope= 0.0690 '/'
Inlet Invert= 161.50', Outlet Invert= 147.00'



Summary for Reach R-1F: Reach R-1F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 2-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.21 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= 0.0170 '/'
Inlet Invert= 167.50', Outlet Invert= 151.50'

Summary for Reach R-1H: LEVEL SPREADER R-1H

Inflow Area = 3.030 ac, 0.00% Impervious, Inflow Depth = 1.09" for 2-yr Storm event
Inflow = 2.78 cfs @ 12.25 hrs, Volume= 0.275 af
Outflow = 2.73 cfs @ 12.31 hrs, Volume= 0.275 af, Atten= 2%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.55 fps, Avg. Travel Time= 5.1 min

Peak Storage= 312 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 1.00' Flow Area= 44.0 sf, Capacity= 411.95 cfs

34.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 54.00'
Length= 170.0' Slope= 0.0471 '/'
Inlet Invert= 182.00', Outlet Invert= 174.00'

Summary for Reach R-2F: Reach R2-F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 2-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
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'

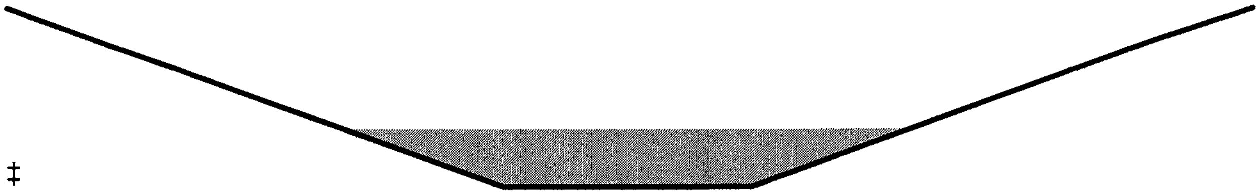
Summary for Reach R1: Reach 1

Inflow Area = 112.491 ac, 3.46% Impervious, Inflow Depth = 0.46" for 2-yr Storm event
Inflow = 12.53 cfs @ 13.74 hrs, Volume= 4.357 af
Outflow = 12.37 cfs @ 14.03 hrs, Volume= 4.357 af, Atten= 1%, Lag= 17.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.17 fps, Min. Travel Time= 10.0 min
Avg. Velocity = 0.20 fps, Avg. Travel Time= 57.6 min

Peak Storage= 7,397 cf @ 13.86 hrs
Average Depth at Peak Storage= 0.64'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 132.69 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= 0.0016 '/'
Inlet Invert= 146.30', Outlet Invert= 145.20'



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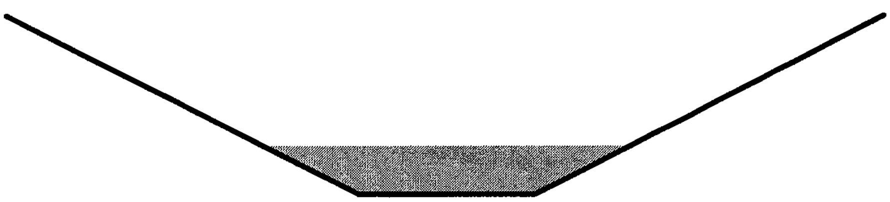
Summary for Reach R1B: LF TOE DITCH

Inflow Area = 13.169 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 5.43 cfs @ 12.29 hrs, Volume= 0.652 af
Outflow = 5.35 cfs @ 12.37 hrs, Volume= 0.652 af, Atten= 1%, Lag= 5.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.22 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 1.30 fps, Avg. Travel Time= 6.9 min

Peak Storage= 896 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.54'
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'



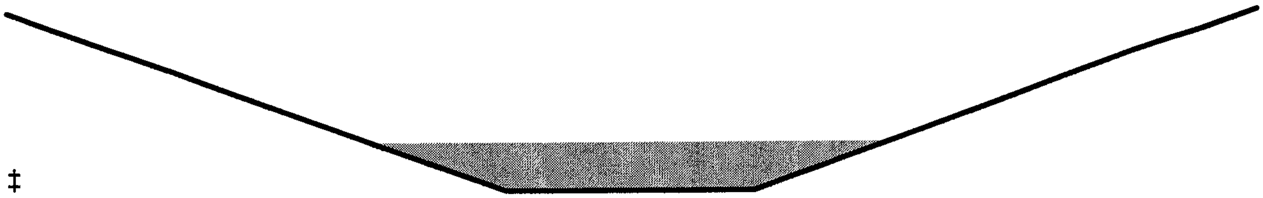
Summary for Reach R2: Reach 2

Inflow Area = 64.567 ac, 4.26% Impervious, Inflow Depth = 0.50" for 2-yr Storm event
Inflow = 10.32 cfs @ 13.37 hrs, Volume= 2.699 af
Outflow = 9.88 cfs @ 13.80 hrs, Volume= 2.699 af, Atten= 4%, Lag= 25.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.20 fps, Min. Travel Time= 14.6 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 49.5 min

Peak Storage= 8,672 cf @ 13.55 hrs
Average Depth at Peak Storage= 0.54'
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= 1,050.0' Slope= 0.0020 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'



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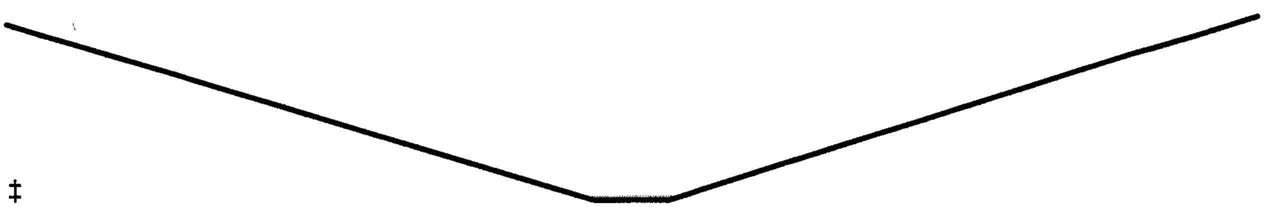
Summary for Reach R2A: Reach 2A

Inflow Area = 20.177 ac, 3.27% Impervious, Inflow Depth > 0.53" for 2-yr Storm event
Inflow = 0.51 cfs @ 18.19 hrs, Volume= 0.885 af
Outflow = 0.49 cfs @ 21.60 hrs, Volume= 0.884 af, Atten= 4%, Lag= 204.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.35 fps, Min. Travel Time= 93.1 min
Avg. Velocity = 0.21 fps, Avg. Travel Time= 152.9 min

Peak Storage= 2,756 cf @ 20.05 hrs
Average Depth at Peak Storage= 0.05'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,358.84 cfs

25.00' x 2.00' deep channel, n= 0.060
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,960.0' Slope= 0.0138 '/'
Inlet Invert= 179.00', Outlet Invert= 152.00'



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Summary for Reach R3: Reach 3

Inflow Area = 53.822 ac, 5.11% Impervious, Inflow Depth = 0.47" for 2-yr Storm event
Inflow = 9.57 cfs @ 13.08 hrs, Volume= 2.130 af
Outflow = 9.24 cfs @ 13.40 hrs, Volume= 2.130 af, Atten= 4%, Lag= 19.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.17 fps, Min. Travel Time= 11.4 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 32.7 min

Peak Storage= 6,300 cf @ 13.21 hrs
Average Depth at Peak Storage= 0.52'
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= 800.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 148.40'

‡

Summary for Reach R5a: Grass Lined Ditch

Inflow Area = 9.334 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 3.92 cfs @ 12.27 hrs, Volume= 0.462 af
Outflow = 3.88 cfs @ 12.30 hrs, Volume= 0.462 af, Atten= 1%, Lag= 1.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.30 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 1.9 min

Peak Storage= 181 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 572.96 cfs

4.00' x 3.00' deep channel, n= 0.025
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 Pond 1P: Culvert - 4JB & FJC

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 5.02 cfs @ 12.34 hrs, Volume= 0.610 af
Outflow = 5.03 cfs @ 12.35 hrs, Volume= 0.610 af, Atten= 0%, Lag= 0.8 min
Primary = 5.03 cfs @ 12.35 hrs, Volume= 0.610 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 210.75' @ 12.35 hrs Surf.Area= 530 sf Storage= 215 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.8 min (901.7 - 900.9)

Volume	Invert	Avail.Storage	Storage Description
#1	210.00'	3,853 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
210.00	43	0	0
212.00	1,340	1,383	1,383
213.00	3,600	2,470	3,853

Device	Routing	Invert	Outlet Devices
#1	Primary	210.00'	**24.0" Round Culvert X 2.00** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 210.00' / 209.00' S= 0.0137 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=5.02 cfs @ 12.35 hrs HW=210.75' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.02 cfs @ 2.33 fps)

Summary for Pond 4IAC: Culvert - 4IA

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 0.50 cfs @ 12.21 hrs, Volume= 0.047 af
Outflow = 0.45 cfs @ 12.26 hrs, Volume= 0.047 af, Atten= 9%, Lag= 3.3 min
Primary = 0.45 cfs @ 12.26 hrs, Volume= 0.047 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 213.23' @ 12.26 hrs Surf.Area= 421 sf Storage= 112 cf

Plug-Flow detention time= 9.5 min calculated for 0.047 af (100% of inflow)
Center-of-Mass det. time= 9.5 min (904.7 - 895.2)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,559 cf	**2.00'W x 125.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.90'	**18.0" Round Culvert - 4IA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 212.90' / 212.20' S= 0.0175 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.45 cfs @ 12.26 hrs HW=213.23' (Free Discharge)
↑—**1=Culvert - 4IA** (Inlet Controls 0.45 cfs @ 1.55 fps)

Summary for Pond 8P: Ex Pond

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth > 0.47" for 2-yr Storm event
Inflow = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af
Outflow = 0.74 cfs @ 17.94 hrs, Volume= 1.035 af, Atten= 0%, Lag= 5.8 min
Primary = 0.74 cfs @ 17.94 hrs, Volume= 1.035 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 171.98' @ 17.94 hrs Surf.Area= 4,583 sf Storage= 3,312 cf

Plug-Flow detention time= 489.8 min calculated for 1.035 af (94% of inflow)

Center-of-Mass det. time= 107.3 min (2,455.6 - 2,348.3)

Volume	Invert	Avail.Storage	Storage Description
#1	171.20'	4,765 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.20	3,900	0	0
172.00	4,600	3,400	3,400
172.30	4,500	1,365	4,765

Device	Routing	Invert	Outlet Devices
#1	Primary	171.90'	**12.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.74 cfs @ 17.94 hrs HW=171.98' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.74 cfs @ 0.77 fps)

Summary for Pond C-2B-A: Culvert - 2BA

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.75 cfs @	12.29 hrs, Volume=	0.693 af
Outflow =	5.70 cfs @	12.31 hrs, Volume=	0.693 af, Atten= 1%, Lag= 1.4 min
Primary =	5.70 cfs @	12.31 hrs, Volume=	0.693 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 204.21' @ 12.31 hrs Surf.Area= 737 sf Storage= 365 cf

Plug-Flow detention time= 0.6 min calculated for 0.693 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (896.9 - 896.3)

Volume	Invert	Avail.Storage	Storage Description
#1	203.50'	1,859 cf	**2.00'W x 150.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	203.20'	**36.0" Round Culvert - 2BA** L= 40.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 203.20' / 202.90' S= 0.0075 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	205.00'	**4.0' long x 2.0' breadth Southern Ditch High Water Outlet X 0.00** 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=5.67 cfs @ 12.31 hrs HW=204.20' (Free Discharge)
↑—**1=Culvert - 2BA** (Barrel Controls 5.67 cfs @ 4.09 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=203.50' (Free Discharge)
↑—**2=Southern Ditch High Water Outlet** (Controls 0.00 cfs)

Summary for Pond C-4F: Culvert - 4F

Inflow Area =	6.771 ac,	0.00% Impervious, Inflow Depth =	0.55"	for 2-yr Storm event
Inflow =	1.30 cfs @	13.07 hrs, Volume=	0.313 af	
Outflow =	1.29 cfs @	13.12 hrs, Volume=	0.313 af,	Atten= 1%, Lag= 3.1 min
Primary =	1.29 cfs @	13.12 hrs, Volume=	0.313 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 165.58' @ 13.12 hrs Surf.Area= 0.017 ac Storage= 0.007 af

Plug-Flow detention time= 6.7 min calculated for 0.313 af (100% of inflow)
Center-of-Mass det. time= 6.7 min (954.8 - 948.0)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	0.047 af	**4.00'W x 96.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**18.0" Round Culvert - 4F** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 165.00' / 162.00' S= 0.0385 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.29 cfs @ 13.12 hrs HW=165.58' (Free Discharge)
↑—**1=Culvert - 4F** (Inlet Controls 1.29 cfs @ 2.05 fps)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth =	0.59"	for 2-yr Storm event
Inflow =	4.33 cfs @	12.39 hrs, Volume=	0.538 af	
Outflow =	4.22 cfs @	12.45 hrs, Volume=	0.538 af,	Atten= 3%, Lag= 3.4 min
Primary =	4.22 cfs @	12.45 hrs, Volume=	0.538 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 220.30' @ 12.45 hrs Surf.Area= 3,417 sf Storage= 924 cf

Plug-Flow detention time= 6.1 min calculated for 0.538 af (100% of inflow)
Center-of-Mass det. time= 6.1 min (911.7 - 905.6)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	3,865 cf	**5.00'W x 550.00'L x 1.00'H Prismatoid Z=2.0**

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' / 214.30' S= 0.0431 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	220.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.21 cfs @ 12.45 hrs HW=220.30' (Free Discharge)
└─**1=Culvert - 4K** (Passes 4.21 cfs of 25.31 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 4.21 cfs @ 1.79 fps)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area =	20.700 ac,	1.27% Impervious, Inflow Depth =	0.64"	for 2-yr Storm event
Inflow =	7.52 cfs @	12.48 hrs, Volume=	1.099 af	
Outflow =	7.52 cfs @	12.48 hrs, Volume=	1.099 af,	Atten= 0%, Lag= 0.0 min
Primary =	7.52 cfs @	12.48 hrs, Volume=	1.099 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 205.34' @ 12.48 hrs Surf.Area= 28 sf Storage= 13 cf

Plug-Flow detention time= 0.0 min calculated for 1.098 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (903.6 - 903.6)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,197 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	47	38	38
208.00	5,375	5,422	5,460
209.00	6,100	5,738	11,197

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0090 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=7.49 cfs @ 12.48 hrs HW=205.33' (Free Discharge)
└─**1=Culvert - 4B** (Inlet Controls 7.49 cfs @ 2.60 fps)

Summary for Pond C4H-A: Culvert 4H-A

Inflow Area =	0.780 ac,	0.00% Impervious, Inflow Depth =	0.59"	for 2-yr Storm event
Inflow =	0.41 cfs @	12.20 hrs, Volume=	0.039 af	
Outflow =	0.30 cfs @	12.33 hrs, Volume=	0.039 af,	Atten= 28%, Lag= 7.8 min
Primary =	0.30 cfs @	12.33 hrs, Volume=	0.039 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 202.17' @ 12.33 hrs Surf.Area= 862 sf Storage= 190 cf

Plug-Flow detention time= 24.1 min calculated for 0.039 af (100% of inflow)
Center-of-Mass det. time= 23.8 min (917.6 - 893.8)

Volume	Invert	Avail.Storage	Storage Description
#1	201.90'	3,419 cf	**2.00'W x 280.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	201.90'	**18.0" Round Culvert - 4HA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 201.90' / 200.90' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.29 cfs @ 12.33 hrs HW=202.17' (Free Discharge)
↑—1=Culvert - 4HA (Inlet Controls 0.29 cfs @ 1.39 fps)

Summary for Pond C4N: Culvert 4N

Inflow Area =	1.921 ac,	0.00% Impervious,	Inflow Depth = 0.59"	for 2-yr Storm event	
Inflow =	0.64 cfs @	12.50 hrs, Volume=	0.095 af		
Outflow =	0.64 cfs @	12.52 hrs, Volume=	0.095 af,	Atten= 0%,	Lag= 1.0 min
Primary =	0.64 cfs @	12.52 hrs, Volume=	0.095 af		

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.40' @ 12.52 hrs Surf.Area= 0.004 ac Storage= 0.001 af

Plug-Flow detention time= 2.8 min calculated for 0.095 af (100% of inflow)
Center-of-Mass det. time= 2.8 min (911.1 - 908.3)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	0.015 af	**2.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	184.00'	**18.0" Round 18-in Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.00' / 183.00' S= 0.0303 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.63 cfs @ 12.52 hrs HW=184.40' (Free Discharge)
↑—1=18-in Culvert (Inlet Controls 0.63 cfs @ 1.69 fps)

Summary for Pond CB-2B-B: Catch Basin - 2BB

Inflow Area =	13.996 ac,	0.00% Impervious,	Inflow Depth = 0.59"	for 2-yr Storm event	
Inflow =	5.61 cfs @	12.38 hrs, Volume=	0.693 af		
Outflow =	5.61 cfs @	12.38 hrs, Volume=	0.693 af,	Atten= 0%,	Lag= 0.0 min
Primary =	5.61 cfs @	12.38 hrs, Volume=	0.693 af		

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 200.21' @ 12.38 hrs Surf.Area= 408 sf Storage= 4 cf

Plug-Flow detention time= 0.0 min calculated for 0.693 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (902.6 - 902.5)

Volume	Invert	Avail.Storage	Storage Description
#1	200.20'	2,459 cf	**2.00'W x 200.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	**24.0" Round Culvert - 2BB** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.00' / 194.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	200.00'	**30.0" Horiz. Orifice/Grate** C= 0.600

Primary OutFlow Max=10.83 cfs @ 12.38 hrs HW=200.21' (Free Discharge)
└─**1=Culvert - 2BB** (Passes 10.83 cfs of 31.04 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 10.83 cfs @ 2.21 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area =	12.750 ac,	0.00% Impervious, Inflow Depth =	0.59"	for 2-yr Storm event
Inflow =	5.14 cfs @	12.39 hrs, Volume=	0.631 af	
Outflow =	5.14 cfs @	12.39 hrs, Volume=	0.631 af,	Atten= 0%, Lag= 0.3 min
Primary =	5.14 cfs @	12.39 hrs, Volume=	0.631 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 181.40' @ 12.39 hrs Surf.Area= 322 sf Storage= 92 cf

Plug-Flow detention time= 0.4 min calculated for 0.631 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (905.8 - 905.4)

Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	1,256 cf	**2.00'W x 71.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	175.00'	**24.0" Round Culvert - 4G** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.00' / 174.00' S= 0.0278 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	181.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.13 cfs @ 12.39 hrs HW=181.40' (Free Discharge)
└─**1=Culvert - 4G** (Passes 5.13 cfs of 35.14 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 5.13 cfs @ 2.06 fps)

Summary for Pond CB-4HB: Catch Basin - 4HB

Inflow Area = 4.180 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 1.79 cfs @ 12.27 hrs, Volume= 0.207 af
Outflow = 1.77 cfs @ 12.28 hrs, Volume= 0.207 af, Atten= 1%, Lag= 0.1 min
Primary = 1.77 cfs @ 12.28 hrs, Volume= 0.207 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 183.50' @ 12.28 hrs Surf.Area= 72 sf Storage= 12 cf

Plug-Flow detention time= 0.2 min calculated for 0.207 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (901.7 - 901.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.30'	359 cf	**2.00'W x 25.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Device 2	183.30'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	178.50'	**18.0" Round Culvert - 4HB** L= 101.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 176.00' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.76 cfs @ 12.28 hrs HW=183.49' (Free Discharge)
└─**2=Culvert - 4HB** (Passes 1.76 cfs of 17.53 cfs potential flow)
  └─**1=Orifice/Grate** (Weir Controls 1.76 cfs @ 1.44 fps)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 0.59" for 2-yr Storm event
Inflow = 4.54 cfs @ 12.31 hrs, Volume= 0.538 af
Outflow = 4.54 cfs @ 12.31 hrs, Volume= 0.538 af, Atten= 0%, Lag= 0.3 min
Primary = 4.54 cfs @ 12.31 hrs, Volume= 0.538 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 207.97' @ 12.31 hrs Surf.Area= 0.009 ac Storage= 0.003 af

Plug-Flow detention time= 1.4 min calculated for 0.538 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (899.9 - 899.1)

Volume	Invert	Avail.Storage	Storage Description
#1	207.50'	0.029 af	**2.00'W x 100.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	202.50'	**18.0" Round Culvert - 4I** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 202.50' / 192.00' S= 0.1313 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	207.60'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=4.51 cfs @ 12.31 hrs HW=207.96' TW=193.96' (TW follows 14.00' below HW)
1=Culvert - 4I (Passes 4.51 cfs of 18.47 cfs potential flow)
2=Orifice/Grate (Weir Controls 4.51 cfs @ 1.97 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	5.07 cfs @	12.31 hrs, Volume=	0.610 af
Outflow =	5.08 cfs @	12.31 hrs, Volume=	0.610 af, Atten= 0%, Lag= 0.3 min
Primary =	5.08 cfs @	12.31 hrs, Volume=	0.610 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 219.09' @ 12.31 hrs Surf.Area= 0.009 ac Storage= 0.003 af

Plug-Flow detention time= 0.6 min calculated for 0.609 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (898.8 - 898.2)

Volume	Invert	Avail.Storage	Storage Description
#1	218.70'	0.032 af	**2.00'W x 113.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	214.00'	**18.0" Round Culvert - 4JA** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.00' / 212.30' S= 0.0283 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.04 cfs @ 12.31 hrs HW=219.09' TW=212.09' (TW follows 7.00' below HW)
1=Culvert - 4JA (Passes 5.04 cfs of 17.73 cfs potential flow)
2=Orifice/Grate (Weir Controls 5.04 cfs @ 2.05 fps)

Summary for Pond CB-4L: Catch Basin - 4L

Inflow Area =	7.500 ac,	0.00% Impervious, Inflow Depth = 0.59"	for 2-yr Storm event
Inflow =	3.34 cfs @	12.23 hrs, Volume=	0.371 af
Outflow =	3.31 cfs @	12.26 hrs, Volume=	0.371 af, Atten= 1%, Lag= 2.1 min
Primary =	3.31 cfs @	12.26 hrs, Volume=	0.371 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 215.30' @ 12.26 hrs Surf.Area= 1,596 sf Storage= 458 cf

Plug-Flow detention time= 4.2 min calculated for 0.371 af (100% of inflow)
Center-of-Mass det. time= 4.2 min (897.2 - 893.0)

Volume	Invert	Avail.Storage	Storage Description
#1	215.00'	3,683 cf	**30.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 211.00' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	215.00'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.27 cfs @ 12.26 hrs HW=215.29' (Free Discharge)
↑—**1=Culvert 4L** (Passes 3.27 cfs of 10.57 cfs potential flow)
↑—**2=Orifice-Top of catch basin** (Weir Controls 3.27 cfs @ 1.77 fps)

Summary for Pond D-1G: (2)24" Culverts P-6h

Inflow Area =	11.290 ac,	0.00% Impervious, Inflow Depth = 0.64"	for 2-yr Storm event
Inflow =	5.77 cfs @	12.21 hrs, Volume=	0.598 af
Outflow =	5.72 cfs @	12.21 hrs, Volume=	0.598 af, Atten= 1%, Lag= 0.4 min
Primary =	5.72 cfs @	12.21 hrs, Volume=	0.598 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 183.81' @ 12.21 hrs Surf.Area= 326 sf Storage= 136 cf
Flood Elev= 185.00' Surf.Area= 800 sf Storage= 805 cf

Plug-Flow detention time= 0.5 min calculated for 0.598 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (888.1 - 887.6)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	3,305 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	10	0	0
184.00	400	205	205
186.00	1,200	1,600	1,805
187.00	1,800	1,500	3,305

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	184.50'	**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=5.65 cfs @ 12.21 hrs HW=183.80' (Free Discharge)
↑—**1=(2)24"-Culvert** (Barrel Controls 5.65 cfs @ 3.54 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond D-1H: LF TOE DITCH - CULVERT

Inflow Area = 3.030 ac, 0.00% Impervious, Inflow Depth = 1.09" for 2-yr Storm event
Inflow = 2.81 cfs @ 12.22 hrs, Volume= 0.275 af
Outflow = 2.78 cfs @ 12.25 hrs, Volume= 0.275 af, Atten= 1%, Lag= 1.7 min
Primary = 2.78 cfs @ 12.25 hrs, Volume= 0.275 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 183.84' @ 12.25 hrs Surf.Area= 259 sf Storage= 372 cf
Flood Elev= 186.00' Surf.Area= 858 sf Storage= 1,323 cf

Plug-Flow detention time= 6.3 min calculated for 0.275 af (100% of inflow)
Center-of-Mass det. time= 6.1 min (863.2 - 857.1)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	1,323 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	24	0	0
186.00	858	1,323	1,323

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**18.0" Round Culvert-C-1H** L= 60.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 183.00' / 182.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=2.78 cfs @ 12.25 hrs HW=183.84' (Free Discharge)
↑—**1=Culvert-C-1H** (Barrel Controls 2.78 cfs @ 3.92 fps)

Summary for Pond DP-1: Detention Pond 1

Inflow Area = 34.624 ac, 3.31% Impervious, Inflow Depth = 0.43" for 2-yr Storm event
Inflow = 10.24 cfs @ 12.33 hrs, Volume= 1.253 af
Outflow = 1.15 cfs @ 15.38 hrs, Volume= 0.695 af, Atten= 89%, Lag= 183.0 min
Primary = 1.15 cfs @ 15.38 hrs, Volume= 0.695 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 162.46' @ 15.38 hrs Surf.Area= 14,359 sf Storage= 31,388 cf

Plug-Flow detention time= 430.2 min calculated for 0.695 af (55% of inflow)
Center-of-Mass det. time= 297.7 min (1,193.7 - 896.1)

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	162.00'	**30.0" Round 30" Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.00' / 159.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	162.00'	**12.0" Vert. Orifice on side** C= 0.600
#3	Device 1	162.00'	**6.0" Vert. Orifice on side** C= 0.600
#4	Device 1	165.50'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**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=1.15 cfs @ 15.38 hrs HW=162.46' (Free Discharge)
↑—**1=30" Culvert** (Inlet Controls 1.15 cfs @ 1.83 fps)
  —**2=Orifice on side** (Passes < 0.83 cfs potential flow)
  —**3=Orifice on side** (Passes < 0.44 cfs potential flow)
  —**4=Orifice-Top of drop inlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
↑—**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 12.05 cfs @ 12.36 hrs, Volume= 1.516 af
Outflow = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af, Atten= 94%, Lag= 328.8 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 177.58' @ 17.84 hrs Surf.Area= 21,167 sf Storage= 43,962 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 1,554.9 min calculated for 1.103 af (73% of inflow)
Center-of-Mass det. time= 1,451.8 min (2,348.3 - 896.5)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**3=18-in Primary Culvert** (Controls 0.00 cfs)
  ├─**1=Orifice/Grate** (Controls 0.00 cfs)
  └─**2=6-in Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.74 cfs @ 17.84 hrs HW=177.58' (Free Discharge)
└─**4=6-in Culvert** (Passes 0.74 cfs of 1.37 cfs potential flow)
  ├─**5=Orifice Top** (Orifice Controls 0.67 cfs @ 3.68 fps)
  └─**6=Orifice Side** (Orifice Controls 0.07 cfs @ 5.53 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**7=E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11: Detention Pond 11

Inflow Area = 22.282 ac, 4.04% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.66 cfs @ 12.40 hrs, Volume= 1.182 af
Outflow = 0.61 cfs @ 17.82 hrs, Volume= 1.030 af, Atten= 92%, Lag= 325.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.61 cfs @ 17.82 hrs, Volume= 1.030 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 165.43' @ 17.82 hrs Surf.Area= 27,580 sf Storage= 33,880 cf

Plug-Flow detention time= 1,598.2 min calculated for 1.030 af (87% of inflow)
Center-of-Mass det. time= 1,537.9 min (2,445.3 - 907.4)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
└─**3=18-In Culvert** (Controls 0.00 cfs)
  ├─**1=6-In Orifice Side (Riser)** (Controls 0.00 cfs)
  └─**2=Grate Top (Riser)** (Controls 0.00 cfs)

Secondary OutFlow Max=0.61 cfs @ 17.82 hrs HW=165.43' (Free Discharge)
└─**4=6-In Culvert** (Passes 0.61 cfs of 1.03 cfs potential flow)
  ├─**5=Orifice Top (6-in Culv)** (Orifice Controls 0.50 cfs @ 2.75 fps)
  └─**6=Orifice Side (6-in Culv)** (Orifice Controls 0.10 cfs @ 8.43 fps)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area =	20.177 ac,	3.27% Impervious, Inflow Depth = 0.62"	for 2-yr Storm event
Inflow =	5.88 cfs @	12.39 hrs, Volume=	1.043 af
Outflow =	0.51 cfs @	18.19 hrs, Volume=	0.885 af, Atten= 91%, Lag= 347.6 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af
Secondary =	0.51 cfs @	18.19 hrs, Volume=	0.885 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 185.69' @ 18.19 hrs Surf.Area= 26,018 sf Storage= 31,513 cf

Plug-Flow detention time= 1,647.6 min calculated for 0.884 af (85% of inflow)
Center-of-Mass det. time= 1,581.2 min (2,498.6 - 917.4)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-in Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=184.00' (Free Discharge)
└─**3=18- In Culvert** (Controls 0.00 cfs)
  ├─**1=Grate Top (Riser)** (Controls 0.00 cfs)
  └─**2=8-In Orifice (Riser Side)** (Controls 0.00 cfs)

Secondary OutFlow Max=0.51 cfs @ 18.19 hrs HW=185.69' (Free Discharge)
└─**6=6-In Culvert** (Passes 0.51 cfs of 1.48 cfs potential flow)
  ├─**4=Orifice Top (6-in Pipe)** (Orifice Controls 0.39 cfs @ 2.12 fps)
  └─**5=Orifice (Side of 6-in)** (Orifice Controls 0.13 cfs @ 5.12 fps)

Summary for Pond DP-1A: DP-1A (Former Leachate Pond)

Inflow Area = 10.835 ac, 10.57% Impervious, Inflow Depth = 0.80" for 2-yr Storm event
Inflow = 5.05 cfs @ 12.27 hrs, Volume= 0.720 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= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 164.00' Surf.Area= 37,429 sf Storage= 182,617 cf
Peak Elev= 164.81' @ 25.65 hrs Surf.Area= 39,695 sf Storage= 213,981 cf (31,364 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (80,429 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

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	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=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
↑—1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area =	10.745 ac,	0.00% Impervious, Inflow Depth =	0.64"	for 2-yr Storm event
Inflow =	5.49 cfs @	12.21 hrs, Volume=	0.569 af	
Outflow =	3.92 cfs @	12.40 hrs, Volume=	0.569 af,	Atten= 29%, Lag= 11.7 min
Primary =	3.92 cfs @	12.40 hrs, Volume=	0.569 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 162.30' Surf.Area= 2,326 sf Storage= 956 cf
Peak Elev= 163.37' @ 12.40 hrs Surf.Area= 3,640 sf Storage= 4,359 cf (3,402 cf above start)
Flood Elev= 166.60' Surf.Area= 12,071 sf Storage= 28,956 cf (27,999 cf above start)

Plug-Flow detention time= 60.2 min calculated for 0.547 af (96% of inflow)
Center-of-Mass det. time= 32.2 min (919.9 - 887.6)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	47,648 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,957	0	0
164.00	4,419	6,376	6,376
166.00	10,150	14,569	20,945
168.00	16,553	26,703	47,648

Device	Routing	Invert	Outlet Devices
#1	Primary	162.30'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.30' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	162.30'	**15.0" Vert. Orifice** C= 0.600
#3	Device 1	166.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.92 cfs @ 12.40 hrs HW=163.37' (Free Discharge)
└1=**Culvert** (Passes 3.92 cfs of 4.88 cfs potential flow)
  ├2=**Orifice** (Orifice Controls 3.92 cfs @ 3.52 fps)
  └3=**Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.78" for 2-yr Storm event
Inflow = 11.00 cfs @ 12.31 hrs, Volume= 1.472 af
Outflow = 0.82 cfs @ 16.92 hrs, Volume= 1.472 af, Atten= 93%, Lag= 276.7 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.82 cfs @ 16.92 hrs, Volume= 1.472 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 174.00' Surf.Area= 25,931 sf Storage= 29,566 cf
Peak Elev= 174.86' @ 16.92 hrs Surf.Area= 41,554 sf Storage= 67,549 cf (37,983 cf above start)
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (467,078 cf above start)

Plug-Flow detention time= 1,153.1 min calculated for 0.794 af (54% of inflow)
Center-of-Mass det. time= 628.6 min (1,512.9 - 884.3)

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	Secondary	169.00'	**6.0" Round Outlet Culvert 6"** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 169.00' / 168.00' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	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=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
└1=**Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.82 cfs @ 16.92 hrs HW=174.86' (Free Discharge)
├2=**Outlet Culvert 6"** (Passes 0.82 cfs of 1.47 cfs potential flow)
│ └3=**Orifice** (Orifice Controls 0.82 cfs @ 4.47 fps)
└4=**Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area =	33.165 ac,	8.08% Impervious, Inflow Depth =	0.87"	for 2-yr Storm event
Inflow =	16.58 cfs @	12.44 hrs, Volume=	2.398 af	
Outflow =	0.05 cfs @	24.97 hrs, Volume=	0.399 af,	Atten= 100%, Lag= 751.5 min
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	
Secondary =	0.05 cfs @	24.97 hrs, Volume=	0.399 af	
Tertiary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 188.57' @ 24.97 hrs Surf.Area= 80,617 sf Storage= 103,321 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 3,910.1 min calculated for 0.399 af (17% of inflow)
Center-of-Mass det. time= 3,748.6 min (4,626.7 - 878.2)

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
#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 @ 24.97 hrs HW=188.57' (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 @ 2.17 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1A: SC-1A Runoff Area=23.080 ac 0.00% Impervious Runoff Depth=1.67"
Flow Length=2,249' Slope=0.0260 '/' Tc=88.1 min CN=74 Runoff=13.58 cfs 3.212 af

Subcatchment 1B: SC-1B Runoff Area=13.169 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,282' Tc=17.5 min CN=71 Runoff=15.37 cfs 1.606 af

Subcatchment 1C: SC-1C Runoff Area=13.300 ac 0.00% Impervious Runoff Depth=1.89"
Flow Length=380' Tc=68.3 min CN=77 Runoff=10.58 cfs 2.095 af

Subcatchment 1D: SC-1D Runoff Area=10.620 ac 0.00% Impervious Runoff Depth=1.60"
Flow Length=1,117' Tc=16.9 min CN=73 Runoff=13.91 cfs 1.416 af

Subcatchment 1E: SC-1E Runoff Area=10.745 ac 0.00% Impervious Runoff Depth=1.53"
Flow Length=910' Tc=12.7 min CN=72 Runoff=14.84 cfs 1.371 af

Subcatchment 1F: SC-1F Runoff Area=31.220 ac 3.52% Impervious Runoff Depth=1.82"
Flow Length=2,066' Tc=73.2 min CN=76 Runoff=22.65 cfs 4.723 af

Subcatchment 1G: SC-1G Runoff Area=11.290 ac 0.00% Impervious Runoff Depth=1.53"
Flow Length=857' Tc=12.7 min CN=72 Runoff=15.60 cfs 1.440 af

Subcatchment 1H: SC-1H Runoff Area=3.030 ac 0.00% Impervious Runoff Depth=2.21"
Flow Length=759' Tc=15.4 min CN=81 Runoff=5.84 cfs 0.557 af

Subcatchment 1I: SC-1I Runoff Area=9.334 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,084' Tc=16.8 min CN=71 Runoff=11.05 cfs 1.138 af

Subcatchment 1J: SC-1J Runoff Area=360,761 sf 19.96% Impervious Runoff Depth=1.89"
Flow Length=593' Tc=33.0 min CN=77 Runoff=9.83 cfs 1.305 af

Subcatchment 2A: SC-2A Runoff Area=54.143 ac 3.66% Impervious Runoff Depth=1.67"
Flow Length=2,435' Tc=126.1 min CN=74 Runoff=24.61 cfs 7.535 af

Subcatchment 2B: 2B Runoff Area=13.996 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,218' Tc=17.6 min CN=71 Runoff=16.29 cfs 1.706 af

Subcatchment 2C: 2C Runoff Area=6.181 ac 10.68% Impervious Runoff Depth=1.60"
Flow Length=702' Tc=80.7 min CN=73 Runoff=3.65 cfs 0.824 af

Subcatchment 3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth=1.60"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=74.13 cfs 36.035 af

Subcatchment 4A: 4A Runoff Area=4.518 ac 7.22% Impervious Runoff Depth=1.89"
Flow Length=379' Tc=5.1 min CN=77 Runoff=9.95 cfs 0.712 af

Subcatchment 4B: 4B Runoff Area=2.330 ac 11.29% Impervious Runoff Depth=2.04"
Flow Length=667' Tc=13.2 min CN=79 Runoff=4.38 cfs 0.397 af

Subcatchment 4C: 4C Runoff Area=1.287 ac 24.86% Impervious Runoff Depth=2.64"
Flow Length=496' Tc=15.4 min CN=86 Runoff=2.96 cfs 0.283 af

Subcatchment 4D: 4D Runoff Area=6.660 ac 26.58% Impervious Runoff Depth=2.73"
Flow Length=824' Tc=33.9 min CN=87 Runoff=11.31 cfs 1.514 af

Subcatchment 4E: 4E Runoff Area=247.915 ac 1.59% Impervious Runoff Depth=1.74"
Flow Length=6,090' Tc=225.6 min CN=75 Runoff=77.97 cfs 35.990 af

Subcatchment 4F: 4F Runoff Area=6.771 ac 0.00% Impervious Runoff Depth=1.40"
Flow Length=1,228' Tc=68.8 min CN=70 Runoff=3.79 cfs 0.788 af

Subcatchment 4G: 4G Runoff Area=12.750 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=929' Tc=17.1 min CN=71 Runoff=14.99 cfs 1.554 af

Subcatchment 4H: 4H Runoff Area=3.400 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=823' Tc=11.9 min CN=71 Runoff=4.54 cfs 0.415 af

Subcatchment 4HA: 4HA Runoff Area=0.780 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=142' Slope=0.3300 '/' Tc=6.7 min CN=71 Runoff=1.24 cfs 0.095 af

Subcatchment 4I: 4I Runoff Area=9.930 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,082' Tc=17.1 min CN=71 Runoff=11.68 cfs 1.211 af

Subcatchment 4IA: 4IA Runoff Area=0.940 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=136' Slope=0.3333 '/' Tc=6.4 min CN=71 Runoff=1.51 cfs 0.115 af

Subcatchment 4J: 4J Runoff Area=12.310 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,051' Tc=17.2 min CN=71 Runoff=14.45 cfs 1.501 af

Subcatchment 4K: 4K Runoff Area=10.870 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=1,095' Tc=18.4 min CN=71 Runoff=12.44 cfs 1.325 af

Subcatchment 4L: 4L Runoff Area=7.500 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=896' Tc=14.1 min CN=71 Runoff=9.51 cfs 0.914 af

Subcatchment 4M: 4M Runoff Area=5.352 ac 16.82% Impervious Runoff Depth=1.74"
Flow Length=642' Tc=53.5 min CN=75 Runoff=4.51 cfs 0.777 af

Subcatchment 4N: 4N Runoff Area=1.921 ac 0.00% Impervious Runoff Depth=1.46"
Flow Length=730' Tc=30.5 min CN=71 Runoff=1.78 cfs 0.234 af

Subcatchment 4O: 4O Runoff Area=5.100 ac 23.53% Impervious Runoff Depth=1.89"
Flow Length=663' Tc=14.2 min CN=77 Runoff=8.61 cfs 0.803 af

Subcatchment 5: SC-5 Runoff Area=35.960 ac 0.40% Impervious Runoff Depth=1.82"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=13.44 cfs 5.440 af

Subcatchment P1A: SC-P1A Runoff Area=65,400 sf 76.26% Impervious Runoff Depth=3.42"
Tc=0.0 min CN=94 Runoff=6.50 cfs 0.428 af

Reach 1R: DP-10 DITCH 1 Avg. Flow Depth=0.60' Max Vel=3.31 fps Inflow=14.21 cfs 1.501 af
n=0.025 L=101.0' S=0.0079 '/' Capacity=128.49 cfs Outflow=14.10 cfs 1.501 af

Reach 2R: E2C-DP9 Avg. Flow Depth=0.48' Max Vel=4.49 fps Inflow=12.00 cfs 0.995 af
n=0.022 L=590.0' S=0.0169 '/' Capacity=488.04 cfs Outflow=11.40 cfs 0.995 af

Reach 3R: Overland Flow Avg. Flow Depth=0.35' Max Vel=9.99 fps Inflow=21.25 cfs 2.637 af
n=0.035 L=168.0' S=0.0554 '/' Capacity=119.87 cfs Outflow=21.22 cfs 2.637 af

Reach 4HR-A: EAST PD - 4 Avg. Flow Depth=0.19' Max Vel=2.69 fps Inflow=1.24 cfs 0.095 af
n=0.025 L=288.0' S=0.0247 '/' Capacity=119.08 cfs Outflow=1.17 cfs 0.095 af

Reach 4HR-B: EAST PD - 5 Avg. Flow Depth=0.37' Max Vel=5.30 fps Inflow=5.42 cfs 0.510 af
n=0.025 L=425.0' S=0.0438 '/' Capacity=158.67 cfs Outflow=5.29 cfs 0.510 af

Reach 4IR-A: EAST PD - 2 Avg. Flow Depth=0.23' Max Vel=2.55 fps Inflow=1.51 cfs 0.115 af
n=0.025 L=330.0' S=0.0176 '/' Capacity=100.55 cfs Outflow=1.41 cfs 0.115 af

Reach 4IR-B: EAST PD - 3 Avg. Flow Depth=0.71' Max Vel=5.36 fps Inflow=12.92 cfs 1.325 af
n=0.025 L=210.0' S=0.0224 '/' Capacity=113.47 cfs Outflow=12.84 cfs 1.325 af

Reach 4JR: EAST PD 1 Avg. Flow Depth=0.79' Max Vel=5.10 fps Inflow=14.45 cfs 1.501 af
n=0.025 L=183.0' S=0.0180 '/' Capacity=101.85 cfs Outflow=14.35 cfs 1.501 af

Reach 4R: DP-10 DITCH 3 Avg. Flow Depth=0.84' Max Vel=8.43 fps Inflow=26.13 cfs 2.826 af
n=0.025 L=260.0' S=0.0462 '/' Capacity=162.94 cfs Outflow=25.93 cfs 2.826 af

Reach 5R: NORTH PD-1 Avg. Flow Depth=0.70' Max Vel=6.16 fps Inflow=14.99 cfs 1.554 af
n=0.025 L=936.0' S=0.0299 '/' Capacity=131.18 cfs Outflow=14.64 cfs 1.554 af

Reach 6R: NORTH PD-2 Avg. Flow Depth=1.02' Max Vel=3.88 fps Inflow=15.99 cfs 1.706 af
n=0.025 L=364.0' S=0.0080 '/' Capacity=67.70 cfs Outflow=15.76 cfs 1.706 af

Reach 7R: DP-10R Avg. Flow Depth=0.53' Max Vel=2.60 fps Inflow=4.95 cfs 3.144 af
n=0.045 L=1,130.0' S=0.0248 '/' Capacity=88.21 cfs Outflow=4.91 cfs 3.143 af

Reach 8R: EAST PD - 6 Avg. Flow Depth=0.67' Max Vel=2.90 fps Inflow=12.44 cfs 1.325 af
n=0.025 L=360.0' S=0.0056 '/' Capacity=25.35 cfs Outflow=12.21 cfs 1.325 af

Reach 9R: LEVEL SPREADER Avg. Flow Depth=0.25' Max Vel=0.17 fps Inflow=0.99 cfs 2.949 af
n=0.800 L=273.0' S=0.0623 '/' Capacity=11.46 cfs Outflow=0.99 cfs 2.943 af

Reach 10R: Ditch 4B1 Avg. Flow Depth=0.87' Max Vel=3.69 fps Inflow=11.94 cfs 1.325 af
n=0.025 L=352.0' S=0.0085 '/' Capacity=70.02 cfs Outflow=11.80 cfs 1.325 af

Reach 11R: DP-11R Avg. Flow Depth=0.28' Max Vel=1.49 fps Inflow=1.18 cfs 2.687 af
n=0.045 L=1,050.0' S=0.0162 '/' Capacity=71.30 cfs Outflow=1.18 cfs 2.686 af

Reach 12R: 4FR Avg. Flow Depth=0.53' Max Vel=1.89 fps Inflow=3.77 cfs 0.788 af
n=0.045 L=1,523.0' S=0.0131 '/' Capacity=64.21 cfs Outflow=3.57 cfs 0.788 af

Reach 13R: Ex Ditch Avg. Flow Depth=1.00' Max Vel=4.62 fps Inflow=18.62 cfs 2.240 af
n=0.030 L=225.0' S=0.0164 '/' Capacity=81.05 cfs Outflow=18.53 cfs 2.240 af

Reach 14R: DP-10 DITCH 2 Avg. Flow Depth=0.65' Max Vel=6.49 fps Inflow=14.07 cfs 1.501 af
n=0.025 L=434.0' S=0.0357 '/' Capacity=143.33 cfs Outflow=13.95 cfs 1.501 af

Reach AP1: AP-1 Inflow=50.41 cfs 13.974 af
Outflow=50.41 cfs 13.974 af

Reach AP2: ANALYSIS POINT #2 Inflow=24.63 cfs 9.905 af
Outflow=24.63 cfs 9.905 af

Reach AP3: ANALYSIS POINT #3 Inflow=74.13 cfs 36.035 af
Outflow=74.13 cfs 36.035 af

Reach AP4: AP4 Inflow=84.71 cfs 45.769 af
Outflow=84.71 cfs 45.769 af

Reach AP5: ANALYSIS POINT #5 Inflow=13.44 cfs 5.440 af
Outflow=13.44 cfs 5.440 af

Reach E2R2: E2R2 Avg. Flow Depth=0.08' Max Vel=0.32 fps Inflow=1.77 cfs 0.234 af
n=0.080 L=4,356.0' S=0.0094 '/' Capacity=132.12 cfs Outflow=0.34 cfs 0.234 af

Reach E2R3: REACH TO AP Avg. Flow Depth=0.31' Max Vel=1.07 fps Inflow=0.99 cfs 2.943 af
n=0.045 L=2,170.0' S=0.0074 '/' Capacity=48.12 cfs Outflow=0.99 cfs 2.936 af

Reach E2R4: Reach to AP Avg. Flow Depth=0.52' Max Vel=0.97 fps Inflow=9.18 cfs 9.788 af
n=0.080 L=963.0' S=0.0094 '/' Capacity=131.94 cfs Outflow=8.62 cfs 9.779 af

Reach R-1D: Reach R-1D Avg. Flow Depth=0.28' Max Vel=1.66 fps Inflow=5.91 cfs 2.573 af
n=0.060 L=370.0' S=0.0324 '/' Capacity=67.93 cfs Outflow=5.91 cfs 2.573 af

Reach R-1E: LEVEL SPREADER R-1E Avg. Flow Depth=0.21' Max Vel=2.11 fps Inflow=7.89 cfs 1.371 af
n=0.060 L=210.0' S=0.0690 '/' Capacity=135.95 cfs Outflow=7.88 cfs 1.371 af

Reach R-1F: Reach R-1F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.060 L=940.0' S=0.0170 '/' Capacity=49.21 cfs Outflow=0.00 cfs 0.000 af

Reach R-1H: LEVEL SPREADER R-1H Avg. Flow Depth=0.08' Max Vel=2.01 fps Inflow=5.77 cfs 0.557 af
n=0.030 L=170.0' S=0.0471 '/' Capacity=411.95 cfs Outflow=5.67 cfs 0.557 af

Reach R-2F: Reach R2-F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=735.0' S=0.0020 '/' Capacity=151.21 cfs Outflow=0.00 cfs 0.000 af

Reach R1: Reach 1 Avg. Flow Depth=1.13' Max Vel=1.60 fps Inflow=38.57 cfs 10.762 af
n=0.030 L=700.0' S=0.0016 '/' Capacity=132.69 cfs Outflow=38.22 cfs 10.762 af

Reach R1B: LF TOE DITCH Avg. Flow Depth=0.92' Max Vel=4.29 fps Inflow=15.37 cfs 1.606 af
n=0.040 L=540.0' S=0.0278 '/' Capacity=79.00 cfs Outflow=15.08 cfs 1.606 af

Reach R2: Reach 2 Avg. Flow Depth=0.87' Max Vel=1.56 fps Inflow=26.10 cfs 6.094 af
n=0.030 L=1,050.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=25.30 cfs 6.094 af

Reach R2A: Reach 2A Avg. Flow Depth=0.08' Max Vel=0.48 fps Inflow=1.34 cfs 2.371 af
n=0.060 L=1,960.0' S=0.0138 '/' Capacity=1,358.84 cfs Outflow=1.33 cfs 2.370 af

Reach R3: Reach 3 Avg. Flow Depth=0.81' Max Vel=1.50 fps Inflow=22.65 cfs 4.723 af
n=0.030 L=800.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=22.18 cfs 4.723 af

Reach R5a: Grass Lined Ditch Avg. Flow Depth=0.38' Max Vel=6.16 fps Inflow=11.05 cfs 1.138 af
n=0.025 L=200.0' S=0.0500 '/' Capacity=572.96 cfs Outflow=10.99 cfs 1.138 af

Pond 1P: Culvert - 4JB & FJC Peak Elev=211.35' Storage=648 cf Inflow=14.10 cfs 1.501 af
24.0" Round Culvert x 2.00 n=0.011 L=73.0' S=0.0137 '/' Outflow=14.07 cfs 1.501 af

Pond 4IAC: Culvert - 4IA Peak Elev=213.49' Storage=236 cf Inflow=1.41 cfs 0.115 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0175 '/' Outflow=1.33 cfs 0.115 af

Pond 8P: Ex Pond Peak Elev=172.19' Storage=4,248 cf Inflow=4.96 cfs 3.212 af
Outflow=4.95 cfs 3.144 af

Pond C-2B-A: Culvert - 2BA Peak Elev=205.04' Storage=1,200 cf Inflow=16.29 cfs 1.706 af
Primary=15.99 cfs 1.706 af Secondary=0.00 cfs 0.000 af Outflow=15.99 cfs 1.706 af

Pond C-4F: Culvert - 4F Peak Elev=166.07' Storage=0.018 af Inflow=3.79 cfs 0.788 af
18.0" Round Culvert n=0.011 L=78.0' S=0.0385 '/' Outflow=3.77 cfs 0.788 af

Pond C-4K: Catch Basin - 4K Peak Elev=220.60' Storage=2,052 cf Inflow=12.21 cfs 1.325 af
Outflow=11.94 cfs 1.325 af

Pond C4B: Culvert - 4BA & 4BB Peak Elev=206.18' Storage=92 cf Inflow=21.27 cfs 2.637 af
24.0" Round Culvert x 2.00 n=0.011 L=78.0' S=0.0090 '/' Outflow=21.25 cfs 2.637 af

Pond C4H-A: Culvert 4H-A Peak Elev=202.39' Storage=414 cf Inflow=1.17 cfs 0.095 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0250 '/' Outflow=0.96 cfs 0.095 af

Pond C4N: Culvert 4N Peak Elev=184.69' Storage=0.003 af Inflow=1.78 cfs 0.234 af
18.0" Round Culvert n=0.011 L=33.0' S=0.0303 '/' Outflow=1.77 cfs 0.234 af

Pond CB-2B-B: Catch Basin - 2BB Peak Elev=200.44' Storage=121 cf Inflow=15.76 cfs 1.706 af
Outflow=15.73 cfs 1.706 af

Pond CB-4G: Catch Basin - 4G Peak Elev=181.93' Storage=331 cf Inflow=14.64 cfs 1.554 af
Outflow=14.58 cfs 1.554 af

Pond CB-4HB: Catch Basin - 4HB Peak Elev=183.70' Storage=29 cf Inflow=5.29 cfs 0.510 af
Outflow=5.29 cfs 0.510 af

Pond CB-4I: Catch Basin - 4I Peak Elev=208.33' Storage=0.007 af Inflow=12.84 cfs 1.325 af
Outflow=12.83 cfs 1.325 af

Pond CB-4JA: Catch Basin - 4JA Peak Elev=219.58' Storage=0.009 af Inflow=14.35 cfs 1.501 af
Outflow=14.21 cfs 1.501 af

Pond CB-4L: Catch Basin - 4L Peak Elev=215.59' Storage=946 cf Inflow=9.51 cfs 0.914 af
Outflow=9.37 cfs 0.914 af

Pond D-1G: (2)24" Culverts P-6h Peak Elev=184.43' Storage=416 cf Inflow=15.60 cfs 1.440 af
Primary=15.45 cfs 1.440 af Secondary=0.00 cfs 0.000 af Outflow=15.45 cfs 1.440 af

Pond D-1H: LF TOE DITCH - CULVERT Peak Elev=184.35' Storage=594 cf Inflow=5.84 cfs 0.557 af
18.0" Round Culvert n=0.013 L=60.0' S=0.0083 '/' Outflow=5.77 cfs 0.557 af

Pond DP-1: Detention Pond 1 Peak Elev=164.02' Storage=55,211 cf Inflow=28.22 cfs 3.131 af
Primary=5.91 cfs 2.573 af Secondary=0.00 cfs 0.000 af Outflow=5.91 cfs 2.573 af

Pond DP-10: DETENTION POND 10 Peak Elev=179.16' Storage=79,803 cf Inflow=32.93 cfs 3.629 af
Primary=3.56 cfs 1.042 af Secondary=1.40 cfs 2.169 af Tertiary=0.00 cfs 0.000 af Outflow=4.96 cfs 3.212 af

Pond DP-11: Detention Pond 11 Peak Elev=166.87' Storage=82,513 cf Inflow=21.28 cfs 2.841 af
Primary=0.00 cfs 0.000 af Secondary=1.18 cfs 2.687 af Outflow=1.18 cfs 2.687 af

Pond DP-12: DETENTION POND 12 Peak Elev=186.96' Storage=70,200 cf Inflow=16.74 cfs 2.530 af
Primary=0.09 cfs 0.026 af Secondary=1.25 cfs 2.344 af Outflow=1.34 cfs 2.371 af

Pond DP-1A: DP-1A (Former Leachate Peak Elev=165.63' Storage=247,127 cf Inflow=12.96 cfs 1.566 af
Outflow=0.33 cfs 0.110 af

Pond DP-2: DETENTION POND 2 Peak Elev=164.71' Storage=11,544 cf Inflow=14.84 cfs 1.371 af
Outflow=7.89 cfs 1.371 af

Pond DP-6: DETENTION POND 6 Peak Elev=176.12' Storage=127,302 cf Inflow=26.87 cfs 3.302 af
Primary=0.00 cfs 0.000 af Secondary=1.29 cfs 3.302 af Outflow=1.29 cfs 3.302 af

Pond DP-9: DETENTION POND 9 Peak Elev=189.59' Storage=187,879 cf Inflow=38.75 cfs 5.146 af
Primary=0.03 cfs 0.012 af Secondary=0.96 cfs 2.937 af Tertiary=0.00 cfs 0.000 af Outflow=0.99 cfs 2.949 af

Summary for Subcatchment 1A: SC-1A

Runoff = 13.58 cfs @ 13.22 hrs, Volume= 3.212 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	10.120	70	Woods, Good, HSG C
	9.500	77	Woods, Good, HSG D
	2.560	71	Meadow, non-grazed, HSG C
	0.400	78	Meadow, non-grazed, HSG D
*	0.500	96	Gravel Road
	23.080	74	Weighted Average
	23.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.7	150	0.0260	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	1,839		1.46		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
88.1	2,249	Total			

Summary for Subcatchment 1B: SC-1B

Runoff = 15.37 cfs @ 12.26 hrs, Volume= 1.606 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
13.169	71	Meadow, non-grazed, HSG C
13.169		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	183	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.9	392	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	557	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.5	1,282	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 10.58 cfs @ 12.95 hrs, Volume= 2.095 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	6.100	77	Woods, Good, HSG D
	0.720	70	Woods, Good, HSG C
	3.100	78	Meadow, non-grazed, HSG D
	2.580	71	Meadow, non-grazed, HSG C
*	0.800	96	Gravel Road
	13.300	77	Weighted Average
	13.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.0	150	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.6	230	0.0133	0.58		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
16.7					**Direct Entry, Segment ID: C-D**
68.3	380	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 13.91 cfs @ 12.25 hrs, Volume= 1.416 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	9.230	71	Meadow, non-grazed, HSG C
*	0.590	96	Gravel Road/Berm
*	0.800	78	Pond, Meadow HSG D
	10.620	73	Weighted Average
	10.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	159	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.5	203	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	605	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035

16.9	1,117	Total

Summary for Subcatchment 1E: SC-1E

Runoff = 14.84 cfs @ 12.19 hrs, Volume= 1.371 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	10.495	71	Meadow, non-grazed, HSG C
*	0.250	96	Gravel Road/Berm
	10.745	72	Weighted Average
	10.745		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	150	0.1500	2.71		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.2	93	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	517	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	910	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 22.65 cfs @ 13.00 hrs, Volume= 4.723 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	13.200	77	Woods, Good, HSG D
	7.250	70	Woods, Good, HSG C
	7.670	78	Meadow, non-grazed, HSG D
	1.500	71	Meadow, non-grazed, HSG C
*	0.500	96	Gravel Road/Pad
*	0.600	98	Impervious / Structures
	0.500	98	Paved roads w/curbs & sewers, HSG C
	31.220	76	Weighted Average
	30.120		96.48% Pervious Area
	1.100		3.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	17	0.3300	0.23		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
2.4	300	0.0190	2.07		**Shallow Concentrated Flow, Segment ID: C-D** Grassed Waterway Kv= 15.0 fps
24.6	1,649	0.0500	1.12		**Shallow Concentrated Flow, Segment ID D-E** Woodland Kv= 5.0 fps
24.5					**Direct Entry, Segment ID: E-F**
73.2	2,066	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 15.60 cfs @ 12.19 hrs, Volume= 1.440 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	10.860	71	Meadow, non-grazed, HSG C
*	0.430	96	Gravel Road/Berm
	11.290	72	Weighted Average
	11.290		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	62	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.4	90	0.3300	4.02		**Shallow Concentrated Flow, Segment ID: C-D** Short Grass Pasture Kv= 7.0 fps
0.3	140	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	415	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	857	Total			

Summary for Subcatchment 1H: SC-1H

Runoff = 5.84 cfs @ 12.22 hrs, Volume= 0.557 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
1.830	71	Meadow, non-grazed, HSG C
1.200	96	Gravel Road/Berm
3.030	81	Weighted Average
3.030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.3300	0.36		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
8.4	609	0.0300	1.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
15.4	759	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 11.05 cfs @ 12.25 hrs, Volume= 1.138 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
9.334	71	Meadow, non-grazed, HSG C
9.334		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	146	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	218	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	570	0.3300	27.25	817.65	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 5.0 '/' Top.W=25.00' n= 0.035
16.8	1,084	Total			

Summary for Subcatchment 1J: SC-1J

Runoff = 9.83 cfs @ 12.47 hrs, Volume= 1.305 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (sf)	CN	Description
*	186,445	70	Woods, Good HSG C
	85,939	71	Meadow, non-grazed, HSG C
*	16,377	96	Gravel Road/Pad
*	72,000	98	Pond water surface
	360,761	77	Weighted Average
	288,761		80.04% Pervious Area
	72,000		19.96% 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 2A: SC-2A

Runoff = 24.61 cfs @ 13.74 hrs, Volume= 7.535 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	27.993	70	Woods, Good, HSG C
	21.380	77	Woods, Good, HSG D
	2.790	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area (New)
	1.600	98	Existing Waterbody
	54.143	74	Weighted Average
	52.163		96.34% Pervious Area
	1.980		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.9	150	0.0300	0.05		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
25.4	538	0.0200	0.35		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
37.5	534	0.0090	0.24		**Shallow Concentrated Flow, Segment C-D** Forest w/Heavy Litter Kv= 2.5 fps
15.3	1,213	0.0080	1.32	52.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=2.00' Z= 10.0 '/' Top.W=40.00' n= 0.100 Earth, dense brush, high stage
126.1	2,435	Total			

Summary for Subcatchment 2B: 2B

Runoff = 16.29 cfs @ 12.26 hrs, Volume= 1.706 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
13.996	71	Meadow, non-grazed, HSG C
13.996		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	187	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	431	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	450	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.6	1,218	Total			

Summary for Subcatchment 2C: 2C

Runoff = 3.65 cfs @ 13.14 hrs, Volume= 0.824 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
5.521	70	Woods, Good, HSG C
0.660	98	Water Surface, HSG C
6.181	73	Weighted Average
5.521		89.32% Pervious Area
0.660		10.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.2	289	0.0242	0.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	263	0.0114	0.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
80.7	702	Total			

Summary for Subcatchment 3: SC-3

Runoff = 74.13 cfs @ 15.27 hrs, Volume= 36.035 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	162.090	70	Woods, Good, HSG C
	102.790	77	Woods, Good, HSG D
	0.950	71	Meadow, non-grazed, HSG C
*	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
*	2.330	98	Existing Water Body
	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 4A: 4A

Runoff = 9.95 cfs @ 12.08 hrs, Volume= 0.712 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	0.740	89	Gravel roads, HSG C
	1.955	74	>75% Grass cover, Good, HSG C
*	0.088	98	ROOF
	1.497	71	Meadow, non-grazed, HSG C
	0.238	98	Paved roads w/curbs & sewers, HSG C
	4.518	77	Weighted Average
	4.192		92.78% Pervious Area
	0.326		7.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	150	0.0167	0.71		**Sheet Flow, Segment A-B** n= 0.023 P2= 2.70"
0.8	159	0.0410	3.26		**Shallow Concentrated Flow, Segment B-C** Unpaved Kv= 16.1 fps
0.8	70	0.0429	1.45		**Shallow Concentrated Flow, Segment C-D** Short Grass Pasture Kv= 7.0 fps
5.1	379	Total			

Summary for Subcatchment 4B: 4B

Runoff = 4.38 cfs @ 12.19 hrs, Volume= 0.397 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	1.040	70	Brush, Fair, HSG C
*	0.023	98	ROOF
	0.640	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
	0.240	98	Paved roads w/curbs & sewers, HSG C
	2.330	79	Weighted Average
	2.067		88.71% Pervious Area
	0.263		11.29% 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 4C: 4C

Runoff = 2.96 cfs @ 12.21 hrs, Volume= 0.283 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	0.511	74	>75% Grass cover, Good, HSG C
	0.070	98	Paved roads w/curbs & sewers, HSG C
*	0.250	98	Building/Concrete Slabs
*	0.456	91	Gravel Roads
	1.287	86	Weighted Average
	0.967		75.14% Pervious Area
	0.320		24.86% 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"
4.0	374	0.0107	1.55		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
15.4	496	Total			

Summary for Subcatchment 4D: 4D

Runoff = 11.31 cfs @ 12.46 hrs, Volume= 1.514 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	0.453	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.634	98	Pond
	0.136	98	Paved roads w/curbs & sewers, HSG C
	6.660	87	Weighted Average
	4.890		73.42% Pervious Area
	1.770		26.58% 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 4E: 4E

Runoff = 77.97 cfs @ 15.24 hrs, Volume= 35.990 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	152.615	77	Woods, Good, HSG D
	91.360	70	Woods, Good, HSG C
*	3.940	98	Paved roads w/curbs & sewers,
	247.915	75	Weighted Average
	243.975		98.41% Pervious Area
	3.940		1.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
127.0	2,625	0.0190	0.34		**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)**
225.6	6,090	Total			

Summary for Subcatchment 4F: 4F

Runoff = 3.79 cfs @ 12.98 hrs, Volume= 0.788 af, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
6.691	70	Woods, Good, HSG C
0.080	89	Gravel roads, HSG C
6.771	70	Weighted Average
6.771		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.6	144	0.0280	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.9	1,067	0.0290	0.85		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	17	0.0210	0.97	19.47	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.250
68.8	1,228	Total			

Summary for Subcatchment 4G: 4G

Runoff = 14.99 cfs @ 12.25 hrs, Volume= 1.554 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
12.750	71	Meadow, non-grazed, HSG C
12.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	98	0.0500	0.15		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.8	52	0.1000	0.18		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
1.1	150	0.1000	2.21		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.3	133	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	496	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	929	Total			

Summary for Subcatchment 4H: 4H

Runoff = 4.54 cfs @ 12.18 hrs, Volume= 0.415 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
3.400	71	Meadow, non-grazed, HSG C
3.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	75	0.1000	0.19		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.0	75	0.3300	0.31		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	150	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.7	285	0.0500	6.92	76.15	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 2.0 & 20.0 '/' Top.W=22.00' n= 0.030 Short grass
0.1	238	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00'

n= 0.035

11.9	823	Total

Summary for Subcatchment 4HA: 4HA

Runoff = 1.24 cfs @ 12.11 hrs, Volume= 0.095 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
0.780	71	Meadow, non-grazed, HSG C
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	142	0.3300	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4I: 4I

Runoff = 11.68 cfs @ 12.25 hrs, Volume= 1.211 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
9.930	71	Meadow, non-grazed, HSG C
9.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	200	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	290	0.0500	11.02	506.75	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=2.00' Z= 3.0 & 20.0 '/' Top.W=46.00' n= 0.030
0.3	442	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	1,082	Total			

Summary for Subcatchment 4IA: 4IA

Runoff = 1.51 cfs @ 12.10 hrs, Volume= 0.115 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
0.940	71	Meadow, non-grazed, HSG C
0.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	136	0.3333	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4J: 4J

Runoff = 14.45 cfs @ 12.26 hrs, Volume= 1.501 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
12.310	71	Meadow, non-grazed, HSG C
12.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	202	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.6	270	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	429	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.2	1,051	Total			

Summary for Subcatchment 4K: 4K

Runoff = 12.44 cfs @ 12.27 hrs, Volume= 1.325 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
10.870	71	Meadow, non-grazed, HSG C
10.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
2.7	268	0.0555	1.65		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.6	267	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	410	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
18.4	1,095	Total			

Summary for Subcatchment 4L: 4L

Runoff = 9.51 cfs @ 12.21 hrs, Volume= 0.914 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
7.500	71	Meadow, non-grazed, HSG C
7.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	23	0.0500	0.12		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
9.9	127	0.1000	0.21		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	252	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	494	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
14.1	896	Total			

Summary for Subcatchment 4M: 4M

Runoff = 4.51 cfs @ 12.76 hrs, Volume= 0.777 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
4.262	70	Woods, Good, HSG C
0.900	98	Water Surface, HSG C
0.190	89	Gravel roads, HSG C
5.352	75	Weighted Average
4.452		83.18% Pervious Area
0.900		16.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.9	150	0.0333	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
7.5	474	0.0440	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.1	18	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
53.5	642	Total			

Summary for Subcatchment 4N: 4N

Runoff = 1.78 cfs @ 12.46 hrs, Volume= 0.234 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
0.743	70	Woods, Good, HSG C
1.178	71	Meadow, non-grazed, HSG C
1.921	71	Weighted Average
1.921		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	150	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
9.0	580	0.0233	1.07		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
30.5	730	Total			

Summary for Subcatchment 4O: 4O

Runoff = 8.61 cfs @ 12.20 hrs, Volume= 0.803 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (ac)	CN	Description
	3.900	70	Brush, Fair, HSG C
*	0.800	98	Paved and Gravel Shoulder
*	0.400	98	Detention Pond 10
	5.100	77	Weighted Average
	3.900		76.47% Pervious Area
	1.200		23.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	55	0.3000	0.28		**Sheet Flow, SEGMENT AB** Grass: Dense n= 0.240 P2= 2.70"
4.0	289	0.0300	1.21		**Shallow Concentrated Flow, SEGMENT BC** Short Grass Pasture Kv= 7.0 fps
6.9	319	0.0120	0.77		**Shallow Concentrated Flow, SEGMENT CD** Short Grass Pasture Kv= 7.0 fps
14.2	663	Total			

Summary for Subcatchment 5: SC-5

Runoff = 13.44 cfs @ 14.71 hrs, Volume= 5.440 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
28.410	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
35.960	76	Weighted Average
35.815		99.60% Pervious Area
0.145		0.40% 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 Subcatchment P1A: SC-P1A

Runoff = 6.50 cfs @ 12.00 hrs, Volume= 0.428 af, Depth= 3.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Storm Rainfall=4.10"

	Area (sf)	CN	Description
*	49,872	98	Pond and Liner
	1,012	89	Gravel roads, HSG C
	14,516	79	Pasture/grassland/range, Fair, HSG C
	65,400	94	Weighted Average
	15,528		23.74% Pervious Area
	49,872		76.26% Impervious Area

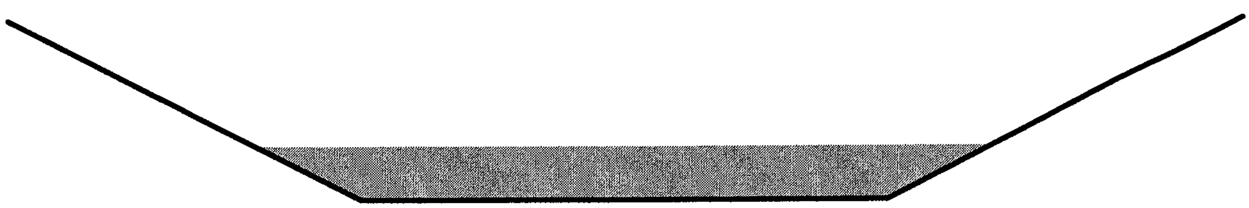
Summary for Reach 1R: DP-10 DITCH 1

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 14.21 cfs @ 12.30 hrs, Volume= 1.501 af
Outflow = 14.10 cfs @ 12.31 hrs, Volume= 1.501 af, Atten= 1%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.31 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.14 fps, Avg. Travel Time= 1.5 min

Peak Storage= 432 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.60'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 128.49 cfs

6.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 101.0' Slope= 0.0079 '/'
Inlet Invert= 212.30', Outlet Invert= 211.50'



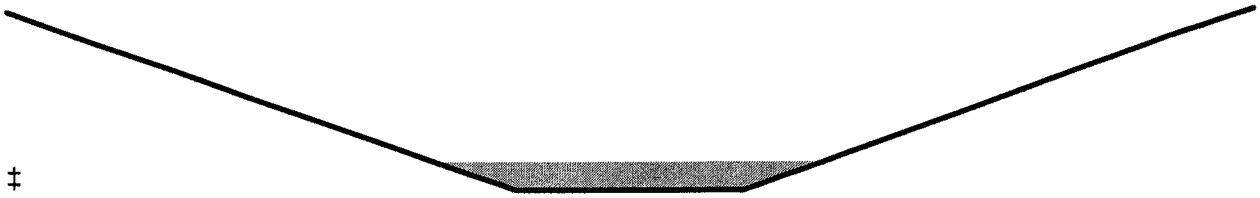
Summary for Reach 2R: E2C-DP9

Inflow Area = 5.805 ac, 11.13% Impervious, Inflow Depth = 2.06" for 10-yr Storm event
Inflow = 12.00 cfs @ 12.09 hrs, Volume= 0.995 af
Outflow = 11.40 cfs @ 12.16 hrs, Volume= 0.995 af, Atten= 5%, Lag= 4.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.49 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.40 fps, Avg. Travel Time= 7.0 min

Peak Storage= 1,521 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 488.04 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= 590.0' Slope= 0.0169 '/'
Inlet Invert= 200.00', Outlet Invert= 190.00'



‡

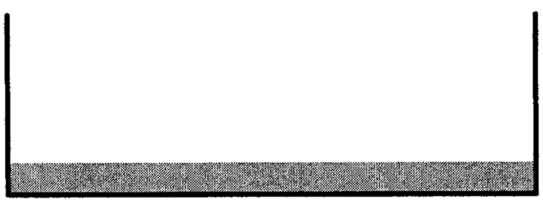
Summary for Reach 3R: Overland Flow

Inflow Area = 20.700 ac, 1.27% Impervious, Inflow Depth = 1.53" for 10-yr Storm event
Inflow = 21.25 cfs @ 12.39 hrs, Volume= 2.637 af
Outflow = 21.22 cfs @ 12.39 hrs, Volume= 2.637 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 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= 357 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.35'
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

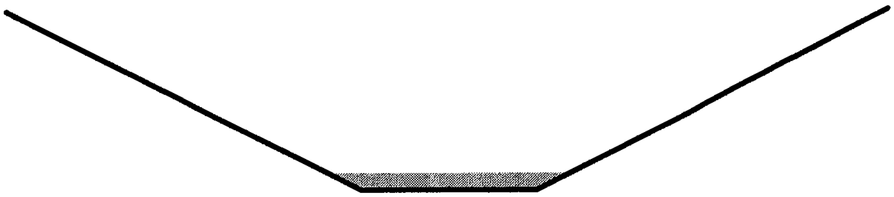
Summary for Reach 4HR-A: EAST PD - 4

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 1.24 cfs @ 12.11 hrs, Volume= 0.095 af
Outflow = 1.17 cfs @ 12.16 hrs, Volume= 0.095 af, Atten= 6%, Lag= 3.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.69 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 5.3 min

Peak Storage= 127 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.08 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 288.0' Slope= 0.0247 '/'
Inlet Invert= 209.00', Outlet Invert= 201.90'



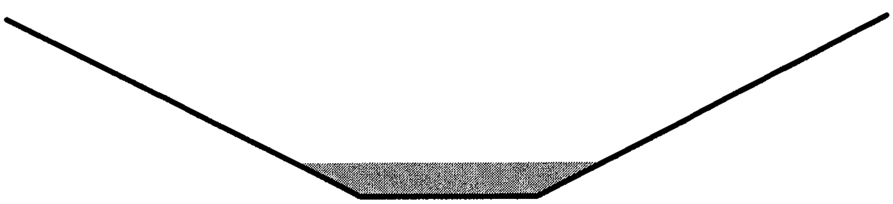
Summary for Reach 4HR-B: EAST PD - 5

Inflow Area = 4.180 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 5.42 cfs @ 12.19 hrs, Volume= 0.510 af
Outflow = 5.29 cfs @ 12.23 hrs, Volume= 0.510 af, Atten= 2%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.30 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 1.62 fps, Avg. Travel Time= 4.4 min

Peak Storage= 434 cf @ 12.21 hrs
Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 158.67 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 425.0' Slope= 0.0438 '/'
Inlet Invert= 201.90', Outlet Invert= 183.30'



Summary for Reach 4IR-A: EAST PD - 2

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 1.51 cfs @ 12.10 hrs, Volume= 0.115 af
Outflow = 1.41 cfs @ 12.17 hrs, Volume= 0.115 af, Atten= 7%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.55 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 6.5 min

Peak Storage= 185 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 100.55 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 330.0' Slope= 0.0176 '/'
Inlet Invert= 218.70', Outlet Invert= 212.90'

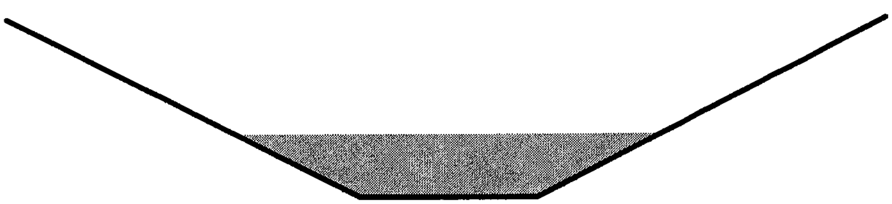
Summary for Reach 4IR-B: EAST PD - 3

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth =	1.46"	for 10-yr Storm event
Inflow =	12.92 cfs @	12.25 hrs, Volume=	1.325 af	
Outflow =	12.84 cfs @	12.27 hrs, Volume=	1.325 af, Atten= 1%, Lag= 1.2 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.36 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.88 fps, Avg. Travel Time= 1.9 min

Peak Storage= 507 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.71'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 113.47 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 210.0' Slope= 0.0224 '/'
Inlet Invert= 212.20', Outlet Invert= 207.50'



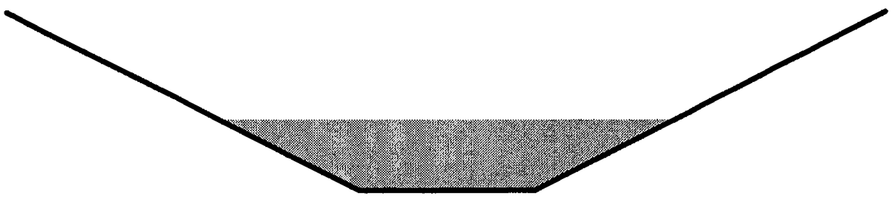
Summary for Reach 4JR: EAST PD 1

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth =	1.46"	for 10-yr Storm event
Inflow =	14.45 cfs @	12.26 hrs, Volume=	1.501 af	
Outflow =	14.35 cfs @	12.27 hrs, Volume=	1.501 af, Atten= 1%, Lag= 1.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.10 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 2.04 fps, Avg. Travel Time= 1.5 min

Peak Storage= 518 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.79'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 101.85 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 183.0' Slope= 0.0180 '/'
Inlet Invert= 222.00', Outlet Invert= 218.70'



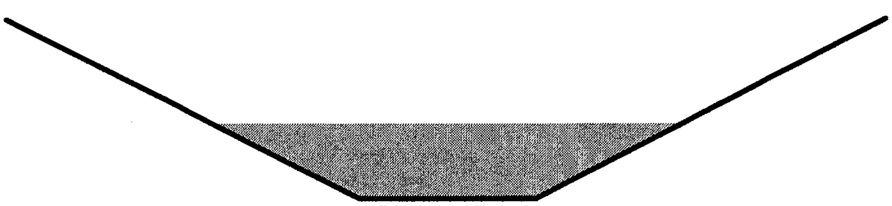
Summary for Reach 4R: DP-10 DITCH 3

Inflow Area =	23.180 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event	
Inflow =	26.13 cfs @	12.32 hrs, Volume=	2.826 af	
Outflow =	25.93 cfs @	12.33 hrs, Volume=	2.826 af, Atten= 1%, Lag= 1.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.43 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 3.10 fps, Avg. Travel Time= 1.4 min

Peak Storage= 805 cf @ 12.32 hrs
Average Depth at Peak Storage= 0.84'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 162.94 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 260.0' Slope= 0.0462 '/'
Inlet Invert= 191.00', Outlet Invert= 179.00'



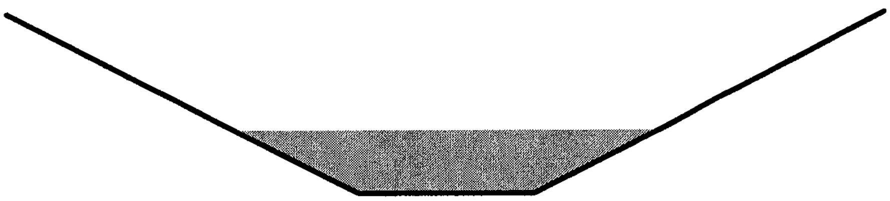
Summary for Reach 5R: NORTH PD-1

Inflow Area =	12.750 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event	
Inflow =	14.99 cfs @	12.25 hrs, Volume=	1.554 af	
Outflow =	14.64 cfs @	12.33 hrs, Volume=	1.554 af, Atten= 2%, Lag= 4.7 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.16 fps, Min. Travel Time= 2.5 min
Avg. Velocity = 2.28 fps, Avg. Travel Time= 6.8 min

Peak Storage= 2,233 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.70'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 131.18 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 936.0' Slope= 0.0299 '/'
Inlet Invert= 210.00', Outlet Invert= 182.00'



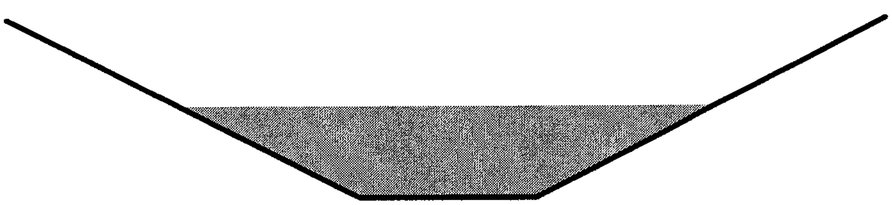
Summary for Reach 6R: NORTH PD-2

Inflow Area = 13.996 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 15.99 cfs @ 12.29 hrs, Volume= 1.706 af
Outflow = 15.76 cfs @ 12.34 hrs, Volume= 1.706 af, Atten= 1%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.88 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.52 fps, Avg. Travel Time= 4.0 min

Peak Storage= 1,493 cf @ 12.31 hrs
Average Depth at Peak Storage= 1.02'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.70 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 364.0' Slope= 0.0080 '/'
Inlet Invert= 202.90', Outlet Invert= 200.00'



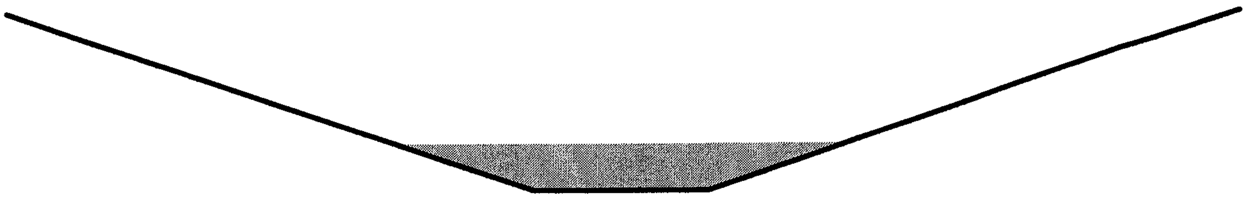
Summary for Reach 7R: DP-10R

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth > 1.33" for 10-yr Storm event
Inflow = 4.95 cfs @ 13.57 hrs, Volume= 3.144 af
Outflow = 4.91 cfs @ 13.81 hrs, Volume= 3.143 af, Atten= 1%, Lag= 14.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.60 fps, Min. Travel Time= 7.2 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 27.9 min

Peak Storage= 2,132 cf @ 13.69 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 88.21 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= 1,130.0' Slope= 0.0248 '/'
Inlet Invert= 170.00', Outlet Invert= 142.00'



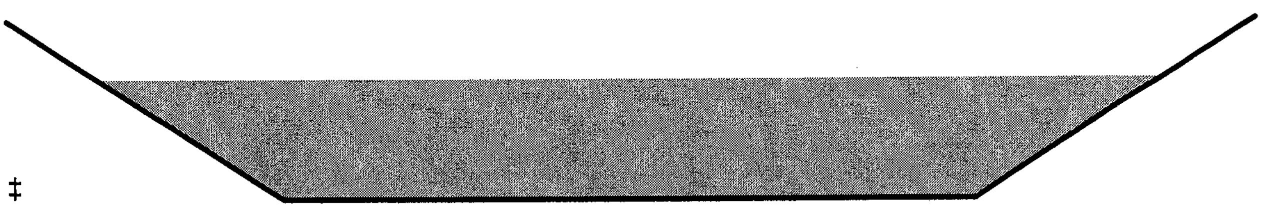
Summary for Reach 8R: EAST PD - 6

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	12.44 cfs @	12.27 hrs, Volume=	1.325 af
Outflow =	12.21 cfs @	12.34 hrs, Volume=	1.325 af, Atten= 2%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.90 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 6.6 min

Peak Storage= 1,527 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.67'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 25.35 cfs

5.00' x 1.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 360.0' Slope= 0.0056 '/'
Inlet Invert= 222.00', Outlet Invert= 220.00'



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Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area =	33.165 ac,	8.08% Impervious, Inflow Depth > 1.07"	for 10-yr Storm event
Inflow =	0.99 cfs @	23.58 hrs, Volume=	2.949 af
Outflow =	0.99 cfs @	24.30 hrs, Volume=	2.943 af, Atten= 0%, Lag= 43.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.17 fps, Min. Travel Time= 26.3 min
Avg. Velocity = 0.08 fps, Avg. Travel Time= 53.9 min

Peak Storage= 1,567 cf @ 23.86 hrs
Average Depth at Peak Storage= 0.25'
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'

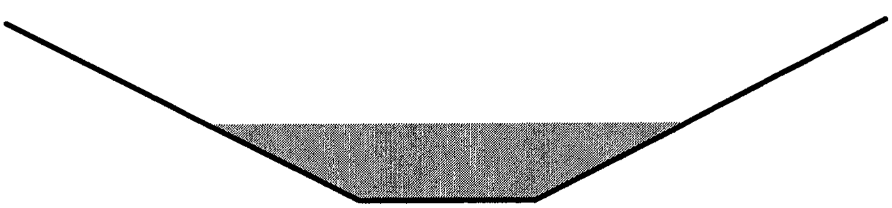
Summary for Reach 10R: Ditch 4B1

Inflow Area =	10.870 ac,	0.00% Impervious,	Inflow Depth = 1.46"	for 10-yr Storm event	
Inflow =	11.94 cfs @	12.38 hrs,	Volume=	1.325 af	
Outflow =	11.80 cfs @	12.43 hrs,	Volume=	1.325 af,	Atten= 1%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.69 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 4.4 min

Peak Storage= 1,138 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.87'
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'



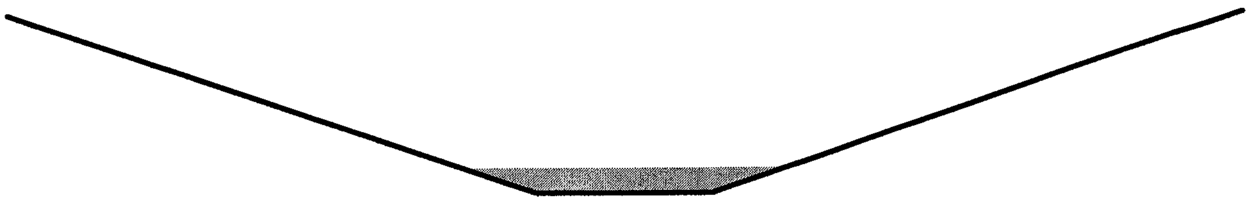
Summary for Reach 11R: DP-11R

Inflow Area =	22.282 ac,	4.04% Impervious,	Inflow Depth > 1.45"	for 10-yr Storm event	
Inflow =	1.18 cfs @	17.92 hrs,	Volume=	2.687 af	
Outflow =	1.18 cfs @	18.26 hrs,	Volume=	2.686 af,	Atten= 0%, Lag= 20.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.49 fps, Min. Travel Time= 11.8 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 27.4 min

Peak Storage= 831 cf @ 18.06 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 71.30 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,050.0' Slope= 0.0162 '/'
Inlet Invert= 158.00', Outlet Invert= 141.00'



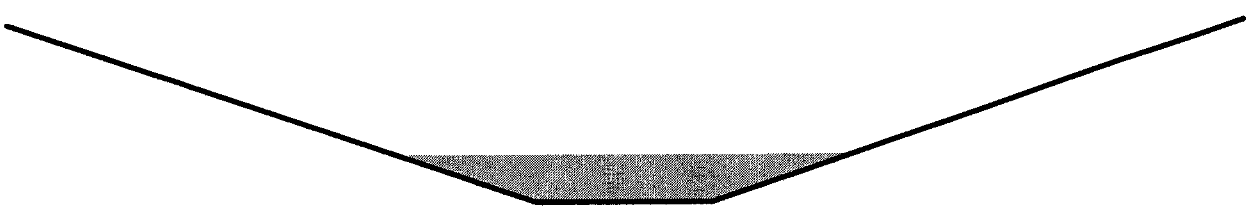
Summary for Reach 12R: 4FR

Inflow Area =	6.771 ac,	0.00% Impervious, Inflow Depth =	1.40"	for 10-yr Storm event
Inflow =	3.77 cfs @	13.04 hrs, Volume=	0.788 af	
Outflow =	3.57 cfs @	13.44 hrs, Volume=	0.788 af, Atten= 5%, Lag= 24.2 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.89 fps, Min. Travel Time= 13.4 min
Avg. Velocity = 0.68 fps, Avg. Travel Time= 37.2 min

Peak Storage= 2,873 cf @ 13.22 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 64.21 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,523.0' Slope= 0.0131 '/'
Inlet Invert= 161.00', Outlet Invert= 141.00'



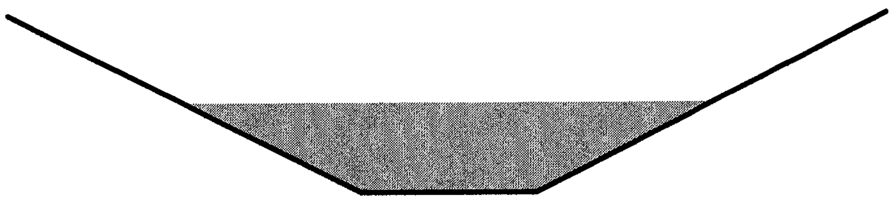
Summary for Reach 13R: Ex Ditch

Inflow Area =	18.370 ac,	0.00% Impervious, Inflow Depth =	1.46"	for 10-yr Storm event
Inflow =	18.62 cfs @	12.38 hrs, Volume=	2.240 af	
Outflow =	18.53 cfs @	12.40 hrs, Volume=	2.240 af, Atten= 0%, Lag= 1.4 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.62 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 2.2 min

Peak Storage= 906 cf @ 12.39 hrs
Average Depth at Peak Storage= 1.00'
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'



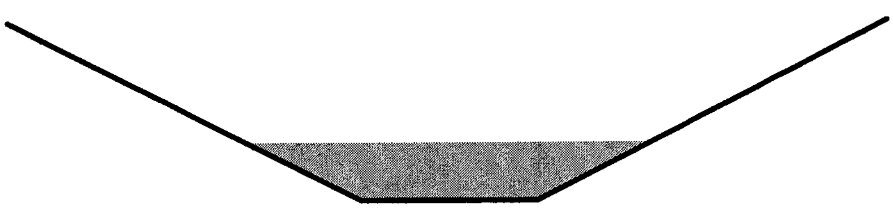
Summary for Reach 14R: DP-10 DITCH 2

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	14.07 cfs @	12.32 hrs, Volume=	1.501 af
Outflow =	13.95 cfs @	12.36 hrs, Volume=	1.501 af, Atten= 1%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.49 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 2.51 fps, Avg. Travel Time= 2.9 min

Peak Storage= 939 cf @ 12.34 hrs
Average Depth at Peak Storage= 0.65'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 143.33 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 434.0' Slope= 0.0357 '/'
Inlet Invert= 209.00', Outlet Invert= 193.50'



Summary for Reach AP1: AP-1

Inflow Area =	135.571 ac,	2.88% Impervious, Inflow Depth = 1.24"	for 10-yr Storm event
Inflow =	50.41 cfs @	13.50 hrs, Volume=	13.974 af
Outflow =	50.41 cfs @	13.50 hrs, Volume=	13.974 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 74.320 ac, 3.55% Impervious, Inflow Depth = 1.60" for 10-yr Storm event
Inflow = 24.63 cfs @ 13.74 hrs, Volume= 9.905 af
Outflow = 24.63 cfs @ 13.74 hrs, Volume= 9.905 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 270.330 ac, 1.32% Impervious, Inflow Depth = 1.60" for 10-yr Storm event
Inflow = 74.13 cfs @ 15.27 hrs, Volume= 36.035 af
Outflow = 74.13 cfs @ 15.27 hrs, Volume= 36.035 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 340.334 ac, 2.56% Impervious, Inflow Depth > 1.61" for 10-yr Storm event
Inflow = 84.71 cfs @ 15.06 hrs, Volume= 45.769 af
Outflow = 84.71 cfs @ 15.06 hrs, Volume= 45.769 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: ANALYSIS POINT #5

Inflow Area = 35.960 ac, 0.40% Impervious, Inflow Depth = 1.82" for 10-yr Storm event
Inflow = 13.44 cfs @ 14.71 hrs, Volume= 5.440 af
Outflow = 13.44 cfs @ 14.71 hrs, Volume= 5.440 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

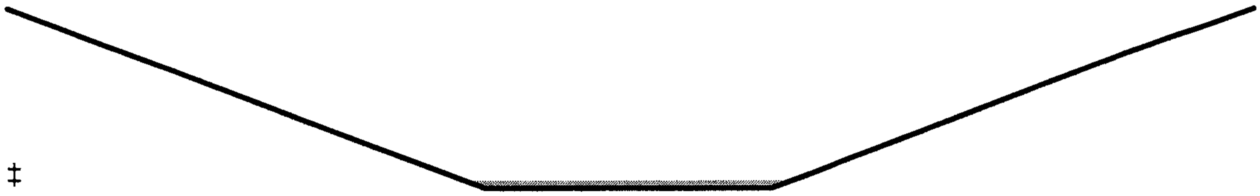
Summary for Reach E2R2: E2R2

Inflow Area = 1.921 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 1.77 cfs @ 12.47 hrs, Volume= 0.234 af
Outflow = 0.34 cfs @ 17.42 hrs, Volume= 0.234 af, Atten= 81%, Lag= 297.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.32 fps, Min. Travel Time= 223.8 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 484.8 min

Peak Storage= 4,526 cf @ 13.69 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 132.12 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 4,356.0' Slope= 0.0094 '/'
Inlet Invert= 182.00', Outlet Invert= 141.00'



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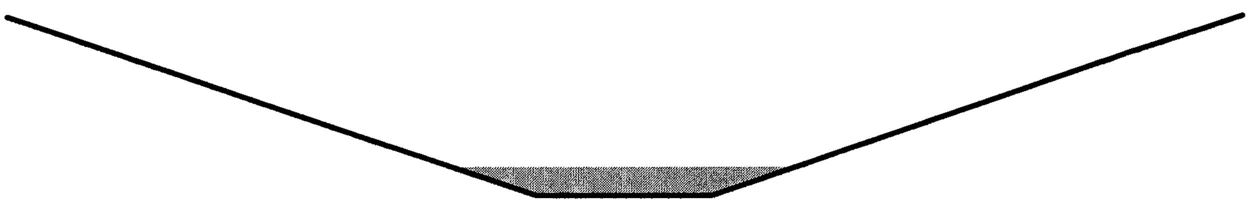
Summary for Reach E2R3: REACH TO AP

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth > 1.06" for 10-yr Storm event
Inflow = 0.99 cfs @ 24.30 hrs, Volume= 2.943 af
Outflow = 0.99 cfs @ 25.22 hrs, Volume= 2.936 af, Atten= 0%, Lag= 55.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.07 fps, Min. Travel Time= 33.7 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 63.8 min

Peak Storage= 2,012 cf @ 24.66 hrs
Average Depth at Peak Storage= 0.31'
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'



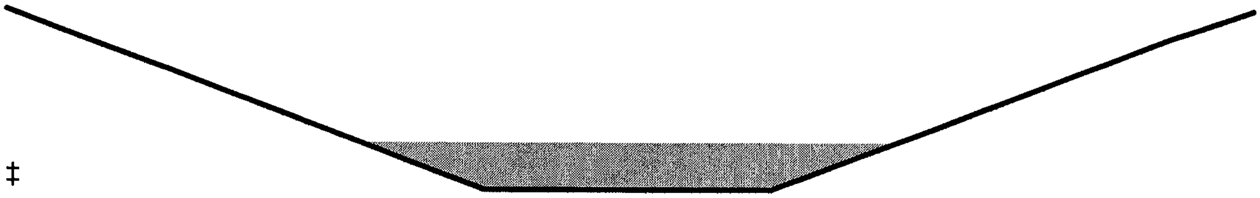
Summary for Reach E2R4: Reach to AP

Inflow Area = 92.419 ac, 5.17% Impervious, Inflow Depth > 1.27" for 10-yr Storm event
Inflow = 9.18 cfs @ 13.66 hrs, Volume= 9.788 af
Outflow = 8.62 cfs @ 14.22 hrs, Volume= 9.779 af, Atten= 6%, Lag= 33.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.97 fps, Min. Travel Time= 16.5 min
Avg. Velocity = 0.33 fps, Avg. Travel Time= 49.2 min

Peak Storage= 8,549 cf @ 13.94 hrs
Average Depth at Peak Storage= 0.52'
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'



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Summary for Reach R-1D: Reach R-1D

Inflow Area =	34.624 ac,	3.31% Impervious, Inflow Depth = 0.89"		for 10-yr Storm event
Inflow =	5.91 cfs @	13.04 hrs, Volume=	2.573 af	
Outflow =	5.91 cfs @	13.15 hrs, Volume=	2.573 af,	Atten= 0%, Lag= 6.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.66 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.29 fps, Avg. Travel Time= 20.9 min

Peak Storage= 1,314 cf @ 13.09 hrs
Average Depth at Peak Storage= 0.28'
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'

‡

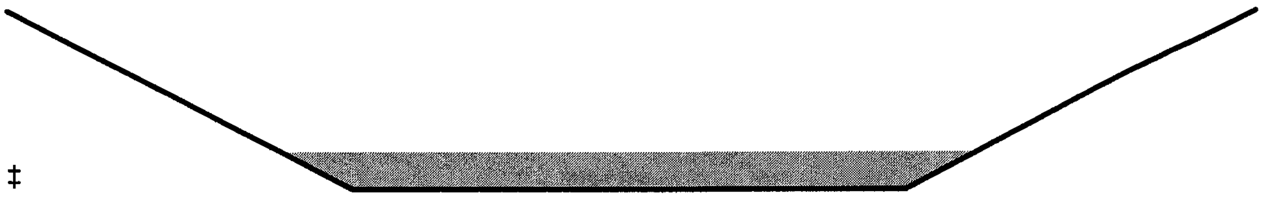
Summary for Reach R-1E: LEVEL SPREADER R-1E

Inflow Area =	10.745 ac,	0.00% Impervious, Inflow Depth = 1.53"		for 10-yr Storm event
Inflow =	7.89 cfs @	12.47 hrs, Volume=	1.371 af	
Outflow =	7.88 cfs @	12.51 hrs, Volume=	1.371 af,	Atten= 0%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.11 fps, Min. Travel Time= 1.7 min
Avg. Velocity = 0.53 fps, Avg. Travel Time= 6.6 min

Peak Storage= 783 cf @ 12.49 hrs
Average Depth at Peak Storage= 0.21'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 135.95 cfs

16.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 36.00'
Length= 210.0' Slope= 0.0690 '/'
Inlet Invert= 161.50', Outlet Invert= 147.00'



Summary for Reach R-1F: Reach R-1F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 10-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.21 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= 0.0170 '/'
Inlet Invert= 167.50', Outlet Invert= 151.50'

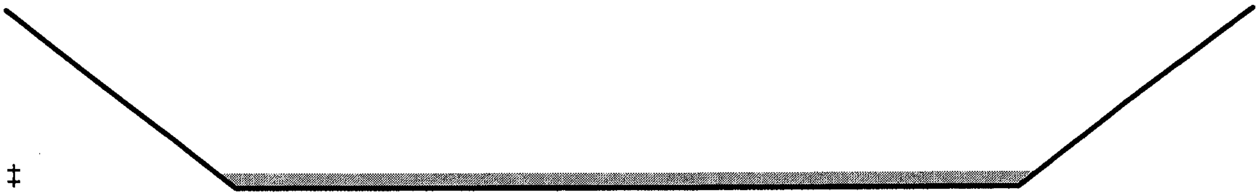
Summary for Reach R-1H: LEVEL SPREADER R-1H

Inflow Area = 3.030 ac, 0.00% Impervious, Inflow Depth = 2.21" for 10-yr Storm event
Inflow = 5.77 cfs @ 12.24 hrs, Volume= 0.557 af
Outflow = 5.67 cfs @ 12.28 hrs, Volume= 0.557 af, Atten= 2%, Lag= 2.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.01 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 4.7 min

Peak Storage= 488 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 1.00' Flow Area= 44.0 sf, Capacity= 411.95 cfs

34.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 54.00'
Length= 170.0' Slope= 0.0471 '/'
Inlet Invert= 182.00', Outlet Invert= 174.00'



Summary for Reach R-2F: Reach R2-F

Inflow Area =	22.602 ac,	7.31% Impervious,	Inflow Depth = 0.00"	for 10-yr Storm event	
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
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'

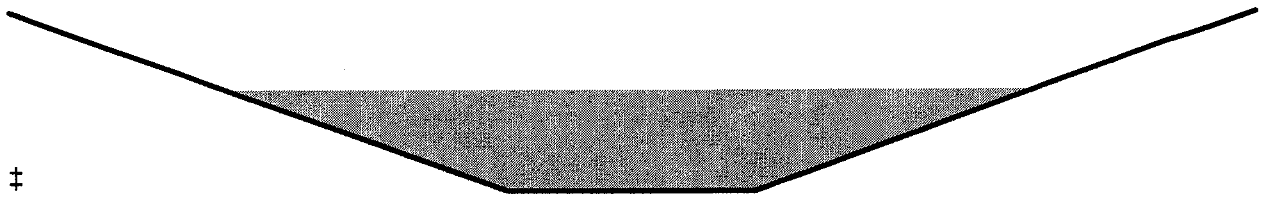
Summary for Reach R1: Reach 1

Inflow Area =	112.491 ac,	3.46% Impervious,	Inflow Depth = 1.15"	for 10-yr Storm event	
Inflow =	38.57 cfs @	13.37 hrs,	Volume=	10.762 af	
Outflow =	38.22 cfs @	13.59 hrs,	Volume=	10.762 af,	Atten= 1%, Lag= 13.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.60 fps, Min. Travel Time= 7.3 min
Avg. Velocity = 0.23 fps, Avg. Travel Time= 51.9 min

Peak Storage= 16,759 cf @ 13.46 hrs
Average Depth at Peak Storage= 1.13'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 132.69 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= 0.0016 '/'
Inlet Invert= 146.30', Outlet Invert= 145.20'



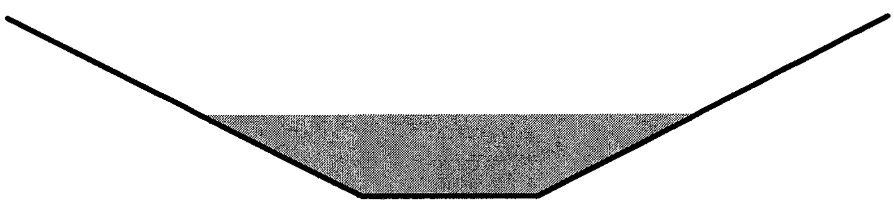
Summary for Reach R1B: LF TOE DITCH

Inflow Area = 13.169 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 15.37 cfs @ 12.26 hrs, Volume= 1.606 af
Outflow = 15.08 cfs @ 12.32 hrs, Volume= 1.606 af, Atten= 2%, Lag= 3.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.29 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.63 fps, Avg. Travel Time= 5.5 min

Peak Storage= 1,906 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.92'
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'



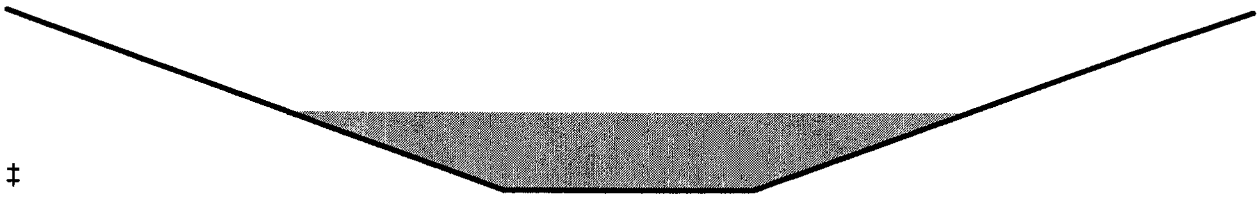
Summary for Reach R2: Reach 2

Inflow Area = 64.567 ac, 4.26% Impervious, Inflow Depth = 1.13" for 10-yr Storm event
Inflow = 26.10 cfs @ 13.15 hrs, Volume= 6.094 af
Outflow = 25.30 cfs @ 13.49 hrs, Volume= 6.094 af, Atten= 3%, Lag= 20.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.56 fps, Min. Travel Time= 11.2 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 42.2 min

Peak Storage= 17,037 cf @ 13.30 hrs
Average Depth at Peak Storage= 0.87'
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= 1,050.0' Slope= 0.0020 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'



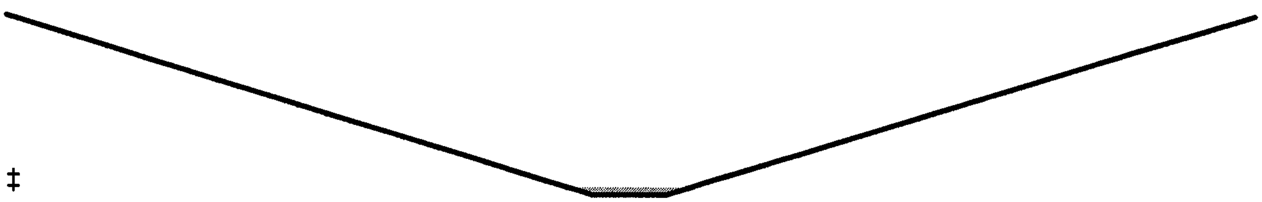
Summary for Reach R2A: Reach 2A

Inflow Area =	20.177 ac,	3.27% Impervious,	Inflow Depth > 1.41"	for 10-yr Storm event
Inflow =	1.34 cfs @	17.11 hrs, Volume=	2.371 af	
Outflow =	1.33 cfs @	19.17 hrs, Volume=	2.370 af, Atten= 1%,	Lag= 123.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.48 fps, Min. Travel Time= 68.2 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 136.7 min

Peak Storage= 5,426 cf @ 18.03 hrs
Average Depth at Peak Storage= 0.08'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,358.84 cfs

25.00' x 2.00' deep channel, n= 0.060
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,960.0' Slope= 0.0138 '/'
Inlet Invert= 179.00', Outlet Invert= 152.00'



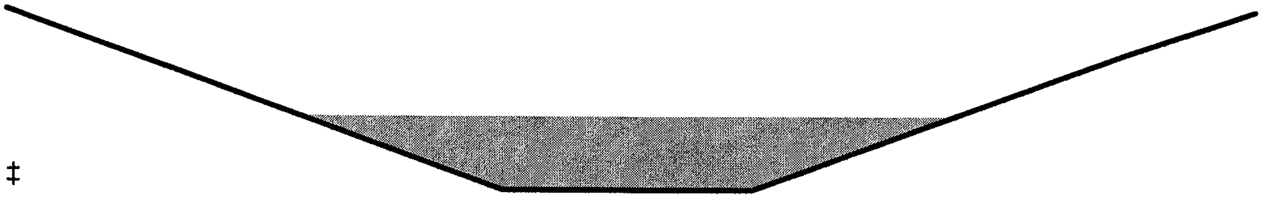
Summary for Reach R3: Reach 3

Inflow Area =	53.822 ac,	5.11% Impervious,	Inflow Depth = 1.05"	for 10-yr Storm event
Inflow =	22.65 cfs @	13.00 hrs, Volume=	4.723 af	
Outflow =	22.18 cfs @	13.27 hrs, Volume=	4.723 af, Atten= 2%,	Lag= 16.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 8.9 min
Avg. Velocity = 0.49 fps, Avg. Travel Time= 27.2 min

Peak Storage= 11,795 cf @ 13.13 hrs
Average Depth at Peak Storage= 0.81'
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= 800.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 148.40'



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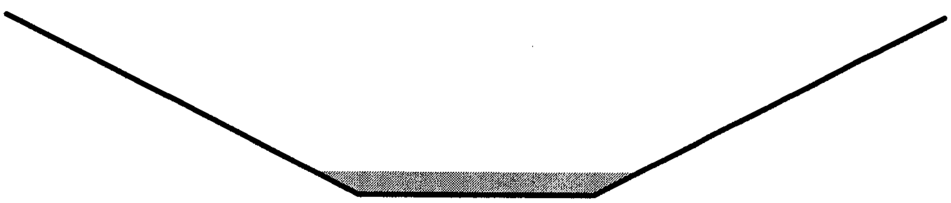
Summary for Reach R5a: Grass Lined Ditch

Inflow Area = 9.334 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 11.05 cfs @ 12.25 hrs, Volume= 1.138 af
Outflow = 10.99 cfs @ 12.26 hrs, Volume= 1.138 af, Atten= 1%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.16 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.21 fps, Avg. Travel Time= 1.5 min

Peak Storage= 359 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.38'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 572.96 cfs

4.00' x 3.00' deep channel, n= 0.025
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 Pond 1P: Culvert - 4JB & FJC

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 14.10 cfs @ 12.31 hrs, Volume= 1.501 af
Outflow = 14.07 cfs @ 12.32 hrs, Volume= 1.501 af, Atten= 0%, Lag= 0.9 min
Primary = 14.07 cfs @ 12.32 hrs, Volume= 1.501 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 211.35' @ 12.32 hrs Surf.Area= 918 sf Storage= 648 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.8 min (871.0 - 870.2)

Volume	Invert	Avail.Storage	Storage Description
#1	210.00'	3,853 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
210.00	43	0	0
212.00	1,340	1,383	1,383
213.00	3,600	2,470	3,853

Device	Routing	Invert	Outlet Devices
#1	Primary	210.00'	**24.0" Round Culvert X 2.00** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 210.00' / 209.00' S= 0.0137 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=13.97 cfs @ 12.32 hrs HW=211.34' (Free Discharge)
└─**1=Culvert** (Inlet Controls 13.97 cfs @ 3.11 fps)

Summary for Pond 4IAC: Culvert - 4IA

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 1.41 cfs @ 12.17 hrs, Volume= 0.115 af
Outflow = 1.33 cfs @ 12.21 hrs, Volume= 0.115 af, Atten= 6%, Lag= 2.4 min
Primary = 1.33 cfs @ 12.21 hrs, Volume= 0.115 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 213.49' @ 12.21 hrs Surf.Area= 555 sf Storage= 236 cf

Plug-Flow detention time= 6.5 min calculated for 0.115 af (100% of inflow)
Center-of-Mass det. time= 6.5 min (869.8 - 863.3)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,559 cf	**2.00'W x 125.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.90'	**18.0" Round Culvert - 4IA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 212.90' / 212.20' S= 0.0175 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.31 cfs @ 12.21 hrs HW=213.48' (Free Discharge)
└─**1=Culvert - 4IA** (Inlet Controls 1.31 cfs @ 2.05 fps)

Summary for Pond 8P: Ex Pond

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth > 1.36" for 10-yr Storm event
Inflow = 4.96 cfs @ 13.51 hrs, Volume= 3.212 af
Outflow = 4.95 cfs @ 13.57 hrs, Volume= 3.144 af, Atten= 0%, Lag= 3.4 min
Primary = 4.95 cfs @ 13.57 hrs, Volume= 3.144 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 172.19' @ 13.57 hrs Surf.Area= 4,538 sf Storage= 4,248 cf

Plug-Flow detention time= 170.1 min calculated for 3.143 af (98% of inflow)

Center-of-Mass det. time= 24.5 min (1,612.8 - 1,588.3)

Volume	Invert	Avail.Storage	Storage Description
#1	171.20'	4,765 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.20	3,900	0	0
172.00	4,600	3,400	3,400
172.30	4,500	1,365	4,765

Device	Routing	Invert	Outlet Devices
#1	Primary	171.90'	**12.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=4.95 cfs @ 13.57 hrs HW=172.19' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 4.95 cfs @ 1.44 fps)

Summary for Pond C-2B-A: Culvert - 2BA

Inflow Area =	13.996 ac,	0.00% Impervious,	Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	16.29 cfs @	12.26 hrs, Volume=	1.706 af	
Outflow =	15.99 cfs @	12.29 hrs, Volume=	1.706 af,	Atten= 2%, Lag= 1.6 min
Primary =	15.99 cfs @	12.29 hrs, Volume=	1.706 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 205.04' @ 12.29 hrs Surf.Area= 1,273 sf Storage= 1,200 cf

Plug-Flow detention time= 0.8 min calculated for 1.706 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (867.7 - 866.9)

Volume	Invert	Avail.Storage	Storage Description
#1	203.50'	1,859 cf	**2.00'W x 150.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	203.20'	**36.0" Round Culvert - 2BA** L= 40.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 203.20' / 202.90' S= 0.0075 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	205.00'	**4.0' long x 2.0' breadth Southern Ditch High Water Outlet X 0.00** 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=15.89 cfs @ 12.29 hrs HW=205.03' (Free Discharge)
└─**1=Culvert - 2BA** (Barrel Controls 15.89 cfs @ 5.04 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=203.50' (Free Discharge)
└─**2=Southern Ditch High Water Outlet**(Controls 0.00 cfs)

Summary for Pond C-4F: Culvert - 4F

Inflow Area =	6.771 ac,	0.00% Impervious,	Inflow Depth = 1.40"	for 10-yr Storm event
Inflow =	3.79 cfs @	12.98 hrs, Volume=	0.788 af	
Outflow =	3.77 cfs @	13.04 hrs, Volume=	0.788 af,	Atten= 1%, Lag= 3.6 min
Primary =	3.77 cfs @	13.04 hrs, Volume=	0.788 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 166.07' @ 13.04 hrs Surf.Area= 0.025 ac Storage= 0.018 af

Plug-Flow detention time= 4.8 min calculated for 0.788 af (100% of inflow)
Center-of-Mass det. time= 4.9 min (922.1 - 917.3)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	0.047 af	**4.00'W x 96.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**18.0" Round Culvert - 4F** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 165.00' / 162.00' S= 0.0385 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=3.77 cfs @ 13.04 hrs HW=166.07' (Free Discharge)
└─**1=Culvert - 4F** (Inlet Controls 3.77 cfs @ 2.78 fps)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area =	10.870 ac,	0.00% Impervious,	Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	12.21 cfs @	12.34 hrs, Volume=	1.325 af	
Outflow =	11.94 cfs @	12.38 hrs, Volume=	1.325 af,	Atten= 2%, Lag= 2.5 min
Primary =	11.94 cfs @	12.38 hrs, Volume=	1.325 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 220.60' @ 12.38 hrs Surf.Area= 4,088 sf Storage= 2,052 cf

Plug-Flow detention time= 4.7 min calculated for 1.325 af (100% of inflow)
Center-of-Mass det. time= 4.7 min (878.4 - 873.8)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	3,865 cf	**5.00'W x 550.00'L x 1.00'H Prismatoid Z=2.0**

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' / 214.30' S= 0.0431 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	220.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=11.87 cfs @ 12.38 hrs HW=220.60' (Free Discharge)
└─**1=Culvert - 4K** (Passes 11.87 cfs of 26.62 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 11.87 cfs @ 2.53 fps)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area =	20.700 ac,	1.27% Impervious,	Inflow Depth =	1.53"	for 10-yr Storm event
Inflow =	21.27 cfs @	12.38 hrs,	Volume=	2.637 af	
Outflow =	21.25 cfs @	12.39 hrs,	Volume=	2.637 af,	Atten= 0%, Lag= 0.5 min
Primary =	21.25 cfs @	12.39 hrs,	Volume=	2.637 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 206.18' @ 12.39 hrs Surf.Area= 539 sf Storage= 92 cf

Plug-Flow detention time= 0.0 min calculated for 2.636 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (872.7 - 872.7)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,197 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	47	38	38
208.00	5,375	5,422	5,460
209.00	6,100	5,738	11,197

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0090 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=21.19 cfs @ 12.39 hrs HW=206.18' (Free Discharge)
└─**1=Culvert - 4B** (Inlet Controls 21.19 cfs @ 3.59 fps)

Summary for Pond C4H-A: Culvert 4H-A

Inflow Area =	0.780 ac,	0.00% Impervious,	Inflow Depth =	1.46"	for 10-yr Storm event
Inflow =	1.17 cfs @	12.16 hrs,	Volume=	0.095 af	
Outflow =	0.96 cfs @	12.24 hrs,	Volume=	0.095 af,	Atten= 18%, Lag= 4.8 min
Primary =	0.96 cfs @	12.24 hrs,	Volume=	0.095 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 202.39' @ 12.24 hrs Surf.Area= 1,120 sf Storage= 414 cf

Plug-Flow detention time= 15.8 min calculated for 0.095 af (100% of inflow)
Center-of-Mass det. time= 15.9 min (878.4 - 862.4)

Volume	Invert	Avail.Storage	Storage Description
#1	201.90'	3,419 cf	**2.00'W x 280.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	201.90'	**18.0" Round Culvert - 4HA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 201.90' / 200.90' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=0.95 cfs @ 12.24 hrs HW=202.39' (Free Discharge)
1=Culvert - 4HA (Inlet Controls 0.95 cfs @ 1.88 fps)

Summary for Pond C4N: Culvert 4N

Inflow Area =	1.921 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	1.78 cfs @	12.46 hrs, Volume=	0.234 af
Outflow =	1.77 cfs @	12.47 hrs, Volume=	0.234 af, Atten= 0%, Lag= 0.9 min
Primary =	1.77 cfs @	12.47 hrs, Volume=	0.234 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.69' @ 12.47 hrs Surf.Area= 0.006 ac Storage= 0.003 af

Plug-Flow detention time= 2.0 min calculated for 0.234 af (100% of inflow)
Center-of-Mass det. time= 2.0 min (880.9 - 878.9)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	0.015 af	**2.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	184.00'	**18.0" Round 18-in Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.00' / 183.00' S= 0.0303 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.77 cfs @ 12.47 hrs HW=184.69' (Free Discharge)
1=18-in Culvert (Inlet Controls 1.77 cfs @ 2.23 fps)

Summary for Pond CB-2B-B: Catch Basin - 2BB

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	15.76 cfs @	12.34 hrs, Volume=	1.706 af
Outflow =	15.73 cfs @	12.35 hrs, Volume=	1.706 af, Atten= 0%, Lag= 0.5 min
Primary =	15.73 cfs @	12.35 hrs, Volume=	1.706 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 200.44' @ 12.35 hrs Surf.Area= 597 sf Storage= 121 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.0 min (872.0 - 872.0)

Volume	Invert	Avail.Storage	Storage Description
#1	200.20'	2,459 cf	**2.00'W x 200.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	**24.0" Round Culvert - 2BB** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.00' / 194.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	200.00'	**30.0" Horiz. Orifice/Grate** C= 0.600

Primary OutFlow Max=15.70 cfs @ 12.35 hrs HW=200.44' (Free Discharge)
└─**1=Culvert - 2BB** (Passes 15.70 cfs of 31.88 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 15.70 cfs @ 3.20 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area =	12.750 ac,	0.00% Impervious, Inflow Depth =	1.46"	for 10-yr Storm event	
Inflow =	14.64 cfs @	12.33 hrs, Volume=	1.554 af		
Outflow =	14.58 cfs @	12.35 hrs, Volume=	1.554 af,	Atten= 0%,	Lag= 1.3 min
Primary =	14.58 cfs @	12.35 hrs, Volume=	1.554 af		

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 181.93' @ 12.35 hrs Surf.Area= 580 sf Storage= 331 cf

Plug-Flow detention time= 0.4 min calculated for 1.554 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (873.9 - 873.5)

Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	1,256 cf	**2.00'W x 71.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	175.00'	**24.0" Round Culvert - 4G** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.00' / 174.00' S= 0.0278 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	181.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=14.55 cfs @ 12.35 hrs HW=181.93' (Free Discharge)
└─**1=Culvert - 4G** (Passes 14.55 cfs of 36.82 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 14.55 cfs @ 4.63 fps)

Summary for Pond CB-4HB: Catch Basin - 4HB

Inflow Area = 4.180 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 5.29 cfs @ 12.23 hrs, Volume= 0.510 af
Outflow = 5.29 cfs @ 12.23 hrs, Volume= 0.510 af, Atten= 0%, Lag= 0.1 min
Primary = 5.29 cfs @ 12.23 hrs, Volume= 0.510 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 183.70' @ 12.23 hrs Surf.Area= 96 sf Storage= 29 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (868.9 - 868.7)

Volume	Invert	Avail.Storage	Storage Description
#1	183.30'	359 cf	**2.00'W x 25.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Device 2	183.30'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	178.50'	**18.0" Round Culvert - 4HB** L= 101.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 176.00' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=5.23 cfs @ 12.23 hrs HW=183.70' (Free Discharge)
↑—**2=Culvert - 4HB** (Passes 5.23 cfs of 17.95 cfs potential flow)
 ↑—**1=Orifice/Grate** (Weir Controls 5.23 cfs @ 2.07 fps)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 1.46" for 10-yr Storm event
Inflow = 12.84 cfs @ 12.27 hrs, Volume= 1.325 af
Outflow = 12.83 cfs @ 12.27 hrs, Volume= 1.325 af, Atten= 0%, Lag= 0.3 min
Primary = 12.83 cfs @ 12.27 hrs, Volume= 1.325 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 208.33' @ 12.27 hrs Surf.Area= 0.013 ac Storage= 0.007 af

Plug-Flow detention time= 1.0 min calculated for 1.325 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (869.2 - 868.6)

Volume	Invert	Avail.Storage	Storage Description
#1	207.50'	0.029 af	**2.00'W x 100.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	202.50'	**18.0" Round Culvert - 4I** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 202.50' / 192.00' S= 0.1313 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	207.60'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=12.69 cfs @ 12.27 hrs HW=208.33' TW=194.33' (TW follows 14.00' below HW)
↑—**1=Culvert - 4I** (Passes 12.69 cfs of 19.17 cfs potential flow)
↑—**2=Orifice/Grate** (Weir Controls 12.69 cfs @ 2.79 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area =	12.310 ac,	0.00% Impervious,	Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	14.35 cfs @	12.27 hrs, Volume=	1.501 af	
Outflow =	14.21 cfs @	12.30 hrs, Volume=	1.501 af,	Atten= 1%, Lag= 1.4 min
Primary =	14.21 cfs @	12.30 hrs, Volume=	1.501 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 219.58' @ 12.30 hrs Surf.Area= 0.015 ac Storage= 0.009 af

Plug-Flow detention time= 0.5 min calculated for 1.500 af (100% of inflow)
Center-of-Mass det. time= 0.5 min (868.7 - 868.2)

Volume	Invert	Avail.Storage	Storage Description
#1	218.70'	0.032 af	**2.00'W x 113.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	214.00'	**18.0" Round Culvert - 4JA** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.00' / 212.30' S= 0.0283 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=14.18 cfs @ 12.30 hrs HW=219.58' TW=212.58' (TW follows 7.00' below HW)
↑—**1=Culvert - 4JA** (Passes 14.18 cfs of 18.70 cfs potential flow)
↑—**2=Orifice/Grate** (Orifice Controls 14.18 cfs @ 4.51 fps)

Summary for Pond CB-4L: Catch Basin - 4L

Inflow Area =	7.500 ac,	0.00% Impervious,	Inflow Depth = 1.46"	for 10-yr Storm event
Inflow =	9.51 cfs @	12.21 hrs, Volume=	0.914 af	
Outflow =	9.37 cfs @	12.23 hrs, Volume=	0.914 af,	Atten= 1%, Lag= 1.3 min
Primary =	9.37 cfs @	12.23 hrs, Volume=	0.914 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 215.59' @ 12.23 hrs Surf.Area= 1,695 sf Storage= 946 cf

Plug-Flow detention time= 3.1 min calculated for 0.914 af (100% of inflow)
Center-of-Mass det. time= 3.1 min (866.8 - 863.6)

Volume	Invert	Avail.Storage	Storage Description
#1	215.00'	3,683 cf	**30.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 211.00' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	215.00'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.27 cfs @ 12.23 hrs HW=215.59' (Free Discharge)
└─**1=Culvert 4L** (Passes 9.27 cfs of 11.54 cfs potential flow)
└─**2=Orifice-Top of catch basin** (Weir Controls 9.27 cfs @ 2.51 fps)

Summary for Pond D-1G: (2)24" Culverts P-6h

Inflow Area =	11.290 ac,	0.00% Impervious, Inflow Depth = 1.53"	for 10-yr Storm event
Inflow =	15.60 cfs @	12.19 hrs, Volume=	1.440 af
Outflow =	15.45 cfs @	12.20 hrs, Volume=	1.440 af, Atten= 1%, Lag= 0.6 min
Primary =	15.45 cfs @	12.20 hrs, Volume=	1.440 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 184.43' @ 12.20 hrs Surf.Area= 573 sf Storage= 416 cf
Flood Elev= 185.00' Surf.Area= 800 sf Storage= 805 cf

Plug-Flow detention time= 0.5 min calculated for 1.440 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (859.9 - 859.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	3,305 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	10	0	0
184.00	400	205	205
186.00	1,200	1,600	1,805
187.00	1,800	1,500	3,305

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	184.50'	**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=15.44 cfs @ 12.20 hrs HW=184.43' (Free Discharge)
└─**1=(2)24"-Culvert** (Barrel Controls 15.44 cfs @ 4.49 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=183.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond D-1H: LF TOE DITCH - CULVERT

Inflow Area =	3.030 ac,	0.00% Impervious, Inflow Depth = 2.21"	for 10-yr Storm event
Inflow =	5.84 cfs @	12.22 hrs, Volume=	0.557 af
Outflow =	5.77 cfs @	12.24 hrs, Volume=	0.557 af, Atten= 1%, Lag= 1.4 min
Primary =	5.77 cfs @	12.24 hrs, Volume=	0.557 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.35' @ 12.24 hrs Surf.Area= 399 sf Storage= 594 cf
Flood Elev= 186.00' Surf.Area= 858 sf Storage= 1,323 cf

Plug-Flow detention time= 4.6 min calculated for 0.557 af (100% of inflow)
Center-of-Mass det. time= 4.5 min (840.9 - 836.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	1,323 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	24	0	0
186.00	858	1,323	1,323

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**18.0" Round Culvert-C-1H** L= 60.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 183.00' / 182.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=5.73 cfs @ 12.24 hrs HW=184.34' (Free Discharge)
└─**1=Culvert-C-1H** (Barrel Controls 5.73 cfs @ 4.55 fps)

Summary for Pond DP-1: Detention Pond 1

Inflow Area =	34.624 ac,	3.31% Impervious, Inflow Depth = 1.09"	for 10-yr Storm event
Inflow =	28.22 cfs @	12.29 hrs, Volume=	3.131 af
Outflow =	5.91 cfs @	13.04 hrs, Volume=	2.573 af, Atten= 79%, Lag= 45.1 min
Primary =	5.91 cfs @	13.04 hrs, Volume=	2.573 af
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 164.02' @ 13.04 hrs Surf.Area= 17,108 sf Storage= 55,211 cf

Plug-Flow detention time= 222.9 min calculated for 2.573 af (82% of inflow)
Center-of-Mass det. time= 138.3 min (1,023.4 - 885.1)

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	162.00'	**30.0" Round 30" Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.00' / 159.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	162.00'	**12.0" Vert. Orifice on side** C= 0.600
#3	Device 1	162.00'	**6.0" Vert. Orifice on side** C= 0.600
#4	Device 1	165.50'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**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=5.91 cfs @ 13.04 hrs HW=164.02' (Free Discharge)
1=30" Culvert (Passes 5.91 cfs of 16.20 cfs potential flow)
2=Orifice on side (Orifice Controls 4.66 cfs @ 5.93 fps)
3=Orifice on side (Orifice Controls 1.26 cfs @ 6.40 fps)
4=Orifice-Top of drop inlet (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth = 1.54" for 10-yr Storm event
Inflow = 32.93 cfs @ 12.31 hrs, Volume= 3.629 af
Outflow = 4.96 cfs @ 13.51 hrs, Volume= 3.212 af, Atten= 85%, Lag= 72.2 min
Primary = 3.56 cfs @ 13.51 hrs, Volume= 1.042 af
Secondary = 1.40 cfs @ 13.51 hrs, Volume= 2.169 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 179.16' @ 13.51 hrs Surf.Area= 24,319 sf Storage= 79,803 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 773.3 min calculated for 3.211 af (88% of inflow)
Center-of-Mass det. time= 720.9 min (1,588.3 - 867.4)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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=3.52 cfs @ 13.51 hrs HW=179.16' (Free Discharge)
3=18-in Primary Culvert (Passes 3.52 cfs of 15.24 cfs potential flow)
1=Orifice/Grate (Weir Controls 2.62 cfs @ 1.31 fps)
2=6-in Orifice (Orifice Controls 0.90 cfs @ 4.59 fps)

Secondary OutFlow Max=1.40 cfs @ 13.51 hrs HW=179.16' (Free Discharge)
4=6-in Culvert (Passes 1.40 cfs of 1.59 cfs potential flow)
5=Orifice Top (Orifice Controls 1.30 cfs @ 7.08 fps)
6=Orifice Side (Orifice Controls 0.10 cfs @ 8.20 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
7=E-Spillway Weir (Controls 0.00 cfs)

Summary for Pond DP-11: Detention Pond 11

Inflow Area = 22.282 ac, 4.04% Impervious, Inflow Depth = 1.53" for 10-yr Storm event
Inflow = 21.28 cfs @ 12.35 hrs, Volume= 2.841 af
Outflow = 1.18 cfs @ 17.92 hrs, Volume= 2.687 af, Atten= 94%, Lag= 334.6 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 1.18 cfs @ 17.92 hrs, Volume= 2.687 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 166.87' @ 17.92 hrs Surf.Area= 36,691 sf Storage= 82,513 cf

Plug-Flow detention time= 1,190.5 min calculated for 2.686 af (95% of inflow)
Center-of-Mass det. time= 1,163.6 min (2,040.7 - 877.1)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
└─**3=18-In Culvert** (Controls 0.00 cfs)
  ├─**1=6-In Orifice Side (Riser)** (Controls 0.00 cfs)
  └─**2=Grate Top (Riser)** (Controls 0.00 cfs)

Secondary OutFlow Max=1.18 cfs @ 17.92 hrs HW=166.87' (Free Discharge)
└─**4=6-In Culvert** (Barrel Controls 1.18 cfs @ 6.41 fps)
  ├─**5=Orifice Top (6-in Culv)** (Passes < 1.18 cfs potential flow)
  └─**6=Orifice Side (6-in Culv)** (Passes < 0.15 cfs potential flow)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area =	20.177 ac,	3.27% Impervious, Inflow Depth =	1.50"	for 10-yr Storm event
Inflow =	16.74 cfs @	12.36 hrs, Volume=	2.530 af	
Outflow =	1.34 cfs @	17.11 hrs, Volume=	2.371 af,	Atten= 92%, Lag= 285.2 min
Primary =	0.09 cfs @	17.11 hrs, Volume=	0.026 af	
Secondary =	1.25 cfs @	17.11 hrs, Volume=	2.344 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 186.96' @ 17.11 hrs Surf.Area= 34,237 sf Storage= 70,200 cf

Plug-Flow detention time= 1,073.7 min calculated for 2.370 af (94% of inflow)
Center-of-Mass det. time= 1,042.8 min (1,930.3 - 887.5)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-in Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.09 cfs @ 17.11 hrs HW=186.96' (Free Discharge)
└─**3=18- In Culvert** (Passes 0.09 cfs of 8.79 cfs potential flow)
  ├─**1=Grate Top (Riser)** (Controls 0.00 cfs)
  └─**2=8-In Orifice (Riser Side)** (Orifice Controls 0.09 cfs @ 1.37 fps)

Secondary OutFlow Max=1.25 cfs @ 17.11 hrs HW=186.96' (Free Discharge)
└─**6=6-In Culvert** (Passes 1.25 cfs of 1.70 cfs potential flow)
  ├─**4=Orifice Top (6-in Pipe)** (Orifice Controls 1.07 cfs @ 5.82 fps)
  └─**5=Orifice (Side of 6-in)** (Orifice Controls 0.18 cfs @ 7.46 fps)

Summary for Pond DP-1A: DP-1A (Former Leachate Pond)

Inflow Area =	10.835 ac,	10.57% Impervious, Inflow Depth = 1.73"	for 10-yr Storm event	
Inflow =	12.96 cfs @	12.25 hrs, Volume=	1.566 af	
Outflow =	0.33 cfs @	22.79 hrs, Volume=	0.110 af,	Atten= 97%, Lag= 632.3 min
Primary =	0.33 cfs @	22.79 hrs, Volume=	0.110 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 164.00' Surf.Area= 37,429 sf Storage= 182,617 cf
Peak Elev= 165.63' @ 22.79 hrs Surf.Area= 41,956 sf Storage= 247,127 cf (64,510 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (80,429 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 544.3 min (1,386.4 - 842.1)

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	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=0.19 cfs @ 22.79 hrs HW=165.63' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.19 cfs @ 0.41 fps)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 10.745 ac, 0.00% Impervious, Inflow Depth = 1.53" for 10-yr Storm event
Inflow = 14.84 cfs @ 12.19 hrs, Volume= 1.371 af
Outflow = 7.89 cfs @ 12.47 hrs, Volume= 1.371 af, Atten= 47%, Lag= 16.8 min
Primary = 7.89 cfs @ 12.47 hrs, Volume= 1.371 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 162.30' Surf.Area= 2,326 sf Storage= 956 cf
Peak Elev= 164.71' @ 12.47 hrs Surf.Area= 6,452 sf Storage= 11,544 cf (10,588 cf above start)
Flood Elev= 166.60' Surf.Area= 12,071 sf Storage= 28,956 cf (27,999 cf above start)

Plug-Flow detention time= 37.5 min calculated for 1.349 af (98% of inflow)
Center-of-Mass det. time= 24.6 min (884.1 - 859.5)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	47,648 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,957	0	0
164.00	4,419	6,376	6,376
166.00	10,150	14,569	20,945
168.00	16,553	26,703	47,648

Device	Routing	Invert	Outlet Devices
#1	Primary	162.30'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.30' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	162.30'	**15.0" Vert. Orifice** C= 0.600
#3	Device 1	166.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=7.89 cfs @ 12.47 hrs HW=164.71' (Free Discharge)
└─**1=Culvert** (Passes 7.89 cfs of 16.52 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 7.89 cfs @ 6.43 fps)
  └─**3=Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 1.75" for 10-yr Storm event
Inflow = 26.87 cfs @ 12.26 hrs, Volume= 3.302 af
Outflow = 1.29 cfs @ 17.77 hrs, Volume= 3.302 af, Atten= 95%, Lag= 331.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 1.29 cfs @ 17.77 hrs, Volume= 3.302 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 174.00' Surf.Area= 25,931 sf Storage= 29,566 cf
Peak Elev= 176.12' @ 17.77 hrs Surf.Area= 64,099 sf Storage= 127,302 cf (97,736 cf above start)
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (467,078 cf above start)

Plug-Flow detention time= 1,263.3 min calculated for 2.622 af (79% of inflow)
Center-of-Mass det. time= 953.2 min (1,812.4 - 859.2)

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	Secondary	169.00'	**6.0" Round Outlet Culvert 6"** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 169.00' / 168.00' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	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=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
└─**1=Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=1.29 cfs @ 17.77 hrs HW=176.12' (Free Discharge)
├─**2=Outlet Culvert 6"** (Passes 1.29 cfs of 1.61 cfs potential flow)
│ └─**3=Orifice** (Orifice Controls 1.29 cfs @ 7.02 fps)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area =	33.165 ac,	8.08% Impervious, Inflow Depth = 1.86"	for 10-yr Storm event
Inflow =	38.75 cfs @	12.38 hrs, Volume=	5.146 af
Outflow =	0.99 cfs @	23.58 hrs, Volume=	2.949 af, Atten= 97%, Lag= 672.1 min
Primary =	0.03 cfs @	23.58 hrs, Volume=	0.012 af
Secondary =	0.96 cfs @	23.58 hrs, Volume=	2.937 af
Tertiary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 189.59' @ 23.58 hrs Surf.Area= 84,965 sf Storage= 187,879 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,926.1 min calculated for 2.949 af (57% of inflow)
Center-of-Mass det. time= 1,808.6 min (2,664.1 - 855.5)

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
#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=0.03 cfs @ 23.58 hrs HW=189.59' (Free Discharge)
└─**1=12-In Outlet Culvert** (Inlet Controls 0.03 cfs @ 0.81 fps)

Secondary OutFlow Max=0.96 cfs @ 23.58 hrs HW=189.59' (Free Discharge)
└─**2=6-In Culvert** (Passes 0.96 cfs of 1.58 cfs potential flow)
  ├─**3=Orifice** (Orifice Controls 0.83 cfs @ 4.54 fps)
  └─**4=Orifice** (Orifice Controls 0.13 cfs @ 5.34 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1A: SC-1A Runoff Area=23.080 ac 0.00% Impervious Runoff Depth=2.21"
Flow Length=2,249' Slope=0.0260 '/' Tc=88.1 min CN=74 Runoff=18.21 cfs 4.242 af

Subcatchment1B: SC-1B Runoff Area=13.169 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,282' Tc=17.5 min CN=71 Runoff=21.08 cfs 2.158 af

Subcatchment1C: SC-1C Runoff Area=13.300 ac 0.00% Impervious Runoff Depth=2.46"
Flow Length=380' Tc=68.3 min CN=77 Runoff=13.85 cfs 2.723 af

Subcatchment1D: SC-1D Runoff Area=10.620 ac 0.00% Impervious Runoff Depth=2.12"
Flow Length=1,117' Tc=16.9 min CN=73 Runoff=18.76 cfs 1.880 af

Subcatchment1E: SC-1E Runoff Area=10.745 ac 0.00% Impervious Runoff Depth=2.05"
Flow Length=910' Tc=12.7 min CN=72 Runoff=20.18 cfs 1.831 af

Subcatchment1F: SC-1F Runoff Area=31.220 ac 3.52% Impervious Runoff Depth=2.37"
Flow Length=2,066' Tc=73.2 min CN=76 Runoff=29.90 cfs 6.170 af

Subcatchment1G: SC-1G Runoff Area=11.290 ac 0.00% Impervious Runoff Depth=2.05"
Flow Length=857' Tc=12.7 min CN=72 Runoff=21.20 cfs 1.924 af

Subcatchment1H: SC-1H Runoff Area=3.030 ac 0.00% Impervious Runoff Depth=2.81"
Flow Length=759' Tc=15.4 min CN=81 Runoff=7.45 cfs 0.709 af

Subcatchment1I: SC-1I Runoff Area=9.334 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,084' Tc=16.8 min CN=71 Runoff=15.16 cfs 1.530 af

Subcatchment1J: SC-1J Runoff Area=360,761 sf 19.96% Impervious Runoff Depth=2.46"
Flow Length=593' Tc=33.0 min CN=77 Runoff=12.86 cfs 1.695 af

Subcatchment2A: SC-2A Runoff Area=54.143 ac 3.66% Impervious Runoff Depth=2.21"
Flow Length=2,435' Tc=126.1 min CN=74 Runoff=33.02 cfs 9.952 af

Subcatchment2B: 2B Runoff Area=13.996 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,218' Tc=17.6 min CN=71 Runoff=22.34 cfs 2.294 af

Subcatchment2C: 2C Runoff Area=6.181 ac 10.68% Impervious Runoff Depth=2.12"
Flow Length=702' Tc=80.7 min CN=73 Runoff=4.92 cfs 1.094 af

Subcatchment3: SC-3 Runoff Area=270.330 ac 1.32% Impervious Runoff Depth=2.12"
Flow Length=4,335' Tc=240.2 min CN=73 Runoff=100.29 cfs 47.866 af

Subcatchment4A: 4A Runoff Area=4.518 ac 7.22% Impervious Runoff Depth=2.46"
Flow Length=379' Tc=5.1 min CN=77 Runoff=12.99 cfs 0.925 af

Subcatchment4B: 4B Runoff Area=2.330 ac 11.29% Impervious Runoff Depth=2.63"
Flow Length=667' Tc=13.2 min CN=79 Runoff=5.65 cfs 0.511 af

Subcatchment 4C: 4C Runoff Area=1.287 ac 24.86% Impervious Runoff Depth=3.28"
Flow Length=496' Tc=15.4 min CN=86 Runoff=3.66 cfs 0.352 af

Subcatchment 4D: 4D Runoff Area=6.660 ac 26.58% Impervious Runoff Depth=3.38"
Flow Length=824' Tc=33.9 min CN=87 Runoff=13.92 cfs 1.876 af

Subcatchment 4E: 4E Runoff Area=247.915 ac 1.59% Impervious Runoff Depth=2.29"
Flow Length=6,090' Tc=225.6 min CN=75 Runoff=103.71 cfs 47.271 af

Subcatchment 4F: 4F Runoff Area=6.771 ac 0.00% Impervious Runoff Depth=1.89"
Flow Length=1,228' Tc=68.8 min CN=70 Runoff=5.26 cfs 1.066 af

Subcatchment 4G: 4G Runoff Area=12.750 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=929' Tc=17.1 min CN=71 Runoff=20.57 cfs 2.089 af

Subcatchment 4H: 4H Runoff Area=3.400 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=823' Tc=11.9 min CN=71 Runoff=6.28 cfs 0.557 af

Subcatchment 4HA: 4HA Runoff Area=0.780 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=142' Slope=0.3300 '/' Tc=6.7 min CN=71 Runoff=1.70 cfs 0.128 af

Subcatchment 4I: 4I Runoff Area=9.930 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,082' Tc=17.1 min CN=71 Runoff=16.02 cfs 1.627 af

Subcatchment 4IA: 4IA Runoff Area=0.940 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=136' Slope=0.3333 '/' Tc=6.4 min CN=71 Runoff=2.07 cfs 0.154 af

Subcatchment 4J: 4J Runoff Area=12.310 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,051' Tc=17.2 min CN=71 Runoff=19.82 cfs 2.017 af

Subcatchment 4K: 4K Runoff Area=10.870 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=1,095' Tc=18.4 min CN=71 Runoff=17.06 cfs 1.781 af

Subcatchment 4L: 4L Runoff Area=7.500 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=896' Tc=14.1 min CN=71 Runoff=13.04 cfs 1.229 af

Subcatchment 4M: 4M Runoff Area=5.352 ac 16.82% Impervious Runoff Depth=2.29"
Flow Length=642' Tc=53.5 min CN=75 Runoff=5.98 cfs 1.020 af

Subcatchment 4N: 4N Runoff Area=1.921 ac 0.00% Impervious Runoff Depth=1.97"
Flow Length=730' Tc=30.5 min CN=71 Runoff=2.43 cfs 0.315 af

Subcatchment 4O: 4O Runoff Area=5.100 ac 23.53% Impervious Runoff Depth=2.46"
Flow Length=663' Tc=14.2 min CN=77 Runoff=11.26 cfs 1.044 af

Subcatchment 5: SC-5 Runoff Area=35.960 ac 0.40% Impervious Runoff Depth=2.37"
Flow Length=2,355' Tc=192.1 min CN=76 Runoff=17.74 cfs 7.107 af

Subcatchment P1A: SC-P1A Runoff Area=65,400 sf 76.26% Impervious Runoff Depth=4.11"
Tc=0.0 min CN=94 Runoff=7.72 cfs 0.514 af

Reach 1R: DP-10 DITCH 1 Avg. Flow Depth=0.71' Max Vel=3.65 fps Inflow=19.17 cfs 2.017 af
n=0.025 L=101.0' S=0.0079 '/' Capacity=128.49 cfs Outflow=19.11 cfs 2.017 af

Reach 2R: E2C-DP9 Avg. Flow Depth=0.55' Max Vel=4.87 fps Inflow=15.53 cfs 1.277 af
n=0.022 L=590.0' S=0.0169 '/' Capacity=488.04 cfs Outflow=14.74 cfs 1.277 af

Reach 3R: Overland Flow Avg. Flow Depth=0.49' Max Vel=9.99 fps Inflow=29.11 cfs 3.521 af
n=0.035 L=168.0' S=0.0554 '/' Capacity=119.87 cfs Outflow=29.07 cfs 3.521 af

Reach 4HR-A: EAST PD - 4 Avg. Flow Depth=0.22' Max Vel=2.98 fps Inflow=1.70 cfs 0.128 af
n=0.025 L=288.0' S=0.0247 '/' Capacity=119.08 cfs Outflow=1.60 cfs 0.128 af

Reach 4HR-B: EAST PD - 5 Avg. Flow Depth=0.44' Max Vel=5.84 fps Inflow=7.49 cfs 0.685 af
n=0.025 L=425.0' S=0.0438 '/' Capacity=158.67 cfs Outflow=7.36 cfs 0.685 af

Reach 4IR-A: EAST PD - 2 Avg. Flow Depth=0.27' Max Vel=2.82 fps Inflow=2.07 cfs 0.154 af
n=0.025 L=330.0' S=0.0176 '/' Capacity=100.55 cfs Outflow=1.94 cfs 0.154 af

Reach 4IR-B: EAST PD - 3 Avg. Flow Depth=0.83' Max Vel=5.84 fps Inflow=17.71 cfs 1.781 af
n=0.025 L=210.0' S=0.0224 '/' Capacity=113.47 cfs Outflow=17.60 cfs 1.781 af

Reach 4JR: EAST PD 1 Avg. Flow Depth=0.93' Max Vel=5.56 fps Inflow=19.82 cfs 2.017 af
n=0.025 L=183.0' S=0.0180 '/' Capacity=101.85 cfs Outflow=19.70 cfs 2.017 af

Reach 4R: DP-10 DITCH 3 Avg. Flow Depth=0.98' Max Vel=9.15 fps Inflow=35.39 cfs 3.798 af
n=0.025 L=260.0' S=0.0462 '/' Capacity=162.94 cfs Outflow=35.24 cfs 3.798 af

Reach 5R: NORTH PD-1 Avg. Flow Depth=0.82' Max Vel=6.71 fps Inflow=20.57 cfs 2.089 af
n=0.025 L=936.0' S=0.0299 '/' Capacity=131.18 cfs Outflow=20.17 cfs 2.089 af

Reach 6R: NORTH PD-2 Avg. Flow Depth=1.18' Max Vel=4.22 fps Inflow=21.89 cfs 2.294 af
n=0.025 L=364.0' S=0.0080 '/' Capacity=67.70 cfs Outflow=21.59 cfs 2.294 af

Reach 7R: DP-10R Avg. Flow Depth=0.93' Max Vel=3.56 fps Inflow=18.32 cfs 4.357 af
n=0.045 L=1,130.0' S=0.0248 '/' Capacity=88.21 cfs Outflow=15.92 cfs 4.356 af

Reach 8R: EAST PD - 6 Avg. Flow Depth=0.80' Max Vel=3.20 fps Inflow=17.06 cfs 1.781 af
n=0.025 L=360.0' S=0.0056 '/' Capacity=25.35 cfs Outflow=16.80 cfs 1.781 af

Reach 9R: LEVEL SPREADER Avg. Flow Depth=0.39' Max Vel=0.22 fps Inflow=2.04 cfs 4.456 af
n=0.800 L=273.0' S=0.0623 '/' Capacity=11.46 cfs Outflow=2.04 cfs 4.450 af

Reach 10R: Ditch 4B1 Avg. Flow Depth=1.01' Max Vel=4.01 fps Inflow=16.45 cfs 1.781 af
n=0.025 L=352.0' S=0.0085 '/' Capacity=70.02 cfs Outflow=16.25 cfs 1.781 af

Reach 11R: DP-11R Avg. Flow Depth=0.31' Max Vel=1.57 fps Inflow=1.42 cfs 3.639 af
n=0.045 L=1,050.0' S=0.0162 '/' Capacity=71.30 cfs Outflow=1.42 cfs 3.638 af

Reach 12R: 4FR Avg. Flow Depth=0.62' Max Vel=2.07 fps Inflow=5.21 cfs 1.066 af
n=0.045 L=1,523.0' S=0.0131 '/' Capacity=64.21 cfs Outflow=4.99 cfs 1.066 af

Reach 13R: Ex Ditch Avg. Flow Depth=1.19' Max Vel=5.06 fps Inflow=26.42 cfs 3.010 af
n=0.030 L=225.0' S=0.0164 '/' Capacity=81.05 cfs Outflow=26.19 cfs 3.010 af

Reach 14R: DP-10 DITCH 2 Avg. Flow Depth=0.76' Max Vel=7.05 fps Inflow=19.00 cfs 2.017 af
n=0.025 L=434.0' S=0.0357 '/' Capacity=143.33 cfs Outflow=18.85 cfs 2.017 af

Reach AP1: AP-1 Inflow=68.29 cfs 19.050 af
Outflow=68.29 cfs 19.050 af

Reach AP2: ANALYSIS POINT #2 Inflow=33.15 cfs 13.180 af
Outflow=33.15 cfs 13.180 af

Reach AP3: ANALYSIS POINT #3 Inflow=100.29 cfs 47.866 af
Outflow=100.29 cfs 47.866 af

Reach AP4: AP4 Inflow=112.52 cfs 61.081 af
Outflow=112.52 cfs 61.081 af

Reach AP5: ANALYSIS POINT #5 Inflow=17.74 cfs 7.107 af
Outflow=17.74 cfs 7.107 af

Reach E2R2: E2R2 Avg. Flow Depth=0.11' Max Vel=0.38 fps Inflow=2.43 cfs 0.315 af
n=0.080 L=4,356.0' S=0.0094 '/' Capacity=132.12 cfs Outflow=0.53 cfs 0.315 af

Reach E2R3: REACH TO AP Avg. Flow Depth=0.46' Max Vel=1.32 fps Inflow=2.04 cfs 4.450 af
n=0.045 L=2,170.0' S=0.0074 '/' Capacity=48.12 cfs Outflow=2.03 cfs 4.443 af

Reach E2R4: Reach to AP Avg. Flow Depth=0.75' Max Vel=1.19 fps Inflow=20.22 cfs 13.818 af
n=0.080 L=963.0' S=0.0094 '/' Capacity=131.94 cfs Outflow=17.37 cfs 13.809 af

Reach R-1D: Reach R-1D Avg. Flow Depth=0.32' Max Vel=1.81 fps Inflow=7.74 cfs 4.068 af
n=0.060 L=370.0' S=0.0324 '/' Capacity=67.93 cfs Outflow=7.74 cfs 4.068 af

Reach R-1E: LEVEL SPREADER R-1E Avg. Flow Depth=0.23' Max Vel=2.26 fps Inflow=9.55 cfs 1.847 af
n=0.060 L=210.0' S=0.0690 '/' Capacity=135.95 cfs Outflow=9.54 cfs 1.847 af

Reach R-1F: Reach R-1F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.060 L=940.0' S=0.0170 '/' Capacity=49.21 cfs Outflow=0.00 cfs 0.000 af

Reach R-1H: LEVEL SPREADER R-1H Avg. Flow Depth=0.09' Max Vel=2.19 fps Inflow=7.28 cfs 0.709 af
n=0.030 L=170.0' S=0.0471 '/' Capacity=411.95 cfs Outflow=7.17 cfs 0.709 af

Reach R-2F: Reach R2-F Avg. Flow Depth=0.00' Max Vel=0.00 fps Inflow=0.00 cfs 0.000 af
n=0.030 L=735.0' S=0.0020 '/' Capacity=151.21 cfs Outflow=0.00 cfs 0.000 af

Reach R1: Reach 1 Avg. Flow Depth=1.30' Max Vel=1.73 fps Inflow=52.38 cfs 14.808 af
n=0.030 L=700.0' S=0.0016 '/' Capacity=132.69 cfs Outflow=52.01 cfs 14.808 af

Reach R1B: LF TOE DITCH Avg. Flow Depth=1.07' Max Vel=4.66 fps Inflow=21.08 cfs 2.158 af
n=0.040 L=540.0' S=0.0278 '/' Capacity=79.00 cfs Outflow=20.70 cfs 2.158 af

Reach R2: Reach 2 Avg. Flow Depth=1.02' Max Vel=1.71 fps Inflow=36.10 cfs 8.017 af
n=0.030 L=1,050.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=35.21 cfs 8.017 af

Reach R2A: Reach 2A Avg. Flow Depth=0.11' Max Vel=0.57 fps Inflow=2.44 cfs 3.228 af
n=0.060 L=1,960.0' S=0.0138 '/' Capacity=1,358.84 cfs Outflow=2.38 cfs 3.227 af

Reach R3: Reach 3 Avg. Flow Depth=0.93' Max Vel=1.62 fps Inflow=29.90 cfs 6.170 af
n=0.030 L=800.0' S=0.0020 '/' Capacity=149.69 cfs Outflow=29.33 cfs 6.170 af

Reach R5a: Grass Lined Ditch Avg. Flow Depth=0.45' Max Vel=6.83 fps Inflow=15.16 cfs 1.530 af
n=0.025 L=200.0' S=0.0500 '/' Capacity=572.96 cfs Outflow=15.08 cfs 1.530 af

Pond 1P: Culvert - 4JB & FJC Peak Elev=211.64' Storage=944 cf Inflow=19.11 cfs 2.017 af
24.0" Round Culvert x 2.00 n=0.011 L=73.0' S=0.0137 '/' Outflow=19.00 cfs 2.017 af

Pond 4IAC: Culvert - 4IA Peak Elev=213.60' Storage=302 cf Inflow=1.94 cfs 0.154 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0175 '/' Outflow=1.82 cfs 0.154 af

Pond 8P: Ex Pond Peak Elev=172.57' Storage=4,765 cf Inflow=16.88 cfs 4.425 af
Outflow=18.32 cfs 4.357 af

Pond C-2B-A: Culvert - 2BA Peak Elev=205.43' Storage=1,750 cf Inflow=22.34 cfs 2.294 af
Primary=21.89 cfs 2.294 af Secondary=0.00 cfs 0.000 af Outflow=21.89 cfs 2.294 af

Pond C-4F: Culvert - 4F Peak Elev=166.34' Storage=0.025 af Inflow=5.26 cfs 1.066 af
18.0" Round Culvert n=0.011 L=78.0' S=0.0385 '/' Outflow=5.21 cfs 1.066 af

Pond C-4K: Catch Basin - 4K Peak Elev=220.74' Storage=2,659 cf Inflow=16.80 cfs 1.781 af
Outflow=16.45 cfs 1.781 af

Pond C4B: Culvert - 4BA & 4BB Peak Elev=206.89' Storage=1,124 cf Inflow=29.93 cfs 3.521 af
24.0" Round Culvert x 2.00 n=0.011 L=78.0' S=0.0090 '/' Outflow=29.11 cfs 3.521 af

Pond C4H-A: Culvert 4H-A Peak Elev=202.49' Storage=527 cf Inflow=1.60 cfs 0.128 af
18.0" Round Culvert n=0.011 L=40.0' S=0.0250 '/' Outflow=1.33 cfs 0.128 af

Pond C4N: Culvert 4N Peak Elev=184.82' Storage=0.004 af Inflow=2.43 cfs 0.315 af
18.0" Round Culvert n=0.011 L=33.0' S=0.0303 '/' Outflow=2.43 cfs 0.315 af

Pond CB-2B-B: Catch Basin - 2BB Peak Elev=200.83' Storage=412 cf Inflow=21.59 cfs 2.294 af
Outflow=21.51 cfs 2.294 af

Pond CB-4G: Catch Basin - 4G Peak Elev=182.69' Storage=921 cf Inflow=20.17 cfs 2.089 af
Outflow=19.65 cfs 2.089 af

Pond CB-4HB: Catch Basin - 4HB Peak Elev=183.80' Storage=40 cf Inflow=7.36 cfs 0.685 af
Outflow=7.36 cfs 0.685 af

Pond CB-4I: Catch Basin - 4I Peak Elev=208.90' Storage=0.016 af Inflow=17.60 cfs 1.781 af
Outflow=17.28 cfs 1.781 af

Pond CB-4JA: Catch Basin - 4JA Peak Elev=220.31' Storage=0.022 af Inflow=19.70 cfs 2.017 af
Outflow=19.17 cfs 2.017 af

Pond CB-4L: Catch Basin - 4L Peak Elev=215.82' Storage=1,341 cf Inflow=13.04 cfs 1.229 af
Outflow=12.24 cfs 1.229 af

Pond D-1G: (2)24" Culverts P-6h Peak Elev=184.67' Storage=561 cf Inflow=21.20 cfs 1.924 af
Primary=19.42 cfs 1.908 af Secondary=1.63 cfs 0.015 af Outflow=21.06 cfs 1.924 af

Pond D-1H: LF TOE DITCH - CULVERT Peak Elev=184.69' Storage=746 cf Inflow=7.45 cfs 0.709 af
18.0" Round Culvert n=0.013 L=60.0' S=0.0083 '/' Outflow=7.28 cfs 0.709 af

Pond DP-1: Detention Pond 1 Peak Elev=165.13' Storage=75,820 cf Inflow=38.52 cfs 4.626 af
Primary=7.74 cfs 4.068 af Secondary=0.00 cfs 0.000 af Outflow=7.74 cfs 4.068 af

Pond DP-10: DETENTION POND 10 Peak Elev=179.51' Storage=88,504 cf Inflow=44.00 cfs 4.842 af
Primary=15.37 cfs 2.131 af Secondary=1.51 cfs 2.294 af Tertiary=0.00 cfs 0.000 af Outflow=16.88 cfs 4.425 af

Pond DP-11: Detention Pond 11 Peak Elev=167.75' Storage=115,942 cf Inflow=28.67 cfs 3.795 af
Primary=0.17 cfs 0.076 af Secondary=1.25 cfs 3.562 af Outflow=1.42 cfs 3.639 af

Pond DP-12: DETENTION POND 12 Peak Elev=187.48' Storage=88,740 cf Inflow=23.02 cfs 3.388 af
Primary=0.99 cfs 0.501 af Secondary=1.45 cfs 2.727 af Outflow=2.44 cfs 3.228 af

Pond DP-1A: DP-1A (Former Leachate Peak Elev=165.68' Storage=249,629 cf Inflow=17.45 cfs 2.044 af
Outflow=1.16 cfs 0.587 af

Pond DP-2: DETENTION POND 2 Peak Elev=165.54' Storage=17,590 cf Inflow=21.80 cfs 1.847 af
Outflow=9.55 cfs 1.847 af

Pond DP-6: DETENTION POND 6 Peak Elev=176.58' Storage=163,071 cf Inflow=34.84 cfs 4.313 af
Primary=0.00 cfs 0.000 af Secondary=1.42 cfs 4.313 af Outflow=1.42 cfs 4.313 af

Pond DP-9: DETENTION POND 9 Peak Elev=190.04' Storage=225,513 cf Inflow=50.65 cfs 6.673 af
Primary=0.86 cfs 0.727 af Secondary=1.18 cfs 3.729 af Tertiary=0.00 cfs 0.000 af Outflow=2.04 cfs 4.456 af

Summary for Subcatchment 1A: SC-1A

Runoff = 18.21 cfs @ 13.21 hrs, Volume= 4.242 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	10.120	70	Woods, Good, HSG C
	9.500	77	Woods, Good, HSG D
	2.560	71	Meadow, non-grazed, HSG C
	0.400	78	Meadow, non-grazed, HSG D
*	0.500	96	Gravel Road
	23.080	74	Weighted Average
	23.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.7	150	0.0260	0.05		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
21.0	1,839		1.46		**Direct Entry, Segment ID: B-C**
16.4	260		0.26		**Direct Entry, Segment ID: C-D**
88.1	2,249	Total			

Summary for Subcatchment 1B: SC-1B

Runoff = 21.08 cfs @ 12.25 hrs, Volume= 2.158 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
13.169	71	Meadow, non-grazed, HSG C
13.169		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	183	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.9	392	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	557	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.5	1,282	Total			

Summary for Subcatchment 1C: SC-1C

Runoff = 13.85 cfs @ 12.94 hrs, Volume= 2.723 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	6.100	77	Woods, Good, HSG D
	0.720	70	Woods, Good, HSG C
	3.100	78	Meadow, non-grazed, HSG D
	2.580	71	Meadow, non-grazed, HSG C
*	0.800	96	Gravel Road
	13.300	77	Weighted Average
	13.300		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.0	150	0.0350	0.06		**Sheet Flow, Segment ID: A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.6	230	0.0133	0.58		**Shallow Concentrated Flow, Segment ID: B-C** Woodland Kv= 5.0 fps
16.7					**Direct Entry, Segment ID: C-D**
68.3	380	Total			

Summary for Subcatchment 1D: SC-1D

Runoff = 18.76 cfs @ 12.24 hrs, Volume= 1.880 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	9.230	71	Meadow, non-grazed, HSG C
*	0.590	96	Gravel Road/Berm
*	0.800	78	Pond, Meadow HSG D
	10.620	73	Weighted Average
	10.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	159	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.5	203	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	605	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035

16.9	1,117	Total

Summary for Subcatchment 1E: SC-1E

Runoff = 20.18 cfs @ 12.19 hrs, Volume= 1.831 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	10.495	71	Meadow, non-grazed, HSG C
*	0.250	96	Gravel Road/Berm
	10.745	72	Weighted Average
	10.745		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.9	150	0.1500	2.71		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.2	93	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	517	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	910	Total			

Summary for Subcatchment 1F: SC-1F

Runoff = 29.90 cfs @ 12.99 hrs, Volume= 6.170 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	13.200	77	Woods, Good, HSG D
	7.250	70	Woods, Good, HSG C
	7.670	78	Meadow, non-grazed, HSG D
	1.500	71	Meadow, non-grazed, HSG C
*	0.500	96	Gravel Road/Pad
*	0.600	98	Impervious / Structures
	0.500	98	Paved roads w/curbs & sewers, HSG C
	31.220	76	Weighted Average
	30.120		96.48% Pervious Area
	1.100		3.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.5	100	0.0100	0.08		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
1.2	17	0.3300	0.23		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
2.4	300	0.0190	2.07		**Shallow Concentrated Flow, Segment ID: C-D** Grassed Waterway Kv= 15.0 fps
24.6	1,649	0.0500	1.12		**Shallow Concentrated Flow, Segment ID D-E** Woodland Kv= 5.0 fps
24.5					**Direct Entry, Segment ID: E-F**
73.2	2,066	Total			

Summary for Subcatchment 1G: SC-1G

Runoff = 21.20 cfs @ 12.19 hrs, Volume= 1.924 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	10.860	71	Meadow, non-grazed, HSG C
*	0.430	96	Gravel Road/Berm
	11.290	72	Weighted Average
	11.290		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 ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
0.5	62	0.1000	2.21		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.4	90	0.3300	4.02		**Shallow Concentrated Flow, Segment ID: C-D** Short Grass Pasture Kv= 7.0 fps
0.3	140	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	415	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
12.7	857	Total			

Summary for Subcatchment 1H: SC-1H

Runoff = 7.45 cfs @ 12.21 hrs, Volume= 0.709 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
1.830	71	Meadow, non-grazed, HSG C
1.200	96	Gravel Road/Berm
3.030	81	Weighted Average
3.030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.0	150	0.3300	0.36		**Sheet Flow, Segment A-B** Grass: Dense n= 0.240 P2= 2.70"
8.4	609	0.0300	1.21		**Shallow Concentrated Flow, Segment B-C** Short Grass Pasture Kv= 7.0 fps
15.4	759	Total			

Summary for Subcatchment 1I: SC-1I

Runoff = 15.16 cfs @ 12.24 hrs, Volume= 1.530 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
9.334	71	Meadow, non-grazed, HSG C
9.334		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.1	146	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.5	218	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	570	0.3300	27.25	817.65	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 5.0 '/' Top.W=25.00' n= 0.035
16.8	1,084	Total			

Summary for Subcatchment 1J: SC-1J

Runoff = 12.86 cfs @ 12.47 hrs, Volume= 1.695 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (sf)	CN	Description
*	186,445	70	Woods, Good HSG C
	85,939	71	Meadow, non-grazed, HSG C
*	16,377	96	Gravel Road/Pad
*	72,000	98	Pond water surface
	360,761	77	Weighted Average
	288,761		80.04% Pervious Area
	72,000		19.96% 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 2A: SC-2A

Runoff = 33.02 cfs @ 13.71 hrs, Volume= 9.952 af, Depth= 2.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	27.993	70	Woods, Good, HSG C
	21.380	77	Woods, Good, HSG D
	2.790	71	Meadow, non-grazed, HSG C
*	0.380	98	Paved Area (New)
	1.600	98	Existing Waterbody
	54.143	74	Weighted Average
	52.163		96.34% Pervious Area
	1.980		3.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.9	150	0.0300	0.05		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
25.4	538	0.0200	0.35		**Shallow Concentrated Flow, Segment B-C** Forest w/Heavy Litter Kv= 2.5 fps
37.5	534	0.0090	0.24		**Shallow Concentrated Flow, Segment C-D** Forest w/Heavy Litter Kv= 2.5 fps
15.3	1,213	0.0080	1.32	52.99	**Trap/Vee/Rect Channel Flow, Segment D-E** Bot.W=0.00' D=2.00' Z= 10.0 '/' Top.W=40.00' n= 0.100 Earth, dense brush, high stage
126.1	2,435	Total			

Summary for Subcatchment 2B: 2B

Runoff = 22.34 cfs @ 12.26 hrs, Volume= 2.294 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
13.996	71	Meadow, non-grazed, HSG C
13.996		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.4	187	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
1.0	431	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	450	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.6	1,218	Total			

Summary for Subcatchment 2C: 2C

Runoff = 4.92 cfs @ 13.12 hrs, Volume= 1.094 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
5.521	70	Woods, Good, HSG C
0.660	98	Water Surface, HSG C
6.181	73	Weighted Average
5.521		89.32% Pervious Area
0.660		10.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
6.2	289	0.0242	0.78		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
8.2	263	0.0114	0.53		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
80.7	702	Total			

Summary for Subcatchment 3: SC-3

Runoff = 100.29 cfs @ 15.24 hrs, Volume= 47.866 af, Depth= 2.12"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	162.090	70	Woods, Good, HSG C
	102.790	77	Woods, Good, HSG D
	0.950	71	Meadow, non-grazed, HSG C
*	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
*	2.330	98	Existing Water Body
	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 4A: 4A

Runoff = 12.99 cfs @ 12.08 hrs, Volume= 0.925 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	0.740	89	Gravel roads, HSG C
	1.955	74	>75% Grass cover, Good, HSG C
*	0.088	98	ROOF
	1.497	71	Meadow, non-grazed, HSG C
	0.238	98	Paved roads w/curbs & sewers, HSG C
	4.518	77	Weighted Average
	4.192		92.78% Pervious Area
	0.326		7.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	150	0.0167	0.71		**Sheet Flow, Segment A-B** n= 0.023 P2= 2.70"
0.8	159	0.0410	3.26		**Shallow Concentrated Flow, Segment B-C** Unpaved Kv= 16.1 fps
0.8	70	0.0429	1.45		**Shallow Concentrated Flow, Segment C-D** Short Grass Pasture Kv= 7.0 fps
5.1	379	Total			

Summary for Subcatchment 4B: 4B

Runoff = 5.65 cfs @ 12.19 hrs, Volume= 0.511 af, Depth= 2.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	1.040	70	Brush, Fair, HSG C
*	0.023	98	ROOF
	0.640	89	Gravel roads, HSG C
	0.387	74	>75% Grass cover, Good, HSG C
	0.240	98	Paved roads w/curbs & sewers, HSG C
	2.330	79	Weighted Average
	2.067		88.71% Pervious Area
	0.263		11.29% 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 4C: 4C

Runoff = 3.66 cfs @ 12.21 hrs, Volume= 0.352 af, Depth= 3.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	0.511	74	>75% Grass cover, Good, HSG C
	0.070	98	Paved roads w/curbs & sewers, HSG C
*	0.250	98	Building/Concrete Slabs
*	0.456	91	Gravel Roads
	1.287	86	Weighted Average
	0.967		75.14% Pervious Area
	0.320		24.86% 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"
4.0	374	0.0107	1.55		**Shallow Concentrated Flow, Grassed waterway** Grassed Waterway Kv= 15.0 fps
15.4	496	Total			

Summary for Subcatchment 4D: 4D

Runoff = 13.92 cfs @ 12.46 hrs, Volume= 1.876 af, Depth= 3.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	0.453	89	Gravel roads, HSG C
*	2.133	91	Gravel
	2.304	74	>75% Grass cover, Good, HSG C
*	1.634	98	Pond
	0.136	98	Paved roads w/curbs & sewers, HSG C
	6.660	87	Weighted Average
	4.890		73.42% Pervious Area
	1.770		26.58% 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 4E: 4E

Runoff = 103.71 cfs @ 15.07 hrs, Volume= 47.271 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	152.615	77	Woods, Good, HSG D
	91.360	70	Woods, Good, HSG C
*	3.940	98	Paved roads w/curbs & sewers,
	247.915	75	Weighted Average
	243.975		98.41% Pervious Area
	3.940		1.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
66.3	150	0.0133	0.04		**Sheet Flow, Segment A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
127.0	2,625	0.0190	0.34		**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)**
225.6	6,090	Total			

Summary for Subcatchment 4F: 4F

Runoff = 5.26 cfs @ 12.96 hrs, Volume= 1.066 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
6.691	70	Woods, Good, HSG C
0.080	89	Gravel roads, HSG C
6.771	70	Weighted Average
6.771		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.6	144	0.0280	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
20.9	1,067	0.0290	0.85		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	17	0.0210	0.97	19.47	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=4.00' D=2.00' Z= 3.0 '/' Top.W=16.00' n= 0.250
68.8	1,228	Total			

Summary for Subcatchment 4G: 4G

Runoff = 20.57 cfs @ 12.25 hrs, Volume= 2.089 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
12.750	71	Meadow, non-grazed, HSG C
12.750		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	98	0.0500	0.15		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.8	52	0.1000	0.18		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
1.1	150	0.1000	2.21		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.3	133	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	496	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	929	Total			

Summary for Subcatchment 4H: 4H

Runoff = 6.28 cfs @ 12.17 hrs, Volume= 0.557 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
3.400	71	Meadow, non-grazed, HSG C
3.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	75	0.1000	0.19		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
4.0	75	0.3300	0.31		**Sheet Flow, B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	150	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
0.7	285	0.0500	6.92	76.15	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=0.00' D=1.00' Z= 2.0 & 20.0 '/' Top.W=22.00' n= 0.030 Short grass
0.1	238	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, E-F** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00'

					n= 0.035
11.9	823	Total			

Summary for Subcatchment 4HA: 4HA

Runoff = 1.70 cfs @ 12.10 hrs, Volume= 0.128 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
0.780	71	Meadow, non-grazed, HSG C
0.780		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7	142	0.3300	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4I: 4I

Runoff = 16.02 cfs @ 12.25 hrs, Volume= 1.627 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
9.930	71	Meadow, non-grazed, HSG C
9.930		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	200	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.4	290	0.0500	11.02	506.75	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=2.00' Z= 3.0 & 20.0 '/' Top.W=46.00' n= 0.030
0.3	442	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.1	1,082	Total			

Summary for Subcatchment 4IA: 4IA

Runoff = 2.07 cfs @ 12.10 hrs, Volume= 0.154 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
0.940	71	Meadow, non-grazed, HSG C
0.940		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	136	0.3333	0.35		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"

Summary for Subcatchment 4J: 4J

Runoff = 19.82 cfs @ 12.25 hrs, Volume= 2.017 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
12.310	71	Meadow, non-grazed, HSG C
12.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
1.5	202	0.1000	2.21		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
0.6	270	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	429	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
17.2	1,051	Total			

Summary for Subcatchment 4K: 4K

Runoff = 17.06 cfs @ 12.27 hrs, Volume= 1.781 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
10.870	71	Meadow, non-grazed, HSG C
10.870		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.9	150	0.0500	0.17		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
2.7	268	0.0555	1.65		**Shallow Concentrated Flow, Segment ID: B-C** Short Grass Pasture Kv= 7.0 fps
0.6	267	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.2	410	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
18.4	1,095	Total			

Summary for Subcatchment 4L: 4L

Runoff = 13.04 cfs @ 12.21 hrs, Volume= 1.229 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
7.500	71	Meadow, non-grazed, HSG C
7.500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	23	0.0500	0.12		**Sheet Flow, Segment ID: A-B** Grass: Dense n= 0.240 P2= 2.70"
9.9	127	0.1000	0.21		**Sheet Flow, Segment ID: B-C** Grass: Dense n= 0.240 P2= 2.70"
0.6	252	0.0500	6.94	79.81	**Trap/Vee/Rect Channel Flow, Segment ID: C-D** Bot.W=0.00' D=1.00' Z= 3.0 & 20.0 '/' Top.W=23.00' n= 0.030
0.3	494	0.3300	28.92	520.47	**Trap/Vee/Rect Channel Flow, Segment ID: D-E** Bot.W=5.00' D=2.00' Z= 2.0 '/' Top.W=13.00' n= 0.035
14.1	896	Total			

Summary for Subcatchment 4M: 4M

Runoff = 5.98 cfs @ 12.75 hrs, Volume= 1.020 af, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
4.262	70	Woods, Good, HSG C
0.900	98	Water Surface, HSG C
0.190	89	Gravel roads, HSG C
5.352	75	Weighted Average
4.452		83.18% Pervious Area
0.900		16.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
45.9	150	0.0333	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 2.70"
7.5	474	0.0440	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.1	18	0.3300	4.02		**Shallow Concentrated Flow, C-D** Short Grass Pasture Kv= 7.0 fps
53.5	642	Total			

Summary for Subcatchment 4N: 4N

Runoff = 2.43 cfs @ 12.45 hrs, Volume= 0.315 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
0.743	70	Woods, Good, HSG C
1.178	71	Meadow, non-grazed, HSG C
1.921	71	Weighted Average
1.921		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.5	150	0.0200	0.12		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 2.70"
9.0	580	0.0233	1.07		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
30.5	730	Total			

Summary for Subcatchment 4O: 4O

Runoff = 11.26 cfs @ 12.20 hrs, Volume= 1.044 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (ac)	CN	Description
	3.900	70	Brush, Fair, HSG C
*	0.800	98	Paved and Gravel Shoulder
*	0.400	98	Detention Pond 10
	5.100	77	Weighted Average
	3.900		76.47% Pervious Area
	1.200		23.53% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	55	0.3000	0.28		**Sheet Flow, SEGMENT AB** Grass: Dense n= 0.240 P2= 2.70"
4.0	289	0.0300	1.21		**Shallow Concentrated Flow, SEGMENT BC** Short Grass Pasture Kv= 7.0 fps
6.9	319	0.0120	0.77		**Shallow Concentrated Flow, SEGMENT CD** Short Grass Pasture Kv= 7.0 fps
14.2	663	Total			

Summary for Subcatchment 5: SC-5

Runoff = 17.74 cfs @ 14.70 hrs, Volume= 7.107 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

Area (ac)	CN	Description
7.260	70	Woods, Good, HSG C
28.410	77	Woods, Good, HSG D
0.290	93	Paved roads w/open ditches, 50% imp, HSG D
35.960	76	Weighted Average
35.815		99.60% Pervious Area
0.145		0.40% 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 Subcatchment P1A: SC-P1A

Runoff = 7.72 cfs @ 12.00 hrs, Volume= 0.514 af, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Storm Rainfall=4.80"

	Area (sf)	CN	Description
*	49,872	98	Pond and Liner
	1,012	89	Gravel roads, HSG C
	14,516	79	Pasture/grassland/range, Fair, HSG C
	65,400	94	Weighted Average
	15,528		23.74% Pervious Area
	49,872		76.26% Impervious Area

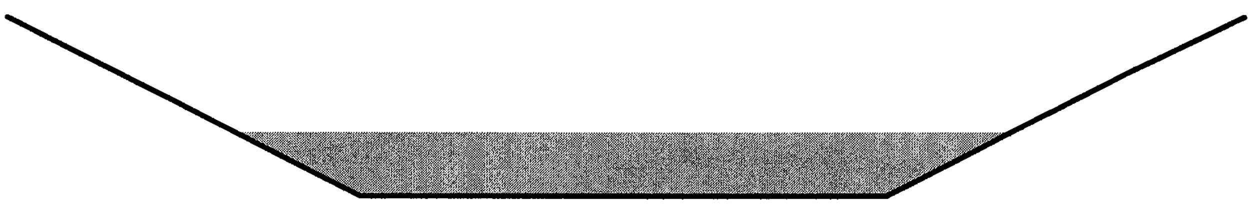
Summary for Reach 1R: DP-10 DITCH 1

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 19.17 cfs @ 12.31 hrs, Volume= 2.017 af
Outflow = 19.11 cfs @ 12.32 hrs, Volume= 2.017 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.65 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.24 fps, Avg. Travel Time= 1.4 min

Peak Storage= 531 cf @ 12.31 hrs
Average Depth at Peak Storage= 0.71'
Bank-Full Depth= 2.00' Flow Area= 20.0 sf, Capacity= 128.49 cfs

6.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 14.00'
Length= 101.0' Slope= 0.0079 '/'
Inlet Invert= 212.30', Outlet Invert= 211.50'



Summary for Reach 2R: E2C-DP9

Inflow Area = 5.805 ac, 11.13% Impervious, Inflow Depth = 2.64" for 25-yr Storm event
Inflow = 15.53 cfs @ 12.09 hrs, Volume= 1.277 af
Outflow = 14.74 cfs @ 12.15 hrs, Volume= 1.277 af, Atten= 5%, Lag= 3.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.87 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.49 fps, Avg. Travel Time= 6.6 min

Peak Storage= 1,827 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.55'
Bank-Full Depth= 3.00' Flow Area= 39.0 sf, Capacity= 488.04 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= 590.0' Slope= 0.0169 '/'
Inlet Invert= 200.00', Outlet Invert= 190.00'

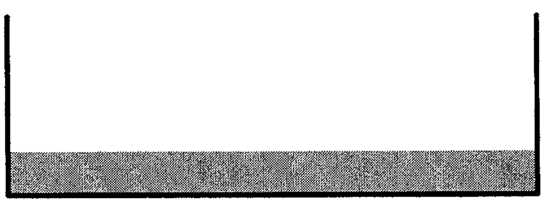
Summary for Reach 3R: Overland Flow

Inflow Area = 20.700 ac, 1.27% Impervious, Inflow Depth = 2.04" for 25-yr Storm event
Inflow = 29.11 cfs @ 12.40 hrs, Volume= 3.521 af
Outflow = 29.07 cfs @ 12.41 hrs, Volume= 3.521 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 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= 490 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.49'
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 4HR-A: EAST PD - 4

Inflow Area = 0.780 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 1.70 cfs @ 12.10 hrs, Volume= 0.128 af
Outflow = 1.60 cfs @ 12.16 hrs, Volume= 0.128 af, Atten= 6%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.98 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.97 fps, Avg. Travel Time= 4.9 min

Peak Storage= 158 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.22'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 119.08 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 288.0' Slope= 0.0247 '/'
Inlet Invert= 209.00', Outlet Invert= 201.90'

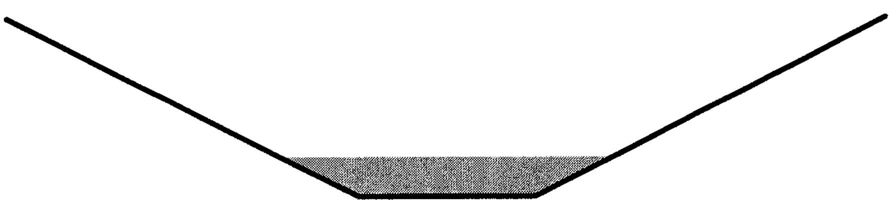
Summary for Reach 4HR-B: EAST PD - 5

Inflow Area = 4.180 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 7.49 cfs @ 12.18 hrs, Volume= 0.685 af
Outflow = 7.36 cfs @ 12.22 hrs, Volume= 0.685 af, Atten= 2%, Lag= 2.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.84 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.74 fps, Avg. Travel Time= 4.1 min

Peak Storage= 545 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.44'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 158.67 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 425.0' Slope= 0.0438 '/'
Inlet Invert= 201.90', Outlet Invert= 183.30'



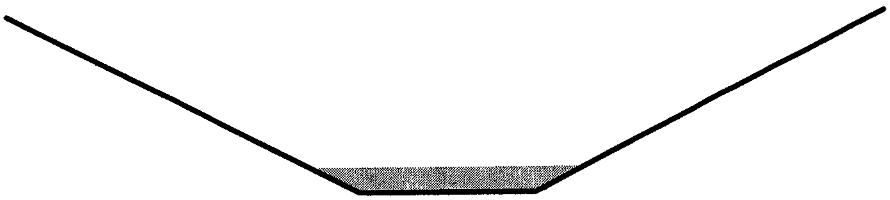
Summary for Reach 4IR-A: EAST PD - 2

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 2.07 cfs @ 12.10 hrs, Volume= 0.154 af
Outflow = 1.94 cfs @ 12.16 hrs, Volume= 0.154 af, Atten= 6%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.82 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 6.0 min

Peak Storage= 231 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.27'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 100.55 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 330.0' Slope= 0.0176 '/'
Inlet Invert= 218.70', Outlet Invert= 212.90'



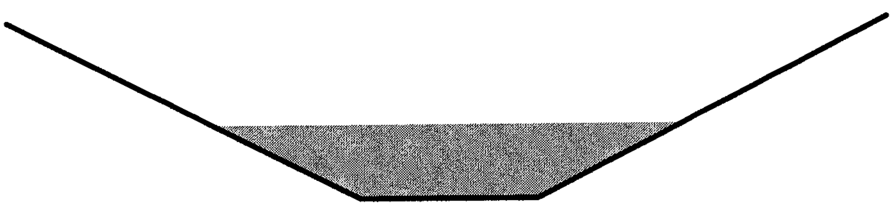
Summary for Reach 4IR-B: EAST PD - 3

Inflow Area =	10.870 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	17.71 cfs @	12.24 hrs, Volume=	1.781 af
Outflow =	17.60 cfs @	12.26 hrs, Volume=	1.781 af, Atten= 1%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.84 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 2.03 fps, Avg. Travel Time= 1.7 min

Peak Storage= 638 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.83'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 113.47 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 210.0' Slope= 0.0224 '/'
Inlet Invert= 212.20', Outlet Invert= 207.50'



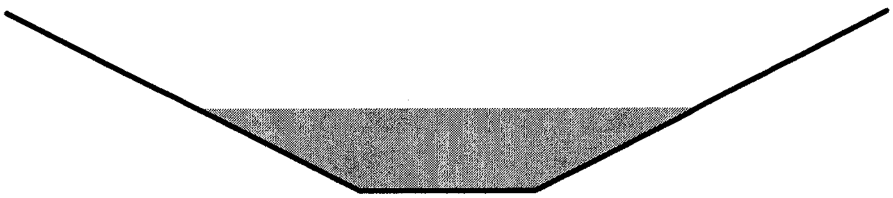
Summary for Reach 4JR: EAST PD 1

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	19.82 cfs @	12.25 hrs, Volume=	2.017 af
Outflow =	19.70 cfs @	12.27 hrs, Volume=	2.017 af, Atten= 1%, Lag= 1.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.56 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.19 fps, Avg. Travel Time= 1.4 min

Peak Storage= 653 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.93'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 101.85 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 183.0' Slope= 0.0180 '/'
Inlet Invert= 222.00', Outlet Invert= 218.70'



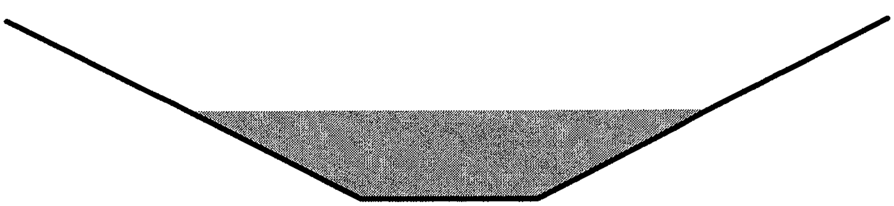
Summary for Reach 4R: DP-10 DITCH 3

Inflow Area = 23.180 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 35.39 cfs @ 12.33 hrs, Volume= 3.798 af
Outflow = 35.24 cfs @ 12.34 hrs, Volume= 3.798 af, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.15 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 3.34 fps, Avg. Travel Time= 1.3 min

Peak Storage= 1,005 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.98'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 162.94 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 260.0' Slope= 0.0462 '/'
Inlet Invert= 191.00', Outlet Invert= 179.00'



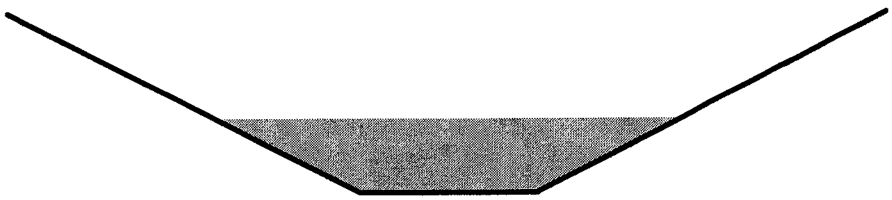
Summary for Reach 5R: NORTH PD-1

Inflow Area = 12.750 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 20.57 cfs @ 12.25 hrs, Volume= 2.089 af
Outflow = 20.17 cfs @ 12.32 hrs, Volume= 2.089 af, Atten= 2%, Lag= 4.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.71 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 2.45 fps, Avg. Travel Time= 6.4 min

Peak Storage= 2,816 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.82'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 131.18 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 936.0' Slope= 0.0299 '/'
Inlet Invert= 210.00', Outlet Invert= 182.00'



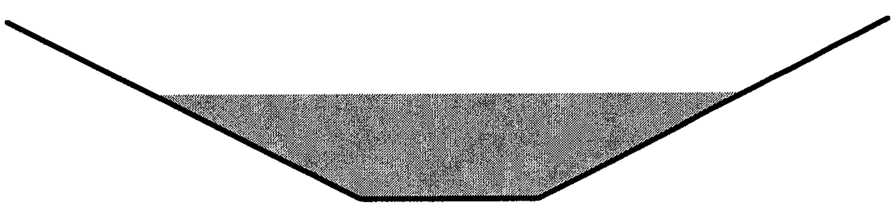
Summary for Reach 6R: NORTH PD-2

Inflow Area = 13.996 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 21.89 cfs @ 12.28 hrs, Volume= 2.294 af
Outflow = 21.59 cfs @ 12.33 hrs, Volume= 2.294 af, Atten= 1%, Lag= 2.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.22 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 1.64 fps, Avg. Travel Time= 3.7 min

Peak Storage= 1,884 cf @ 12.30 hrs
Average Depth at Peak Storage= 1.18'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 67.70 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 364.0' Slope= 0.0080 '/'
Inlet Invert= 202.90', Outlet Invert= 200.00'



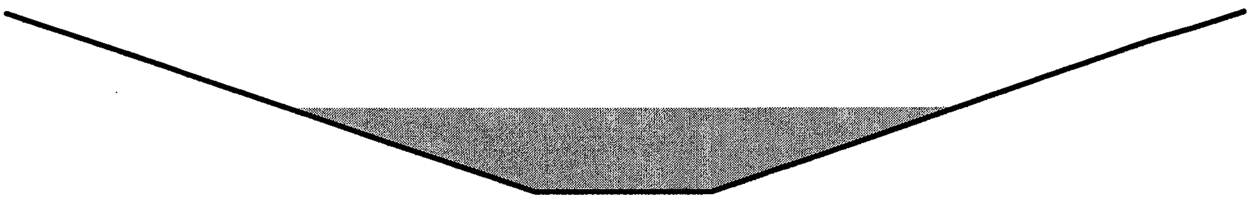
Summary for Reach 7R: DP-10R

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth > 1.85" for 25-yr Storm event
Inflow = 18.32 cfs @ 12.75 hrs, Volume= 4.357 af
Outflow = 15.92 cfs @ 12.96 hrs, Volume= 4.356 af, Atten= 13%, Lag= 12.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.56 fps, Min. Travel Time= 5.3 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 27.0 min

Peak Storage= 5,071 cf @ 12.87 hrs
Average Depth at Peak Storage= 0.93'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 88.21 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= 1,130.0' Slope= 0.0248 '/'
Inlet Invert= 170.00', Outlet Invert= 142.00'



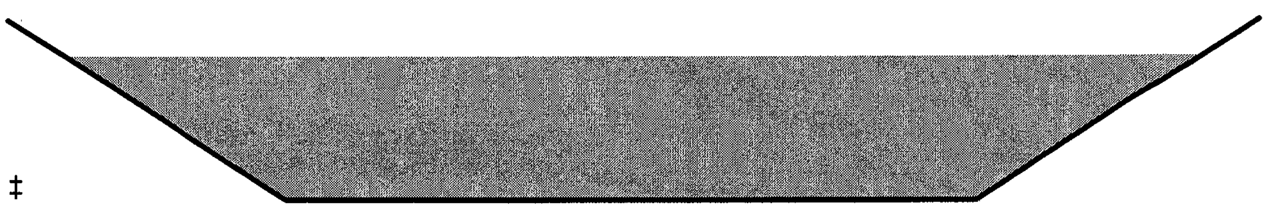
Summary for Reach 8R: EAST PD - 6

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 17.06 cfs @ 12.27 hrs, Volume= 1.781 af
Outflow = 16.80 cfs @ 12.32 hrs, Volume= 1.781 af, Atten= 2%, Lag= 3.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.20 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 0.98 fps, Avg. Travel Time= 6.1 min

Peak Storage= 1,899 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.80'
Bank-Full Depth= 1.00' Flow Area= 7.0 sf, Capacity= 25.35 cfs

5.00' x 1.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 360.0' Slope= 0.0056 '/'
Inlet Invert= 222.00', Outlet Invert= 220.00'



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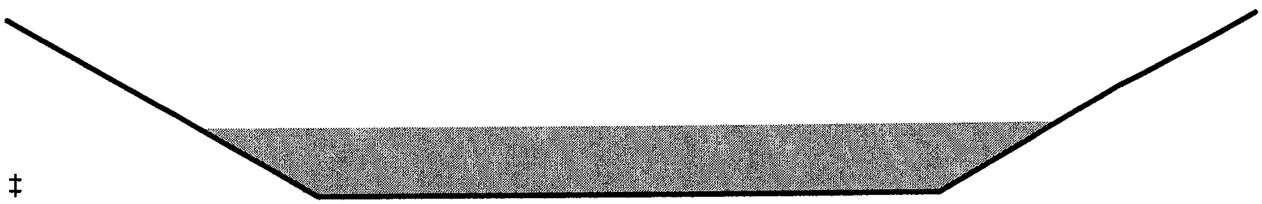
Summary for Reach 9R: LEVEL SPREADER DISCHARGE

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth > 1.61" for 25-yr Storm event
Inflow = 2.04 cfs @ 18.50 hrs, Volume= 4.456 af
Outflow = 2.04 cfs @ 19.12 hrs, Volume= 4.450 af, Atten= 0%, Lag= 37.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 0.22 fps, Min. Travel Time= 20.5 min
Avg. Velocity = 0.09 fps, Avg. Travel Time= 48.7 min

Peak Storage= 2,507 cf @ 18.78 hrs
Average Depth at Peak Storage= 0.39'
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'



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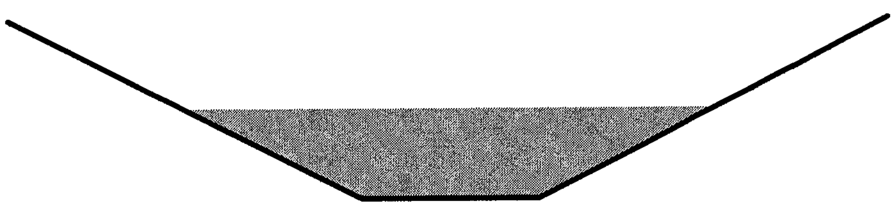
Summary for Reach 10R: Ditch 4B1

Inflow Area =	10.870 ac,	0.00% Impervious,	Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	16.45 cfs @	12.37 hrs, Volume=	1.781 af	
Outflow =	16.25 cfs @	12.41 hrs, Volume=	1.781 af,	Atten= 1%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.01 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.43 fps, Avg. Travel Time= 4.1 min

Peak Storage= 1,436 cf @ 12.39 hrs
Average Depth at Peak Storage= 1.01'
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'



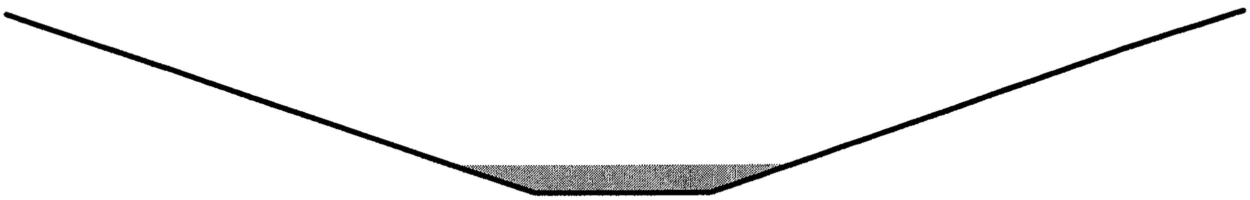
Summary for Reach 11R: DP-11R

Inflow Area =	22.282 ac,	4.04% Impervious,	Inflow Depth > 1.96"	for 25-yr Storm event
Inflow =	1.42 cfs @	18.07 hrs, Volume=	3.639 af	
Outflow =	1.42 cfs @	18.39 hrs, Volume=	3.638 af,	Atten= 0%, Lag= 19.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.57 fps, Min. Travel Time= 11.1 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 24.9 min

Peak Storage= 950 cf @ 18.20 hrs
Average Depth at Peak Storage= 0.31'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 71.30 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,050.0' Slope= 0.0162 '/'
Inlet Invert= 158.00', Outlet Invert= 141.00'



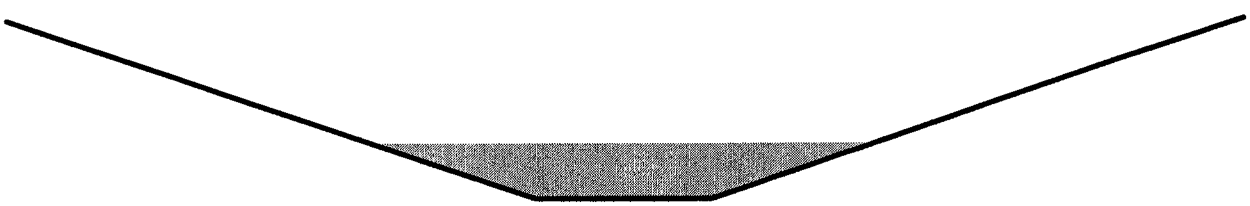
Summary for Reach 12R: 4FR

Inflow Area =	6.771 ac,	0.00% Impervious, Inflow Depth = 1.89"	for 25-yr Storm event
Inflow =	5.21 cfs @	13.04 hrs, Volume=	1.066 af
Outflow =	4.99 cfs @	13.40 hrs, Volume=	1.066 af, Atten= 4%, Lag= 21.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.07 fps, Min. Travel Time= 12.2 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 34.9 min

Peak Storage= 3,665 cf @ 13.20 hrs
Average Depth at Peak Storage= 0.62'
Bank-Full Depth= 2.00' Flow Area= 16.0 sf, Capacity= 64.21 cfs

2.00' x 2.00' deep channel, n= 0.045
Side Slope Z-value= 3.0 '/' Top Width= 14.00'
Length= 1,523.0' Slope= 0.0131 '/'
Inlet Invert= 161.00', Outlet Invert= 141.00'



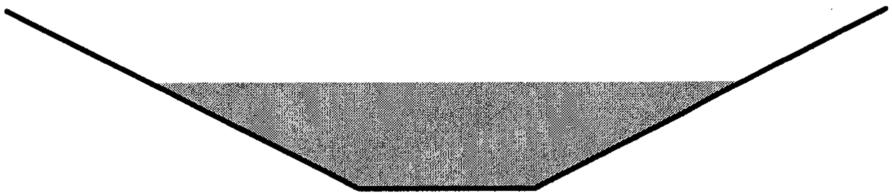
Summary for Reach 13R: Ex Ditch

Inflow Area =	18.370 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	26.42 cfs @	12.35 hrs, Volume=	3.010 af
Outflow =	26.19 cfs @	12.37 hrs, Volume=	3.010 af, Atten= 1%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.06 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.83 fps, Avg. Travel Time= 2.0 min

Peak Storage= 1,173 cf @ 12.36 hrs
Average Depth at Peak Storage= 1.19'
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'



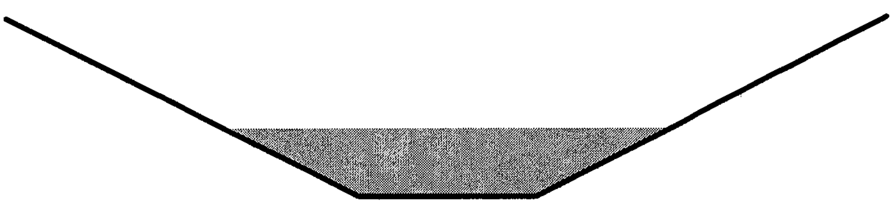
Summary for Reach 14R: DP-10 DITCH 2

Inflow Area =	12.310 ac,	0.00% Impervious,	Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	19.00 cfs @	12.34 hrs, Volume=	2.017 af	
Outflow =	18.85 cfs @	12.37 hrs, Volume=	2.017 af, Atten= 1%, Lag= 1.8 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.05 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 2.71 fps, Avg. Travel Time= 2.7 min

Peak Storage= 1,168 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 143.33 cfs

2.00' x 2.00' deep channel, n= 0.025
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 434.0' Slope= 0.0357 '/'
Inlet Invert= 209.00', Outlet Invert= 193.50'



Summary for Reach AP1: AP-1

Inflow Area =	135.571 ac,	2.88% Impervious,	Inflow Depth = 1.69"	for 25-yr Storm event
Inflow =	68.29 cfs @	13.48 hrs, Volume=	19.050 af	
Outflow =	68.29 cfs @	13.48 hrs, Volume=	19.050 af, Atten= 0%, Lag= 0.0 min	

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP2: ANALYSIS POINT #2

Inflow Area = 74.320 ac, 3.55% Impervious, Inflow Depth = 2.13" for 25-yr Storm event
Inflow = 33.15 cfs @ 13.73 hrs, Volume= 13.180 af
Outflow = 33.15 cfs @ 13.73 hrs, Volume= 13.180 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP3: ANALYSIS POINT #3

Inflow Area = 270.330 ac, 1.32% Impervious, Inflow Depth = 2.12" for 25-yr Storm event
Inflow = 100.29 cfs @ 15.24 hrs, Volume= 47.866 af
Outflow = 100.29 cfs @ 15.24 hrs, Volume= 47.866 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP4: AP4

Inflow Area = 340.334 ac, 2.56% Impervious, Inflow Depth > 2.15" for 25-yr Storm event
Inflow = 112.52 cfs @ 15.04 hrs, Volume= 61.081 af
Outflow = 112.52 cfs @ 15.04 hrs, Volume= 61.081 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach AP5: ANALYSIS POINT #5

Inflow Area = 35.960 ac, 0.40% Impervious, Inflow Depth = 2.37" for 25-yr Storm event
Inflow = 17.74 cfs @ 14.70 hrs, Volume= 7.107 af
Outflow = 17.74 cfs @ 14.70 hrs, Volume= 7.107 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Summary for Reach E2R2: E2R2

Inflow Area = 1.921 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 2.43 cfs @ 12.46 hrs, Volume= 0.315 af
Outflow = 0.53 cfs @ 16.57 hrs, Volume= 0.315 af, Atten= 78%, Lag= 246.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.38 fps, Min. Travel Time= 189.0 min
Avg. Velocity = 0.15 fps, Avg. Travel Time= 470.8 min

Peak Storage= 6,027 cf @ 13.43 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 2.00' Flow Area= 64.0 sf, Capacity= 132.12 cfs

12.00' x 2.00' deep channel, n= 0.080
Side Slope Z-value= 10.0 '/' Top Width= 52.00'
Length= 4,356.0' Slope= 0.0094 '/'
Inlet Invert= 182.00', Outlet Invert= 141.00'

‡

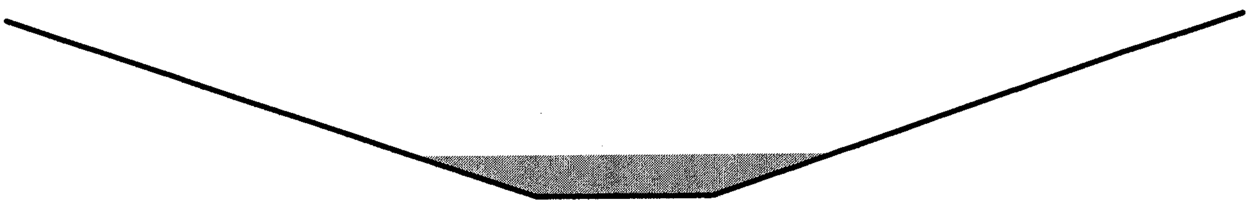
Summary for Reach E2R3: REACH TO AP

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth > 1.61" for 25-yr Storm event
Inflow = 2.04 cfs @ 19.12 hrs, Volume= 4.450 af
Outflow = 2.03 cfs @ 20.00 hrs, Volume= 4.443 af, Atten= 0%, Lag= 52.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.32 fps, Min. Travel Time= 27.5 min
Avg. Velocity = 0.62 fps, Avg. Travel Time= 58.6 min

Peak Storage= 3,358 cf @ 19.54 hrs
Average Depth at Peak Storage= 0.46'
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'



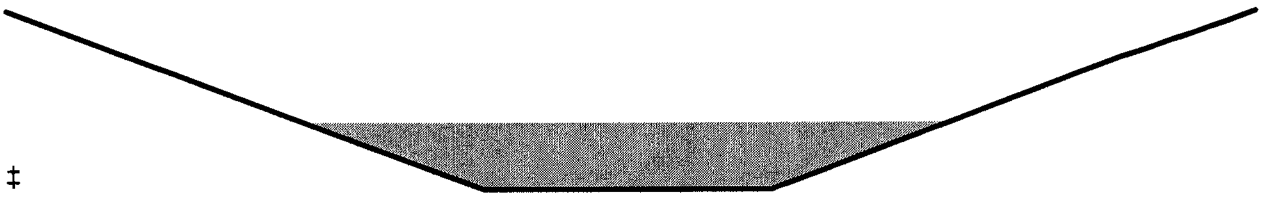
Summary for Reach E2R4: Reach to AP

Inflow Area = 92.419 ac, 5.17% Impervious, Inflow Depth > 1.79" for 25-yr Storm event
Inflow = 20.22 cfs @ 12.99 hrs, Volume= 13.818 af
Outflow = 17.37 cfs @ 13.49 hrs, Volume= 13.809 af, Atten= 14%, Lag= 29.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.19 fps, Min. Travel Time= 13.5 min
Avg. Velocity = 0.35 fps, Avg. Travel Time= 45.2 min

Peak Storage= 14,050 cf @ 13.26 hrs
Average Depth at Peak Storage= 0.75'
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'



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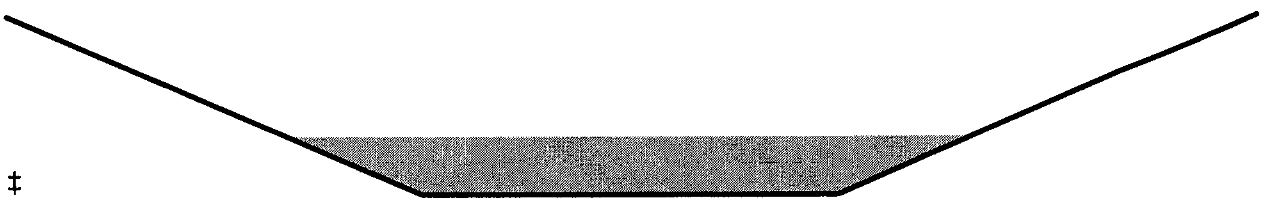
Summary for Reach R-1D: Reach R-1D

Inflow Area = 34.624 ac, 3.31% Impervious, Inflow Depth = 1.41" for 25-yr Storm event
Inflow = 7.74 cfs @ 13.03 hrs, Volume= 4.068 af
Outflow = 7.74 cfs @ 13.13 hrs, Volume= 4.068 af, Atten= 0%, Lag= 5.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.81 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.31 fps, Avg. Travel Time= 19.7 min

Peak Storage= 1,580 cf @ 13.07 hrs
Average Depth at Peak Storage= 0.32'
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'



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Summary for Reach R-1E: LEVEL SPREADER R-1E

Inflow Area = 10.745 ac, 0.00% Impervious, Inflow Depth = 2.06" for 25-yr Storm event
Inflow = 9.55 cfs @ 12.50 hrs, Volume= 1.847 af
Outflow = 9.54 cfs @ 12.54 hrs, Volume= 1.847 af, Atten= 0%, Lag= 2.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.26 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.57 fps, Avg. Travel Time= 6.1 min

Peak Storage= 887 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.23'
Bank-Full Depth= 1.00' Flow Area= 26.0 sf, Capacity= 135.95 cfs

16.00' x 1.00' deep channel, n= 0.060
Side Slope Z-value= 10.0 '/' Top Width= 36.00'
Length= 210.0' Slope= 0.0690 '/'
Inlet Invert= 161.50', Outlet Invert= 147.00'

‡

Summary for Reach R-1F: Reach R-1F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 25-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 49.21 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= 0.0170 '/'
Inlet Invert= 167.50', Outlet Invert= 151.50'

‡

Summary for Reach R-1H: LEVEL SPREADER R-1H

Inflow Area = 3.030 ac, 0.00% Impervious, Inflow Depth = 2.81" for 25-yr Storm event
Inflow = 7.28 cfs @ 12.25 hrs, Volume= 0.709 af
Outflow = 7.17 cfs @ 12.28 hrs, Volume= 0.709 af, Atten= 2%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.19 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 4.5 min

Peak Storage= 562 cf @ 12.26 hrs
Average Depth at Peak Storage= 0.09'
Bank-Full Depth= 1.00' Flow Area= 44.0 sf, Capacity= 411.95 cfs

34.00' x 1.00' deep channel, n= 0.030
Side Slope Z-value= 10.0 '/' Top Width= 54.00'
Length= 170.0' Slope= 0.0471 '/'
Inlet Invert= 182.00', Outlet Invert= 174.00'

Summary for Reach R-2F: Reach R2-F

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.00" for 25-yr Storm event
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

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.00 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 0.00 fps, Avg. Travel Time= 0.0 min

Peak Storage= 0 cf @ 0.00 hrs
Average Depth at Peak Storage= 0.00'
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'

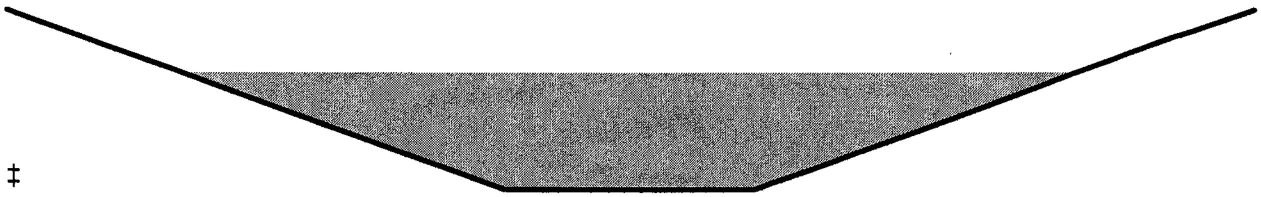
Summary for Reach R1: Reach 1

Inflow Area = 112.491 ac, 3.46% Impervious, Inflow Depth = 1.58" for 25-yr Storm event
Inflow = 52.38 cfs @ 13.38 hrs, Volume= 14.808 af
Outflow = 52.01 cfs @ 13.58 hrs, Volume= 14.808 af, Atten= 1%, Lag= 11.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.73 fps, Min. Travel Time= 6.7 min
Avg. Velocity = 0.24 fps, Avg. Travel Time= 49.5 min

Peak Storage= 21,013 cf @ 13.46 hrs
Average Depth at Peak Storage= 1.30'
Bank-Full Depth= 2.00' Flow Area= 60.0 sf, Capacity= 132.69 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= 0.0016 '/'
Inlet Invert= 146.30', Outlet Invert= 145.20'



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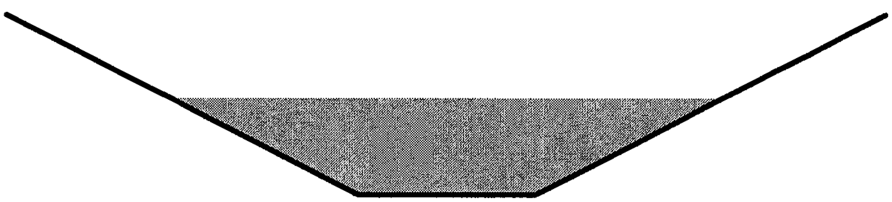
Summary for Reach R1B: LF TOE DITCH

Inflow Area = 13.169 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 21.08 cfs @ 12.25 hrs, Volume= 2.158 af
Outflow = 20.70 cfs @ 12.31 hrs, Volume= 2.158 af, Atten= 2%, Lag= 3.6 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.66 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.75 fps, Avg. Travel Time= 5.1 min

Peak Storage= 2,407 cf @ 12.28 hrs
Average Depth at Peak Storage= 1.07'
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'



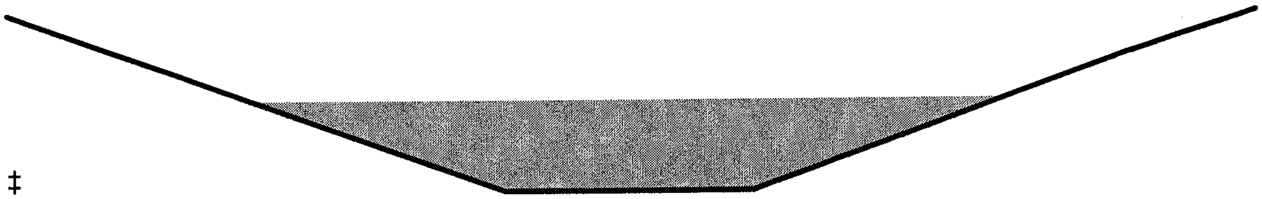
Summary for Reach R2: Reach 2

Inflow Area = 64.567 ac, 4.26% Impervious, Inflow Depth = 1.49" for 25-yr Storm event
Inflow = 36.10 cfs @ 13.19 hrs, Volume= 8.017 af
Outflow = 35.21 cfs @ 13.49 hrs, Volume= 8.017 af, Atten= 2%, Lag= 17.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.71 fps, Min. Travel Time= 10.3 min
Avg. Velocity = 0.44 fps, Avg. Travel Time= 39.7 min

Peak Storage= 21,682 cf @ 13.32 hrs
Average Depth at Peak Storage= 1.02'
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= 1,050.0' Slope= 0.0020 '/'
Inlet Invert= 148.40', Outlet Invert= 146.30'



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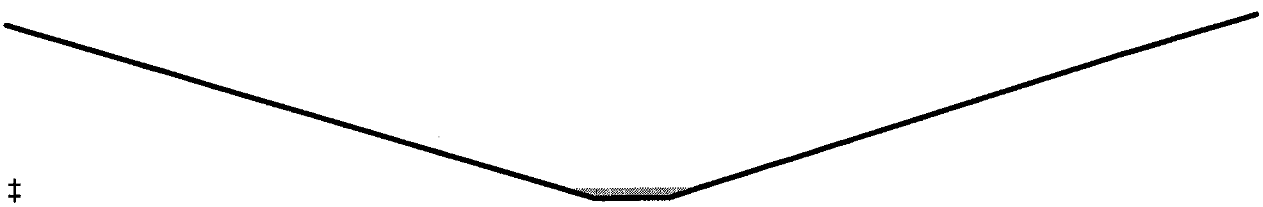
Summary for Reach R2A: Reach 2A

Inflow Area = 20.177 ac, 3.27% Impervious, Inflow Depth > 1.92" for 25-yr Storm event
Inflow = 2.44 cfs @ 15.88 hrs, Volume= 3.228 af
Outflow = 2.38 cfs @ 17.79 hrs, Volume= 3.227 af, Atten= 2%, Lag= 114.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.57 fps, Min. Travel Time= 57.1 min
Avg. Velocity = 0.25 fps, Avg. Travel Time= 131.9 min

Peak Storage= 8,164 cf @ 16.84 hrs
Average Depth at Peak Storage= 0.11'
Bank-Full Depth= 2.00' Flow Area= 450.0 sf, Capacity= 1,358.84 cfs

25.00' x 2.00' deep channel, n= 0.060
Side Slope Z-value= 100.0 '/' Top Width= 425.00'
Length= 1,960.0' Slope= 0.0138 '/'
Inlet Invert= 179.00', Outlet Invert= 152.00'



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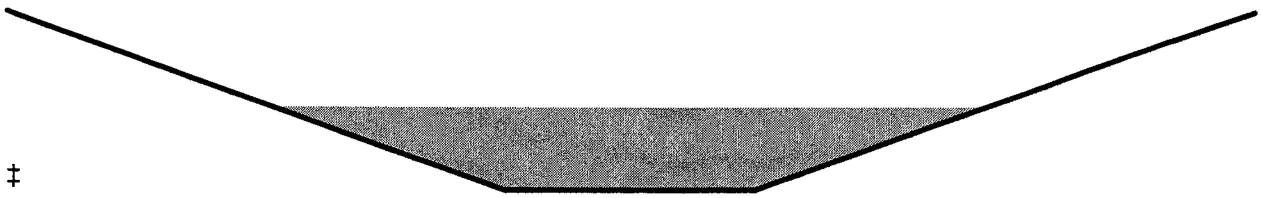
Summary for Reach R3: Reach 3

Inflow Area = 53.822 ac, 5.11% Impervious, Inflow Depth = 1.38" for 25-yr Storm event
Inflow = 29.90 cfs @ 12.99 hrs, Volume= 6.170 af
Outflow = 29.33 cfs @ 13.24 hrs, Volume= 6.170 af, Atten= 2%, Lag= 15.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.62 fps, Min. Travel Time= 8.2 min
Avg. Velocity = 0.52 fps, Avg. Travel Time= 25.5 min

Peak Storage= 14,458 cf @ 13.11 hrs
Average Depth at Peak Storage= 0.93'
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= 800.0' Slope= 0.0020 '/'
Inlet Invert= 150.00', Outlet Invert= 148.40'



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Summary for Reach R5a: Grass Lined Ditch

Inflow Area = 9.334 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 15.16 cfs @ 12.24 hrs, Volume= 1.530 af
Outflow = 15.08 cfs @ 12.26 hrs, Volume= 1.530 af, Atten= 1%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.83 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.38 fps, Avg. Travel Time= 1.4 min

Peak Storage= 444 cf @ 12.25 hrs
Average Depth at Peak Storage= 0.45'
Bank-Full Depth= 3.00' Flow Area= 30.0 sf, Capacity= 572.96 cfs

4.00' x 3.00' deep channel, n= 0.025
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 Pond 1P: Culvert - 4JB & FJC

Inflow Area = 12.310 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 19.11 cfs @ 12.32 hrs, Volume= 2.017 af
Outflow = 19.00 cfs @ 12.34 hrs, Volume= 2.017 af, Atten= 1%, Lag= 1.2 min
Primary = 19.00 cfs @ 12.34 hrs, Volume= 2.017 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 211.64' @ 12.34 hrs Surf.Area= 1,107 sf Storage= 944 cf

Plug-Flow detention time= 0.8 min calculated for 2.017 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (861.9 - 861.1)

Volume	Invert	Avail.Storage	Storage Description
#1	210.00'	3,853 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
210.00	43	0	0
212.00	1,340	1,383	1,383
213.00	3,600	2,470	3,853

Device	Routing	Invert	Outlet Devices
#1	Primary	210.00'	**24.0" Round Culvert X 2.00** L= 73.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 210.00' / 209.00' S= 0.0137 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=18.92 cfs @ 12.34 hrs HW=211.64' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 18.92 cfs @ 3.44 fps)

Summary for Pond 4IAC: Culvert - 4IA

Inflow Area = 0.940 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 1.94 cfs @ 12.16 hrs, Volume= 0.154 af
Outflow = 1.82 cfs @ 12.20 hrs, Volume= 0.154 af, Atten= 6%, Lag= 2.4 min
Primary = 1.82 cfs @ 12.20 hrs, Volume= 0.154 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 213.60' @ 12.20 hrs Surf.Area= 614 sf Storage= 302 cf

Plug-Flow detention time= 5.8 min calculated for 0.154 af (100% of inflow)
Center-of-Mass det. time= 5.8 min (859.6 - 853.8)

Volume	Invert	Avail.Storage	Storage Description
#1	212.90'	1,559 cf	**2.00'W x 125.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	212.90'	**18.0" Round Culvert - 4IA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 212.90' / 212.20' S= 0.0175 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.82 cfs @ 12.20 hrs HW=213.60' (Free Discharge)
↑—**1=Culvert - 4IA** (Inlet Controls 1.82 cfs @ 2.25 fps)

Summary for Pond 8P: Ex Pond

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth > 1.88" for 25-yr Storm event
Inflow = 16.88 cfs @ 12.75 hrs, Volume= 4.425 af
Outflow = 18.32 cfs @ 12.75 hrs, Volume= 4.357 af, Atten= 0%, Lag= 0.1 min
Primary = 18.32 cfs @ 12.75 hrs, Volume= 4.357 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 172.57' @ 12.75 hrs Surf.Area= 4,500 sf Storage= 4,765 cf

Plug-Flow detention time= 123.8 min calculated for 4.355 af (98% of inflow)

Center-of-Mass det. time= 15.8 min (1,420.6 - 1,404.8)

Volume	Invert	Avail.Storage	Storage Description
#1	171.20'	4,765 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
171.20	3,900	0	0
172.00	4,600	3,400	3,400
172.30	4,500	1,365	4,765

Device	Routing	Invert	Outlet Devices
#1	Primary	171.90'	**12.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=18.31 cfs @ 12.75 hrs HW=172.57' (Free Discharge)
└—**1=Broad-Crested Rectangular Weir** (Weir Controls 18.31 cfs @ 2.28 fps)

Summary for Pond C-2B-A: Culvert - 2BA

Inflow Area = 13.996 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 22.34 cfs @ 12.26 hrs, Volume= 2.294 af
Outflow = 21.89 cfs @ 12.28 hrs, Volume= 2.294 af, Atten= 2%, Lag= 1.7 min
Primary = 21.89 cfs @ 12.28 hrs, Volume= 2.294 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 205.43' @ 12.28 hrs Surf.Area= 1,533 sf Storage= 1,750 cf

Plug-Flow detention time= 0.9 min calculated for 2.294 af (100% of inflow)
Center-of-Mass det. time= 0.9 min (858.9 - 858.0)

Volume	Invert	Avail.Storage	Storage Description
#1	203.50'	1,859 cf	**2.00'W x 150.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	203.20'	**36.0" Round Culvert - 2BA** L= 40.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 203.20' / 202.90' S= 0.0075 '/' Cc= 0.900 n= 0.011, Flow Area= 7.07 sf
#2	Secondary	205.00'	**4.0' long x 2.0' breadth Southern Ditch High Water Outlet X 0.00** 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=21.74 cfs @ 12.28 hrs HW=205.42' (Free Discharge)
↑—**1=Culvert - 2BA** (Barrel Controls 21.74 cfs @ 5.40 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=203.50' (Free Discharge)
↑—**2=Southern Ditch High Water Outlet**(Controls 0.00 cfs)

Summary for Pond C-4F: Culvert - 4F

Inflow Area = 6.771 ac, 0.00% Impervious, Inflow Depth = 1.89" for 25-yr Storm event
Inflow = 5.26 cfs @ 12.96 hrs, Volume= 1.066 af
Outflow = 5.21 cfs @ 13.04 hrs, Volume= 1.066 af, Atten= 1%, Lag= 4.5 min
Primary = 5.21 cfs @ 13.04 hrs, Volume= 1.066 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 166.34' @ 13.04 hrs Surf.Area= 0.029 ac Storage= 0.025 af

Plug-Flow detention time= 4.5 min calculated for 1.066 af (100% of inflow)
Center-of-Mass det. time= 4.5 min (912.7 - 908.1)

Volume	Invert	Avail.Storage	Storage Description
#1	165.00'	0.047 af	**4.00'W x 96.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	165.00'	**18.0" Round Culvert - 4F** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 165.00' / 162.00' S= 0.0385 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=5.20 cfs @ 13.04 hrs HW=166.34' (Free Discharge)
↑—**1=Culvert - 4F** (Inlet Controls 5.20 cfs @ 3.12 fps)

Summary for Pond C-4K: Catch Basin - 4K

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 16.80 cfs @ 12.32 hrs, Volume= 1.781 af
Outflow = 16.45 cfs @ 12.37 hrs, Volume= 1.781 af, Atten= 2%, Lag= 2.5 min
Primary = 16.45 cfs @ 12.37 hrs, Volume= 1.781 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 220.74' @ 12.37 hrs Surf.Area= 4,409 sf Storage= 2,659 cf

Plug-Flow detention time= 4.3 min calculated for 1.781 af (100% of inflow)
Center-of-Mass det. time= 4.3 min (868.6 - 864.3)

Volume	Invert	Avail.Storage	Storage Description
#1	220.00'	3,865 cf	**5.00'W x 550.00'L x 1.00'H Prismatoid Z=2.0**

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' / 214.30' S= 0.0431 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	220.00'	**30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=16.33 cfs @ 12.37 hrs HW=220.74' (Free Discharge)
└─**1=Culvert - 4K** (Passes 16.33 cfs of 27.23 cfs potential flow)
  └─**2=Orifice/Grate** (Weir Controls 16.33 cfs @ 2.81 fps)

Summary for Pond C4B: Culvert - 4BA & 4BB

Inflow Area =	20.700 ac,	1.27% Impervious, Inflow Depth =	2.04"	for 25-yr Storm event
Inflow =	29.93 cfs @	12.35 hrs, Volume=	3.521 af	
Outflow =	29.11 cfs @	12.40 hrs, Volume=	3.521 af,	Atten= 3%, Lag= 3.0 min
Primary =	29.11 cfs @	12.40 hrs, Volume=	3.521 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 206.89' @ 12.40 hrs Surf.Area= 2,406 sf Storage= 1,124 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.1 min (863.5 - 863.3)

Volume	Invert	Avail.Storage	Storage Description
#1	204.40'	11,197 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	47	38	38
208.00	5,375	5,422	5,460
209.00	6,100	5,738	11,197

Device	Routing	Invert	Outlet Devices
#1	Primary	204.40'	**24.0" Round Culvert - 4B X 2.00** L= 78.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 204.40' / 203.70' S= 0.0090 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf

Primary OutFlow Max=29.08 cfs @ 12.40 hrs HW=206.88' (Free Discharge)
└─**1=Culvert - 4B** (Inlet Controls 29.08 cfs @ 4.63 fps)

Summary for Pond C4H-A: Culvert 4H-A

Inflow Area =	0.780 ac,	0.00% Impervious, Inflow Depth =	1.97"	for 25-yr Storm event
Inflow =	1.60 cfs @	12.16 hrs, Volume=	0.128 af	
Outflow =	1.33 cfs @	12.23 hrs, Volume=	0.128 af,	Atten= 17%, Lag= 4.2 min
Primary =	1.33 cfs @	12.23 hrs, Volume=	0.128 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 202.49' @ 12.23 hrs Surf.Area= 1,230 sf Storage= 527 cf

Plug-Flow detention time= 14.1 min calculated for 0.128 af (100% of inflow)
Center-of-Mass det. time= 14.2 min (867.2 - 853.0)

Volume	Invert	Avail.Storage	Storage Description
#1	201.90'	3,419 cf	**2.00'W x 280.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	201.90'	**18.0" Round Culvert - 4HA** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 201.90' / 200.90' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.32 cfs @ 12.23 hrs HW=202.49' (Free Discharge)
↑**1=Culvert - 4HA** (Inlet Controls 1.32 cfs @ 2.06 fps)

Summary for Pond C4N: Culvert 4N

Inflow Area =	1.921 ac,	0.00% Impervious, Inflow Depth =	1.97"	for 25-yr Storm event
Inflow =	2.43 cfs @	12.45 hrs, Volume=	0.315 af	
Outflow =	2.43 cfs @	12.46 hrs, Volume=	0.315 af,	Atten= 0%, Lag= 0.9 min
Primary =	2.43 cfs @	12.46 hrs, Volume=	0.315 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.82' @ 12.46 hrs Surf.Area= 0.006 ac Storage= 0.004 af

Plug-Flow detention time= 1.8 min calculated for 0.315 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (871.8 - 870.0)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	0.015 af	**2.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	184.00'	**18.0" Round 18-in Culvert** L= 33.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.00' / 183.00' S= 0.0303 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.42 cfs @ 12.46 hrs HW=184.82' (Free Discharge)
↑**1=18-in Culvert** (Inlet Controls 2.42 cfs @ 2.44 fps)

Summary for Pond CB-2B-B: Catch Basin - 2BB

Inflow Area =	13.996 ac,	0.00% Impervious, Inflow Depth =	1.97"	for 25-yr Storm event
Inflow =	21.59 cfs @	12.33 hrs, Volume=	2.294 af	
Outflow =	21.51 cfs @	12.35 hrs, Volume=	2.294 af,	Atten= 0%, Lag= 1.2 min
Primary =	21.51 cfs @	12.35 hrs, Volume=	2.294 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 200.83' @ 12.35 hrs Surf.Area= 914 sf Storage= 412 cf

Plug-Flow detention time= 0.1 min calculated for 2.293 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (862.9 - 862.8)

Volume	Invert	Avail.Storage	Storage Description
#1	200.20'	2,459 cf	**2.00'W x 200.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	195.00'	**24.0" Round Culvert - 2BB** L= 96.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 195.00' / 194.00' S= 0.0104 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	200.00'	**30.0" Horiz. Orifice/Grate** C= 0.600

Primary OutFlow Max=21.51 cfs @ 12.35 hrs HW=200.83' (Free Discharge)
└─**1=Culvert - 2BB** (Passes 21.51 cfs of 33.24 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 21.51 cfs @ 4.38 fps)

Summary for Pond CB-4G: Catch Basin - 4G

Inflow Area =	12.750 ac,	0.00% Impervious,	Inflow Depth =	1.97"	for 25-yr Storm event
Inflow =	20.17 cfs @	12.32 hrs, Volume=	2.089 af		
Outflow =	19.65 cfs @	12.36 hrs, Volume=	2.089 af,	Atten= 3%,	Lag= 2.5 min
Primary =	19.65 cfs @	12.36 hrs, Volume=	2.089 af		

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 182.69' @ 12.36 hrs Surf.Area= 983 sf Storage= 921 cf

Plug-Flow detention time= 0.4 min calculated for 2.089 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (864.4 - 864.0)

Volume	Invert	Avail.Storage	Storage Description
#1	181.00'	1,256 cf	**2.00'W x 71.00'L x 2.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	175.00'	**24.0" Round Culvert - 4G** L= 36.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.00' / 174.00' S= 0.0278 '/' Cc= 0.900 n= 0.011, Flow Area= 3.14 sf
#2	Device 1	181.00'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=19.55 cfs @ 12.36 hrs HW=182.67' (Free Discharge)
└─**1=Culvert - 4G** (Passes 19.55 cfs of 39.07 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 19.55 cfs @ 6.22 fps)

Summary for Pond CB-4HB: Catch Basin - 4HB

Inflow Area = 4.180 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 7.36 cfs @ 12.22 hrs, Volume= 0.685 af
Outflow = 7.36 cfs @ 12.22 hrs, Volume= 0.685 af, Atten= 0%, Lag= 0.1 min
Primary = 7.36 cfs @ 12.22 hrs, Volume= 0.685 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 183.80' @ 12.22 hrs Surf.Area= 109 sf Storage= 40 cf

Plug-Flow detention time= 0.1 min calculated for 0.685 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (859.2 - 859.0)

Volume	Invert	Avail.Storage	Storage Description
#1	183.30'	359 cf	**2.00'W x 25.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Device 2	183.30'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Primary	178.50'	**18.0" Round Culvert - 4HB** L= 101.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 178.50' / 176.00' S= 0.0248 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=7.23 cfs @ 12.22 hrs HW=183.80' (Free Discharge)
2=Culvert - 4HB (Passes 7.23 cfs of 18.15 cfs potential flow)
1=Orifice/Grate (Weir Controls 7.23 cfs @ 2.31 fps)

Summary for Pond CB-4I: Catch Basin - 4I

Inflow Area = 10.870 ac, 0.00% Impervious, Inflow Depth = 1.97" for 25-yr Storm event
Inflow = 17.60 cfs @ 12.26 hrs, Volume= 1.781 af
Outflow = 17.28 cfs @ 12.29 hrs, Volume= 1.781 af, Atten= 2%, Lag= 1.9 min
Primary = 17.28 cfs @ 12.29 hrs, Volume= 1.781 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 208.90' @ 12.29 hrs Surf.Area= 0.018 ac Storage= 0.016 af

Plug-Flow detention time= 0.9 min calculated for 1.781 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (860.0 - 859.4)

Volume	Invert	Avail.Storage	Storage Description
#1	207.50'	0.029 af	**2.00'W x 100.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	202.50'	**18.0" Round Culvert - 4I** L= 80.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 202.50' / 192.00' S= 0.1313 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	207.60'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=17.20 cfs @ 12.29 hrs HW=208.89' TW=194.89' (TW follows 14.00' below HW)
└─**1=Culvert - 4I** (Passes 17.20 cfs of 20.21 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 17.20 cfs @ 5.47 fps)

Summary for Pond CB-4JA: Catch Basin - 4JA

Inflow Area =	12.310 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	19.70 cfs @	12.27 hrs, Volume=	2.017 af
Outflow =	19.17 cfs @	12.31 hrs, Volume=	2.017 af, Atten= 3%, Lag= 2.5 min
Primary =	19.17 cfs @	12.31 hrs, Volume=	2.017 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 220.31' @ 12.31 hrs Surf.Area= 0.023 ac Storage= 0.022 af

Plug-Flow detention time= 0.6 min calculated for 2.017 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (859.7 - 859.2)

Volume	Invert	Avail.Storage	Storage Description
#1	218.70'	0.032 af	**2.00'W x 113.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	214.00'	**18.0" Round Culvert - 4JA** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 214.00' / 212.30' S= 0.0283 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	218.70'	**24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=19.10 cfs @ 12.31 hrs HW=220.29' TW=213.29' (TW follows 7.00' below HW)
└─**1=Culvert - 4JA** (Passes 19.10 cfs of 20.03 cfs potential flow)
  └─**2=Orifice/Grate** (Orifice Controls 19.10 cfs @ 6.08 fps)

Summary for Pond CB-4L: Catch Basin - 4L

Inflow Area =	7.500 ac,	0.00% Impervious, Inflow Depth = 1.97"	for 25-yr Storm event
Inflow =	13.04 cfs @	12.21 hrs, Volume=	1.229 af
Outflow =	12.24 cfs @	12.25 hrs, Volume=	1.229 af, Atten= 6%, Lag= 2.9 min
Primary =	12.24 cfs @	12.25 hrs, Volume=	1.229 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 215.82' @ 12.25 hrs Surf.Area= 1,773 sf Storage= 1,341 cf

Plug-Flow detention time= 2.9 min calculated for 1.229 af (100% of inflow)
Center-of-Mass det. time= 2.9 min (857.7 - 854.8)

Volume	Invert	Avail.Storage	Storage Description
#1	215.00'	3,683 cf	**30.00'W x 50.00'L x 2.00'H Prismatoid Z=2.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	213.00'	**18.0" Round Culvert 4L** L= 121.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 213.00' / 211.00' S= 0.0165 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#2	Device 1	215.00'	**24.0" Horiz. Orifice-Top of catch basin** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=12.23 cfs @ 12.25 hrs HW=215.82' (Free Discharge)
↑—1=**Culvert 4L** (Inlet Controls 12.23 cfs @ 6.92 fps)
 ↑—2=**Orifice-Top of catch basin** (Passes 12.23 cfs of 13.67 cfs potential flow)

Summary for Pond D-1G: (2)24" Culverts P-6h

Inflow Area = 11.290 ac, 0.00% Impervious, Inflow Depth = 2.05" for 25-yr Storm event
Inflow = 21.20 cfs @ 12.19 hrs, Volume= 1.924 af
Outflow = 21.06 cfs @ 12.19 hrs, Volume= 1.924 af, Atten= 1%, Lag= 0.5 min
Primary = 19.42 cfs @ 12.19 hrs, Volume= 1.908 af
Secondary = 1.63 cfs @ 12.19 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 184.67' @ 12.19 hrs Surf.Area= 667 sf Storage= 561 cf
Flood Elev= 185.00' Surf.Area= 800 sf Storage= 805 cf

Plug-Flow detention time= 0.4 min calculated for 1.923 af (100% of inflow)
Center-of-Mass det. time= 0.4 min (851.3 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	3,305 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	10	0	0
184.00	400	205	205
186.00	1,200	1,600	1,805
187.00	1,800	1,500	3,305

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	184.50'	**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=19.33 cfs @ 12.19 hrs HW=184.66' (Free Discharge)
└─**1=(2)24"-Culvert** (Inlet Controls 19.33 cfs @ 3.46 fps)

Secondary OutFlow Max=1.55 cfs @ 12.19 hrs HW=184.66' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 1.55 cfs @ 0.96 fps)

Summary for Pond D-1H: LF TOE DITCH - CULVERT

Inflow Area =	3.030 ac,	0.00% Impervious, Inflow Depth =	2.81"	for 25-yr Storm event
Inflow =	7.45 cfs @	12.21 hrs, Volume=	0.709 af	
Outflow =	7.28 cfs @	12.25 hrs, Volume=	0.709 af,	Atten= 2%, Lag= 2.0 min
Primary =	7.28 cfs @	12.25 hrs, Volume=	0.709 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 184.69' @ 12.25 hrs Surf.Area= 494 sf Storage= 746 cf
Flood Elev= 186.00' Surf.Area= 858 sf Storage= 1,323 cf

Plug-Flow detention time= 4.0 min calculated for 0.709 af (100% of inflow)
Center-of-Mass det. time= 4.0 min (833.6 - 829.5)

Volume	Invert	Avail.Storage	Storage Description
#1	183.00'	1,323 cf	**Custom Stage Data (Prismatic)** Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
183.00	24	0	0
186.00	858	1,323	1,323

Device	Routing	Invert	Outlet Devices
#1	Primary	183.00'	**18.0" Round Culvert-C-1H** L= 60.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 183.00' / 182.50' S= 0.0083 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=7.26 cfs @ 12.25 hrs HW=184.69' (Free Discharge)
└─**1=Culvert-C-1H** (Inlet Controls 7.26 cfs @ 4.11 fps)

Summary for Pond DP-1: Detention Pond 1

Inflow Area =	34.624 ac,	3.31% Impervious, Inflow Depth =	1.60"	for 25-yr Storm event
Inflow =	38.52 cfs @	12.28 hrs, Volume=	4.626 af	
Outflow =	7.74 cfs @	13.03 hrs, Volume=	4.068 af,	Atten= 80%, Lag= 44.9 min
Primary =	7.74 cfs @	13.03 hrs, Volume=	4.068 af	
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 165.13' @ 13.03 hrs Surf.Area= 19,571 sf Storage= 75,820 cf

Plug-Flow detention time= 185.8 min calculated for 4.068 af (88% of inflow)
Center-of-Mass det. time= 126.3 min (1,019.5 - 893.1)

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	162.00'	**30.0" Round 30" Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.00' / 159.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	162.00'	**12.0" Vert. Orifice on side** C= 0.600
#3	Device 1	162.00'	**6.0" Vert. Orifice on side** C= 0.600
#4	Device 1	165.50'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**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=7.74 cfs @ 13.03 hrs HW=165.13' (Free Discharge)
└─**1=30" Culvert** (Passes 7.74 cfs of 25.61 cfs potential flow)
  ├─**2=Orifice on side** (Orifice Controls 6.14 cfs @ 7.81 fps)
  ├─**3=Orifice on side** (Orifice Controls 1.61 cfs @ 8.18 fps)
  └─**4=Orifice-Top of drop inlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-10: DETENTION POND 10

Inflow Area =	28.280 ac,	4.24% Impervious,	Inflow Depth =	2.05"	for 25-yr Storm event
Inflow =	44.00 cfs @	12.31 hrs,	Volume=	4.842 af	
Outflow =	16.88 cfs @	12.75 hrs,	Volume=	4.425 af,	Atten= 62%, Lag= 26.0 min
Primary =	15.37 cfs @	12.75 hrs,	Volume=	2.131 af	
Secondary =	1.51 cfs @	12.75 hrs,	Volume=	2.294 af	
Tertiary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 179.51' @ 12.75 hrs Surf.Area= 25,024 sf Storage= 88,504 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 587.4 min calculated for 4.423 af (91% of inflow)
Center-of-Mass det. time= 546.3 min (1,404.8 - 858.5)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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=16.06 cfs @ 12.75 hrs HW=179.51' (Free Discharge)
└3=**18-in Primary Culvert** (Inlet Controls 16.06 cfs @ 9.09 fps)
 ├1=**Orifice/Grate** (Passes < 15.05 cfs potential flow)
 └2=**6-in Orifice** (Passes < 1.06 cfs potential flow)

Secondary OutFlow Max=1.51 cfs @ 12.75 hrs HW=179.51' (Free Discharge)
└4=**6-in Culvert** (Passes 1.51 cfs of 1.64 cfs potential flow)
 ├5=**Orifice Top** (Orifice Controls 1.40 cfs @ 7.63 fps)
 └6=**Orifice Side** (Orifice Controls 0.11 cfs @ 8.68 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└7=**E-Spillway Weir** (Controls 0.00 cfs)

Summary for Pond DP-11: Detention Pond 11

Inflow Area =	22.282 ac,	4.04% Impervious, Inflow Depth = 2.04"	for 25-yr Storm event
Inflow =	28.67 cfs @	12.35 hrs, Volume=	3.795 af
Outflow =	1.42 cfs @	18.07 hrs, Volume=	3.639 af, Atten= 95%, Lag= 343.1 min
Primary =	0.17 cfs @	18.07 hrs, Volume=	0.076 af
Secondary =	1.25 cfs @	18.07 hrs, Volume=	3.562 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2

Peak Elev= 167.75' @ 18.07 hrs Surf.Area= 39,116 sf Storage= 115,942 cf

Plug-Flow detention time= 1,275.7 min calculated for 3.639 af (96% of inflow)
Center-of-Mass det. time= 1,252.9 min (2,120.8 - 867.9)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

Primary OutFlow Max=0.17 cfs @ 18.07 hrs HW=167.75' (Free Discharge)
└─**3=18-In Culvert** (Passes 0.17 cfs of 11.04 cfs potential flow)
  ├─**1=6-In Orifice Side (Riser)** (Orifice Controls 0.17 cfs @ 1.71 fps)
  └─**2=Grate Top (Riser)** (Controls 0.00 cfs)

Secondary OutFlow Max=1.25 cfs @ 18.07 hrs HW=167.75' (Free Discharge)
└─**4=6-In Culvert** (Barrel Controls 1.25 cfs @ 6.84 fps)
  ├─**5=Orifice Top (6-in Culv)** (Passes < 1.44 cfs potential flow)
  └─**6=Orifice Side (6-in Culv)** (Passes < 0.17 cfs potential flow)

Summary for Pond DP-12: DETENTION POND 12

Inflow Area =	20.177 ac,	3.27% Impervious,	Inflow Depth = 2.01"	for 25-yr Storm event
Inflow =	23.02 cfs @	12.36 hrs, Volume=	3.388 af	
Outflow =	2.44 cfs @	15.88 hrs, Volume=	3.228 af,	Atten= 89%, Lag= 211.3 min
Primary =	0.99 cfs @	15.88 hrs, Volume=	0.501 af	
Secondary =	1.45 cfs @	15.88 hrs, Volume=	2.727 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Peak Elev= 187.48' @ 15.88 hrs Surf.Area= 37,220 sf Storage= 88,740 cf

Plug-Flow detention time= 917.5 min calculated for 3.228 af (95% of inflow)
Center-of-Mass det. time= 891.6 min (1,770.2 - 878.5)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-in Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.99 cfs @ 15.88 hrs HW=187.48' (Free Discharge)
└─**3=18- In Culvert** (Passes 0.99 cfs of 10.04 cfs potential flow)
  ├─**1=Grate Top (Riser)** (Controls 0.00 cfs)
  └─**2=8-In Orifice (Riser Side)** (Orifice Controls 0.99 cfs @ 2.84 fps)

Secondary OutFlow Max=1.45 cfs @ 15.88 hrs HW=187.48' (Free Discharge)
└─**6=6-In Culvert** (Passes 1.45 cfs of 1.77 cfs potential flow)
  ├─**4=Orifice Top (6-in Pipe)** (Orifice Controls 1.24 cfs @ 6.78 fps)
  └─**5=Orifice (Side of 6-in)** (Orifice Controls 0.20 cfs @ 8.23 fps)

Summary for Pond DP-1A: DP-1A (Former Leachate Pond)

Inflow Area =	10.835 ac, 10.57% Impervious, Inflow Depth =	2.26"	for 25-yr Storm event
Inflow =	17.45 cfs @ 12.25 hrs, Volume=	2.044 af	
Outflow =	1.16 cfs @ 15.89 hrs, Volume=	0.587 af,	Atten= 93%, Lag= 218.4 min
Primary =	1.16 cfs @ 15.89 hrs, Volume=	0.587 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 164.00' Surf.Area= 37,429 sf Storage= 182,617 cf
Peak Elev= 165.68' @ 15.89 hrs Surf.Area= 42,122 sf Storage= 249,629 cf (67,013 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (80,429 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 298.1 min (1,134.3 - 836.2)

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	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=1.14 cfs @ 15.89 hrs HW=165.68' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.14 cfs @ 0.75 fps)

Summary for Pond DP-2: DETENTION POND 2

Inflow Area =	10.745 ac,	0.00% Impervious, Inflow Depth = 2.06"	for 25-yr Storm event
Inflow =	21.80 cfs @	12.19 hrs, Volume=	1.847 af
Outflow =	9.55 cfs @	12.50 hrs, Volume=	1.847 af, Atten= 56%, Lag= 18.6 min
Primary =	9.55 cfs @	12.50 hrs, Volume=	1.847 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 162.30' Surf.Area= 2,326 sf Storage= 956 cf
Peak Elev= 165.54' @ 12.50 hrs Surf.Area= 8,830 sf Storage= 17,590 cf (16,633 cf above start)
Flood Elev= 166.60' Surf.Area= 12,071 sf Storage= 28,956 cf (27,999 cf above start)

Plug-Flow detention time= 35.3 min calculated for 1.825 af (99% of inflow)
Center-of-Mass det. time= 25.1 min (875.0 - 849.9)

Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	47,648 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,957	0	0
164.00	4,419	6,376	6,376
166.00	10,150	14,569	20,945
168.00	16,553	26,703	47,648

Device	Routing	Invert	Outlet Devices
#1	Primary	162.30'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.30' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	162.30'	**15.0" Vert. Orifice** C= 0.600
#3	Device 1	166.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=9.55 cfs @ 12.50 hrs HW=165.54' (Free Discharge)
└─**1=Culvert** (Passes 9.55 cfs of 22.12 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 9.55 cfs @ 7.78 fps)
  └─**3=Grate** (Controls 0.00 cfs)

Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 2.29" for 25-yr Storm event
Inflow = 34.84 cfs @ 12.27 hrs, Volume= 4.313 af
Outflow = 1.42 cfs @ 18.23 hrs, Volume= 4.313 af, Atten= 96%, Lag= 357.5 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 1.42 cfs @ 18.23 hrs, Volume= 4.313 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 174.00' Surf.Area= 25,931 sf Storage= 29,566 cf
Peak Elev= 176.58' @ 18.23 hrs Surf.Area= 71,266 sf Storage= 163,071 cf (133,505 cf above start)
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (467,078 cf above start)

Plug-Flow detention time= 1,400.4 min calculated for 3.633 af (84% of inflow)
Center-of-Mass det. time= 1,130.4 min (1,982.0 - 851.6)

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	Secondary	169.00'	**6.0" Round Outlet Culvert 6"** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 169.00' / 168.00' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	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=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
└─**1=Outlet Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=1.42 cfs @ 18.23 hrs HW=176.58' (Free Discharge)
├─**2=Outlet Culvert 6"** (Passes 1.42 cfs of 1.66 cfs potential flow)
│ └─**3=Orifice** (Orifice Controls 1.42 cfs @ 7.74 fps)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth = 2.41" for 25-yr Storm event
Inflow = 50.65 cfs @ 12.39 hrs, Volume= 6.673 af
Outflow = 2.04 cfs @ 18.50 hrs, Volume= 4.456 af, Atten= 96%, Lag= 366.8 min
Primary = 0.86 cfs @ 18.50 hrs, Volume= 0.727 af
Secondary = 1.18 cfs @ 18.50 hrs, Volume= 3.729 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 190.04' @ 18.50 hrs Surf.Area= 86,892 sf Storage= 225,513 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,615.4 min calculated for 4.455 af (67% of inflow)
Center-of-Mass det. time= 1,513.6 min (2,361.6 - 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
#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=0.86 cfs @ 18.50 hrs HW=190.04' (Free Discharge)
└─**1=12-In Outlet Culvert** (Inlet Controls 0.86 cfs @ 1.98 fps)

Secondary OutFlow Max=1.18 cfs @ 18.50 hrs HW=190.04' (Free Discharge)
└─**2=6-In Culvert** (Passes 1.18 cfs of 1.65 cfs potential flow)
  ├─**3=Orifice** (Orifice Controls 1.02 cfs @ 5.58 fps)
  └─**4=Orifice** (Orifice Controls 0.15 cfs @ 6.24 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

APPENDIX C

DETENTION POND DESIGN

C-1 DETENTION TIME AND STAGE STORAGE CURVES

Summary for Pond DP-1: Detention Pond 1

Inflow Area = 34.624 ac, 3.31% Impervious, Inflow Depth = 0.43" for 2-yr Storm event
Inflow = 10.24 cfs @ 12.33 hrs, Volume= 1.253 af
Outflow = 1.15 cfs @ 15.38 hrs, Volume= 0.695 af, Atten= 89%, Lag= 183.0 min
Primary = 1.15 cfs @ 15.38 hrs, Volume= 0.695 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 162.46' @ 15.38 hrs Surf.Area= 14,359 sf Storage= 31,388 cf

Plug-Flow detention time= 430.2 min calculated for 0.695 af (55% of inflow)
Center-of-Mass det. time= 297.7 min (1,193.7 - 896.1)

Volume	Invert	Avail.Storage	Storage Description
#1	160.00'	115,245 cf	**Custom Stage Data (Prismatic)**Listed below

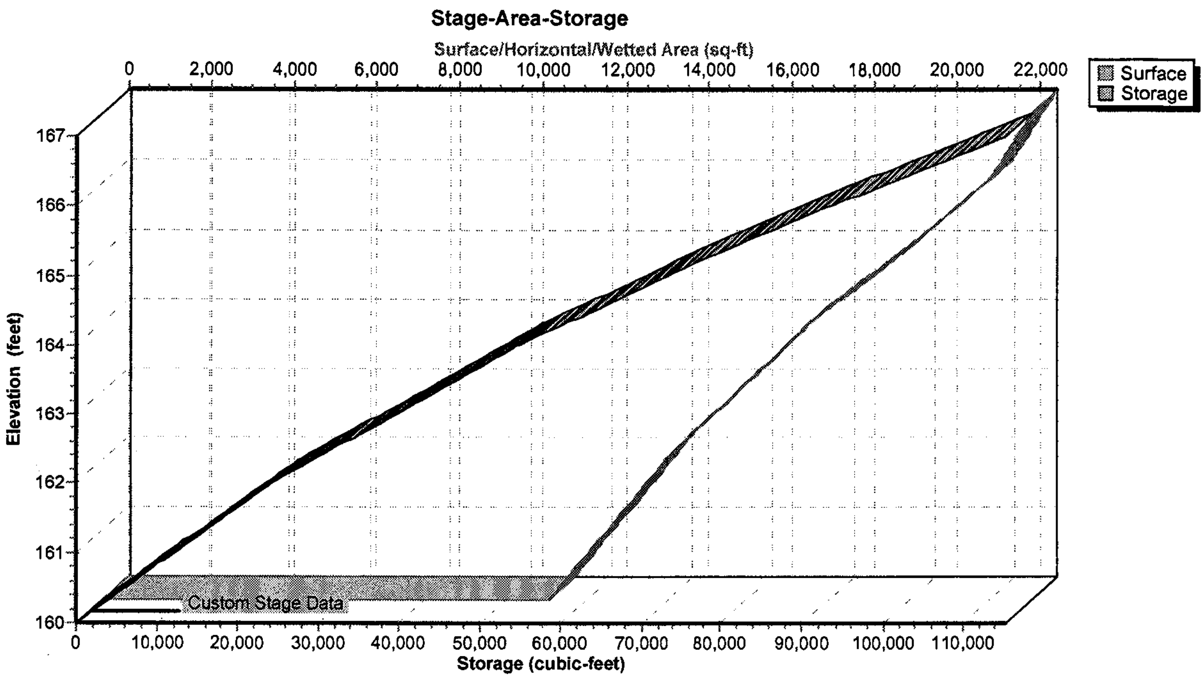
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
160.00	10,750	0	0
162.00	13,540	24,290	24,290
164.00	17,070	30,610	54,900
165.00	19,300	18,185	73,085
166.00	21,310	20,305	93,390
167.00	22,400	21,855	115,245

Device	Routing	Invert	Outlet Devices
#1	Primary	162.00'	**30.0" Round 30" Culvert** L= 75.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 162.00' / 159.50' S= 0.0333 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#2	Device 1	162.00'	**12.0" Vert. Orifice on side** C= 0.600
#3	Device 1	162.00'	**6.0" Vert. Orifice on side** C= 0.600
#4	Device 1	165.50'	**72.0" Horiz. Orifice-Top of drop inlet** C= 0.600 Limited to weir flow at low heads
#5	Secondary	166.00'	**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=1.15 cfs @ 15.38 hrs HW=162.46' (Free Discharge)
└─**1=30" Culvert** (Inlet Controls 1.15 cfs @ 1.83 fps)
  ├─**2=Orifice on side** (Passes < 0.83 cfs potential flow)
  ├─**3=Orifice on side** (Passes < 0.44 cfs potential flow)
  └─**4=Orifice-Top of drop inlet** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=160.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP-1: Detention Pond 1



Summary for Pond DP-1A: DP-1A (Former Leachate Pond)

Inflow Area =	10.835 ac,	10.57% Impervious, Inflow Depth = 0.80"	for 2-yr Storm event	
Inflow =	5.05 cfs @	12.27 hrs, Volume=	0.720 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= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Starting Elev= 164.00' Surf.Area= 37,429 sf Storage= 182,617 cf
Peak Elev= 164.81' @ 25.65 hrs Surf.Area= 39,695 sf Storage= 213,981 cf (31,364 cf above start)
Flood Elev= 166.00' Surf.Area= 43,000 sf Storage= 263,046 cf (80,429 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

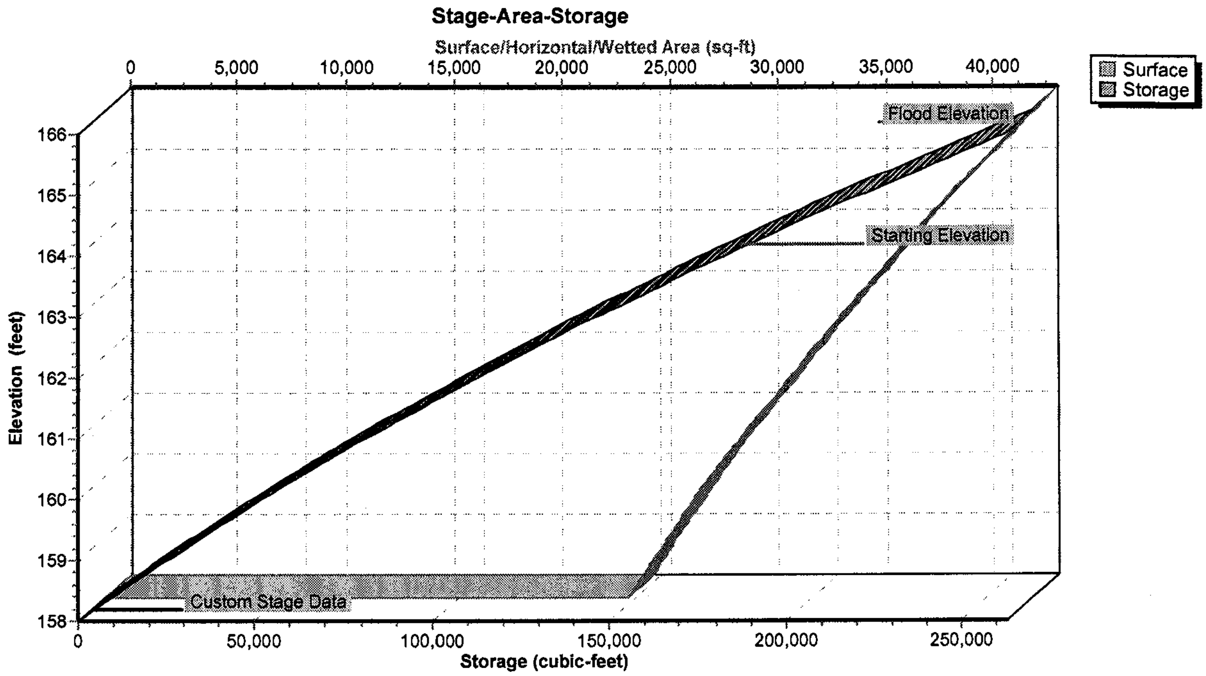
Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	263,046 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

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	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=0.00 cfs @ 0.00 hrs HW=164.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond DP-1A: DP-1A (Former Leachate Pond)



Summary for Pond DP-2: DETENTION POND 2

Inflow Area = 10.745 ac, 0.00% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 5.49 cfs @ 12.21 hrs, Volume= 0.569 af
Outflow = 3.92 cfs @ 12.40 hrs, Volume= 0.569 af, Atten= 29%, Lag= 11.7 min
Primary = 3.92 cfs @ 12.40 hrs, Volume= 0.569 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 162.30' Surf.Area= 2,326 sf Storage= 956 cf
Peak Elev= 163.37' @ 12.40 hrs Surf.Area= 3,640 sf Storage= 4,359 cf (3,402 cf above start)
Flood Elev= 166.60' Surf.Area= 12,071 sf Storage= 28,956 cf (27,999 cf above start)

Plug-Flow detention time= 60.2 min calculated for 0.547 af (96% of inflow)
Center-of-Mass det. time= 32.2 min (919.9 - 887.6)

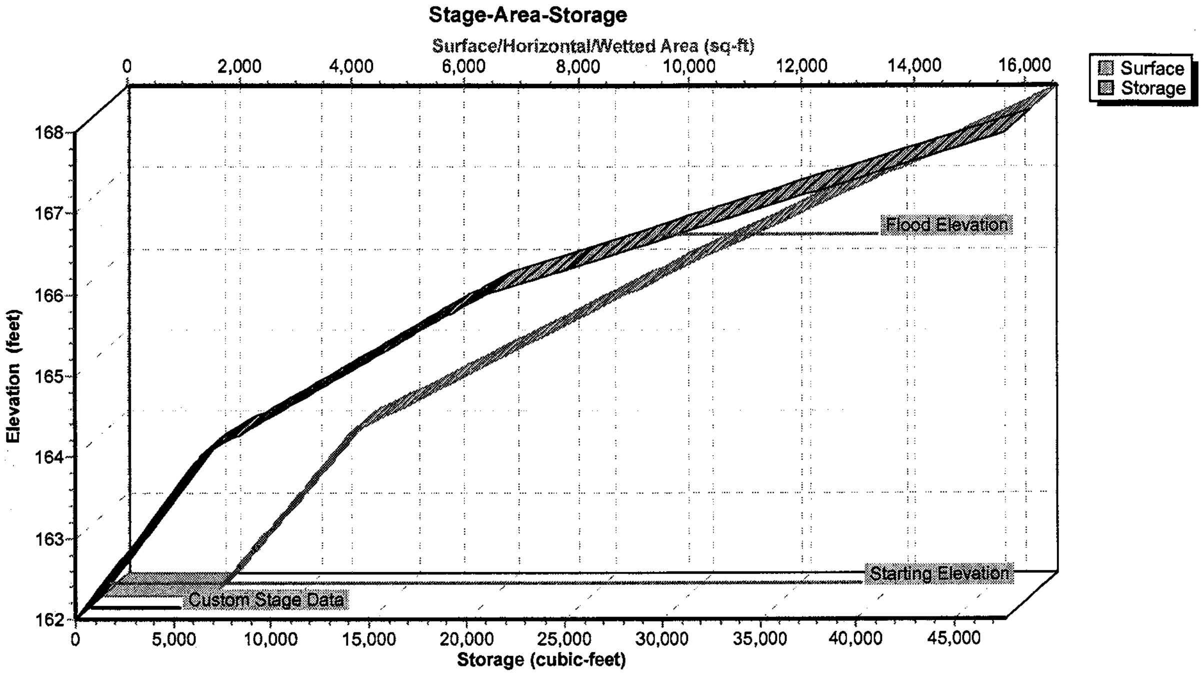
Volume	Invert	Avail.Storage	Storage Description
#1	162.00'	47,648 cf	**Custom Stage Data (Prismatic)**Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
162.00	1,957	0	0
164.00	4,419	6,376	6,376
166.00	10,150	14,569	20,945
168.00	16,553	26,703	47,648

Device	Routing	Invert	Outlet Devices
#1	Primary	162.30'	**24.0" Round Culvert** L= 40.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 162.30' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#2	Device 1	162.30'	**15.0" Vert. Orifice** C= 0.600
#3	Device 1	166.30'	**48.0" Horiz. Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.92 cfs @ 12.40 hrs HW=163.37' (Free Discharge)
└─**1=Culvert** (Passes 3.92 cfs of 4.88 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 3.92 cfs @ 3.52 fps)
  └─**3=Grate** (Controls 0.00 cfs)

Pond DP-2: DETENTION POND 2



Summary for Pond DP-6: DETENTION POND 6

Inflow Area = 22.602 ac, 7.31% Impervious, Inflow Depth = 0.78" for 2-yr Storm event
Inflow = 11.00 cfs @ 12.31 hrs, Volume= 1.472 af
Outflow = 0.82 cfs @ 16.92 hrs, Volume= 1.472 af, Atten= 93%, Lag= 276.7 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.82 cfs @ 16.92 hrs, Volume= 1.472 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Starting Elev= 174.00' Surf.Area= 25,931 sf Storage= 29,566 cf
Peak Elev= 174.86' @ 16.92 hrs Surf.Area= 41,554 sf Storage= 67,549 cf (37,983 cf above start)
Flood Elev= 180.00' Surf.Area= 130,159 sf Storage= 496,644 cf (467,078 cf above start)

Plug-Flow detention time= 1,153.1 min calculated for 0.794 af (54% of inflow)
Center-of-Mass det. time= 628.6 min (1,512.9 - 884.3)

Volume	Invert	Avail.Storage	Storage Description
#1	172.00'	783,647 cf	**Detention Pond (Prismatic)**Listed below

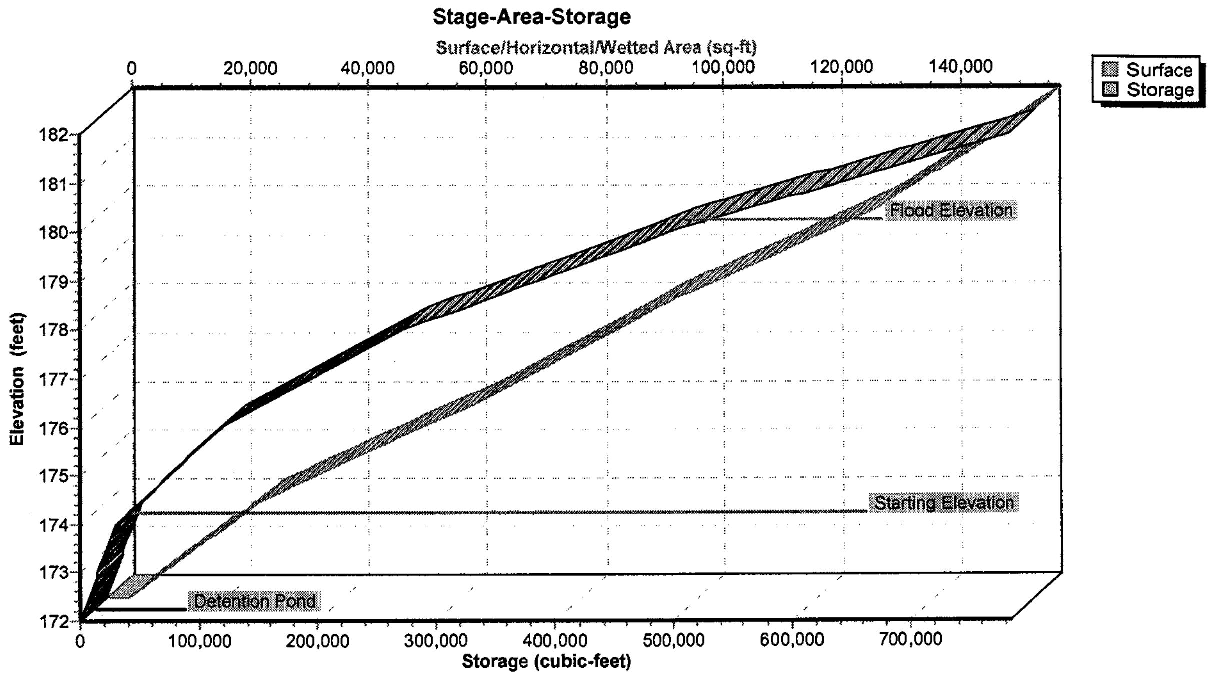
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
172.00	3,635	0	0
174.00	25,931	29,566	29,566
176.00	62,168	88,099	117,665
178.00	93,326	155,494	273,159
180.00	130,159	223,485	496,644
182.00	156,844	287,003	783,647

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	Secondary	169.00'	**6.0" Round Outlet Culvert 6"** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 169.00' / 168.00' S= 0.0125 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#3	Device 2	174.00'	**5.8" Horiz. Orifice** C= 0.600 Limited to weir flow at low heads
#4	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=0.00 cfs @ 0.00 hrs HW=174.00' (Free Discharge)
1=Outlet Culvert (Controls 0.00 cfs)

Secondary OutFlow Max=0.82 cfs @ 16.92 hrs HW=174.86' (Free Discharge)
2=Outlet Culvert 6" (Passes 0.82 cfs of 1.47 cfs potential flow)
3=Orifice (Orifice Controls 0.82 cfs @ 4.47 fps)
4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond DP-6: DETENTION POND 6



Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth = 0.87" for 2-yr Storm event
Inflow = 16.58 cfs @ 12.44 hrs, Volume= 2.398 af
Outflow = 0.05 cfs @ 24.97 hrs, Volume= 0.399 af, Atten= 100%, Lag= 751.5 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.05 cfs @ 24.97 hrs, Volume= 0.399 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 188.57' @ 24.97 hrs Surf.Area= 80,617 sf Storage= 103,321 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 3,910.1 min calculated for 0.399 af (17% of inflow)
Center-of-Mass det. time= 3,748.6 min (4,626.7 - 878.2)

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

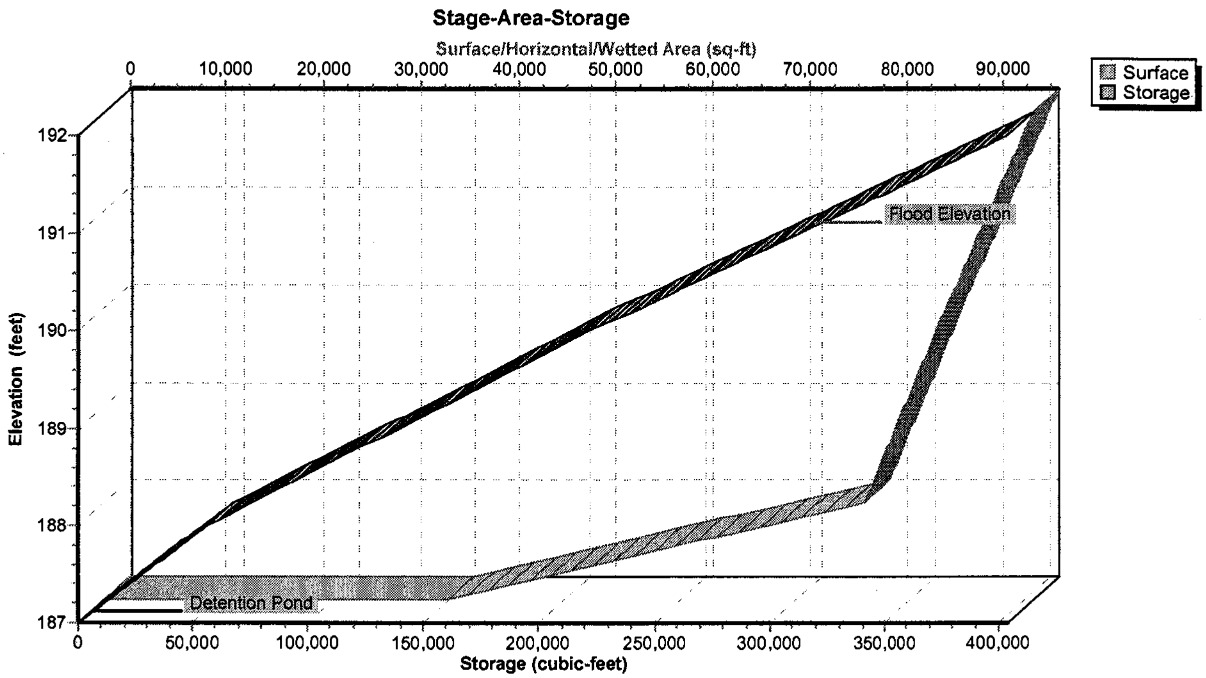
Device	Routing	Invert	Outlet Devices
#1	Primary	189.50'	**12.0" Round 12-In Outlet Culvert** L= 48.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 189.50' / 180.50' S= 0.1875 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	184.21'	**5.8" Round 6-In Culvert** L= 60.0' CPP, projecting, 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
#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 @ 24.97 hrs HW=188.57' (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 @ 2.17 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=187.00' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond DP-9: DETENTION POND 9



Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 12.05 cfs @ 12.36 hrs, Volume= 1.516 af
Outflow = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af, Atten= 94%, Lag= 328.8 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.74 cfs @ 17.84 hrs, Volume= 1.103 af
Tertiary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 177.58' @ 17.84 hrs Surf.Area= 21,167 sf Storage= 43,962 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 1,554.9 min calculated for 1.103 af (73% of inflow)
Center-of-Mass det. time= 1,451.8 min (2,348.3 - 896.5)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

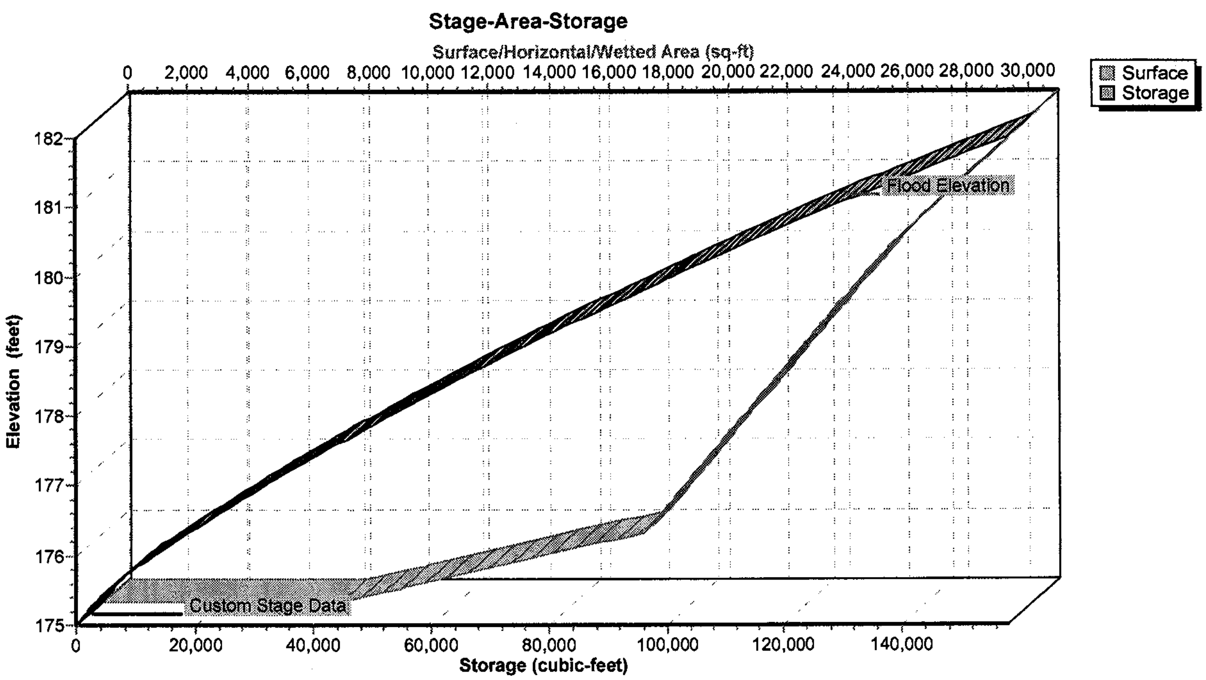
Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**3=18-in Primary Culvert** (Controls 0.00 cfs)
  ├─**1=Orifice/Grate** (Controls 0.00 cfs)
  └─**2=6-in Orifice** (Controls 0.00 cfs)

Secondary OutFlow Max=0.74 cfs @ 17.84 hrs HW=177.58' (Free Discharge)
└─**4=6-in Culvert** (Passes 0.74 cfs of 1.37 cfs potential flow)
  ├─**5=Orifice Top** (Orifice Controls 0.67 cfs @ 3.68 fps)
  └─**6=Orifice Side** (Orifice Controls 0.07 cfs @ 5.53 fps)

Tertiary OutFlow Max=0.00 cfs @ 0.00 hrs HW=175.00' (Free Discharge)
└─**7=E-Spillway Weir** (Controls 0.00 cfs)

Pond DP-10: DETENTION POND 10



Summary for Pond DP-11: Detention Pond 11

Inflow Area = 22.282 ac, 4.04% Impervious, Inflow Depth = 0.64" for 2-yr Storm event
Inflow = 7.66 cfs @ 12.40 hrs, Volume= 1.182 af
Outflow = 0.61 cfs @ 17.82 hrs, Volume= 1.030 af, Atten= 92%, Lag= 325.1 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.61 cfs @ 17.82 hrs, Volume= 1.030 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 165.43' @ 17.82 hrs Surf.Area= 27,580 sf Storage= 33,880 cf

Plug-Flow detention time= 1,598.2 min calculated for 1.030 af (87% of inflow)
Center-of-Mass det. time= 1,537.9 min (2,445.3 - 907.4)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

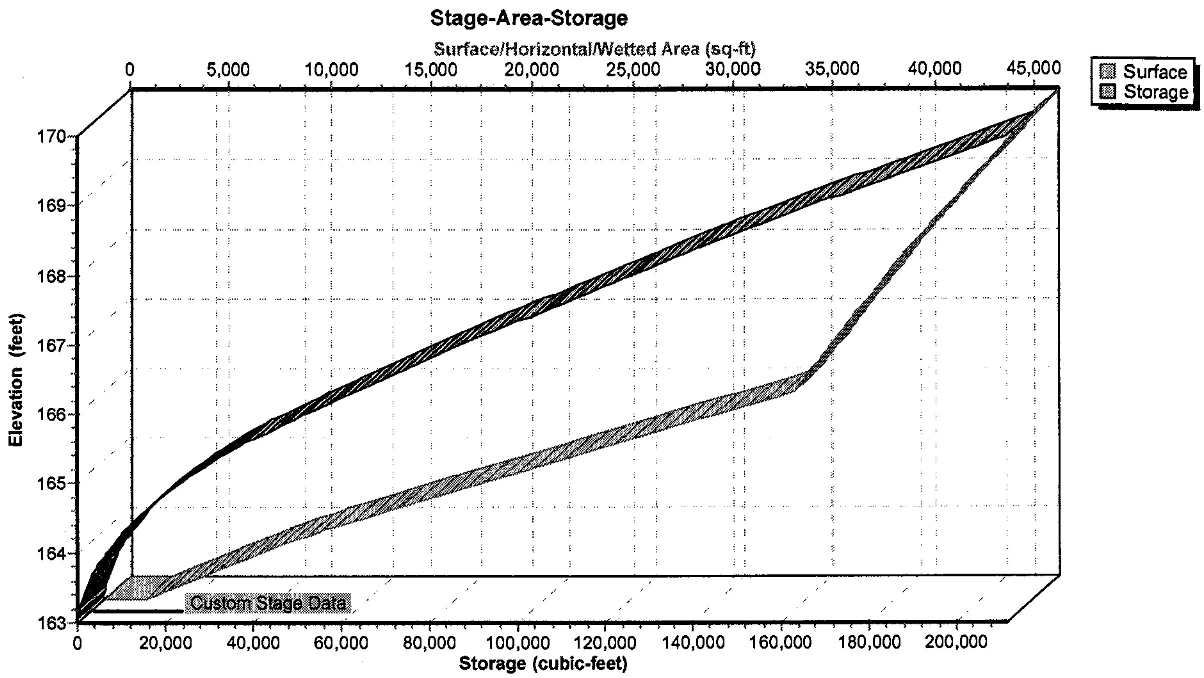
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=163.00' (Free Discharge)
└─**3=18-In Culvert** (Controls 0.00 cfs)
  ├─**1=6-In Orifice Side (Riser)** (Controls 0.00 cfs)
  └─**2=Grate Top (Riser)** (Controls 0.00 cfs)

Secondary OutFlow Max=0.61 cfs @ 17.82 hrs HW=165.43' (Free Discharge)
└─**4=6-In Culvert** (Passes 0.61 cfs of 1.03 cfs potential flow)
  ├─**5=Orifice Top (6-in Culv)** (Orifice Controls 0.50 cfs @ 2.75 fps)
  └─**6=Orifice Side (6-in Culv)** (Orifice Controls 0.10 cfs @ 8.43 fps)

Pond DP-11: Detention Pond 11



Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 20.177 ac, 3.27% Impervious, Inflow Depth = 0.62" for 2-yr Storm event
Inflow = 5.88 cfs @ 12.39 hrs, Volume= 1.043 af
Outflow = 0.51 cfs @ 18.19 hrs, Volume= 0.885 af, Atten= 91%, Lag= 347.6 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Secondary = 0.51 cfs @ 18.19 hrs, Volume= 0.885 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 185.69' @ 18.19 hrs Surf.Area= 26,018 sf Storage= 31,513 cf

Plug-Flow detention time= 1,647.6 min calculated for 0.884 af (85% of inflow)
Center-of-Mass det. time= 1,581.2 min (2,498.6 - 917.4)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

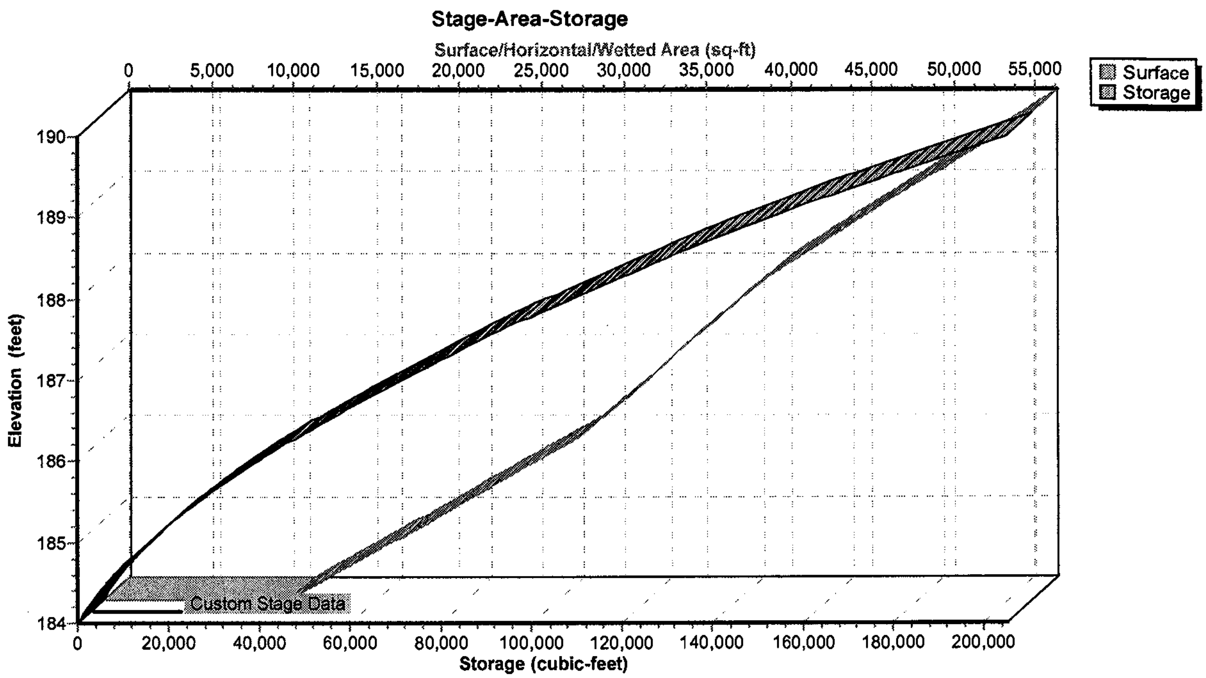
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-in Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=184.00' (Free Discharge)
└─**3=18- In Culvert** (Controls 0.00 cfs)
  ├─**1=Grate Top (Riser)** (Controls 0.00 cfs)
  └─**2=8-In Orifice (Riser Side)** (Controls 0.00 cfs)

Secondary OutFlow Max=0.51 cfs @ 18.19 hrs HW=185.69' (Free Discharge)
└─**6=6-In Culvert** (Passes 0.51 cfs of 1.48 cfs potential flow)
  ├─**4=Orifice Top (6-in Pipe)** (Orifice Controls 0.39 cfs @ 2.12 fps)
  └─**5=Orifice (Side of 6-in)** (Orifice Controls 0.13 cfs @ 5.12 fps)

Pond DP-12: DETENTION POND 12



C-2 ANTI-SEEP COLLAR & FLOTATION DESIGN

Pipe Anti-Seep Collar Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/10/2015
Chk. By: PCM

OBJECTIVE: Design anti-seep collars for dentention pound pipe outlets.

DESIGN CRITERIA

1. Reference is Maryland Specifications for Soil Erosion and Sediment Control, Maryland Department of Environment, 1994.

DESIGN ANALYSIS

Step 1: Calculate Length of Pipe In Saturated Zone (LS) (See table below and attached sketches)

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 embakment as a ratio of Z feet horizontal to one foot vertical. (In this case approximately one due to outlet structure)
U	=	Upstream invert of pipe (feet)
H	=	Highest normal water level expected (feet)
N	=	Number of Collars
D	=	Collar Size (ft)
LS	=	$Y(z+4)/(1-4S_0)$

Step 2: Determine Number and Size of Anti-Seep Collar to be used. (See attached Table 16 and Calculations)

Step 3: Choose one size for anti-seep collars that will fit all situations

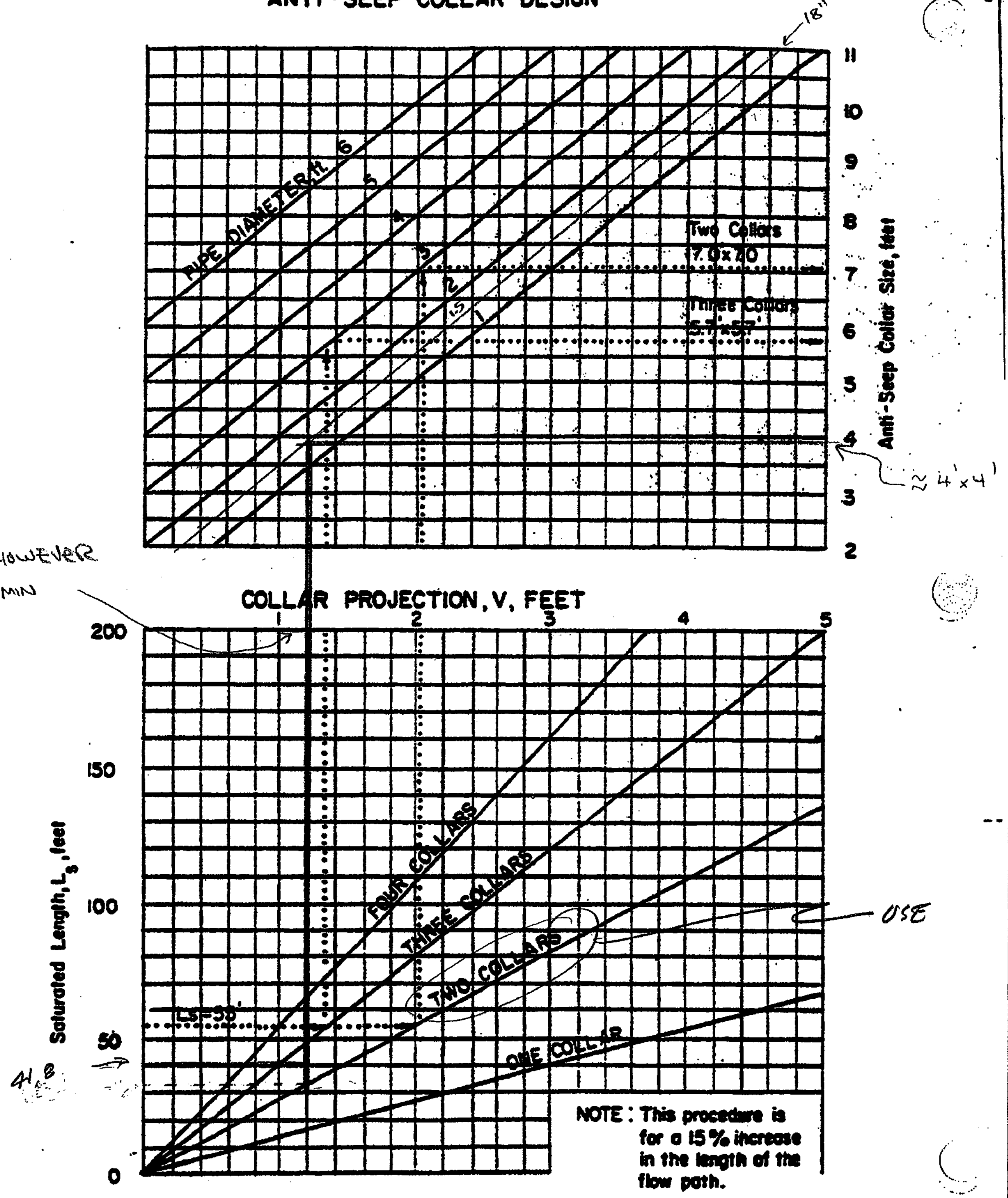
All Anti-Seep Collars shall extend beyond pipe by 1.75' (minimum).

JUNIPER RIDGE LANDFILL EXPANSION
DETENTION POND OCS TABLE

POND I.D.	FLOOD ELEV		STRUCTURE		OUTLET PIPE		ANTI SEEP		
DP-10	POND BOTTOM	175.00	DIA.	4-FOOT	DIA.	18-INCH	Ls=Y(Z+4)/(1-4So)	41.8	Ls=SATURATED LENGTH (ft)
	POND BERM	182.00	TOP ELEV	179.00	INLET ELEV	175.20	V =	1.75	V = Collar Projection (ft), Table 16
	2 YEAR	177.60	ORIFICE DIA.	6-INCH	OUTLET ELEV	172.00	N =	2	N = # of Collars, Table 16
	10 YEAR	179.20	ORIFICE ELEV	178.00	LENGTH (FT)	52	SIZE	4-FEET	Table 16
	25 YEAR	179.50	SPILLWAY ELEV	180.00	SLOPE	0.0615	SPACING=Ls/(N+1)	14	
									USE 2 COLLARS,4.0-FEET, S=11'
DP-11	POND BOTTOM	163.00	DIA.	4-FOOT	DIA.	18-INCH	Ls=Y(Z+4)/(1-4So)	36.9	Ls=SATURATED LENGTH (ft)
	POND BERM	170.30	TOP ELEV	168.40	INLET ELEV	164.30	V =	1.75	V = Collar Projection (ft), Table 16
	2 YEAR	165.43	ORIFICE DIA.	6-INCH	OUTLET ELEV	162.00	N =	2	N = # of Collars, Table 16
	10 YEAR	166.87	ORIFICE ELEV	167.50	LENGTH (FT)	92	SIZE	4-FEET	Table 16
	25 YEAR	167.75	SPILLWAY ELEV	168.40	SLOPE	0.0250	SPACING=Ls/(N+1)	12	
									USE 2 COLLARS, 4.0-FEET, S=10'
DP-12	POND BOTTOM	184.00	DIA.	4-FOOT	DIA.	18-INCH	Ls=Y(Z+4)/(1-4So)	31.4	Ls=SATURATED LENGTH (ft)
	POND BERM	190.30	TOP ELEV	188.00	INLET ELEV	184.50	V =	1.75	V = Collar Projection (ft), Table 16
	2 YEAR	185.69	ORIFICE DIA.	8-INCH	OUTLET ELEV	180.00	N =	2	N = # of Collars, Table 16
	10 YEAR	186.96	ORIFICE ELEV	186.80	LENGTH (FT)	80	SIZE	4-FEET	Table 16
	25 YEAR	187.48	SPILLWAY ELEV	188.00	SLOPE	0.0563	SPACING=Ls/(N+1)	10	
									USE 2 COLLARS, 4.0-FEET, S=10'

Table 16

ANTI-SEEP COLLAR DESIGN



POND	OUTLET DIA	Ls
DP-10	18"	41.8 ← MAX
DP-11	18"	36.9
DP-12	18"	31.4

Structure Flotation Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/9/2015
Chk. By: PCM

DP-10

OBJECTIVE: Design Detention Pond Outlet Structures to Resist Floatation.

DESIGN CRITERIA

1. Design Outlet Structures to resist flotation neglecting all soil friction along sides of structure (conservative).

DESIGN ANALYSIS

Outlet Structure	25-YR EL (ft)	INV OUT (ft)	BARREL TOP (ft)	HYDRAULIC DIFF. (ft)
DP-10	179.50	175.20	179.00	3.80

Step 2: Calculate uplift on structure.

Calculate Weight of Water Displaced

Difference =	3.80	ft (Max anticipated water height - Inv. Out Elev)		
Sump Depth =	0.5	ft	top concrete fill:	174.70
Thickness of Structure Bottom =	6	Inches	bot concrete fill:	174.20
Thickness of Concrete Fill =	6	Inches		
Total Depth =	5.30	ft		
Unit Weight of Water =	62.4	lb/ft^3		
Pressure at Total Depth =	331	lb/ft^2		
Manhole Outer Dia. =	4.83	ft		
Pi =	3.1416			
Manhole Outer Area =	18.32	ft^2		

Total Uplift Pressure = Pressure at Total Depth x $A_{manhole}$

Total Uplift Pressure = **6,060** lb

Step 3: Determine Weight of Structure without concrete footing:

Unit Weight of Water = 62.4 lb/ft^3
Unit Weight of Concrete = 150 lb/ft^3

Frame and Grate Weight =	0	lb
Cover Thickness =	0	Inches
Cover Weight =	0	lb
Concrete Bottom Weight=	2748	lb
Concrete Barrel Weight =	863	lb/vft
Barrel Top El =	179.00	ft
Barrel Bottom El =	174.7	ft
Difference =	4.3	ft
Weight of Barrels =	3713	lb
Manhole Inner Dia. =	4.0	ft
Pi =	3.1416	
Manhole Inner Area =	12.57	ft^2
Volume Displaced in Sump =	6.28	ft^3
Weight of Water in Sump =	392	lb
Total Structure Weight =	**6,853**	lb
Differential =	794	lb
Factor of Safety =	**1.13**	(Desired Factor of Safety is 1.1)

No concrete fill required

Structure Flotation Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/11/2015
Chk. By: PCM

DP-11

OBJECTIVE: Design Detention Pond Outlet Structures to Resist Floatation.

DESIGN CRITERIA

1. Design Outlet Structures to resist flotation neglecting all soil friction along sides of structure (conservative).

DESIGN ANALYSIS

Outlet Structure	25-YR EL (ft)	INV OUT (ft)	BARREL TOP (ft)	HYDRAULIC DIFF. (ft)
DP-11	167.75	164.30	168.40	4.10

Step 2: Calculate uplift on structure.

Calculate Weight of Water Displaced

Difference = 4.10 ft (Max anticipated water height - Inv. Out Elev)
Sump Depth = 0.3 ft — top concrete fill: 164.00
Thickness of Structure Bottom = 6 Inches — bot concrete fill: 163.50
Thickness of Concrete Fill = 6 Inches
Total Depth = 5.40 ft
Unit Weight of Water = 62.4 lb/ft^3
Pressure at Total Depth = 337 lb/ft^2
Manhole Outer Dia. = 4.83 ft
Pi = 3.1416
Manhole Outer Area = 18.32 ft^2
Total Uplift Pressure = Pressure at Total Depth x $A_{manhole}$
Total Uplift Pressure = 6,174 lb

Step 3: Determine Weight of Structure without concrete footing:

Unit Weight of Water = 62.4 lb/ft^3
Unit Weight of Concrete = 150 lb/ft^3

Frame and Grate Weight = 0 lb
Cover Thickness = 0 Inches
Cover Weight = 0 lb
Concrete Bottom Weight= 2748 lb
Concrete Barrel Weight = 863 lb/vft
Barrel Top El = 168.40 ft
Barrel Bottom El = 164.0 ft
Difference = 4.4 ft
Weight of Barrels = 3799 lb
Manhole Inner Dia. = 4.0 ft
Pi = 3.1416
Manhole Inner Area = 12.57 ft^2
Volume Displaced in Sump = 3.77 ft^3
Weight of Water in Sump = 235 lb
Total Structure Weight = 6,783 lb

Differential = 609 lb

Factor of Safety = 1.10 (Desired Factor of Safety is 1.1)
No concrete fill required

Structure Flotation Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/3/2015
Chk. By: PCM

DP-12

OBJECTIVE: Design Detention Pond Outlet Structures to Resist Floatation.

DESIGN CRITERIA

1. Design Outlet Structures to resist flotation neglecting all soil friction along sides of structure (conservative).

DESIGN ANALYSIS

Outlet Structure	25-YR EL (ft)	INV OUT (ft)	BARREL TOP (ft)	HYDRAULIC DIFF. (ft)
DP-12	187.48	184.50	188.00	3.50

Step 2: Calculate uplift on structure.

Calculate Weight of Water Displaced

Difference = 3.50 ft (Max anticipated water height - Inv. Out Elev)
Sump Depth = 0.5 ft — top concrete fill: 184.00
Thickness of Structure Bottom = 6 Inches — bot concrete fill: 183.50
Thickness of Concrete Fill = 6 Inches
Total Depth = 5.00 ft
Unit Weight of Water = 62.4 lb/ft^3
Pressure at Total Depth = 312 lb/ft^2
Manhole Outer Dia. = 4.83 ft
Pi = 3.1416
Manhole Outer Area = 18.32 ft^2
Total Uplift Pressure = Pressure at Total Depth x $A_{manhole}$
Total Uplift Pressure = 5,717 lb

Step 3: Determine Weight of Structure without concrete footing:

Unit Weight of Water = 62.4 lb/ft^3
Unit Weight of Concrete = 150 lb/ft^3

Frame and Grate Weight = 0 lb
Cover Thickness = 0 Inches
Cover Weight = 0 lb
Concrete Bottom Weight= 2748 lb
Concrete Barrel Weight = 863 lb/vft
Barrel Top El = 188.00 ft
Barrel Bottom El = 184.0 ft
Difference = 4 ft
Weight of Barrels = 3454 lb
Manhole Inner Dia. = 4.0 ft
Pi = 3.1416
Manhole Inner Area = 12.57 ft^2
Volume Displaced in Sump = 6.28 ft^3
Weight of Water in Sump = 392 lb
Total Structure Weight = 6,594 lb

Differential = 877 lb

Factor of Safety = **1.15** (Desired Factor of Safety is 1.1)
No concrete fill required

C-3 PLUNGE POOL DESIGN

PLUNGE POOL DESIGN

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/3/2015
Chk. By: [illegible]

OBJECTIVE: Design plunge pool to protect the outlet of culverts from scour and deterioration.

REFERENCES:

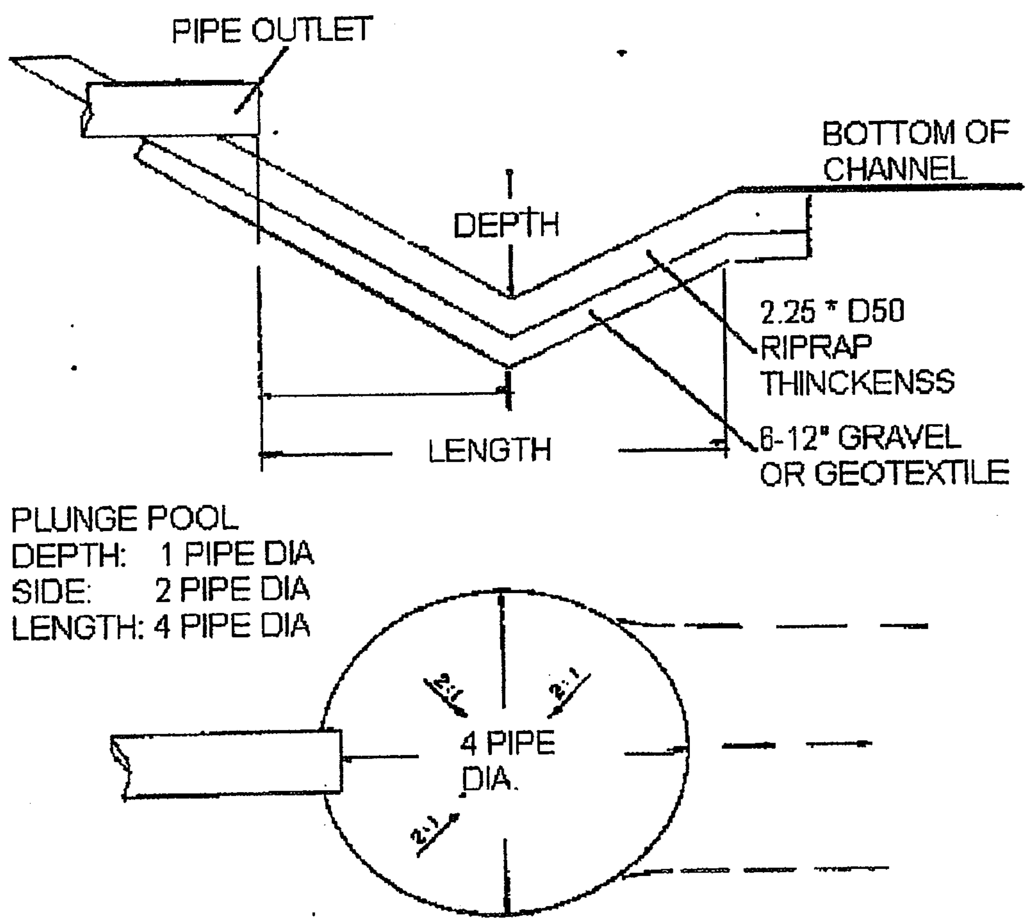
1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, March 2003
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System, Version 7.0, Chocorua, New Hampshire, 2001

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)
10	Pond DP-10	16.9	18	8	18	6	6
11	Pond DP-11	1.4	18	4	9	6	6
12	Pond DP-12	2.4	18	4	9	6	6



OUTLET PLUNGE POOL

OUTLET PROTECTION

FOR A PIPE FLOWING FULL WITH LOW TAILWATER

RIPRAP SIZE - D50 (Inches)

PIPE DIAMETER

DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	4											
5cfs	4											
8cfs	5	4										
10cfs	6	5	4									
12cfs	8	6	6									
15cfs	8	6	8	5								
17cfs		8	8	5								
20cfs		10	10	6	5							
25cfs		12	12	6	6							
30cfs				8	8	6						
40cfs				12	10	8	6					
50cfs				16	12	10	8	6				
60cfs				18	16	12	10	8				
70cfs					18	15	12	8				
80cfs					20	16	15	10	8			
90cfs						18	16	12	10			
100cfs						20	18	12	10			
125cfs						24	20	16	12	10		
150cfs							24	20	16	12	10	
200cfs								24	20	18	15	12

MINIMUM LENGTH OF APRON (FEET)

PIPE DIAMETER

DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	8											
5cfs	8											
8cfs	11	10										
10cfs	14	12	10									
15cfs	18	16	14	12								
20cfs		18	18	16	12							
30cfs			22	20	18	16						
40cfs			26	24	24	20	18					
50cfs				26	26	24	22	18				
70cfs					30	30	28	25				
100cfs						36	36	33	27			
150cfs						42	42	42	38	33	28	
200cfs								48	45	42	37	32

From USDA Soil Conservation Service

C-4 LEVEL SPREADER DESIGN

Standard Level Spreader Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/10/2015
Chk. By: RM

OBJECTIVE: Design level spreaders in accordance with Erosion and Sediment Control Standards.

DESIGN CRITERIA

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'

DESIGN ANALYSIS

Level Spreader Designation	Discharge From	Q_{10} (cfs)	Rqd Rate (cfs/ft)	Min. Rqd. Length (ft)	Specified Length (ft)
10	Pond DP-10	4.9	0.25	19.8	20
11	Pond DP-11	1.2	0.25	4.7	15
12	Pond DP-12	1.3	0.25	5.4	15

C-5 EMERGENCY SPILLWAY DESIGN

EMERGENCY SPILLWAY EVALUATION
EXPANDED POND 9

Summary for Pond DP-9: DETENTION POND 9

Inflow Area = 33.165 ac, 8.08% Impervious, Inflow Depth = 3.25" for 100-yr Storm event
Inflow = 64.87 cfs @ 12.43 hrs, Volume= 8.970 af
Outflow = 4.63 cfs @ 16.13 hrs, Volume= 6.741 af, Atten= 93%, Lag= 222.2 min
Primary = 2.32 cfs @ 16.13 hrs, Volume= 2.271 af
Secondary = 1.40 cfs @ 16.13 hrs, Volume= 4.277 af
Tertiary = 0.91 cfs @ 16.13 hrs, Volume= 0.193 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 190.60' @ 16.13 hrs Surf.Area= 89,426 sf Storage= 276,765 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,283.3 min calculated for 6.741 af (75% of inflow)
Center-of-Mass det. time= 1,194.6 min (2,034.4 - 839.8)

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
#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

192.0 = TOP OF BERM
190.6 = 100 YR PEAK
1.4 ' = FREEBOARD

Primary OutFlow Max=2.32 cfs @ 16.13 hrs HW=190.60' (Free Discharge)
└─**1=12-In Outlet Culvert** (Inlet Controls 2.32 cfs @ 2.96 fps)

Secondary OutFlow Max=1.40 cfs @ 16.13 hrs HW=190.60' (Free Discharge)
└─**2=6-In Culvert** (Passes 1.40 cfs of 1.73 cfs potential flow)
  ├─**3=Orifice** (Orifice Controls 1.22 cfs @ 6.64 fps)
  └─**4=Orifice** (Orifice Controls 0.18 cfs @ 7.21 fps)

Tertiary OutFlow Max=0.90 cfs @ 16.13 hrs HW=190.60' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 0.90 cfs @ 0.87 fps)

EMERGENCY SPILLWAY EVALUATION
POND 10

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth = 2.84" for 100-yr Storm event
Inflow = 59.36 cfs @ 12.35 hrs, Volume= 6.692 af
Outflow = 27.71 cfs @ 12.72 hrs, Volume= 6.274 af, Atten= 53%, Lag= 22.0 min
Primary = 18.03 cfs @ 12.72 hrs, Volume= 3.582 af
Secondary = 1.74 cfs @ 12.72 hrs, Volume= 2.452 af
Tertiary = 7.94 cfs @ 12.72 hrs, Volume= 0.240 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 180.44' @ 12.72 hrs Surf.Area= 27,104 sf Storage= 112,674 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 439.2 min calculated for 6.272 af (94% of inflow)
Center-of-Mass det. time= 408.3 min (1,259.2 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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

182.0 = TOP OF BERM
180.4 = 100 YR PEAK
1.6 ' = FREEBOARD

Primary OutFlow Max=18.03 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└─**3=18-in Primary Culvert** (Inlet Controls 18.03 cfs @ 10.20 fps)
  ├─**1=Orifice/Grate** (Passes < 70.84 cfs potential flow)
  └─**2=6-in Orifice** (Passes < 1.40 cfs potential flow)

Secondary OutFlow Max=1.74 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└─**4=6-in Culvert** (Barrel Controls 1.74 cfs @ 9.51 fps)
  ├─**5=Orifice Top** (Passes < 1.64 cfs potential flow)
  └─**6=Orifice Side** (Passes < 0.12 cfs potential flow)

Tertiary OutFlow Max=7.82 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└─**7=E-Spillway Weir** (Weir Controls 7.82 cfs @ 1.79 fps)

EMERGENCY SPILLWAY EVALUATION
POND 11

Summary for Pond DP-11: Detention Pond 11

Inflow Area = 22.282 ac, 4.04% Impervious, Inflow Depth = 2.83" for 100-yr Storm event
Inflow = 42.15 cfs @ 12.30 hrs, Volume= 5.252 af
Outflow = 3.99 cfs @ 15.24 hrs, Volume= 5.094 af, Atten= 91%, Lag= 176.4 min
Primary = 2.67 cfs @ 15.24 hrs, Volume= 1.081 af
Secondary = 1.32 cfs @ 15.24 hrs, Volume= 4.013 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 168.53' @ 15.24 hrs Surf.Area= 41,482 sf Storage= 147,109 cf

Plug-Flow detention time= 1,111.8 min calculated for 5.093 af (97% of inflow)
Center-of-Mass det. time= 1,096.9 min (1,954.3 - 857.4)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

170. = TOP OF ROAD
168.5 = 100 YR PEAK
1.5 ' = FREEBOARD

Primary OutFlow Max=2.66 cfs @ 15.24 hrs HW=168.53' (Free Discha
3=18-In Culvert (Passes 2.66 cfs of 12.52 cfs potential flow)
1=6-In Orifice Side (Riser) (Orifice Controls 0.83 cfs @ 4.24 fps)
2=Grate Top (Riser) (Weir Controls 1.83 cfs @ 1.16 fps)

Secondary OutFlow Max=1.32 cfs @ 15.24 hrs HW=168.53' (Free Discharge)
4=6-In Culvert (Barrel Controls 1.32 cfs @ 7.19 fps)
5=Orifice Top (6-in Culv) (Passes < 1.64 cfs potential flow)
6=Orifice Side (6-in Culv) (Passes < 0.19 cfs potential flow)

EMERGENCY SPILLWAY EVALUATION
POND 12

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 20.177 ac, 3.27% Impervious, Inflow Depth = 2.80" for 100-yr Storm event
Inflow = 32.91 cfs @ 12.35 hrs, Volume= 4.700 af
Outflow = 5.20 cfs @ 14.55 hrs, Volume= 4.540 af, Atten= 84%, Lag= 132.4 min
Primary = 3.54 cfs @ 14.55 hrs, Volume= 1.439 af
Secondary = 1.65 cfs @ 14.55 hrs, Volume= 3.101 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 188.13' @ 14.55 hrs Surf.Area= 41,214 sf Storage= 113,928 cf

Plug-Flow detention time= 756.5 min calculated for 4.538 af (97% of inflow)
Center-of-Mass det. time= 739.3 min (1,611.6 - 872.3)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-In Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=3.51 cfs @ 14.55 hrs HW=188.13' (Free Discharge)
└─**3=18- In Culvert** (Passes 3.51 cfs of 11.39 cfs potential flow)
  ├─**1=Grate Top (Riser)** (Weir Controls 1.84 cfs @ 1.16 fps)
  └─**2=8-In Orifice (Riser Side)** (Orifice Controls 1.67 cfs @ 4.80 fps)

190.0 = TOP OF ROAD
188.1 = 100 YR PEAK
1.9 ' = FREEBOARD

Secondary OutFlow Max=1.65 cfs @ 14.55 hrs HW=188.13' (Free Discharge)
└─**6=6-In Culvert** (Passes 1.65 cfs of 1.85 cfs potential flow)
  ├─**4=Orifice Top (6-In Pipe)** (Orifice Controls 1.43 cfs @ 7.80 fps)
  └─**5=Orifice (Side of 6-in)** (Orifice Controls 0.22 cfs @ 9.09 fps)

APPENDIX D

FINAL SITE DRAINAGE PLAN AND DETENTION POND DETAILS

LEGEND

WETLAND DELINEATED

WETLAND PHOTO INTERPRETED

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC., NORRIDGEWOCK, MAINE. PHOTO DATE 12/31/14. VERTICAL DATUM: BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY PLISGA & DAY LAND SURVEYORS, BANGOR, MAINE. STANDARD PRACTICE DICTATES THAT PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. SITE BENCHMARK INFORMATION:

   PLUG 1 IS A BRASS PLUG ON FORMER LEACHATE POND PUMP STATION LOCATED AT COORDINATES NORTHING 478242.05, EASTING 925376.35 ELEVATION 167.93

2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004 AND STANTEC CONSULTING SERVICES 2008, 2014 AND 2015.

3. PERMITTED LANDFILL FINAL WASTE GRADES REPRESENT GRADES PRIOR TO CONSTRUCTION OF FINAL COVER SYSTEM.

4. PROPOSED FINAL WASTE GRADES REPRESENT GRADES PRIOR TO CONSTRUCTION OF FINAL COVER SYSTEM.

5. CULVERT SCHEDULE IS SHOWN ON DRAWING C-306. CULVERT SCHEDULE INCLUDES CULVERTS FOR DETENTION BASIN OUTLET STRUCTURES.

REV.	BY	DATE	STATUS
		7/15	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

FINAL SITE DRAINAGE PLAN

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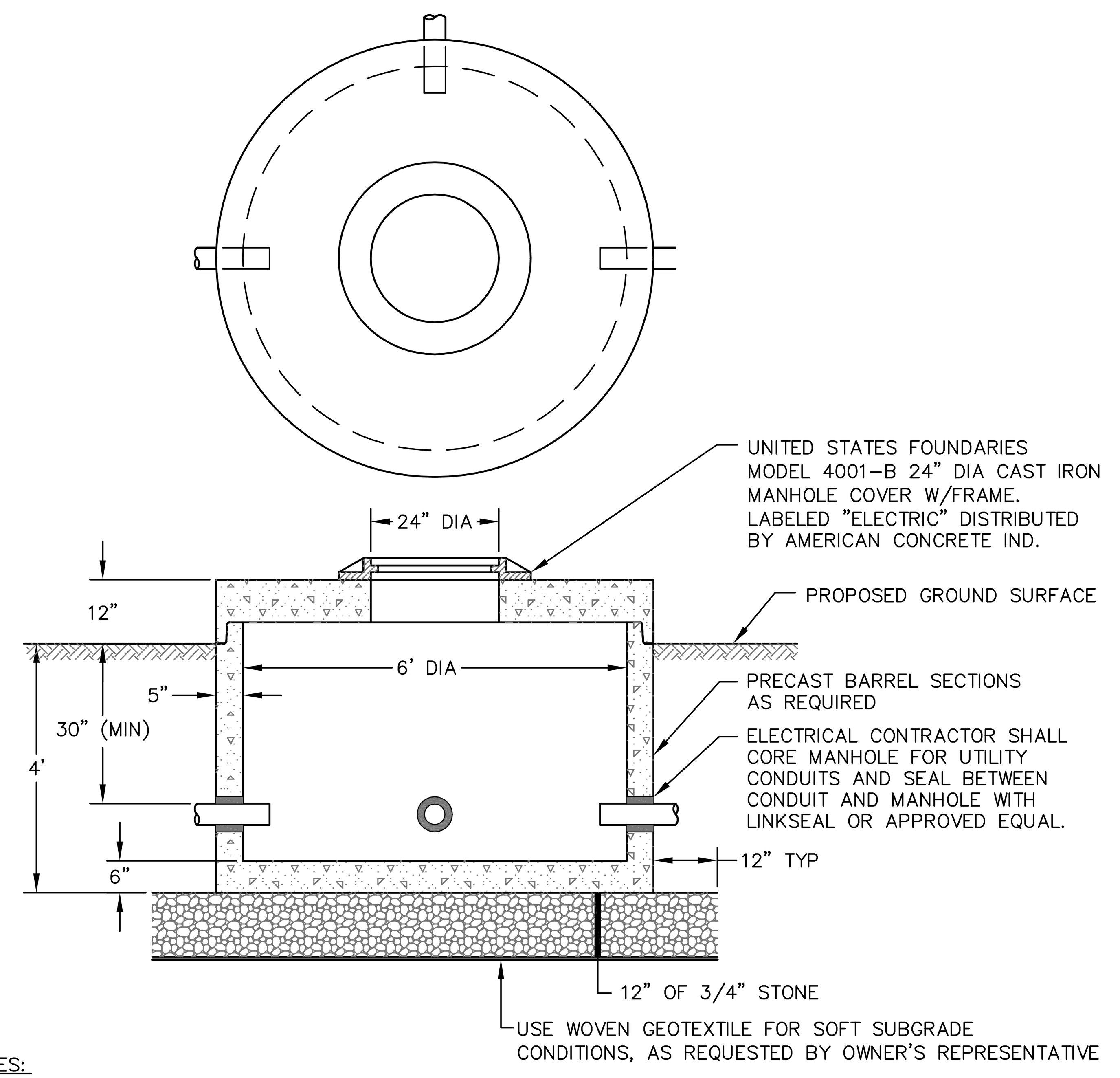
DESIGN BY:	PCM
DRAWN BY:	SJM
DATE:	3/4/2015
CHECKED BY:	
LMN:	FINAL-DRAIN
CTB:	SME-STD

JOB NO. 14101.00 DWG FILE BASE

C-107

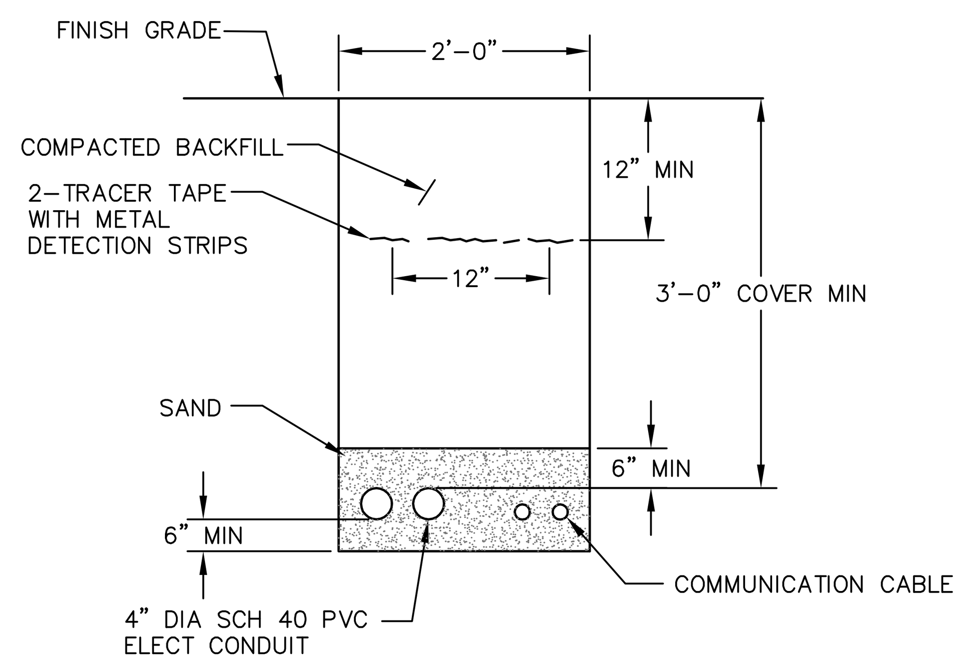


NOTES:

1. 6' DIA MANHOLE AS MANUFACTURED BY AMERICAN CONCRETE INDUSTRIES OR ENGINEER APPROVED EQUAL.
2. 4000 PSI CONCRETE AT 28 DAYS.
3. DESIGNED FOR H-20 WHEEL LOADING.
4. CONFORMS TO ASTM C-478 SPECIFICATIONS.
5. REINFORCED TO 0.12 IN SQ/LF.
6. SHIPLAP JOINTS SEALED WITH BUTYL RUBBER.
7. EXTERIOR COATED WITH ASPHALTIC PROTECTIVE DAMPROOFING.
8. BOTTOM MIN 5'-0" BELOW FINISH GRADE.
9. PRECAST CONCRETE VAULT MANUFACTURER TO PROVIDE ANTI-FLOATATION EXTENDED BASE SLAB AS NECESSARY. ANTI-FLOATATION DESIGN AND SHOP DRAWINGS SHALL BE PREPARED BY THE MANUFACTURER AND SUBMITTED TO THE ENGINEER FOR APPROVAL.

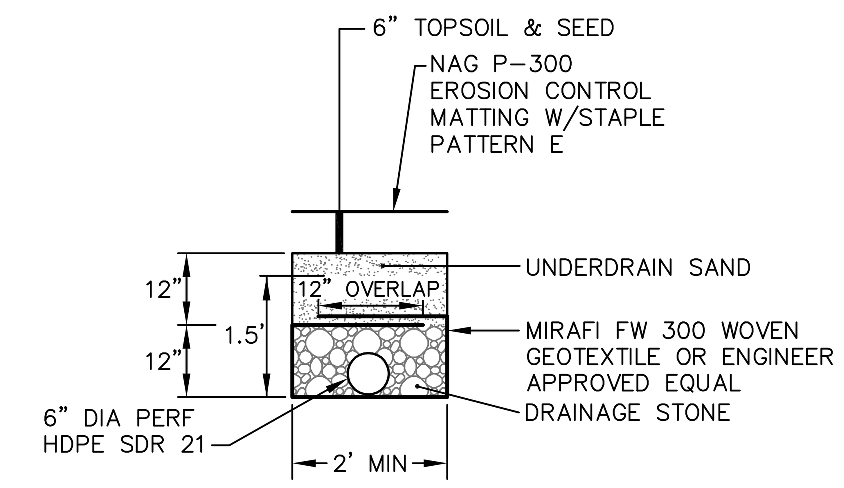
ELECTRIC UTILITY MANHOLE

NTS



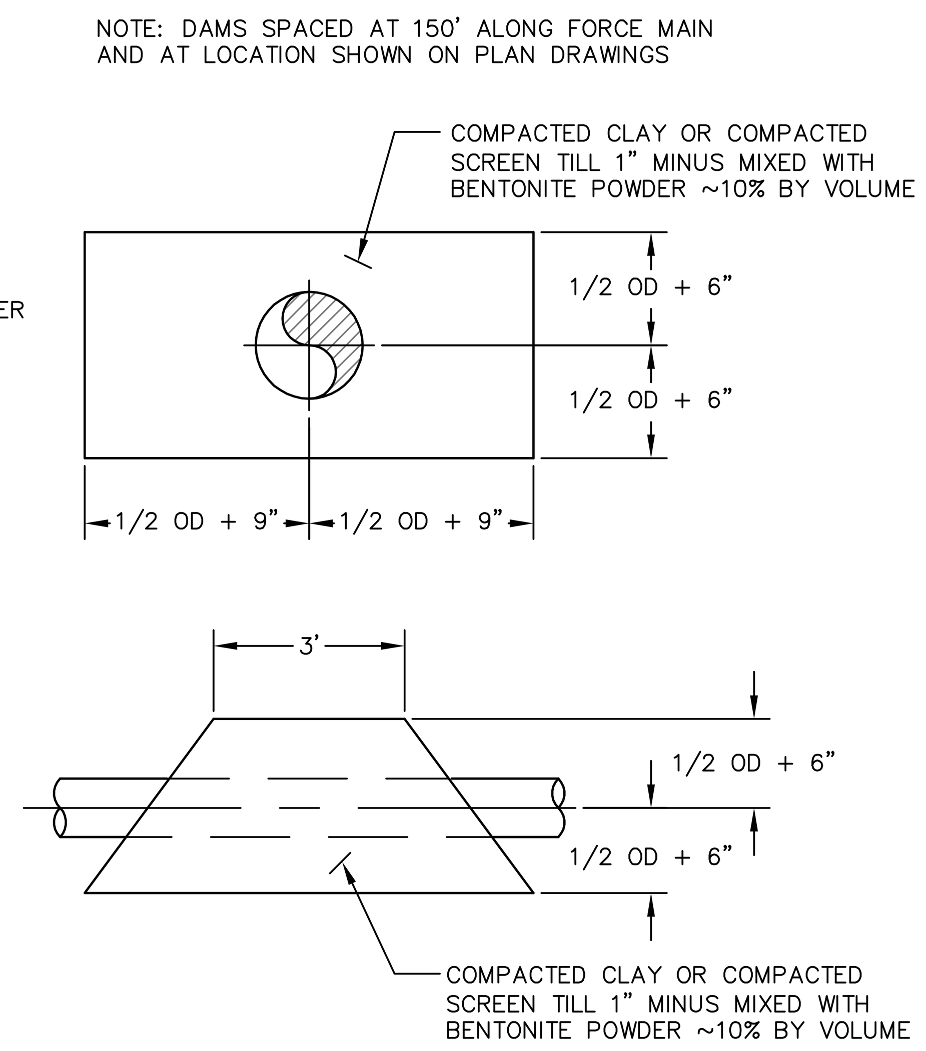
UNDERGROUND ELECTRIC AND COMMUNICATION TRENCH

NTS



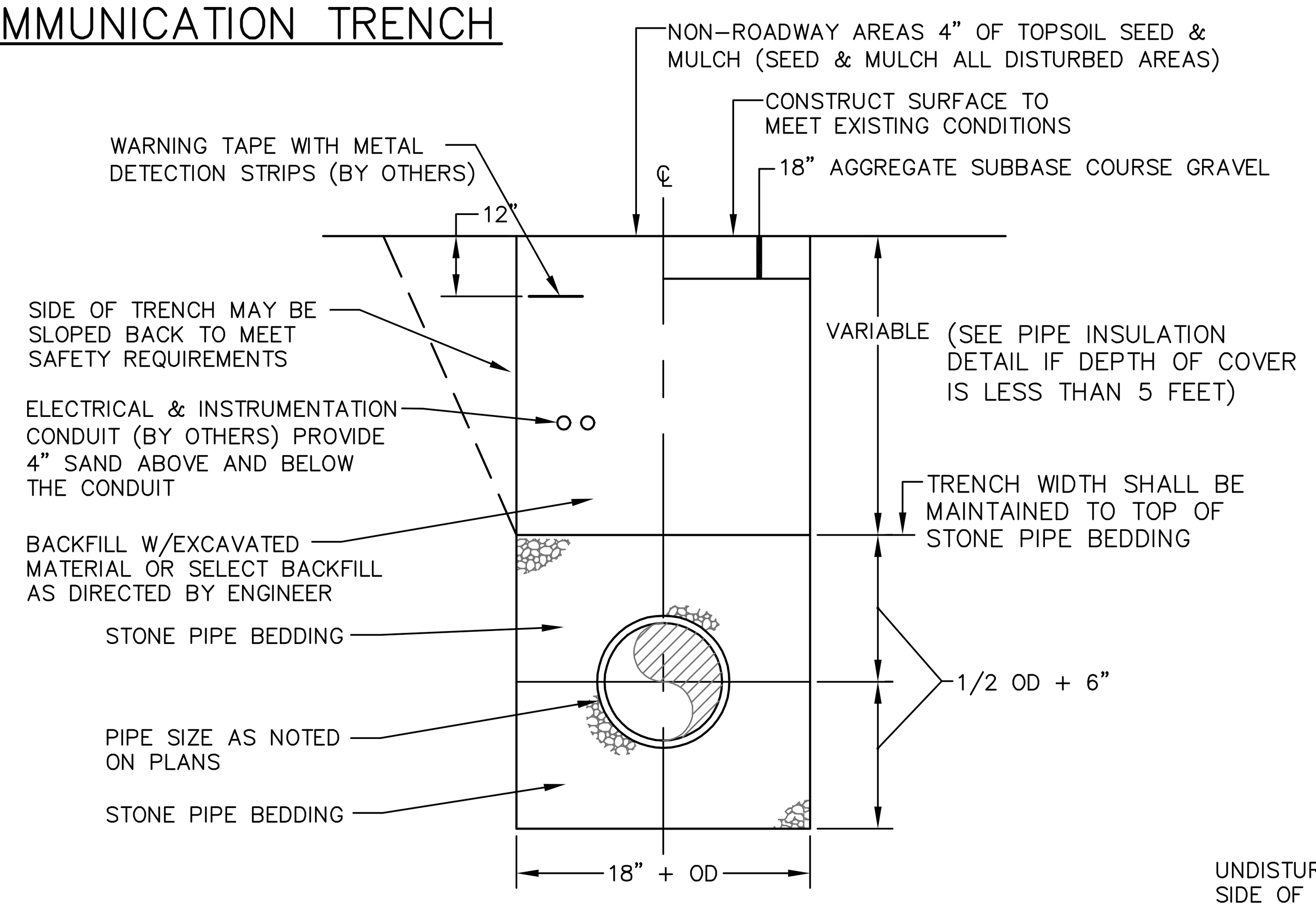
POND UNDERDRAIN

NTS



PIPE DAM

NTS



PIPE TRENCH

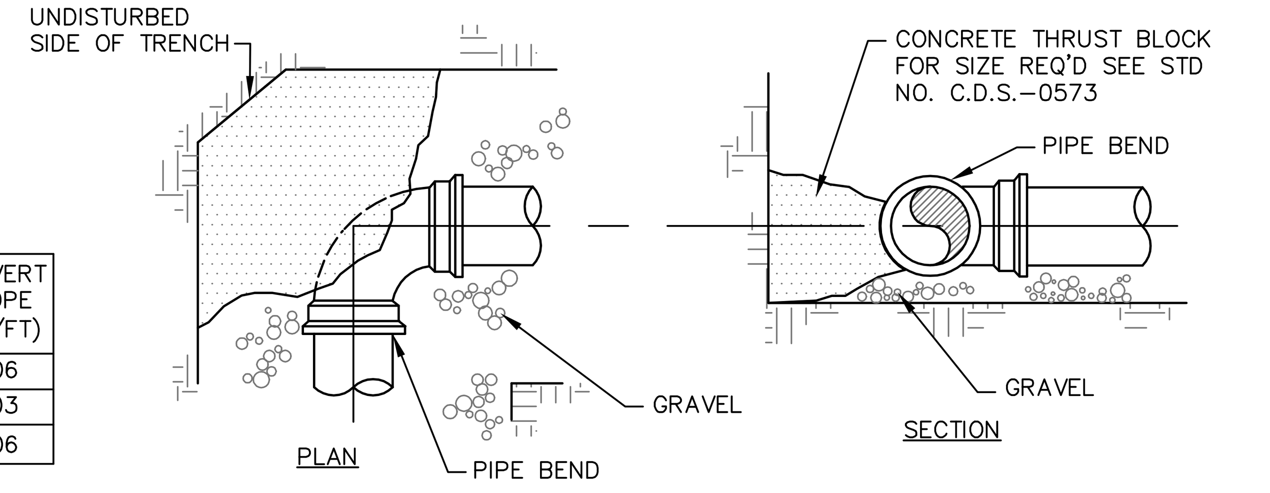
NTS

SIZE REQUIREMENTS FOR CONCRETE THRUST BLOCKS					
	BEARING ON UNDISTURBED SOIL (SQ FT)				
FITTINGS	90° BENDS	45° BENDS	TEES & PLUGS	HYDRANTS	
PIPE SIZE	4"	2.0	1.0	1.0	N/A
	6"	3.0	2.0	2.0	6.0
	8"	5.0	3.0	4.0	N/A
	10"	7.0	4.0	5.0	N/A
	12"	10.0	6.0	7.0	N/A
	14"	13.0	7.0	10.0	N/A
	16"	17.0	9.0	12.0	N/A

CULVERTS	DIAMETER (IN)	LENGTH (FT)	SLOPE (FT/FT)	INV IN (FT)	INV OUT (FT)
C-2BA	24.00	40.00	0.02	203.90	203.00
C-2BB	24.00	96.00	0.01	195.00	194.00
C-4BA	24.00	78.00	0.01	204.40	203.70
C-4BB	24.00	78.00	0.01	204.40	203.70
C-4F	18.00	78.00	0.01	163.00	162.00
C-4G	24.00	36.00	0.03	175.00	174.00
C-4HA	18.00	40.00	0.03	203.50	202.50
C-4HB	18.00	101.00	0.03	178.50	176.00
C-4I	18.00	80.00	0.13	202.50	192.00
C-4IA	18.00	40.00	0.02	214.80	213.90
C-4JA	18.00	60.00	0.07	214.00	210.00
C-4JB	24.00	73.00	0.02	211.50	210.00
C-4JC	24.00	73.00	0.02	211.50	210.00
C-4K	24.00	51.00	0.04	216.50	214.30
C-4L	18.00	121.00	0.02	213.00	211.00
C-4N	18.00	33.00	0.03	184.00	183.00

CULVERT SCHEDULE

NTS



TYPICAL THRUST BLOCK PLACEMENT ON BENDS

NTS

CATCH BASIN SCHEDULE A

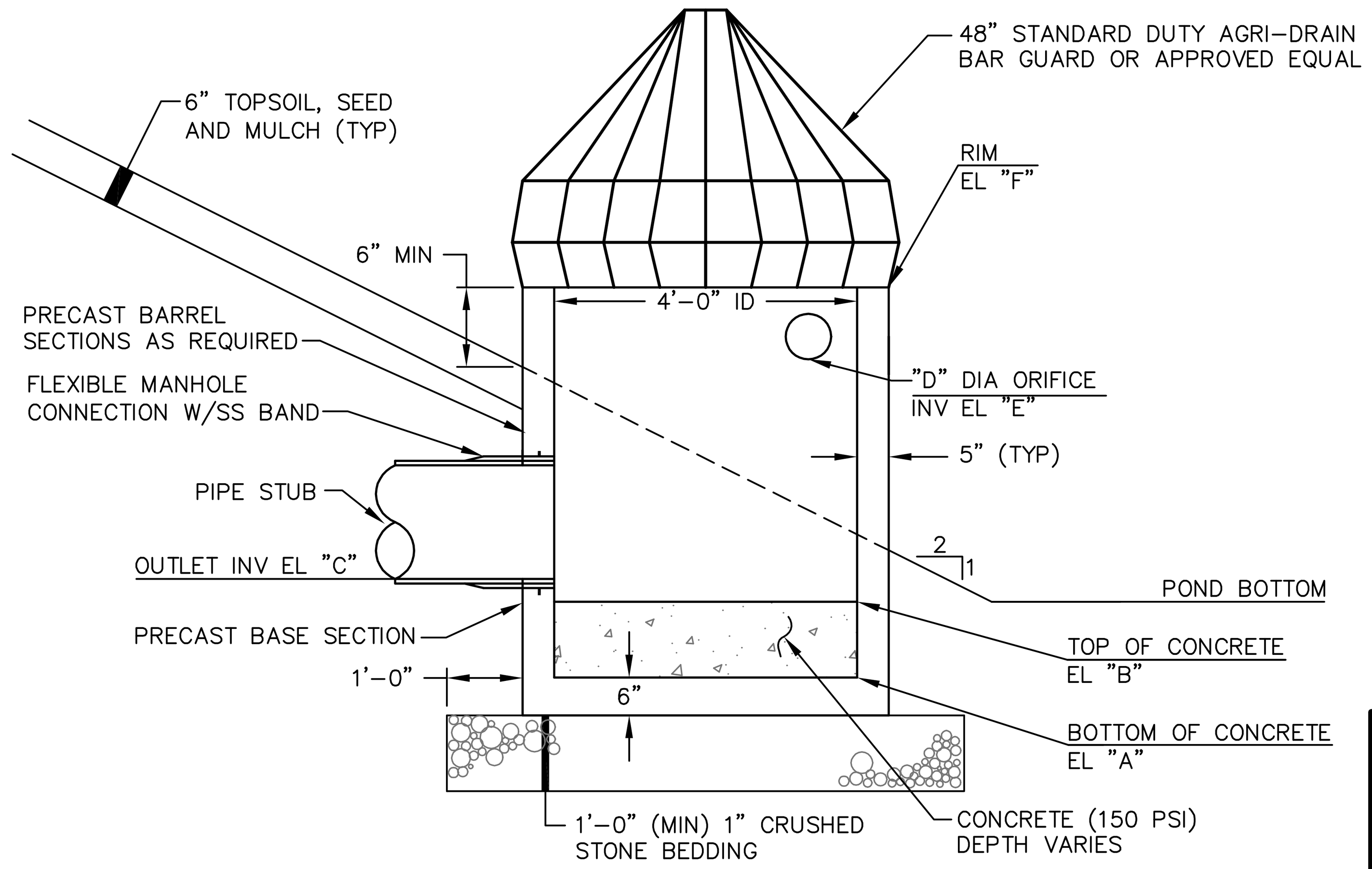
CATCH BASIN DESIGNATION	PIPE INV EL "A" (FT)	RIM EL "B" (FT)	PIPE DIA "C" (IN)	TOP OPENING DIA "D" (IN)
CB-2BB	195.0	201.0	24"	30"
CB-4G	175.0	181.0	24"	24"
CB-4HB	178.5	184.0	18"	24"
CB-4I	202.5	208.0	18"	24"
CB-4JA	214.0	219.5	18"	24"

OUTLET CONTROL STRUCTURE SCHEDULE

STRUCTURE DESIGNATION	BOTTOM OF CONCRETE EL "A" (FT)	TOP OF CONCRETE EL "B" (FT)	OUTLET INV EL "C" (FT)	ORIFICE DIA "D" (IN)	ORIFICE INV EL "E" (FT)	RIM EL "F" (FT)	OUTLET (C) CULVERT DIAMETER (IN)	CULVERT LENGTH (FT)	CULVERT SLOPE (FT/FT)
DP-10	174.2	174.7	175.2	6	178.3	179.0	18 HDPE	52	0.06
DP-11	163.5	164.0	164.3	6	167.5	168.4	18 HDPE	92	0.03
DP-12	183.5	184.0	184.5	8	186.8	188.0	18 HDPE	80	0.06

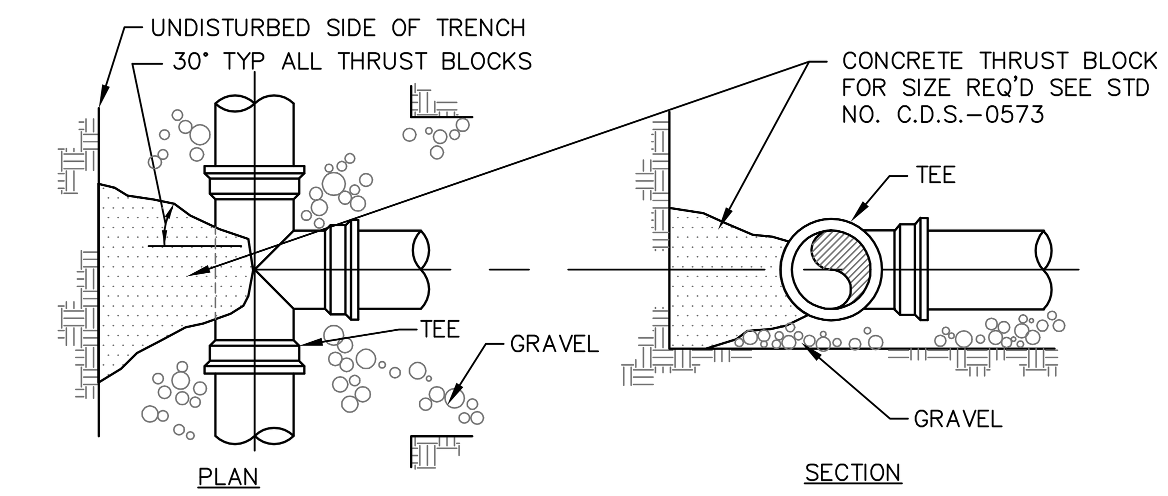
CATCH BASIN SCHEDULE B

CATCH BASIN DESIGNATION	PIPE INV EL "A" (FT)	RIM EL "B" (FT)	PIPE DIA "C" (IN)	TOP OPENING DIA "D" (IN)
CB-4K	216.5	220.0	24"	30"
CB-4L	213.0	215.0	18"	24"



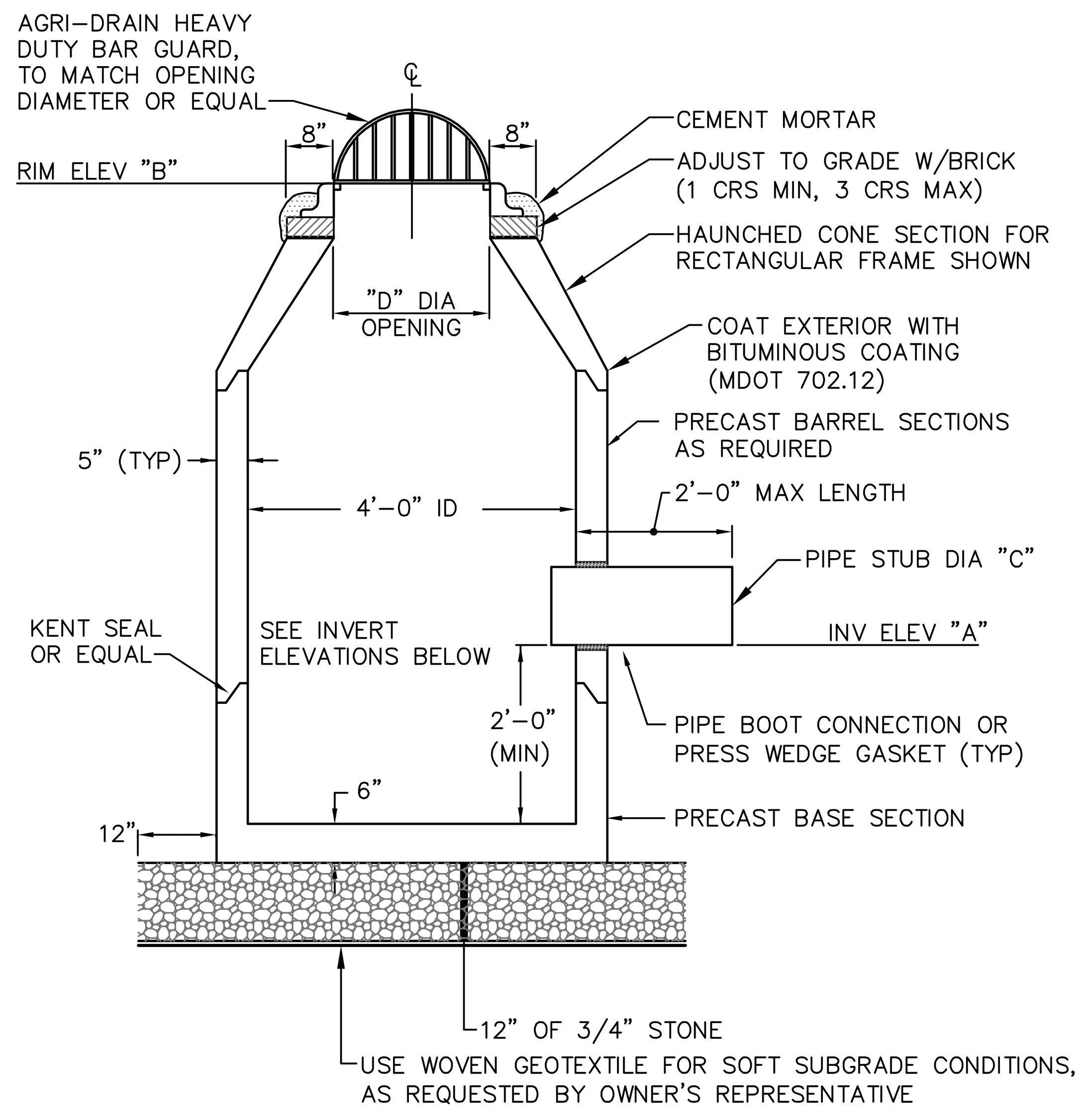
OUTLET CONTROL STRUCTURE

NTS



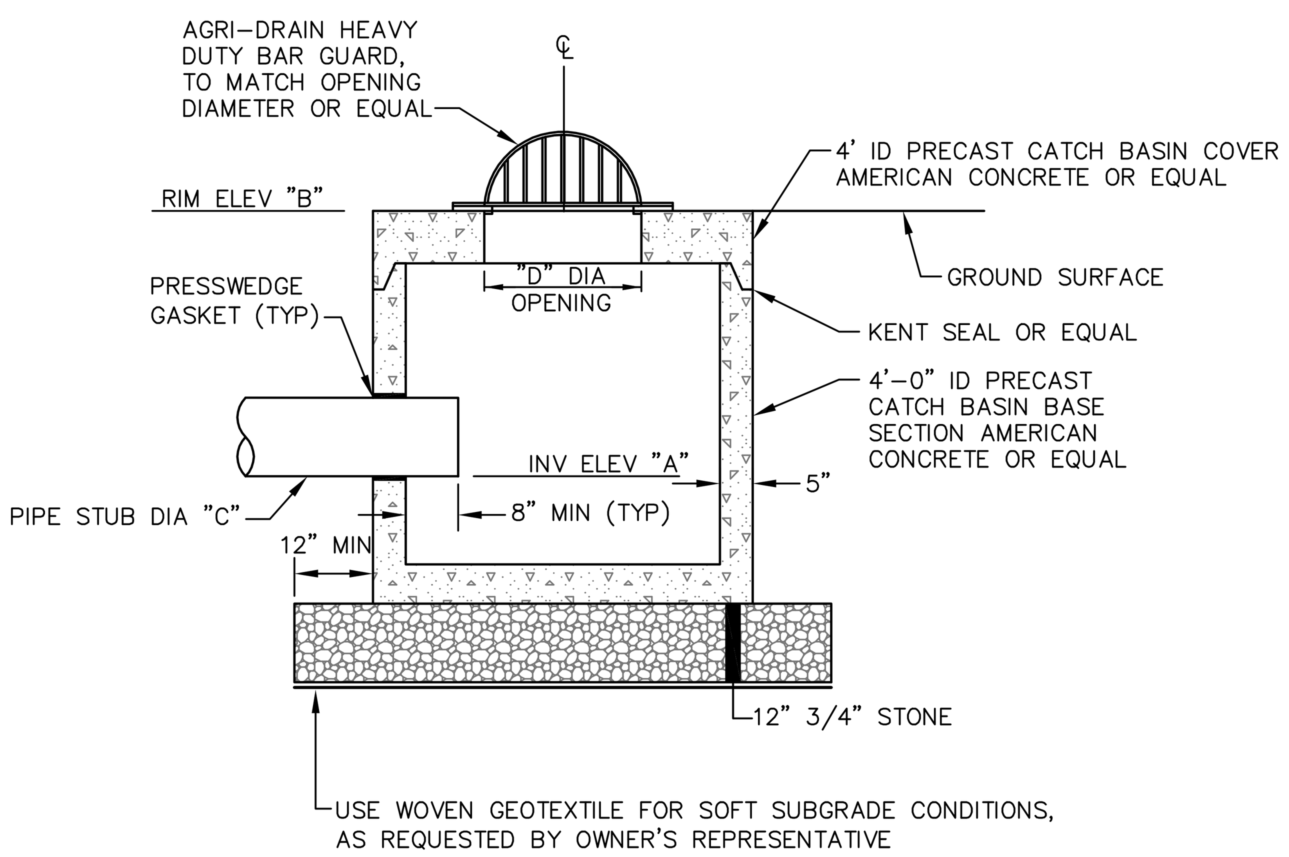
TYPICAL THRUST BLOCK PLACEMENT ON TEES

NTS



CATCH BASINS 2BB, 4G, 4HB, 4I, & 4JA

NTS



CATCH BASINS 4K & 4L

NTS

REV.	BY	DATE	STATUS
		7/15	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SECTIONS AND DETAILS

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DESIGN BY: PCM
DRAWN BY: SJM
DATE: 12/5/2014
CHECKED BY:
LMN: NONE
CTB: SME-STD

JOB NO. 14101.00 DWG FILE DETAILS

C-306

APPENDIX K

EROSION AND SEDIMENTATION CONTROL PLAN

JUNIPER RIDGE LANDFILL EXPANSION EROSION SEDIMENTATION CONTROL PLAN

Submitted by:

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

July 2015

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JUNIPER RIDGE LANDFILL
EXPANSION
EROSION SEDIMENTATION CONTROL PLAN

1.0 INTRODUCTION

This erosion and sedimentation control plan (ESCP) for the Juniper Ridge Landfill (JRL) expansion (Expansion) located in Old Town, Maine was designed to comply with the requirements of 6-096 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 of including the following:

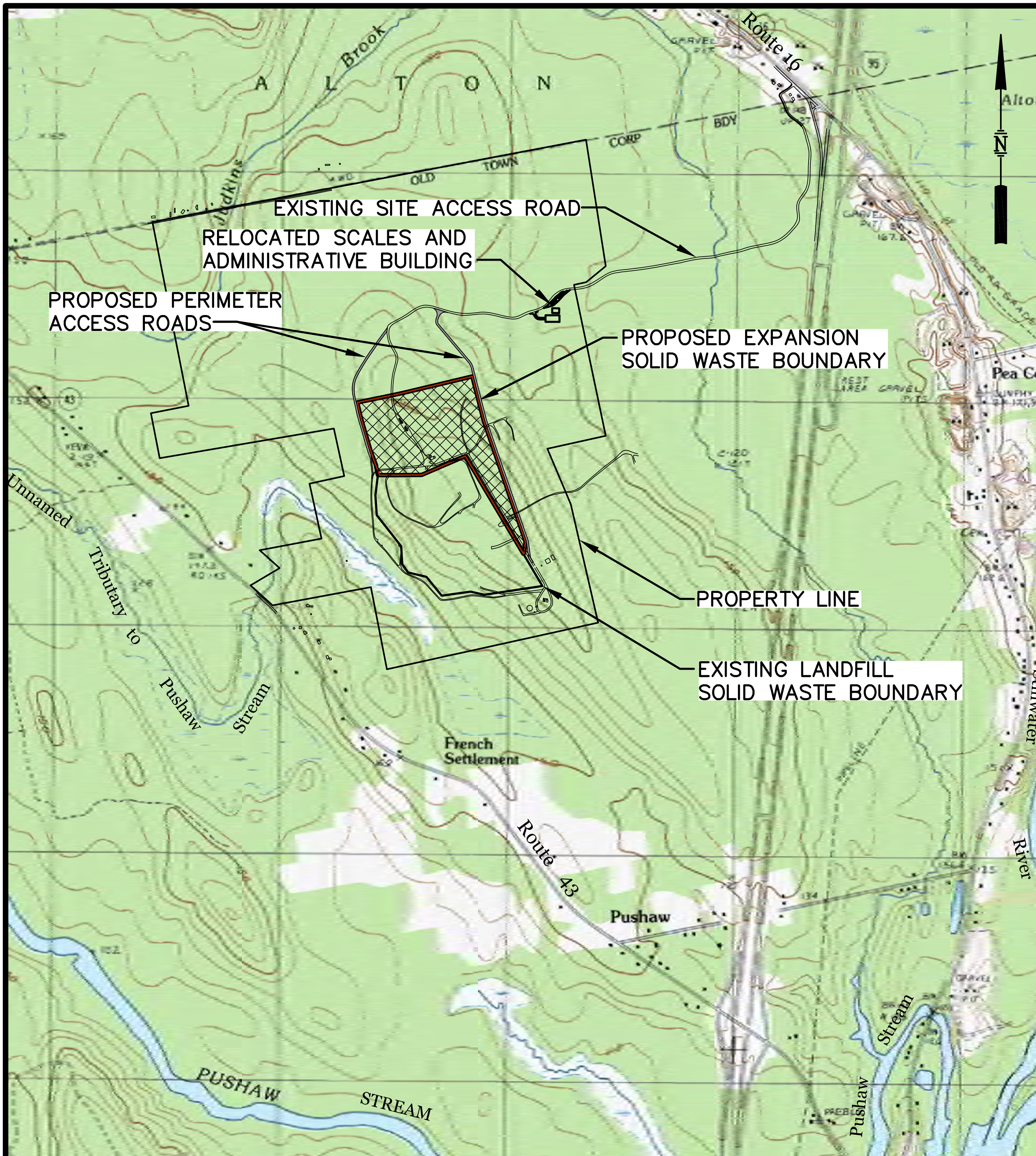
1. That the facility be located on soils suitable for their intended purpose, and
2. That the facility not cause unreasonable sedimentation or erosion of soil.

2.0 SITE DESCRIPTION

The existing landfill and the 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 68-acre solid waste footprint (of which approximately 60 acres are currently developed or undergoing development), the former leachate pond (which has been repurposed to contain stormwater and renamed to Pond 1A), leachate storage tank, maintenance building, scale house (to be relocated as part of the expansion), landfill gas flare, office building, soil borrow areas, soil stockpile areas, stormwater detention ponds, parking areas, access roads and other grassed areas (i.e., berm slopes, laydown areas, etc.).

The Expansion will be adjacent to and generally north of the existing landfill and will expand the solid waste footprint by about 54 acres. The total facility site, including supporting site



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE:
OLD TOWN, MAINE–1988

1000 0 2000 4000 FEET

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

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DWG: SITELOC LMN: SITELOC CTB: SITELOC REV: 5/26/2015

\\Nserver\cfs\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Acad\Figures\SITELOC.dwg, 6/17/2015 1:11:17 PM, paf infrastructure (e.g., access roads, stormwater management ponds, etc.) will be approximately 74 acres.

The development of the Expansion is projected to begin in 2018 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 landfill cells filled to capacity. Additional accessory land development around the perimeter of the Expansion will include; additional stormwater detention ponds, a perimeter berm with a paved access road, electric utilities, leachate force mains and a gas header pipe located within the eastern perimeter berm.

Detention ponds will be used for sediment control and to decrease peak flows prior to discharge. Stormwater discharge from the ponds will be spread using level lip spreaders to limit erosion associated with the point discharge.

3.0 SITE SETTING

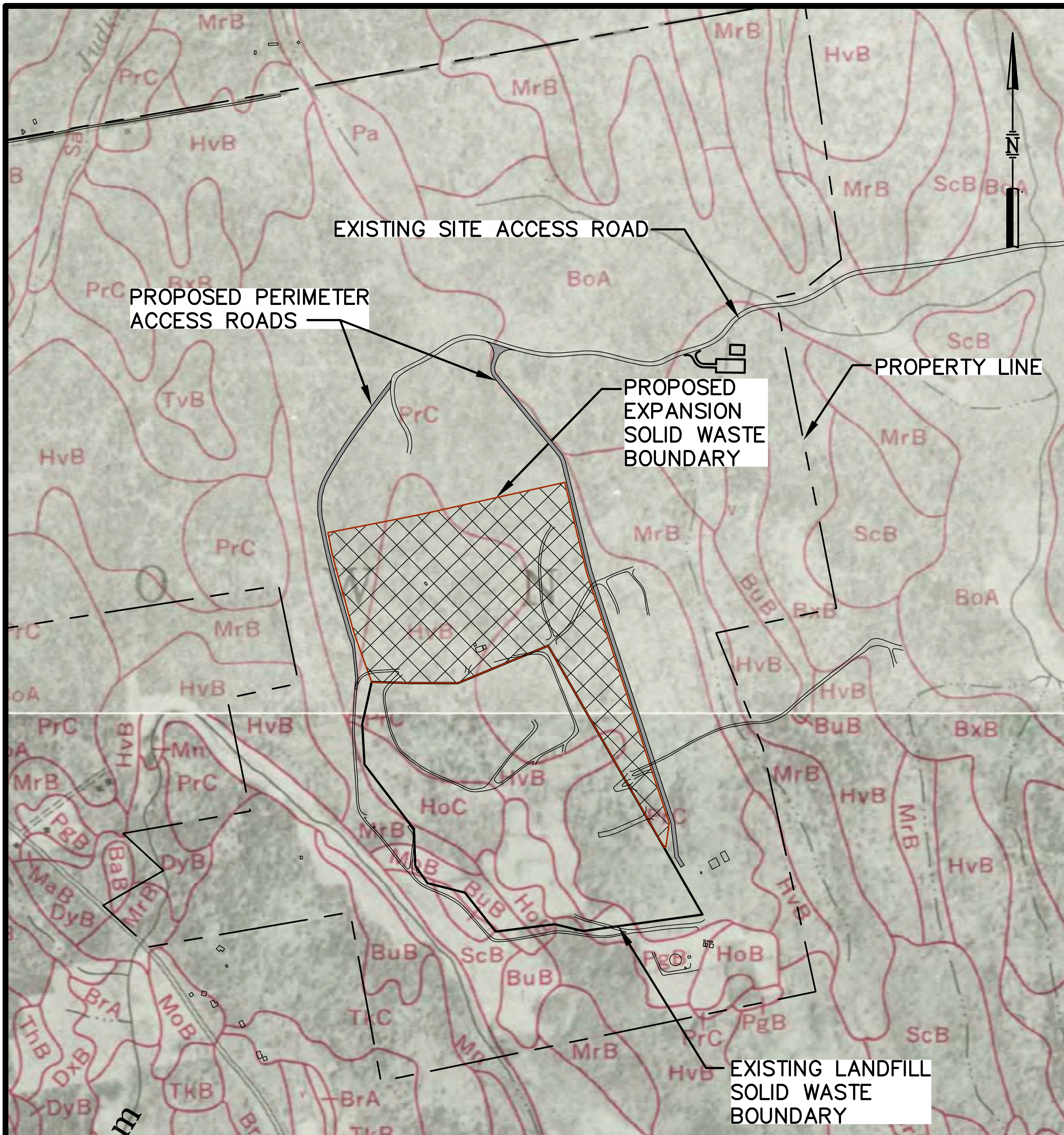
The majority of the 780 acre parcel is wooded, with hardwoods predominating in the upper elevations, and softwoods predominating in the lower elevations. The parcel is irregularly shaped and the existing landfill is positioned in the southern portion of the parcel. A drumlin oriented in a northwest to southeast direction effectively divides the parcel into four watersheds, east, northeast, northwest, and southwest. The area analyzed for each of the watersheds is approximately 346, 26, 271, and 240 acres respectively in the predevelopment conditions. The northeast and the northwest watersheds both contribute to Judkins Brook and eventually Birch Stream. These watersheds will not be affected by the 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. For the purpose of estimating pre-development flows, two of the four watersheds 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 on Drawing D-101 in Appendix A. 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 the east watershed flows. The location of stormwater control structures are shown on Drawing C-107 included in Appendix A.

As stated, a portion of the Expansion is located within several watersheds that will eventually drain to unnamed tributaries of Pushaw Stream and Judkins Brook. 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 (MDEP) Rules 6-096 CMR, Chapter 502: *Direct Watersheds of Lakes Most At Risk from New Development and Urban Impaired Streams.*.

The ground elevation within the Expansion area currently ranges from approximately 170 to 215 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 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.

On-site observations within the landfill site have not identified areas that would be prone or highly susceptible to erosion (i.e., exposed sideslopes). A review of the SCS soils mapping did not identify the presence of highly erodible soils in close proximity to the Expansion.



MAPPING SOURCE
NATURAL RESOURCES CONSERVATION SERVICE, WEB SOIL SURVEY OF PENOBSCOT COUNTY, MAINE, 2014.

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

500 0 1000 2000 FEET

FIGURE 3–1
MEDIUM INTENSITY SOIL TYPES
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

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DWG: SOILS LMN: SOILS CTB: SITELOC REV: 6/17/2015

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TABLE 3-1

SITE SURFICIAL SOIL SUMMARY

Soil Series	Hydrologic Soil Group	Runoff Curve No.	Description
Plaisted	C	70/71	Woods, good condition/Meadow
Howland	C	70/71	Woods, good condition/Meadow
Monarda	D	77/78	Woods, good condition/Meadow
Buxton	C	70/71	Woods, good condition/Meadow
Scantic	D	77/78	Woods, good condition/Meadow
Landfill Cover	C	71	Meadow
Gravel Surfaces	C/D	89/91/96	Gravel Roads, Pads, Berms
Buildings/Roofs/Pond/ Paved Surfaces	NA	98	Impervious Surface

An emergent marsh area that forms the headwaters to an unnamed tributary that feeds the Pushaw Stream is downgradient and to the southwest of the 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 also be maintained between any site development and the emergent wetland marsh to the west of the existing landfill.

The grading and layout of the proposed facility was undertaken 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. No surface drainage outlet structures from the developed site will discharge concentrated flows directly onto abutting properties. Where necessary, the runoff from the developed site will discharge into detention basins that will attenuate peak flows rates to the unnamed tributaries feeding Pushaw Stream and Judkins Brook.

4.0 EXISTING AND PROPOSED DRAINAGE FACILITIES

4.1 Existing Drainage Facilities

There are several existing drainage structures within the existing landfill project site. The locations of these drainage structures are shown on Drawing C-107 in Appendix A.

Detention Pond 1 currently functions as a detention and sedimentation basin during the landfill operational life. The modifications to Detention Pond 1 as part of the Expansion will involve enlarging the flow control orifice located on the side of the existing composite outlet control structure and adding a second orifice to the structure prior to final closure of the site. This is a result of converting the existing pond from a sedimentation pond to a detention pond (as described in the Expansion Application Stormwater Management Plan) and also due to diverting flow from Detention Pond 1A into Detention Pond 1. The existing pond itself does not require any modifications and can adequately accommodate the peak flow both during and after Expansion development. Detention Pond 1 is located to the west of the existing landfill cells and will remain in operation throughout the Expansion development.

Detention Pond 1A is the pond that was formerly used to store leachate adjacent to Detention Pond 1. The pond is an existing pond that does not require modification. It is currently being used as a stormwater detention pond and will remain a detention pond throughout the life of the facility. Detention Pond 1A will outlet via a broad crested weir into Detention Pond 1.

Detention Ponds 2 and 6 are additional existing detention ponds located to the south of the existing landfill that 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 proposed Expansion.

Detention Pond 9 is an existing detention pond located east of the previously permitted landfill and permitted wood handling area and it will remain in place for the life of the facility. As part of the proposed Expansion, this detention pond will be enlarged to increase storage below the emergency spillway outlet (elev. 190.5) from 2.3 acre-feet to 5.1 acre-feet. The existing pond outlets will remain in place without modification.

Existing Detention Pond 5 is located in the northwest of the existing landfill. This pond will be removed as the western portion of the Expansion is developed.

A more thorough description of the outlet structures of existing detention ponds is presented in the Expansion Application Stormwater Management Plan.

4.2 Proposed Drainage Facilities

Proposed drainage facilities used to effectively manage stormwater associated with the 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 and covered areas of the Expansion will be conveyed by a series of drainage structures consisting of ditches, catch basins, culverts as summarized on Table 4-1. Locations of the proposed permanent ditches, catch basins, and culverts are shown on Drawing C-107 included in Appendix A. The post-development stormwater analysis Drawing D-101 located 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 Expansion Stormwater Management Plan. These structures were sized to handle the projected peak flows resulting from the 24-hour/25-year rainfall event.

The design capacity of the stormwater drainage structures was based on SCS TR20 methodology. Culverts and catch basins were sized using a computer stormwater modeling system entitled *Hydrocad* by Applied Microcomputer Systems of Chocorua, New Hampshire. Ditches were sized using the *Hydraulic Design Series No. 4, Design of Roadside Drainage Channels (Mannings Equation)*. Ditch linings, culvert inlet and outlet protection were designed using SCS guidance found in the *Maine Erosion and Sediment Control BMPs* (SCS, 3/2003). These calculations are attached in Appendix B of the application. Calculations for the proposed pond level lip spreaders, plunge pools, and emergency spillways are included in Appendix B.

New culverts will be high-density polyethylene (HDPE) pipe and have diameters ranging from 18 to 36 inches. The culverts were designed with riprap aprons at inlet and riprap-lined aprons or plunge pools at outlet. Riprap for culvert inlet and outlet protection D-50 rating (i.e., 50 percent of riprap) ranges from 4 to 10 inches. Culvert outflows will be routed through level lip spreaders or vegetated swales.

The site stormwater drainage ditches (toe ditch) around the Expansion perimeter will be turf lined grass channels with a minimum base width of 2 feet, depth of 2 feet, and maximum sideslopes of 2H:1V.

Riprap downspouts on the landfill cover will be lined with riprap (D50 of 8 inches) and have a base width of 4 feet, depth of two feet, and maximum sideslopes of 2H:1V. Surface water ditches will have a minimum base width of 2 foot, depth of 2 feet and maximum sideslopes of 2H: 1V.

Terrace drain swales on the sideslopes of the landfill cover will be turf-lined ‘v’-channels with a depth of 1 foot, pitch of 5 percent (typical), and maximum sideslopes of 2H:1V. Terrace drain swales were uniformly sized based on the largest contributing drainage area and minimum expected slope. Riprap sizing was based on the maximum longitudinal slope. Rock chutes (riprap terrace downspouts) were uniformly sized for capacity based on the largest contributing drainage area and riprap size based on contributing area and slope. Computer software entitled HYDRAIN 6.01 (1996), Integrated Drainage Design Computer System, from the Federal Highway Administration (FHWA) was utilized to size the riprap for downspouts and ditches. Computer software entitled Erosion Control Materials Design Software (ECMDS) Version 4.2 (2002) from the North American Green Co. (N.A.G.) was utilized to determine temporary erosion matting for turf-lined and vegetated ditches.

TABLE 4-1

SUMMARY OF STORMWATER CULVERTS, STORM DRAINS, CATCH BASINS, DITCHES

Structures Culvert	Diameter (in.)	Material	Length (ft.)	Slope (%)	Inv. In Elev.	Inv. Out Elev.
EC-D-1G	24 (2)	CMP	56	0.018	183.0	182.0
C-2BA	36	HDPE	40	0.008	203.2	202.9
C-2BB	24	HDPE	96	0.010	195.0	194.0
C-4BA	24	HDPE	78	0.009	204.4	203.7
C-4BB	24	HDPE	78	0.009	204.4	203.7
C-4F	18	HDPE	78	0.04	165.0	162.0
C-4G	24	HDPE	36	0.028	175.0	174.0
C-4HA	18	HDPE	40	0.025	201.9	200.9
C-4HB	18	HDPE	101	0.025	178.5	176.0
C-4I	18	HDPE	80	0.131	202.5	192.0
C-4IA	18	HDPE	40	0.023	212.9	212.2
C-4JA	18	HDPE	60	0.028	214.0	212.3
C-4JB	24	HDPE	73	0.021	211.5	210.0
C-4JC	24	HDPE	73	0.021	211.5	210.0
C-4K	24	HDPE	51	0.043	216.5	214.3
C-4L	18	HDPE	121	0.017	213.0	211.0
C-4N	18	HDPE	33	0.030	184.0	183.0

Catch Basin	Basin Dia. (ft)	Grate Opening (in.)	Depth (ft)	Culvert Dia. (in.)
CB-2BB	4	30	7.2	24
CB-4G	4	24	8	24
CB-4HB	4	24	6.9	18
CB-4I	4	24	7.1	18
CB-4JA	4	24	6.7	18
CB-4K	4	30	5.5	24
CB-4L	4	24	4	18

Ditch	Base Width (ft)	Depth (ft.)	Sideslope Z-Value ('/')	Lining
Ditch to Detention Pond 10	2	2	2	Segments 1&2: NAG S75 Erosion Mat Segment 3: Riprap (D50=4", t=9")
Detention Pond 10 Emergency Spillway	10	2	2	Riprap (D50=4", t=9")
Perimeter (toe)	2	2	2	NAG S75 Erosion Mat
Maintenance Road Ditch	2	3	2	NAG S75 Erosion Mat
Terrace Drain	0' - V-ditch	2	2	NAG C125BN Erosion Mat
Downspouts	4	2	2	Riprap (D50=8", t=18")

Note:
Location of structures shown on Drawing C-107 contained in Appendix A.

The HYCHL Module of the FHWA HYDRAIN 6.01 software and the ECMDS software is designed to provide recommendations to the user 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 (Detention Ponds 10, 11, and 12) were designed to provide flow control and sedimentation during construction. To allow sedimentation each pond was designed to allow 24-hours (minimum) of plug flow detention time during the 2-year/24-hour storm event. Proposed Detention Ponds 10, 11, and 12 will each have a composite outlet structure consisting of a 4-foot diameter drop inlet with a side-mounted orifice which will discharge to an 18-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 lip spreaders which will discharge to the adjacent wooded buffer areas. Plunge pools and level spreaders were designed to meet the requirements of *Maine Erosion and Sedimentation Control (MESC) BMP's* (SCS 3/2003). Detention Pond 10 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.

Detention Ponds 11 and 12 will be adjacent to proposed roadways and thus will utilize the grate atop each of the 4-foot diameter drop structures to allow flow into the outlet culvert during emergency conditions, rather than a traditional emergency spillway. The emergency spillways for theses ponds were designed to pass the 100-year/24-hour storm event with at least one foot of freeboard.

Design calculations for the ponds including riprap plunge pools, level spreaders, anti-seep collars, and emergency spillways are included in the Expansion Stormwater Management Plan Appendix C.

5.0 TIMING AND SEQUENCE OF LAND DISTURBANCE ACTIVITIES

The proposed timing and sequence of land disturbance activities associated with the Expansion cell construction, landfill operations, and cover placement is anticipated to be as follows:

a. Install silt fence and other temporary erosion control measures for the construction of the cell and accessory facilities such as detention ponds, berms, and service roads;
b. Clear and grub cell area;
c. Construct upslope stormwater diversion berms, ditches, culvert outlets, and outlet control structures (if necessary);
d. Construct service road(s) (if necessary);
e. Construct cell, cover system or perform construction required for landfill operations; and,
f. As permanent erosion control measures become stabilized, remove temporary measures (e.g., silt fence, stone check dams).

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 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, sedimentation 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. 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

The greatest potential for erosion will occur 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, a siltation fence will be placed. In addition, stone check dams will be installed in newly created surface water drainage ditches. Once the perimeter dikes, culverts, ditches, 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 15 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 Expansion cell construction, Expansion 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, the landfill sideslope cover will be applied. Once the cover has been applied, if soil cover is used, the cover will be seeded and mulched to minimize erosion. Seeding of the cover with the permanent seeding mixture will be done within 15 days of placing the cover material.

TABLE 6-1

SEEDING SPECIFICATIONS

Permanent Seeding (120 lbs/acre)		**Temorary Seeding (120 lbs/acre)**
Tall Fescue	54 lbs/acre	Aroostook Rye
Red Fescue	25 lbs/acre	
Red Top	5 lbs/acre	
Ladino Clover	13 lbs/acre	
Annual Ryegrass	8 lbs/acre	
Birdsfoot Trefoil	5 lbs/acre	
Timothy	10 lbs/acre	
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 300 lbs./acre fiber mulch.		

Seeding operations typically occur no later than October 1st, at which time the soil shall be protected with mulch consisting of either hay or straw and the temporary seed mixture. 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 manufacturers recommendations. Silt fence shall also be installed at the toe of slopes of greater than 100 feet in length where intermediate cover has been applied. 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 sedimentation ponds and drainage ditches shall be cleaned and repaired as necessary.

6.3 Standard Erosion Control Procedures

In addition to these measures, the following erosion control procedures will be implemented during Expansion cell construction, operations and cover placement:

a. Soil erosion and sediment control measures will be performed in accordance with procedures outlined in the *Maine Erosion and Sediment Control BMPs* (SCS, 3/2003).

b. Removal of trees, brush, and other vegetation, as well as disturbance of soil, will be kept to a minimum during site development.

c. Usable topsoil will be stripped and stockpiled for reuse. Excess topsoil will be stockpiled on-site or 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 for use in final grading. Topsoil will be stockpiled such that natural drainage is not obstructed and no off-site sediment damage will result. Sideslopes of the stockpiled topsoil will not exceed 2H:1V and the stockpile will be surrounded with a siltation fence. Topsoil stockpiles will be temporarily seeded with Aroostook Rye or Annual Ryegrass within 15 days of formation, or temporarily mulched if seeding cannot be done within the recommended seeding dates.

d. 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 a silt fence will be installed as shown, and/or adjusted to suit construction after a cut or fill slope has been created.

e. The silt fence will be inspected after each rainfall 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 silt fence will be replaced, as necessary, to provide proper filtering action.

f. Riprap required at culverts will consist of fieldstone or rough unhewn quarrystone of approximately rectangular shape. Stones will be of a size as noted on the construction drawings.

g. 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 6 inches of topsoil and seeded to provide a permanent vegetative cover.

h. All areas receiving topsoil will be seeded. Seeding normally will occur between April 30 and September 30. 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 raking, discing, or other acceptable means before seeding. Application rates for the lime, fertilizer, seed, and mulch are as presented on Table 6-1. The seed will be applied uniformly with a cyclone seeder, drill, cultipack seeder, or hydroseeder. Seed will not be planted if there is danger of frost shortly after seed germination. Maximum seeding depth is 1/4-inch when using methods other than hydroseeding.

i. 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 a Curasol or Terratac.

j. If germination is unsuccessful (i.e., less than 75-percent catch) within 30 days of seeding or there is unsatisfactory growth in the next year, the area will be reseeded in accordance with seeding specifications described herein.

7.0 MAINTENANCE

7.1 Routine Maintenance

Inspection shall be performed annually by a qualified person during wet weather to assure that the erosion/sediment control system performs as intended. Inspection priorities shall include checking erosion controls for accumulation of sediments.

Maintenance of the detention ponds will be a continuous process that involves routine inspections of the inlet structures, containment dikes, and outlet structures. At least once annually, 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

Lime according to a soil test as necessary.

8.0 INSPECTIONS

Inspections will be undertaken by the Landfill Operator 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 foregoing measures and controls will help to assure that no unreasonable erosion of soil or sediment will occur as a result of the development or operation of the facilities.

APPENDIX A

POST-DEVELOPMENT STORMWATER ANALYSIS DRAWING D-101 AND FINAL SITE DRAINAGE PLAN DRAWING C-107

TIME OF CONCENTRATION

SUBCATCHMENT 1A
A – B: Sht L=150', S=0.020
B – C: Direct Entry, L=1840'
C – D: Direct Entry, L=260'

SUBCATCHMENT 1B
A – B: Sht L=150', S=0.050
B – C: ShC L=185', S=0.100
C – D: Ch L=390', S=0.050
D – E: Ch L=560', S=0.330

SUBCATCHMENT 1C
A – B: Sht L=150', S=0.035
B – C: ShC L=230', S=0.013
C – D: Direct Entry

SUBCATCHMENT 1D
A – B: Sht L=150', S=0.050
B – C: ShC L=160', S=0.100
C – D: Ch L=200', S=0.050
D – E: Ch L=605', S=0.330

SUBCATCHMENT 1E
A – B: Sht L=150', S=0.100
B – C: ShC L=150', S=0.150
C – D: Ch L=93', S=0.050
D – E: Ch L=517', S=0.330

SUBCATCHMENT 1F
A – B: Sht L=100', S=0.010
B – C: Sht L=17', S=0.330
C – D: ShC L=300, S=0.019
D – E: ShC L=1649', S=0.050
E – F: Direct Entry

SUBCATCHMENT 1G
A – B: Sht L=150', S=0.100
B – C: ShC L=62', S=0.100
C – D: ShC L=90', S=0.330
D – E: Ch L=140', S=0.500
E – F: Ch L=415', S=0.330

SUBCATCHMENT 1H
A – B: Sht L=150', S=0.330
B – C: Ch L=610', S=0.030

SUBCATCHMENT 1i
A – B: Sht L=150', S=0.050
B – C: ShC L=150', S=0.100
C – D: Ch L=220', S=0.050
D – E: Ch L=570', S=0.330

SUBCATCHMENT 1J
A – B: Sht L=100', S=0.040
B – C: ShC L=123', S=0.057
C – D: Ch L=370', S=0.019

SUBCATCHMENT 2A
A – B: Sht L=150', S=0.030
B – C: ShC L=540', S=0.020
C – D: ShC L=530', S=0.009
D – E: Cf L=1213', S=0.008

SUBCATCHMENT 2B
A – B: Sht L=150', S=0.050
B – C: ShC L=190', S=0.100
C – D: Ch L=430', S=0.050
D – E: Ch L=450', S=0.330

SUBCATCHMENT 2C
A – B: Sht L=150', S=0.013
B – C: ShC L=290', S=0.024
C – D: Ch L=260', S=0.011

SUBCATCHMENT 3
A – B: Sht L=150', S=0.020
B – C: ShC L=1120', S=0.005
C – D: Direct Entry, L=3070'

SUBCATCHMENT 4A
A – B: Sht L=150', S=0.017
B – C: ShC L=160', S=0.041
C – D: ShC L=70', S=0.043

SUBCATCHMENT 4B
A – B: Sht L=24', S=0.020
B – C: Sht L=19', S=0.500
C – D: ShC L=584', S=0.014
D – E: Ch L=40', S=0.025

SUBCATCHMENT 4C
A – B: Sht L=61', S=0.020
B – C: Sht L=61', S=0.020
C – D: ShC L=374', S=0.011

SUBCATCHMENT 4D
A – B: Sht L=125', S=0.022
B – C: Sht L=25', S=0.052
C – D: ShC L=270', S=0.019
D – E: ShC L=40', S=0.330
E – F: ShC L=100', S=0.015
F – G: ShC L=258', S=0.003

SUBCATCHMENT 4E
A – B: Sht L=150', S=0.013
B – C: ShC L=2625', S=0.019
C – D: Direct Entry L=1590'
D – E: Direct Entry, L=760'
E – F: Direct Entry, L=960'

SUBCATCHMENT 4F
A – B: Sht L=140', S=0.028
B – C: ShC L=1067', S=0.029
C – D: Ch L=20', S=0.021

SUBCATCHMENT 4G
A – B: Sht L=100', S=0.050
B – C: Sht L=50', S=0.100
C – D: ShC L=150', S=0.100
D – E: Ch L=130', S=0.050
D – F: Ch L=500', S=0.330

SUBCATCHMENT 4H
A – B: Sht L=75', S=0.100
B – C: Sht L=75', S=0.330
C – D: ShC L=150', S=0.330
D – E: Ch L=290', S=0.050
E – D: Ch L=240', S=0.330

SUBCATCHMENT 4HA
A – B: Sht L=140', S=0.330

SUBCATCHMENT 4i
A – B: Sht L=150', S=0.050
B – C: ShC L=200', S=0.100
C – D: Ch L=290', S=0.050
D – E: Ch L=440', S=0.330

SUBCATCHMENT 4iA
A – B: Sht L=140', S=0.333

SUBCATCHMENT 4J
A – B: Sht L=150', S=0.050
B – C: ShC L=200', S=0.100
C – D: Ch L=270', S=0.050
D – E: Ch L=430', S=0.330

SUBCATCHMENT 4K
A – B: Sht L=150', S=0.050
B – C: ShC L=270', S=0.055
C – D: Ch L=270', S=0.050
D – E: Ch L=410', S=0.330

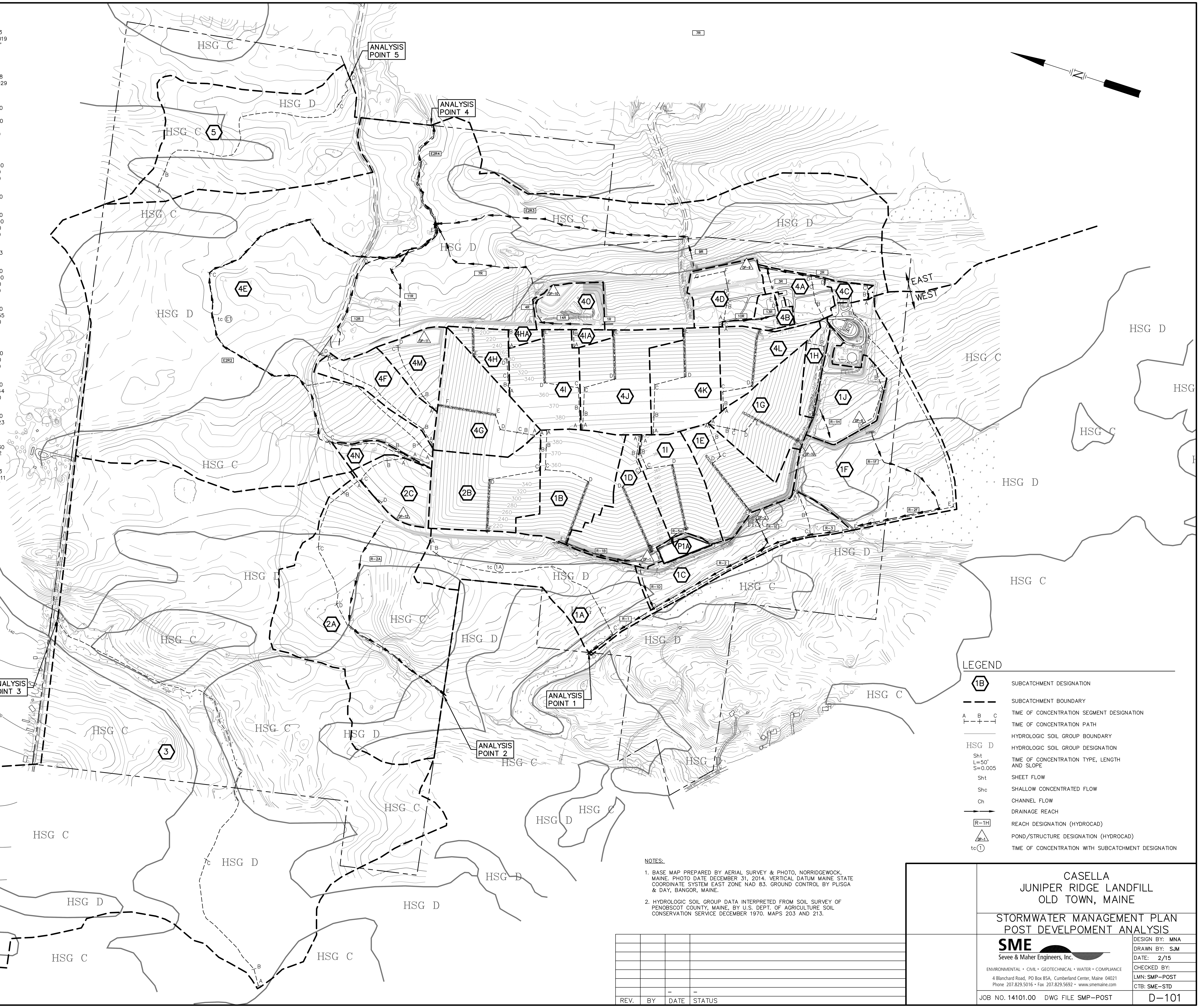
SUBCATCHMENT 4L
A – B: Sht L=20', S=0.050
B – C: ShC L=130', S=0.100
C – D: Ch L=250', S=0.050
D – E: Ch L=490', S=0.330

SUBCATCHMENT 4M
A – B: Sht L=150', S=0.330
B – C: ShC L=470', S=0.044
C – D: ShC L=20', S=0.330

SUBCATCHMENT 4N
A – B: Sht L=150', S=0.020
B – C: ShC L=580', S=0.023

SUBCATCHMENT 4O
A – B: Sht L=55', S=0.300
B – C: ShC L=289', S=0.030
C – D: ShC L=319, S=0.012

SUBCATCHMENT 5
A – B: Sht L=150', S=0.013
B – C: ShC L=1930', S=0.011
C – D: Direct Entry, L=275'



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)
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.

REV.	BY	DATE	STATUS
		–	–

CASELLA
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

STORMWATER MANAGEMENT PLAN
POST DEVELPOMENT ANALYSIS

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
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DESIGN BY: MNA
DRAWN BY: SJM
DATE: 2/15
CHECKED BY:
LMN: SMP–POST
CTB: SME–STD

JOB NO. 14101.00 DWG FILE SMP–POST

D–101

LEGEND

WETLAND DELINEATED

WETLAND PHOTO INTERPRETED

NOTES:

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC., NORRIDGEWOCK, MAINE. PHOTO DATE 12/31/14. VERTICAL DATUM: BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY PLISGA & DAY LAND SURVEYORS, BANGOR, MAINE. STANDARD PRACTICE DICTATES THAT PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. SITE BENCHMARK INFORMATION:

   PLUG 1 IS A BRASS PLUG ON FORMER LEACHATE POND PUMP STATION LOCATED AT COORDINATES NORTHING 478242.05, EASTING 925376.35 ELEVATION 167.93

2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. IN 2004 AND STANTEC CONSULTING SERVICES 2008, 2014 AND 2015.

3. PERMITTED LANDFILL FINAL WASTE GRADES REPRESENT GRADES PRIOR TO CONSTRUCTION OF FINAL COVER SYSTEM.

4. PROPOSED FINAL WASTE GRADES REPRESENT GRADES PRIOR TO CONSTRUCTION OF FINAL COVER SYSTEM.

5. CULVERT SCHEDULE IS SHOWN ON DRAWING C-306. CULVERT SCHEDULE INCLUDES CULVERTS FOR DETENTION BASIN OUTLET STRUCTURES.

REV.	BY	DATE	STATUS
		7/15	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

FINAL SITE DRAINAGE PLAN

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DESIGN BY: PCM
DRAWN BY: SJM
DATE: 3/4/2015
CHECKED BY:
LMN: FINAL-DRAIN
CTB: SME-STD

JOB NO. 14101.00 DWG FILE BASE

C-107

APPENDIX B

EROSION CONTROL DESIGN

APPENDIX B-1

GRASS DITCH LINING DESIGN

GRASS CHANNEL DESIGN

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 3/12/2015
Chk. By: Pcm

OBJECTIVE: Design channel with adequatelining 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. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System, Version 7.0, Chocorua, New Hampshire, 2001
2. North American Green Erosion Control Material Design Software.
3. Maine Erosion and Sedimentation Control BMP's, MEDEP, March 2003.

DESIGN PROCEDURE:

1. Determine peak stormwater flows from 2-year and 25-year, 24-hour storm event using TR-20. Evaluate permanent and temporary channel lining using maximum flow rate.

SUMMARY OF RESULTS:

GRASS DITCH	FLOW FROM	SLOPE (MAX.) (ft/ft)	Q_2 (cfs)	Q_{25} (cfs)	Bottom Width (ft)	Side Slopes (H:1V)	Temp. Lining	Permanent Lining
NPD-1	North Perimeter Ditch 1	0.0299	5.2	20.2	2	2	NAG S75	Grass Only
NPD-2	North Perimeter Ditch 2	0.0027	5.3	22.1	2	2	NAG S75	Grass Only
EPD-1	East Perimeter Ditch 1	0.0075	5.0	19.5	2	2	NAG S75	Grass Only
EPD-2	East Perimeter Ditch 2	0.0157	0.5	1.9	2	2	NAG S75	Grass Only
EPD-3	East Perimeter Ditch 3	0.0167	4.5	17.6	2	2	NAG S75	Grass Only
EPD-4	East Perimeter Ditch 4	0.0191	0.4	1.6	2	2	NAG S75	Grass Only
EPD-5	East Perimeter Ditch 5	0.0350	2.0	7.7	2	2	NAG S75	Grass Only
EPD-6	East Perimeter Ditch 6	0.0056	4.4	16.9	2	2	NAG S75	Grass Only
DP-10-1	DP-10 Ditch 1	0.0079	4.9	19.0	2	2	NAG S75	Grass Only
DP-10-2	DP-10 Ditch 2	0.0362	4.9	18.7	2	2	NAG S75	Grass Only
4B-1	Ditch 4B-1	0.0085	4.2	16.3	2	2	NAG S75	Grass Only
MRD-1	Maintenance Road Ditch	0.0194	5.1	19.7	2	2	NAG S75	Grass Only

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Erosion Control Materials Design Software
Version 5.0

Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: North Perimeter Ditch – PERMANENT LINING

Discharge	22.1
Peak Flow Period	1
Channel Slope	0.0299
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Clay Loam

DITCH	Q_{25}	SLOPE
NPD-1	20.2	0.0299
NPD-2	22.1	0.0027

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	22.1 cfs	3.87 ft/s	1.26 ft	0.055	4.2 lbs/ft2	2.35 lbs/ft2	1.78	STABLE	--
Underlying Substrate	Straight	22.1 cfs	3.87 ft/s	1.26 ft	--	0.05 lbs/ft2	0.048 lbs/ft2	1.04	STABLE	--

∴ GRASS LINED OKAY FOR PERMANENT LINING

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Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: North Perimeter Ditch - TEMP. LINING

Discharge	5.3
Peak Flow Period	1
Channel Slope	0.0299
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	
Vegtation Type	
Vegetation Density	
Soil Type	

DITCH	Q_2	SLOPE
NPD-1	5.2	0.0299
NPD-2	5.3	0.0027

S75

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S75 Unvegetated	Straight	5.3 cfs	2.72 ft/s	0.61 ft	0.053	1.55 lbs/ft2	1.13 lbs/ft2	1.37	STABLE	D

∴ S75 w/ STAPLE PATTERN D

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Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: East Perimeter Ditch — PERMANENT LINING

Discharge	19.5
Peak Flow Period	1
Channel Slope	0.035
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Clay Loam

DITCH	Q_{25}	SLOPE
EPD-1	19.5	0.0075
EPD-2	1.9	0.0157
EPD-3	17.6	0.0167
EPD-4	1.6	0.0191
EPD-5	7.7	0.035
EPD-6	16.9	0.0056

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	19.5 cfs	3.91 ft/s	1.16 ft	0.056	4.2 lbs/ft2	2.52 lbs/ft2	1.66	STABLE	--
Underlying Substrate	Straight	19.5 cfs	3.91 ft/s	1.16 ft	--	0.05 lbs/ft2	0.049 lbs/ft2	1.01	STABLE	--

∴ GRASS LINED OKAY FOR PERMANENT LINING

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Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: East Perimeter Ditch - TEMP. LINING

Discharge	5
Peak Flow Period	1
Channel Slope	0.035
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	
Vegtation Type	
Vegetation Density	
Soil Type	

DITCH	Q_2	SLOPE
EPD-1	5.0	0.0075
EPD-2	0.5	0.0157
EPD-3	4.5	0.0167
EPD-4	0.4	0.0191
EPD-5	2.0	0.035
EPD-6	4.4	0.0056

S75

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S75 Unvegetated	Straight	5 cfs	2.79 ft/s	0.57 ft	0.053	1.55 lbs/ft2	1.24 lbs/ft2	1.25	STABLE	D

∴ S75 w/ STAPLE PATTERN D

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Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: DP-10 Ditch - PERMANENT LINING

Discharge	19.0
Peak Flow Period	1
Channel Slope	0.0362
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Clay Loam

DITCH	Q_{25}	SLOPE	
DP10-1	19.0	0.0079	GRASS
DP-10-2	18.7	0.0362	GRASS
DP-10-3	33.82	0.0462	RIPRAP

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	19 cfs	3.92 ft/s	1.13 ft	0.056	4.2 lbs/ft2	2.56 lbs/ft2	1.64	STABLE	--
Underlying Substrate	Straight	19 cfs	3.92 ft/s	1.13 ft	--	0.05 lbs/ft2	0.05 lbs/ft2	1.01	STABLE	--

∴ GRASS LINED OKAY FOR PERMANENT LINING OF SEGMENTS 1 & 2

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Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: DP-10 Ditch – TEMP. LINING

Discharge	4.9
Peak Flow Period	1
Channel Slope	0.0362
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	
Vegtation Type	
Vegetation Density	
Soil Type	

DITCH	Q_2	SLOPE	
DP-10-1	4.9	0.0079	GRASS
DP-10-2	4.9	0.0362	GRASS
DP-10-3	8.68	0.0462	RIPRAP

S75

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S75 Unvegetated	Straight	4.9 cfs	2.8 ft/s	0.56 ft	0.054	1.55 lbs/ft2	1.27 lbs/ft2	1.23	STABLE	D

∴ S75 w/ STAPLE PATTERN D FOR SEGMENTS 1 & 2

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Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: Ditch 4B-1 – PERMANENT LINING

Discharge	16.3
Peak Flow Period	1
Channel Slope	0.0085
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Clay Loam

DITCH	Q_{25}	SLOPE
4B-1	16.3	0.0085

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	16.3 cfs	1.93 ft/s	1.61 ft	0.067	4.2 lbs/ft2	0.86 lbs/ft2	4.9	STABLE	--
Underlying Substrate	Straight	16.3 cfs	1.93 ft/s	1.61 ft	--	0.05 lbs/ft2	0.012 lbs/ft2	4.29	STABLE	--

∴ GRASS LINED OKAY FOR PERMANENT LINING

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Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: Ditch 4B-1 – TEMP. LINING

Discharge	4.2
Peak Flow Period	1
Channel Slope	0.0085
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	
Vegtation Type	
Vegetation Density	
Soil Type	

DITCH	Q_2	SLOPE
4B-1	4.2	0.0085

S75

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S75 Unvegetated	Straight	4.2 cfs	1.68 ft/s	0.73 ft	0.05	1.55 lbs/ft2	0.38 lbs/ft2	4.03	STABLE	D

∴ S75 W/ STAPLE PATTERN D

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Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: Maintenance Road Ditch – PERMANENT LINING

Discharge	19.65
Peak Flow Period	1
Channel Slope	0.0194
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	C
Vegtation Type	Mix (Sod & Bunch)
Vegetation Density	Good 75-95%
Soil Type	Clay Loam

Unreinforced Vegetation - Class C - Mix (Sod & Bunch) - Good 75-95%

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
Unreinforced Vegetation	Straight	19.65 cfs	3.04 ft/s	1.37 ft	0.059	4.2 lbs/ft2	1.65 lbs/ft2	2.54	STABLE	--
Underlying Substrate	Straight	19.65 cfs	3.04 ft/s	1.37 ft	--	0.05 lbs/ft2	0.029 lbs/ft2	1.7	STABLE	--

∴ Grass Lined OKAY for PERMANENT LINING

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Project Name: Juniper Ridge Landfill
Project Number: 60548
Channel Name: Maintenance Road Ditch – TEMP. LINING

Discharge	5.14
Peak Flow Period	1
Channel Slope	0.0194
Channel Bottom Width	2
Left Side Slope	2
Right Side Slope	2
Low Flow Liner	
Retardance Class	
Vegtation Type	
Vegetation Density	
Soil Type	

S75

Phase	Reach	Discharge	Velocity	Normal Depth	Mannings N	Permissible Shear Stress	Calculated Shear Stress	Safety Factor	Remarks	Staple Pattern
S75 Unvegetated	Straight	5.14 cfs	2.34 ft/s	0.66 ft	0.051	1.55 lbs/ft2	0.8 lbs/ft2	1.94	STABLE	D

∴ S75 W/ STAPLE PATTERN D

APPENDIX B-2

RIPRAP DITCH LINING DESIGN

RIPRAP CHANNEL DESIGN

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/11/2015
Chk. By: Ava

OBJECTIVE: Design channel with adequatelining 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 7.0, Chocorua, New Hampshire, 2001
2. Channel Design Program HYCHL Version 6.1
3. Maine Erosion and Sedimentation Control BMP's, MEDEP, March 2003.

DESIGN PROCEDURE:

1. Determine peak stormwater flows for 25-year, 24-hour storm event using TR-20. (See Attached Hydrocad Printouts). Evaluate permanent channel lining using maximum flow rate.

SUMMARY OF RESULTS:

RIPRAP DITCH	FLOW FROM	SLOPE (MAX.) (ft/ft)	Q_2 (cfs)	Q_{25} (cfs)	Bottom Width (feet)	Side Slopes (H:1V)	Riprap D_{50} (inches)	Riprap Thickness (inches)
DP-10-3	DITCH DP-10 SECTION 3	0.0462	9.3	35.4	2	2	4	9
Emerg Spillway	DP-10	0.33	NA	8.0	10	2	4	9

```
****** HYCHL ****** (Version 6.1) ******              Date 06-02-2015

 Commands Read From File: C:\HCHL\D-1B.CHL

       JOB DP-10-3
       UNI 0
 ** UNITS PARAMETER = 0 (ENGLISH)
       CHL 0.0462 35.4
       TRP 2      2      2
 ** LEFT SIDE SLOPE    2.0 AND RIGHT SIDE SLOPE    2.0
 ** THE BASE WIDTH OF THE TRAPEZOID (ft)    2.00
       LRR 0.33    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************
```

$D_{50} = 4''$

```
 DP-10-3
 ------------
 INPUT REVIEW
 ------------
   DESIGN PARAMETERS:
       DESIGN DISCHARGE (ft^3/s):            35.40
       CHANNEL SHAPE:                    TRAPEZOIDAL
       CHANNEL SLOPE (ft/ft):               .046
 -----------------------------------------
 HYDRAULIC CALCULATIONS USING NORMAL DEPTH
 -----------------------------------------
```

	DESIGN	MAXIMUM
FLOW (cfs)	35.40	27.31
DEPTH (ft)	1.46	1.32
AREA (ft^2)	7.21	6.09
WETTED PERIMETER (ft)	8.54	7.88
HYDRAULIC RADIUS (ft)	.84	.77
VELOCITY (ft/s)	4.91	4.49
MANNINGS N (LOW FLOW)	.058	.060
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	4.22	1.21	STABLE
SIDE; STRAIGHT	RIPRAP	3.79	3.12	1.21	STABLE

```
*** NORMAL END OF HYCHL ***
```

$D_{50} = 4''$ OK

Summary for Pond DP-10: DETENTION POND 10

[62] Hint: Exceeded Reach 4R OUTLET depth by 0.72' @ 12.85 hrs

```
Inflow Area =    28.280 ac,  4.24% Impervious,  Inflow Depth =  2.84"   for 100-yr Storm event
Inflow     =     59.36 cfs @  12.35 hrs,  Volume=        6.692 af
Outflow    =     27.71 cfs @  12.72 hrs,  Volume=        6.274 af,  Atten= 53%,  Lag= 22.0 min
Primary    =     18.03 cfs @  12.72 hrs,  Volume=        3.582 af
Secondary  =      1.74 cfs @  12.72 hrs,  Volume=        2.452 af
Tertiary   =      7.94 cfs @  12.72 hrs,  Volume=        0.240 af
```

100 year storm flow into riprap channel

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 180.44' @ 12.72 hrs Surf.Area= 27,104 sf Storage= 112,674 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 439.2 min calculated for 6.272 af (94% of inflow)
Center-of-Mass det. time= 408.3 min (1,259.2 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert**
			L= 52.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900
			n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert**
			L= 60.0' CPP, projecting, no headwall, Ke= 0.900
			Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900
			n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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=18.03 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└─**3=18-in Primary Culvert** (Inlet Controls 18.03 cfs @ 10.20 fps)
  ├─**1=Orifice/Grate** (Passes < 70.84 cfs potential flow)
  └─**2=6-in Orifice** (Passes < 1.40 cfs potential flow)

Secondary OutFlow Max=1.74 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└─**4=6-in Culvert** (Barrel Controls 1.74 cfs @ 9.51 fps)
  ├─**5=Orifice Top** (Passes < 1.64 cfs potential flow)
  └─**6=Orifice Side** (Passes < 0.12 cfs potential flow)

Tertiary OutFlow Max=7.82 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└─**7=E-Spillway Weir** (Weir Controls 7.82 cfs @ 1.79 fps)

```
 ******  HYCHL  ****** (Version 6.1) ******   Date 02-26-2015

DETENTION POND #10 EMERGENCY SPILLWAY RIPRAP CHANNEL

Commands Read From File: C:\HCHL\DP-10.CHL

       JOB DP-10 SPILLWAY
       UNI 0
 ** UNITS PARAMETER = 0 (ENGLISH)
       CHL 0.33    8
       TRP 10      3       3
 ** LEFT SIDE SLOPE     3.0 AND RIGHT SIDE SLOPE    3.0
 ** THE BASE WIDTH OF THE TRAPEZOID (ft)    10.00
       LRR 0.33    2 0 2.65    0.15
 ** D50 (ft)     .33
 ** SPECIFIC GRAVITY     2.65
 ** SHIELDS PARAMETER     .150
       END
***************END OF COMMAND FILE************

 DP-10 SPILLWAY
 ------------
 INPUT REVIEW
 ------------
   DEFAULT ANGLE OF REPOSE (degrees):      40.95
   DESIGN PARAMETERS:
       DESIGN DISCHARGE (ft^3/s):              8.00
       CHANNEL SHAPE:                     TRAPEZOIDAL
       CHANNEL SLOPE (ft/ft):                  .330
 -------------------------------------
 HYDRAULIC CALCULATIONS USING BATHURST
 -------------------------------------

 FLOW (cfs)                     8.00
 MAX DEPTH (ft)                  .09
 AREA (ft^2)                    1.20
 WETTED PERIMETER (ft)         10.73
 HYDRAULIC RADIUS (ft)           .11
 AVG VELOCITY (ft/s)            6.69
 MANNINGS EQUIVALENT            .127
 Davg / D50                      .34
 FROUDE NUMBER                  3.87
 REYNOLDS NUMBER (10^5)          .43
 ------------------
 STABILITY ANALYSIS
 ------------------

                          LINING    PERMIS SHR   CALC. SHR  STAB.
     CONDITION            TYPE      (LB/FT^2)    (LB/FT^2)  FACTOR    REMARKS
     ---------            ------    ----------   ---------  ------    ------

   BOTTOM; STRAIGHT     RIPRAP           5.10       1.91      2.67    STABLE
   SIDE; STRAIGHT       RIPRAP           4.46       1.62      2.76    STABLE
  *** NORMAL END OF HYCHL ***
```

D50 = 4 INCHES

DOWNSPOUT RIPRAP SIZING:

SUBCATCHMENT	DOWNSPOUT SLOPE	25-YEAR Q (CFS)
1B	0.33	21.2
1D	0.33	18.84
1E	0.33	20.23
1G	0.33	21.25
1I	0.33	15.23
2B	0.33	22.49
4G	0.33	20.62
4H	0.33	6.34
4I	0.33	16.02
4J	0.33	19.91
4K	0.33	17.14
4L	0.33	13.11
MAX =	**0.33**	**22.49**

DOWNSPOUT.TXT

```
       ******  HYCHL  ****** (Version 6.1) ******          Date 02-11-2015

Commands Read From File: C:\CHANNEL.CHL

      JOB DOWNSPOUT
      UNI 0
** UNITS PARAMETER = 0 (ENGLISH)
      CHL 0.33   22.49
*** WARNING:  DATA IS OUT OF REASONABLE RANGE
      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 0.67   2 42     2.65   0.15
** D50 (ft)     .67
** ANGLE OF REPOSE (DEGREES)   42.00
** SPECIFIC GRAVITY    2.65
** SHIELDS PARAMETER    .150
      END
***************END OF COMMAND FILE************

DOWNSPOUT
------------
INPUT REVIEW
------------
  DESIGN PARAMETERS:
      DESIGN DISCHARGE (ft^3/s):          22.49
      CHANNEL SHAPE:                   TRAPEZOIDAL
      CHANNEL SLOPE (ft/ft):               .330
-------------------------------------
HYDRAULIC CALCULATIONS USING BATHURST
-------------------------------------

FLOW (cfs)                  22.49
MAX DEPTH (ft)                .42
AREA (ft^2)                  2.05
WETTED PERIMETER (ft)        5.89
HYDRAULIC RADIUS (ft)         .35
AVG VELOCITY (ft/s)         10.98
MANNINGS EQUIVALENT          .039
Davg / D50                    .54
FROUDE NUMBER                2.98
REYNOLDS NUMBER (10^5)       1.25
------------------
STABILITY ANALYSIS
------------------

                         LINING   PERMIS SHR   CALC. SHR  STAB.
   CONDITION             TYPE     (LB/FT^2)    (LB/FT^2)  FACTOR   REMARKS
   ---------             ------   ----------   ---------  ------   -------
 BOTTOM; STRAIGHT       RIPRAP       10.35        8.68     1.19    STABLE
 SIDE; STRAIGHT         RIPRAP        7.70        6.68     1.15    STABLE

*** NORMAL END OF HYCHL ***
```

MAX DOWNSPOT
Q25

D50 = 8-INCHES

D50 = 8-INCHES OKAY
FOR ALL DOWNSPOUTS

APPENDIX B-3

CULVERT INLET/OUTLET DESIGN

RIPRAP APRON DESIGN

Project Name: Juniper Ridge Landfill
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/11/2015
Chk. By: PCM

OBJECTIVE: Design culvert outlet protection 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 Protection table to determine apron dimensions and riprap size.

SUMMARY OF RESULTS:

Riprap Apron Designation	Flow From	Q_{25} (cfs)	Culvert Dia. (in)	D_{50} (in)	Thickness (in)	Length (ft)	Width (ft)
2BA	Culvert 2BA	22	24	8	18	18	20
2BB	Culvert 2BB	22	24	6	14	18	20
4BA	Culvert 4BA	15	24	5	12	12	14
4BB	Culvert 4BB	15	24	5	12	12	14
4F	Culvert 4F	5	18	4	9	10	12
4G	Culvert 4G	20	24	5	12	12	14
4HA	Culvert 4HA	2	18	4	9	10	12
4HB	Culvert 4HB	7	18	4	9	10	12
4I	Culvert 4I	17	18	10	23	18	20
4IA	Culvert 4IA	2	18	4	9	10	12
4JA	Culvert 4JA	19	18	10	23	18	20
4JB	Culvert 4JB	9	24	5	12	12	14
4JC	Culvert 4JC	9	24	5	12	12	14
4K	Culvert 4K	17	24	5	12	12	14
4L	Culvert 4L	12	18	8	18	14	16
4N	Culvert 4N	2	18	4	9	10	12

OUTLET PROTECTION
FOR A PIPE FLOWING FULL WITH LOW TAILWATER

RIPRAP SIZE - D50 (inches)

PIPE DIAMETER

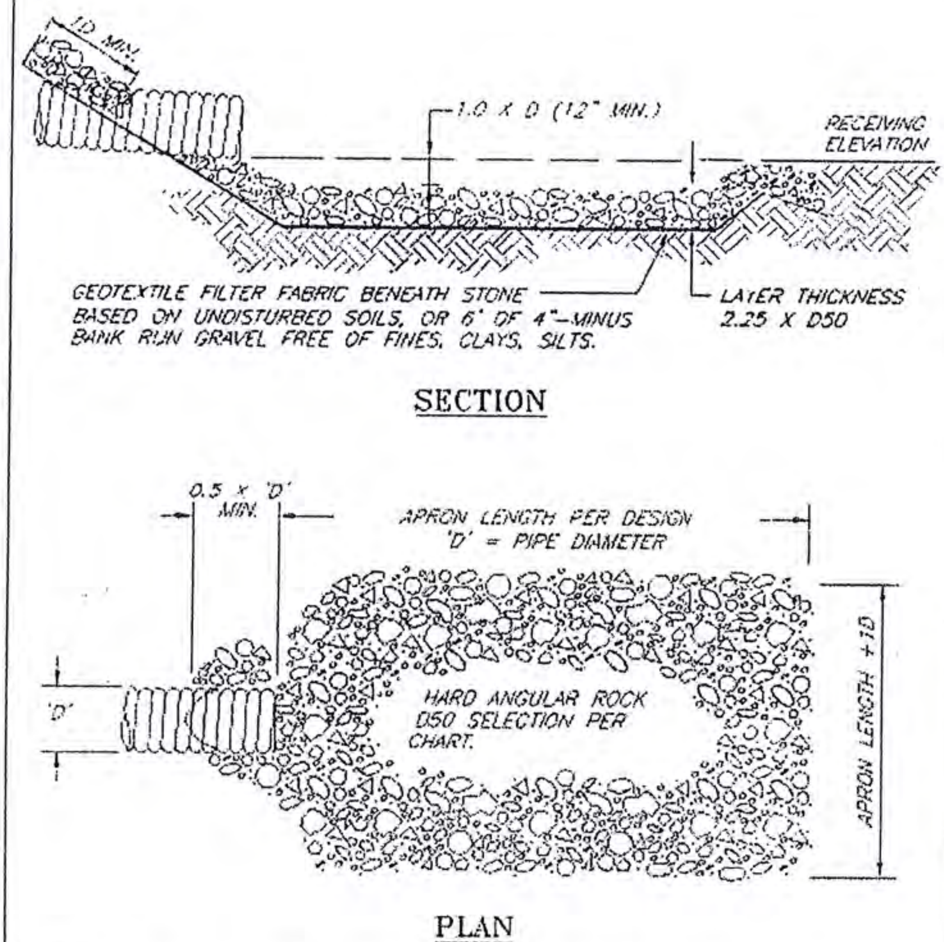
DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	4											
5cfs	4											
8cfs	5	4										
10cfs	6	5	4									
12cfs	8	6	6									
15cfs	8	6	8	5								
17cfs		8	8	5								
20cfs		10	10	6	5							
25cfs		12	12	6	6							
30cfs				8	8	6						
40cfs				12	10	8	6					
50cfs				16	12	10	8	6				
60cfs				18	16	12	10	8				
70cfs					18	15	12	8				
80cfs					20	16	15	10	8			
90cfs						18	16	12	10			
100cfs						20	18	12	10			
125cfs						24	20	16	12	10		
150cfs							24	20	16	12	10	
200cfs								24	20	18	15	12

MINIMUM LENGTH OF APRON (FEET)

PIPE DIAMETER

DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	8											
5cfs	8											
8cfs	11	10										
10cfs	14	12	10									
15cfs	18	16	14	12								
20cfs		18	18	16	12							
30cfs			22	20	18	16						
40cfs			26	24	24	20	18					
50cfs				26	26	24	22	18				
70cfs					30	30	28	25				
100cfs						36	36	33	27			
150cfs						42	42	42	38	33	28	
200cfs								48	45	42	37	32

From USDA Solid Conservation Service



NOTES:

1. CONSULT WITH IF&W IF FISH PASSAGE WILL BE INHIBITED DURING LOW FLOWS.
2. REFER TO DESIGN NOTES AND LIMITATIONS IN TEXT ON PIPE OUTLET PROTECTION.
3. IN DEFINED CHANNELS, APRON SHALL EXTEND FULL WIDTH OF BOTTOM AND ONE FOOT ABOVE MAX. TAILWATER OR UP TO BANK FULL, WHICHEVER IS LESS.

PIPE OUTLET PROTECTION

FILE: OUTLETAPRON

APPENDIX B-4

LEVEL LIP SPREADER DESIGN

Standard Level Spreader Design

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/10/2015
Chk. By: RAM

OBJECTIVE: Design level spreaders in accordance with Erosion and Sediment Control Standards.

DESIGN CRITERIA

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'

DESIGN ANALYSIS

Level Spreader Designation	Discharge From	Q_{10} (cfs)	Rqd Rate (cfs/ft)	Min. Rqd. Length (ft)	Specified Length (ft)
10	Pond DP-10	4.9	0.25	19.8	20
11	Pond DP-11	1.2	0.25	4.7	15
12	Pond DP-12	1.3	0.25	5.4	15

APPENDIX B-5

PLUNGE POOL DESIGN

PLUNGE POOL DESIGN

Project Name: Juniper Ridge
Project Location: Old Town, ME
Project No: 14101.00
Comp By: MNA
Date: 2/3/2015
Chk. By: PCM

OBJECTIVE: Design plunge pool to protect the outlet of culverts from scour and deterioration.

REFERENCES:

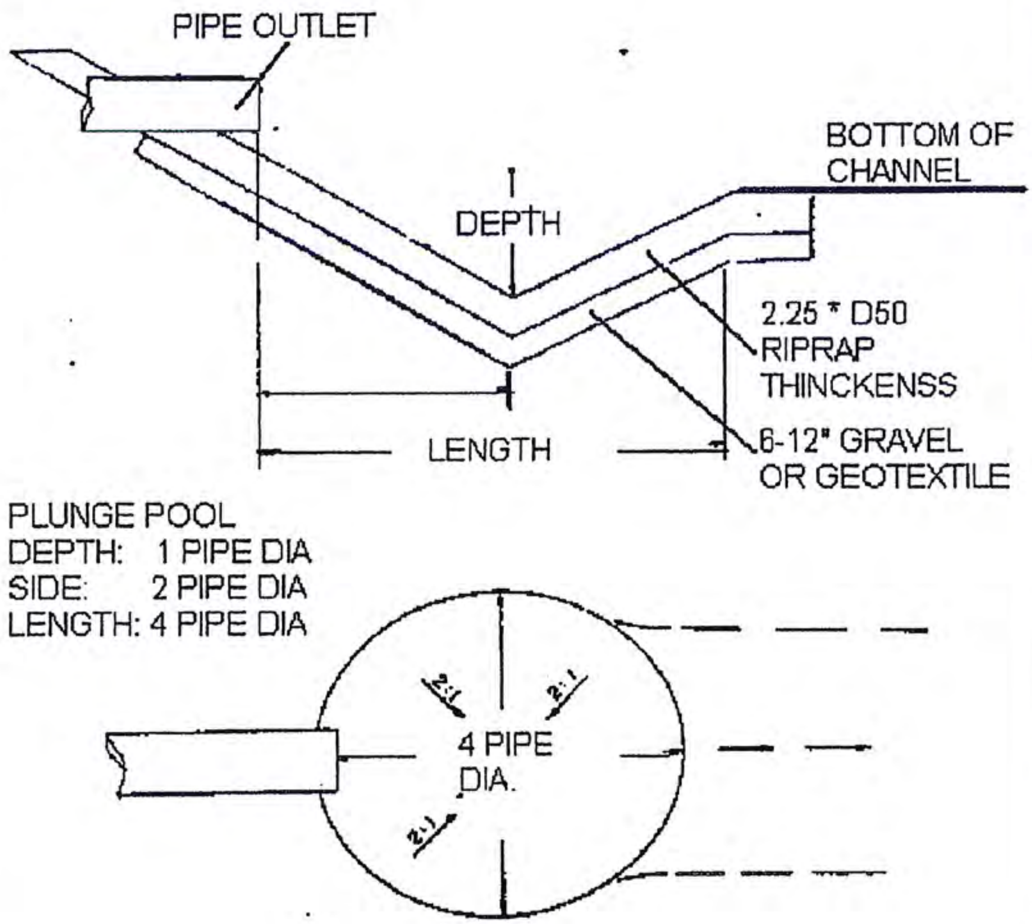
1. Maine Department of Environmental Protection, Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, March 2003
2. Applied Microcomputer Systems, HydroCAD Stormwater Modeling System, Version 7.0, Chocorua, New Hampshire, 2001

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)
10	Pond DP-10	16.9	18	8	18	6	6
11	Pond DP-11	1.4	18	4	9	6	6
12	Pond DP-12	2.4	18	4	9	6	6



OUTLET PLUNGE POOL

OUTLET PROTECTION
FOR A PIPE FLOWING FULL WITH LOW TAILWATER

RIPRAP SIZE - D50 (inches)

PIPE DIAMETER

DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	4											
5cfs	4											
8cfs	5	4										
10cfs	6	5	4									
12cfs	8	6	6									
15cfs	8	6	8	5								
17cfs		8	8	5								
20cfs		10	10	6	5							
25cfs		12	12	6	6							
30cfs				8	8	6						
40cfs				12	10	8	6					
50cfs				16	12	10	8	6				
60cfs				18	16	12	10	8				
70cfs					18	15	12	8				
80cfs					20	16	15	10	8			
90cfs						18	16	12	10			
100cfs						20	18	12	10			
125cfs						24	20	16	12	10		
150cfs							24	20	16	12	10	
200cfs								24	20	18	15	12

MINIMUM LENGTH OF APRON (FEET)

PIPE DIAMETER

DISCHARGE	12"	15"	18"	21"	24"	27"	30"	36"	42"	48"	54"	60"
3cfs	8											
5cfs	8											
8cfs	11	10										
10cfs	14	12	10									
15cfs	18	16	14	12								
20cfs		18	18	16	12							
30cfs			22	20	18	16						
40cfs			26	24	24	20	18					
50cfs				26	26	24	22	18				
70cfs					30	30	28	25				
100cfs						36	36	33	27			
150cfs						42	42	42	38	33	28	
200cfs								48	45	42	37	32

From USDA Solid Conservation Service

APPENDIX B-6

EMERGENCY SPILLWAY DESIGN

EMERGENCY SPILLWAY EVALUATION
EXPANDED POND 9

Summary for Pond DP-9: DETENTION POND 9

```
Inflow Area =    33.165 ac,  8.08% Impervious,  Inflow Depth =  3.25"   for  100-yr Storm event
Inflow      =    64.87 cfs @  12.43 hrs,  Volume=        8.970 af
Outflow     =     4.63 cfs @  16.13 hrs,  Volume=        6.741 af,  Atten= 93%,  Lag= 222.2 min
Primary     =     2.32 cfs @  16.13 hrs,  Volume=        2.271 af
Secondary   =     1.40 cfs @  16.13 hrs,  Volume=        4.277 af
Tertiary    =     0.91 cfs @  16.13 hrs,  Volume=        0.193 af
```

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 190.60' @ 16.13 hrs Surf.Area= 89,426 sf Storage= 276,765 cf
Flood Elev= 191.00' Surf.Area= 91,210 sf Storage= 312,840 cf

Plug-Flow detention time= 1,283.3 min calculated for 6.741 af (75% of inflow)
Center-of-Mass det. time= 1,194.6 min (2,034.4 - 839.8)

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
#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

192.0 = TOP OF BERM
190.6 = 100 YR PEAK
1.4 ' = FREEBOARD

Primary OutFlow Max=2.32 cfs @ 16.13 hrs HW=190.60' (Free Discharge)
└─**1=12-In Outlet Culvert** (Inlet Controls 2.32 cfs @ 2.96 fps)

Secondary OutFlow Max=1.40 cfs @ 16.13 hrs HW=190.60' (Free Discharge)
└─**2=6-In Culvert** (Passes 1.40 cfs of 1.73 cfs potential flow)
  ├─**3=Orifice** (Orifice Controls 1.22 cfs @ 6.64 fps)
  └─**4=Orifice** (Orifice Controls 0.18 cfs @ 7.21 fps)

Tertiary OutFlow Max=0.90 cfs @ 16.13 hrs HW=190.60' (Free Discharge)
└─**5=Broad-Crested Rectangular Weir** (Weir Controls 0.90 cfs @ 0.87 fps)

EMERGENCY SPILLWAY EVALUATION
POND 10

Summary for Pond DP-10: DETENTION POND 10

Inflow Area = 28.280 ac, 4.24% Impervious, Inflow Depth = 2.84" for 100-yr Storm event
Inflow = 59.36 cfs @ 12.35 hrs, Volume= 6.692 af
Outflow = 27.71 cfs @ 12.72 hrs, Volume= 6.274 af, Atten= 53%, Lag= 22.0 min
Primary = 18.03 cfs @ 12.72 hrs, Volume= 3.582 af
Secondary = 1.74 cfs @ 12.72 hrs, Volume= 2.452 af
Tertiary = 7.94 cfs @ 12.72 hrs, Volume= 0.240 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Starting Elev= 170.00' Surf.Area= 0 sf Storage= 0 cf
Peak Elev= 180.44' @ 12.72 hrs Surf.Area= 27,104 sf Storage= 112,674 cf
Flood Elev= 181.00' Surf.Area= 28,500 sf Storage= 128,200 cf

Plug-Flow detention time= 439.2 min calculated for 6.272 af (94% of inflow)
Center-of-Mass det. time= 408.3 min (1,259.2 - 850.9)

Volume	Invert	Avail.Storage	Storage Description
#1	175.00'	157,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
175.00	7,900	0	0
176.00	18,000	12,950	12,950
178.00	22,000	40,000	52,950
180.00	26,000	48,000	100,950
182.00	31,000	57,000	157,950

Device	Routing	Invert	Outlet Devices
#1	Device 3	179.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Device 3	178.00'	**6.0" Vert. 6-in Orifice** C= 0.600
#3	Primary	175.20'	**18.0" Round 18-in Primary Culvert** L= 52.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 175.20' / 172.00' S= 0.0615 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	173.50'	**5.8" Round 6-in Culvert** L= 60.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 173.50' / 172.30' S= 0.0200 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	177.00'	**5.8" Horiz. Orifice Top** C= 0.600 Limited to weir flow at low heads
#6	Device 4	176.20'	**1.5" Vert. Orifice Side** C= 0.600
#7	Tertiary	180.00'	**10.0' long x 22.0' 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

182.0 = TOP OF BERM
180.4 = 100 YR PEAK
1.6 ' = FREEBOARD

Primary OutFlow Max=18.03 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└─**3=18-in Primary Culvert** (Inlet Controls 18.03 cfs @ 10.20 fps)
  ├─**1=Orifice/Grate** (Passes < 70.84 cfs potential flow)
  └─**2=6-in Orifice** (Passes < 1.40 cfs potential flow)

Secondary OutFlow Max=1.74 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└─**4=6-in Culvert** (Barrel Controls 1.74 cfs @ 9.51 fps)
  ├─**5=Orifice Top** (Passes < 1.64 cfs potential flow)
  └─**6=Orifice Side** (Passes < 0.12 cfs potential flow)

Tertiary OutFlow Max=7.82 cfs @ 12.72 hrs HW=180.44' (Free Discharge)
└─**7=E-Spillway Weir** (Weir Controls 7.82 cfs @ 1.79 fps)

EMERGENCY SPILLWAY EVALUATION
POND 11

Summary for Pond DP-11: Detention Pond 11

Inflow Area = 22.282 ac, 4.04% Impervious, Inflow Depth = 2.83" for 100-yr Storm event
Inflow = 42.15 cfs @ 12.30 hrs, Volume= 5.252 af
Outflow = 3.99 cfs @ 15.24 hrs, Volume= 5.094 af, Atten= 91%, Lag= 176.4 min
Primary = 2.67 cfs @ 15.24 hrs, Volume= 1.081 af
Secondary = 1.32 cfs @ 15.24 hrs, Volume= 4.013 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 168.53' @ 15.24 hrs Surf.Area= 41,482 sf Storage= 147,109 cf

Plug-Flow detention time= 1,111.8 min calculated for 5.093 af (97% of inflow)
Center-of-Mass det. time= 1,096.9 min (1,954.3 - 857.4)

Volume	Invert	Avail.Storage	Storage Description
#1	163.00'	211,750 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
163.00	2,000	0	0
164.00	10,900	6,450	6,450
166.00	34,300	45,200	51,650
168.00	39,800	74,100	125,750
170.00	46,200	86,000	211,750

Device	Routing	Invert	Outlet Devices
#1	Device 3	167.50'	**6.0" Vert. 6-In Orifice Side (Riser)** C= 0.600
#2	Device 3	168.40'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#3	Primary	164.30'	**18.0" Round 18-In Culvert** L= 92.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 164.30' / 162.00' S= 0.0250 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Secondary	161.50'	**5.8" Round 6-In Culvert** L= 137.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 161.50' / 160.00' S= 0.0109 '/' Cc= 0.900 n= 0.011, Flow Area= 0.18 sf
#5	Device 4	165.10'	**5.8" Horiz. Orifice Top (6-in Culv)** C= 0.600 Limited to weir flow at low heads
#6	Device 4	164.00'	**1.5" Vert. Orifice Side (6-in Culv) X 1.50** C= 0.600

170. = TOP OF ROAD
168.5 = 100 YR PEAK
1.5 ' = FREEBOARD

Primary OutFlow Max=2.66 cfs @ 15.24 hrs HW=168.53' (Free Discha
└─**3=18-In Culvert** (Passes 2.66 cfs of 12.52 cfs potential flow)
  ├─**1=6-In Orifice Side (Riser)** (Orifice Controls 0.83 cfs @ 4.24 fps)
  └─**2=Grate Top (Riser)** (Weir Controls 1.83 cfs @ 1.16 fps)

Secondary OutFlow Max=1.32 cfs @ 15.24 hrs HW=168.53' (Free Discharge)
└─**4=6-In Culvert** (Barrel Controls 1.32 cfs @ 7.19 fps)
  ├─**5=Orifice Top (6-in Culv)** (Passes < 1.64 cfs potential flow)
  └─**6=Orifice Side (6-in Culv)** (Passes < 0.19 cfs potential flow)

EMERGENCY SPILLWAY EVALUATION
POND 12

Summary for Pond DP-12: DETENTION POND 12

Inflow Area = 20.177 ac, 3.27% Impervious, Inflow Depth = 2.80" for 100-yr Storm event
Inflow = 32.91 cfs @ 12.35 hrs, Volume= 4.700 af
Outflow = 5.20 cfs @ 14.55 hrs, Volume= 4.540 af, Atten= 84%, Lag= 132.4 min
Primary = 3.54 cfs @ 14.55 hrs, Volume= 1.439 af
Secondary = 1.65 cfs @ 14.55 hrs, Volume= 3.101 af

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 188.13' @ 14.55 hrs Surf.Area= 41,214 sf Storage= 113,928 cf

Plug-Flow detention time= 756.5 min calculated for 4.538 af (97% of inflow)
Center-of-Mass det. time= 739.3 min (1,611.6 - 872.3)

Volume	Invert	Avail.Storage	Storage Description
#1	184.00'	205,300 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
184.00	11,200	0	0
186.00	28,700	39,900	39,900
188.00	40,200	68,900	108,800
190.00	56,300	96,500	205,300

Device	Routing	Invert	Outlet Devices
#1	Device 3	188.00'	**48.0" Horiz. Grate Top (Riser)** C= 0.600 Limited to weir flow at low heads
#2	Device 3	186.80'	**8.0" Vert. 8-In Orifice (Riser Side)** C= 0.600
#3	Primary	184.50'	**18.0" Round 18- In Culvert** L= 80.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 184.50' / 180.00' S= 0.0563 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf
#4	Device 6	185.50'	**5.8" Horiz. Orifice Top (6-in Pipe)** C= 0.600 Limited to weir flow at low heads
#5	Device 6	184.50'	**1.5" Vert. Orifice (Side of 6-in) X 2.00** C= 0.600
#6	Secondary	181.50'	**6.0" Round 6-In Culvert** L= 64.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 181.50' / 180.00' S= 0.0234 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=3.51 cfs @ 14.55 hrs HW=188.13' (Free Discharge)
└─**3=18- In Culvert** (Passes 3.51 cfs of 11.39 cfs potential flow)
  ├─**1=Grate Top (Riser)** (Weir Controls 1.84 cfs @ 1.16 fps)
  └─**2=8-In Orifice (Riser Side)** (Orifice Controls 1.67 cfs @ 4.80 fps)

190.0 = TOP OF ROAD
188.1 = 100 YR PEAK
1.9 ' = FREEBOARD

Secondary OutFlow Max=1.65 cfs @ 14.55 hrs HW=188.13' (Free Discharge)
└─**6=6-In Culvert** (Passes 1.65 cfs of 1.85 cfs potential flow)
  ├─**4=Orifice Top (6-in Pipe)** (Orifice Controls 1.43 cfs @ 7.80 fps)
  └─**5=Orifice (Side of 6-in)** (Orifice Controls 0.22 cfs @ 9.09 fps)

APPENDIX C

TYPICAL CONSTRUCTION EROSION AND SEDIMENTATION CONTROL SPECIFICATIONS AND DRAWING C-308

SECTION 02220

EROSION CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and General Terms and Conditions as outlined in Section 1 of the Construction Agreement and Division-1 Specification sections, apply to work of this section. The Juniper Ridge Landfill, MEDEP approved Erosion and Sedimentation Control Plan.

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Site Preparation: Section 02100

B. Earthwork: Section 02200

C. Seeding and Mulching: Section 02800

1.03 DESCRIPTION OF WORK:

A. The Contractor shall provide all materials, equipment, and labor necessary for the dewatering of excavations and the removal and/or diversion of surface water from the construction area, and installation of siltation and erosion control structures as shown on the plans and according to these Specifications, and in accordance with the MEDEP "Best Management Practices" – March 2003 for erosion and sedimentation control.

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 siltation and erosion control structures as shown on the plans and according to these Specifications, and in accordance with the MEDEP "Best Management Practices" – March 2003 for erosion and sedimentation control. The Contractor shall maintain a dewatering and stormwater control system so that no sediment impacted waters are discharged west of the access road at the southwestern end of the site.

C. The Contractor shall build all drains and do all ditching, pumping, bailing, and all other work necessary to keep the excavation clear of groundwater, or storm water during the progress of the work and until the finished work is safe from damage. The Contractor shall make provisions on the site to detain and filter water from the excavation operation so that sediments from the dewatering operation are contained. In no case will direct discharge from the dewatering operations to off-site drainage facilities be allowed.

D. The Contractor shall perform all inspections and documentation required by the project's MEDEP Maine General Construction Permit.

E. The Contractor shall provide temporary seeding, mulching, or other protective coverings to exposed earth surfaces and stockpiles which will be exposed to rain or wind elements for a period of greater than seven days.

F. The Contractor shall provide siltation fences, riprap, and/or stone check dams in the newly constructed drainage ditches for temporary sediment control as shown on the Contract Drawings.

G. At the completion of landfill construction activities, the Contractor shall provide permanent seeding, mulching, or other protective landscape coverings to exposed earth surfaces effected by construction activities, and a shown on the Contact Drawings, and as specified in Section 02800.

H. The Contractor shall be responsible for inspection, maintenance, and/or repair of all temporary erosion and sedimentation control measures during construction, including temporary erosion and sedimentation control measures installed by others and used during this project. Inspections will be undertaken by qualified personnel to ensure that controls are correctly functioning, and that additional erosion control measures are in installed if needed. Such inspections will occur bi-weekly and after each significant rain fall 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.

1.04 SEDIMENT CONTROL GUIDELINES:

A. Maine Erosion and Sedimentation Control BMPs, January 2006.

B. State of Maine Department of Environmental Protection Natural Resources Protection Act Permit by Rule Standards Chapter 305 (effective February 1989, revised April 1992).

C. 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.

PART 2 - PRODUCTS

2.01 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 equivalent.

2.02 EROSION CONTROL BLANKET:

A. Shall be placed on newly topsoiled and seeded areas as indicated on the Contract Drawings. The matting type shall be that which is specified on the contract drawings, or an approved equal.

2.03 RIPRAP STONE:

1. Riprap shall be a graded mixture of angular stones such that 50 percent of the mixture by volume shall be greater than the stated D_{50} size as indicated on the Contract Drawings.

   Stones used for riprap shall consist of sound durable angular rock which will not become disintegrated by exposure to the action of water or weather. Either field stone or rough unhewn quarry stone may be used. Stones shall weigh from 10 lbs to 200 lbs except that when available suitable stones weighing more than 200 lbs may be used. Approximately 50 percent of the stones by volume shall exceed a unit weight of 25 lbs. Stone particle size may not be greater than 1.5 times the stated D_{50} size.

2. Exposed Stone: The exposed stones for riprap shall be angular and as nearly rectangular in cross-section as practicable. Rounded boulders or cobbles will not be permitted.

3. Bedding Stone: Material for bedding shall be aggregate base material conforming to Specification 02200, Earthwork; Section 2.01A.2.

4. Riprap Geotextile Filter: The geotextile used in the construction of riprap ditches, spillways, aprons, and plunge pools shall meet Specification 02272 Part 2.01.A (5a).

2.04 STONE CHECK DAMS:

A. Stone for check dams shall consist of a mixture of angular stones having a particle size of between 2 inch and 3 inch. 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.

PART 3 - EXECUTION

3.01 GENERAL

A. The Contractor shall provide for the diversion of clean surface water from uncapped open areas of the landfill for the duration of the construction project.

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 siltation and erosion control structures as shown on the plans and according to these Specifications, and in accordance with the MEDEP "Best Management Practices" – January 2006 for erosion and sedimentation control. The Contractor shall maintain a dewatering and stormwater control system so that no sediment impacted waters are discharged west of the access road at the southwestern end of the site.

C. The Contractor shall provide for the dewatering of excavations and the diversion of surface water from the construction areas and install siltation and erosion control measures as necessary in accordance with MEDEP BMPs.

D. 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.

E. 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.

F. 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.

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 of the outlet pipe shall be protected against erosion by flowing water by the construction of a rock or timber apron.

B. Prior to removal of sediment control dikes all retained silt or other materials shall be removed and placed within landfill limits in areas not susceptible to erosion, 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 or as directed by the Engineer or Owner's Representative.

3.05 PLACEMENT OF RIPRAP: Riprap shall be placed full depth in one operation without special handwork, shall be approximately true to the required slope line and grade, and be uniform in appearance. Larger stones shall be placed at the base of the slope. The stones shall be placed on close contact with the longer axis perpendicular to the plane of the slope and so as to stagger joints. The openings between the stones shall be filled with spall, or gravel and rocks securely rammed into place. Placement of riprap shall include the placement of all bedding materials and geotextiles required as shown on the Contract Drawings.

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 in installed if needed. Such inspections will occur bi-weekly and after each significant rain fall 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 then one-half the depth of the erosion control measure.

END OF SECTION

SECTION 02800

SEEDING AND MULCHING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS: Drawings and General Terms and Conditions as outlined in Section 1 of the Construction Agreement and Division-1 Specification sections, apply to work of this section. All work performed under this specification shall be performed in accordance with the Maine Department of Environmental Protection (MEDEP) Maine Erosion and Sedimentation Control Plan: Best Management Practices (BMPs) (March 2003).

1.02 RELATED WORK SPECIFIED ELSEWHERE:

A. Earthwork: Section 02200
B. Erosion Control: Section 02220
C. Erosion and Sedimentation Control Details Drawings C-308

1.03 DESCRIPTION OF WORK: Work specified in this section shall consist of furnishing all labor, materials, and equipment to perform seeding and mulching work in conformity with the contract drawings and as specified herein. Excavation, filling, and grading required to achieve elevations shown on the Drawings are not specified in this Section. Refer to Section 02200, Earthwork. Topsoil shall be placed to a compacted depth of 4 inches over exterior cell containment dikes and all disturbed areas (excluding the landfill's access road). Topsoil shall receive seed, fertilizer, lime, and mulch per these specifications. Only work described in Section 01010 "Summary of Work" or specifically identified by the Owner's Representative should be considered part of this Contract.

1.04 QUALITY ASSURANCE: If subcontracted, subcontract the seeding work to a single firm specializing in landscape work.

A. Source Quality Control:

1. General: Ship landscape 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 manufacturers certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agricultural Chemists, wherever applicable or as further specified.

3. Topsoil: Before delivery of topsoil, furnish written statement giving location of properties from which topsoil is to be obtained, names and addresses of owners, depth to be stripped, and crops grown during past 2 years, if requested by the Engineer.

4. Grass Seed: All seed shall be certified as to mixture, germination, and purity, as being in conformity with the following requirements:

a. Each variety of seed shall have a percentage of germination of not less than 80, a percentage of purity of not less than 85, and shall have not more than one percent of weed content.

b. All seed shall be from the same or previous year's crop unless recent tests by an approved testing agency demonstrate that older seed meets the above requirements.

5. Inspection: The Engineer reserves the right to inspect any plant materials either at the place of growth or at the site before planting, for compliance with requirements for name, variety, size, and quality.

1.05 SUBMITTALS

A. Certification: For information only, submit 2 copies of certificates of inspection as required by governmental authorities, and manufacturer's or vendors analysis for soil amendments and fertilizer materials. Submit other data substantiating that materials comply with specified requirements at the request of the Engineer.

Submit seed vendor's certified statement for each grass seed mixture required, stating botanical and common name, percentage by weight, and percentages of purity, germination, and weed seed for each grass seed species at the request of the Engineer.

1.06 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Packaged Materials: Deliver packaged materials in containers showing weight, analysis and name of manufacturer. 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's of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in an acceptable manner.

Proceed with and complete the landscape 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:

Seeding: April 1 - September 15

PART 2 - PRODUCTS

2.01 TOPSOIL (STRIPPINGS): Loam or approved topsoil removed within the confines of the project area shall be segregated into piles, cleaned sufficiently and reused in accordance with Section 02200, Earthwork. If quantity of stockpiled topsoil is insufficient, or quality is not in accordance with the requirements for new topsoil, the Contractor shall provide additional new topsoil from approved sources off the site as required to complete landscape work.

Provide new topsoil as required which is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free or roots, stumps, stones larger than 2" in any dimension, and other extraneous or toxic matter harmful to plant growth. Mulch peat or other excessively acidic soil shall not be used. Sand, silt, and clay contents comprising existing or new topsoil shall fall within the following ranges.

Sand	50%-70%
Silt	2%-40%
Clay	10%-28%

Submit representative soil samples of topsoil from offsite sources to qualified soil testing laboratory to ascertain what amendments may be necessary to obtain proper tilth, nutrient characteristics, and pH balance in accordance with the following. Provide amendments as necessary at rates indicated on the soil test in accordance with the following criteria:

Organic Matter: Greater than 3% organic matter (by weight)

pH range: 6.0 to 7.5. If pH is less than 6.0, lime shall be added in accordance with soil test results and seed requirements.

Phosphorus/Potassium: Low to medium range

Soluble Salt: Not greater than 500 ppm

Obtain topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally, well-drained sites where topsoil occurs in a depth of not less than 4"; do not obtain from bogs or marshes.

A. Soil Amendments:

1. Lime: Natural limestone containing not less than 90% of total carbonates, ground so that not less than 100% passes a 10-mesh sieve, not less than 90% passes a 20 mesh sieve, and not less than 50% passes a 100 mesh sieve.

2. Fertilizer: Fertilizer shall contain available elements in conformity with the standards of the Association of Official Agricultural Chemists. The fertilizer shall indicate the weight, contents and guarantee analysis shown thereon or on a securely attached tag, as applicable. The selection of fertilizer shall be based on the minimum phosphorus required by the soil as determined by the chemical analysis of soil samples. The Contractor shall be responsible for sampling and testing topsoil to determine amount of phosphorus required for growing of grass.

   a. Granular fertilizer shall be a commercial grade fertilizer containing the following percentages of available nutrients by weight:

Nitrogen	10 percent
Phosphoric Acid	10 percent
Potash	10 percent

   b. Water soluble fertilizer shall be completely soluble in water and contain the following percentages of available nutrients by weight. It shall contain a coloring agent.

Nitrogen	16 percent
Phosphoric Acid	To Be Determined by Contractor
Potash	16 percent

The Engineer may approve the use of other fertilizers providing they contain an equivalent amount of nutrients in an acceptable form.

2.02 GRASS MATERIAL:

A. Grass Seed: Provide fresh, clean, new-crop seed complying with the tolerance for purity and germination established by the Official Seed Analysts of North America. Provide seed of the grass species, proportions and minimum percentages of purity, germination, and maximum percentage of weed seed, as specified. Apply seed at the rate of 120 lbs/acre.

The seed mixtures shall consist of seeds proportioned by weight as follows:

Tall Fescue	54 lbs/acre
Creeping Red Fescue	25 lbs/acre
Red Top	5 lbs/acre
Ladino Clover	13 lbs/acre
Annual Ryegrass	8 lbs/acre
Birdsfoot Trefoil	5 lbs/acre
Timothy	10 lbs/acre

2.03 MISCELLANEOUS LANDSCAPE MATERIALS:

A. Mulch for Seeded Areas:

1. Hay or straw mulch shall consist of long fibered hay or straw, reasonably free from noxious weeds and other undesirable material. No material shall be used which is too wet, decayed, or compacted as to inhibit even and uniform spreading. No chopped hay, grass clippings or other short fibered material shall be used unless directed.

2. Cellulose fiber mulch shall consist of natural wood, recycled paper of humus cellulose fiber containing no materials which will inhibit seed germination or plant growth. Sufficient non-toxic water soluble green dye shall be added to provide a definite color contrast to the ground surface to aid in even distribution. Cellulose fiber mulch shall be supplied in moisture resistant, sealed bags marked with the manufacturer's name, the air dry weight, and composition of the contents.

B. Mulch Binder: Material for mulch binder may be binder or tackifier of a type acceptable to the Engineer and may be diluted with water to assure even distribution. Other types of approved mulch binders may be used when authorized by the Engineer.

PART 3 - EXECUTION

3.01 TOPSOIL PLACEMENT: Placement of topsoil shall be performed in a uniform manner, with no clumps or clods. It shall be the Contractor's responsibility to restore to the line, grade, and surface all eroded areas with approved material and to keep topsoiled areas in acceptable condition until turf is established and accepted by the Engineer.

A. Grading: Previously established grades on the areas to be topsoiled shall be maintained according to the approved plan.

B. Liming: Where the pH of subsoil is 6.0 or less, ground agricultural limestone shall be spread in accordance with the soil texture or the vegetative establishment practice being used.

C. Bonding: After the areas to be topsoiled have been brought to grade, and immediately prior to spreading the topsoil, the subgrade shall be loosened by discing or scarifying to a depth of at least 2 inches to ensure bonding with subsoil.

D. Placement: Topsoil shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or in a condition that may otherwise be detrimental to proper grading or proposed sodding or seeding. The topsoil shall be uniformly distributed to a minimum compacted depth of 4 inches. Any irregularities in the surface resulting from topsoil placement or other operations shall be corrected in order to prevent the formation of depressions and/or water pockets. It is necessary to compact the topsoil enough to ensure good contact with the underlying soil and to obtain a uniform firm seedbed for the establishment of a high maintenance turf. However, undue compaction is to be avoided as it increases runoff velocity and volume, and prevents seed germination.

3.02 SEEDING:

A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage.

B. Rates of Application: Rates of application for limestone, fertilizer, and grass seed shall be in accordance with Drawing C-308 of the Construction Drawings.

C. The hydraulic spray method shall be used for seeding all areas unless alternative methods are approved by the Engineer.

D. Application Procedure:

1. Hydraulic Spray Method: The hydraulic spray method of sowing seed shall be done with an approved machine operated by a competent crew. Seed and fertilizing materials shall be mixed with water in the tank of the machine and kept thoroughly agitated so the materials are uniformly mixed and suspended in the water at all times during operation. The spraying equipment must be designed and operated to distribute seed and fertilizing materials evenly and uniformly on the designated areas at the required rates. If the Engineer finds the application uneven or otherwise unsatisfactory, he may require the hydraulic spray method to be abandoned and the balance of the work done as specified under another method.

E. Mulching:

1. Cellulose fiber mulch shall be applied as waterborne slurry. The cellulose fiber and water shall be thoroughly mixed and sprayed on the area to be covered so as to form a uniform mat of mulch at the rate of not less than 60 pounds of mulch material per 1,000 square feet unit of area.

Cellulose fiber mulch may be mixed with the proper quantities of seed, fertilizer, and agricultural limestone as required, or may be applied separately the next day after seeding.

2. Hay or straw mulch shall be spread evenly and uniformly over any designated areas or as directed by the Engineer in the field so to avoid damage to seeded areas. Unless otherwise directed, mulch shall be applied at the rate of 2 to 3 tons per acre or 3 bales (90 to 130 lbs) per 1,000 square feet. Too heavy application of mulch shall be avoided. Lumps and thick mulch material shall be thinned.

   Unless otherwise authorized, the mulch shall be anchored in place by uniformly applying an acceptable mulch binder at a rate of 10 to 13 gallons per 1000 sq. ft. Application of a concentrated stream of mulch binder will not be allowed. Asphalt mulch binder may be omitted when authorized and when there is a danger of the asphalt defacing the surface of nearby structures, houses, vehicles or other objects. Other methods of anchoring mulch may be used subject to the approval.

3.03 MAINTENANCE AND ACCEPTANCE:

A. Seeded Areas:

1. Maintain seeded areas by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable grass growth, free or eroded or bare areas.

2. Seeding, April 1 to September 15, Inclusive: The Contractor shall maintain each seeded area until acceptance of the individual area. Maintenance shall consist of providing protection by erecting necessary signs and barriers and by repairing damaged areas as directed. Damaged areas and areas which do not produce a satisfactory stand of grass shall be repaired to re-establish the condition and grade of the area prior to the original seeding and then refertilized, reseeded and remulched as specified to produce satisfactory results.

   Areas fertilized and seeded by the hydraulic method will be accepted only upon attainment of a reasonable thick uniform stand of not less than 80 percent coverage of permanent grasses, free from sizeable thin or bare spots.

3. Seeding, September 16 to March 31, Inclusive: Areas not seeded or which do not obtain satisfactory growth by October 1, will be seeded with Aroostook Rye or mulched at rates previously specified herein. After November 1, or the first killing frost, disturbed areas shall receive dormant seeding (at double the regular seeding rate) in accordance with MEDEP BMPs and Drawing C-308.

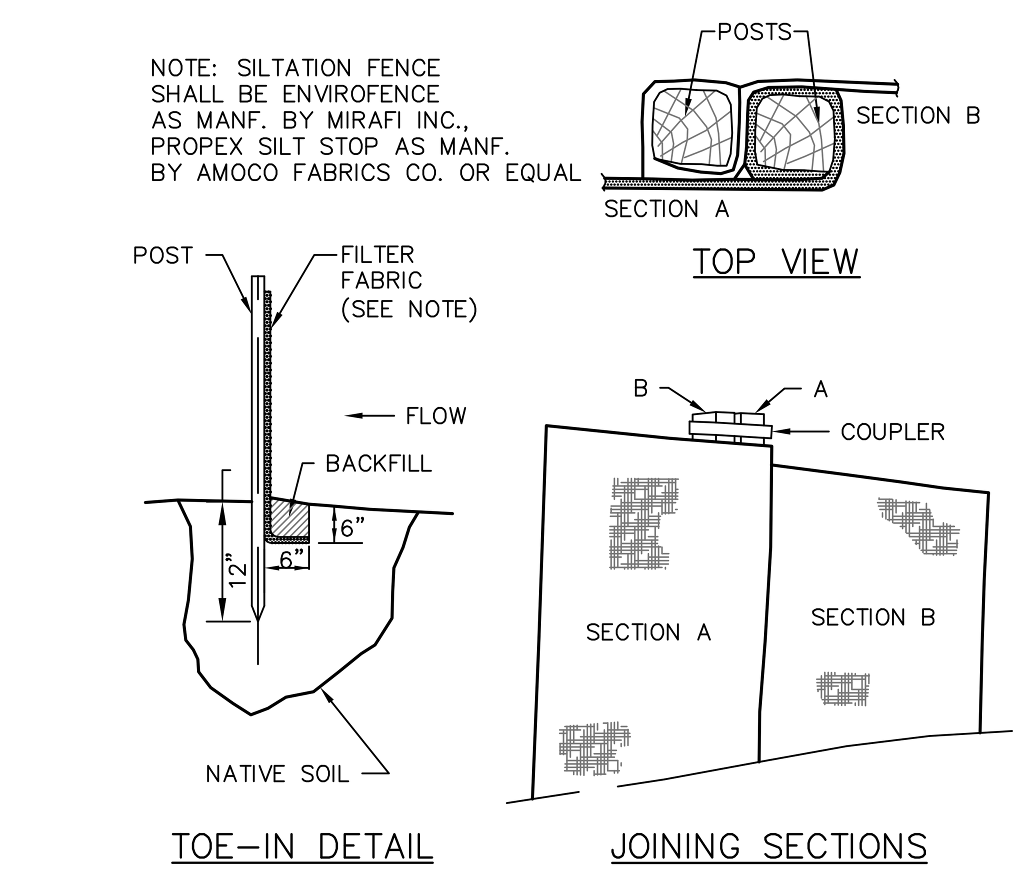
4. Seeded areas will be accepted only upon attainment of a reasonably thick, uniform stand of not less than 90 percent coverage of permanent grasses, free from sizable thin or bare spots.

3.04 CLEANUP AND PROTECTION: During landscape work, store materials and equipment where directed. Keep pavements clean and work area in an orderly condition.

Protect landscape work and materials from damage due to landscape operation, operations by other contractors, and trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged landscape work as directed.

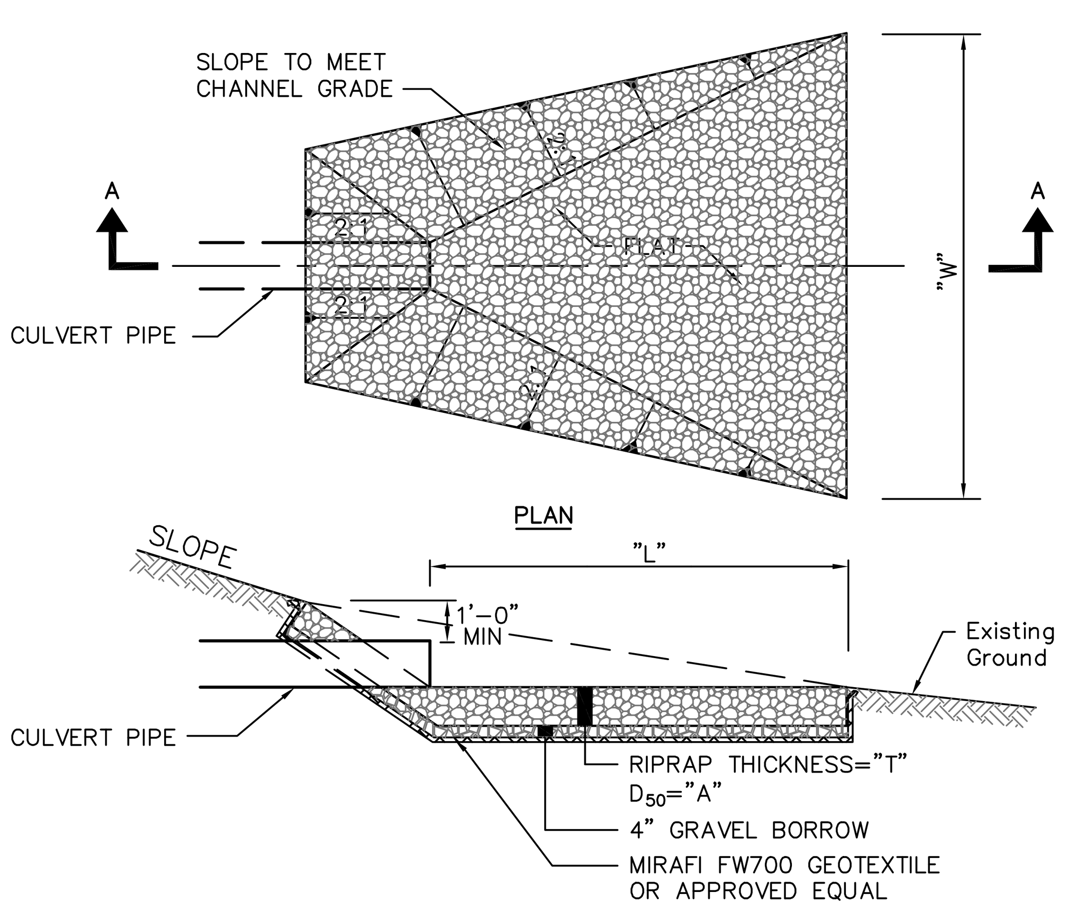
3.05 RESTORATION: All paved, sod covered, or planted areas, structures, and substructures not specifically provided for in the contract disturbed by the Contractor during the execution of the work shall be restored by the Contractor, in a manner satisfactory to the Engineer, to their original conditions at no additional cost to the Owner.

END OF SECTION



SILTATION FENCE

NTS

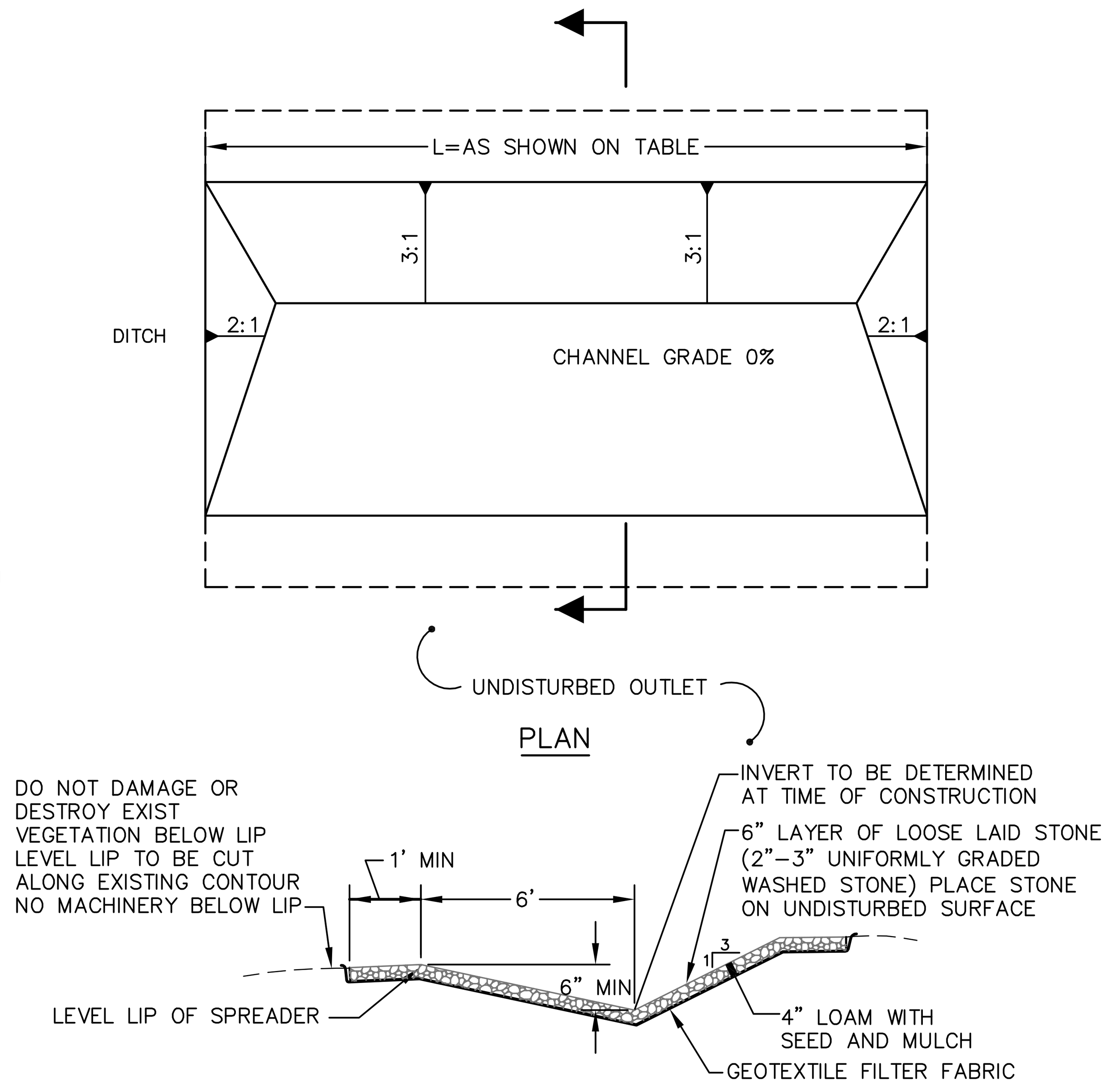


SECTION A–A

CULVERT OUTLET	L (FT)	W (FT)	A (d_{50}) IN.	t (IN)
2BA	18	20	8	18
2BB	18	20	6	14
4BA	12	14	5	12
4BB	12	14	5	12
4F	10	12	4	9
4G	12	14	5	12
4HA	10	12	4	9
4HB	10	12	4	9
4I	18	20	10	23
4IA	10	12	4	9
4JA	18	20	10	23
4JB	12	14	5	12
4JC	12	14	5	12
4K	12	14	5	12
4L	14	16	8	18
4N	10	12	4	9

RIPRAP APRON

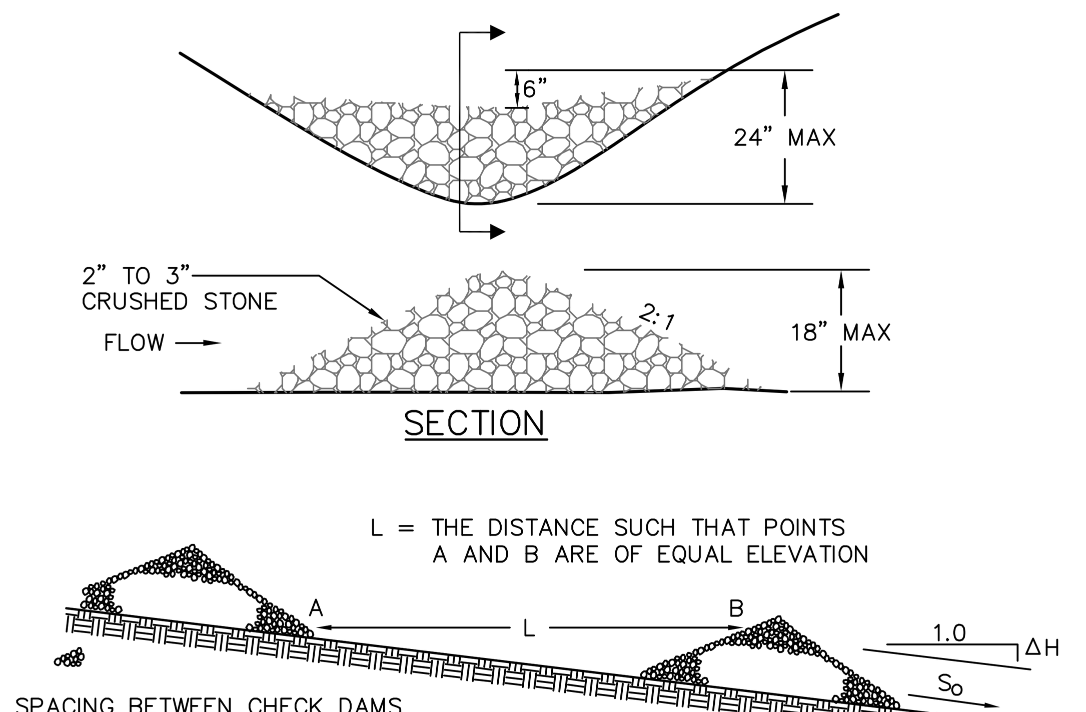
NTS



NOTES:
1. CONSTRUCT LEVEL LIP ON ZERO PERCENT GRADE TO INSURE UNIFORM SPREADING OF SEDIMENT – FREE RUNOFF (CONVERTING CHANNEL FLOW TO SHEET FLOW).
2. LAST 20 FT OF DRAINAGE DITCH NOT TO EXCEED 1% GRADE

LEVEL SPREADER	LENGTH, L (FT)
DP–10	20
DP–11	15
DP–12	15

LEVEL SPREADER

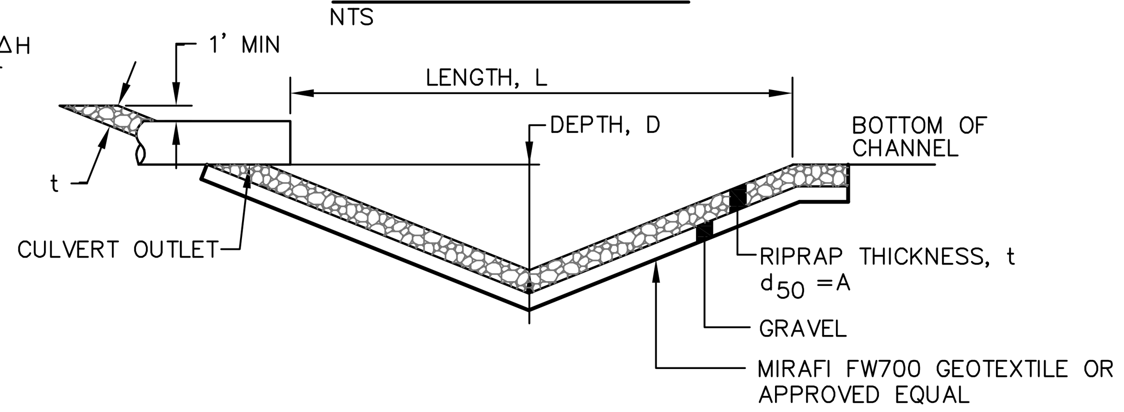


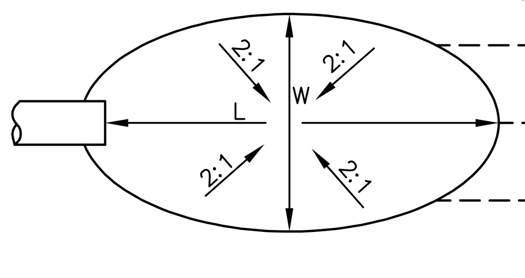
SPACING BETWEEN CHECK DAMS

S_o (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

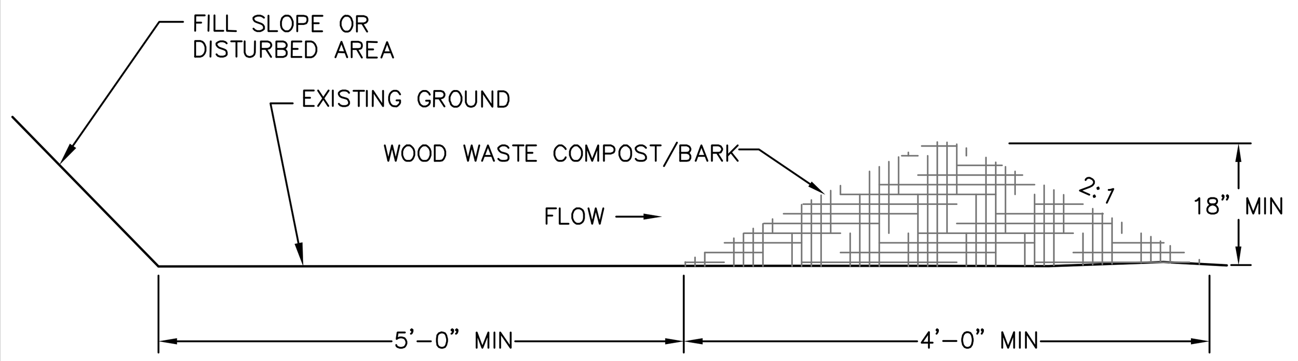




CULVERT OUTLET	L (FT)	W (FT)	A (d_{50}) IN.	t (IN)	D (FT)
DP–10	6	6	8	18	1.5
DP–11	6	6	4	9	1.5
DP–12	6	6	4	9	1.5

RIPRAP PLUNGE POOL

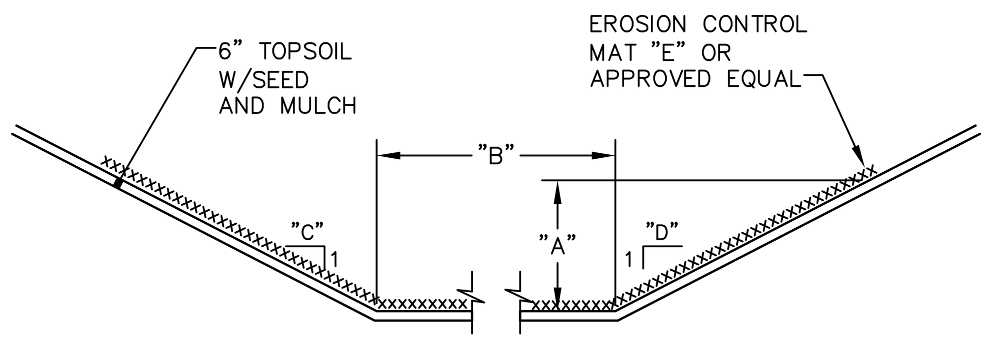
NTS



NOTE:
BARK MULCH SEDIMENT BARRIERS MAY BE USED AS AN ALTERNATE TO SILT FENCE WHEN APPROVED BY THE ENGINEER.

BARK MULCH SEDIMENT BARRIER

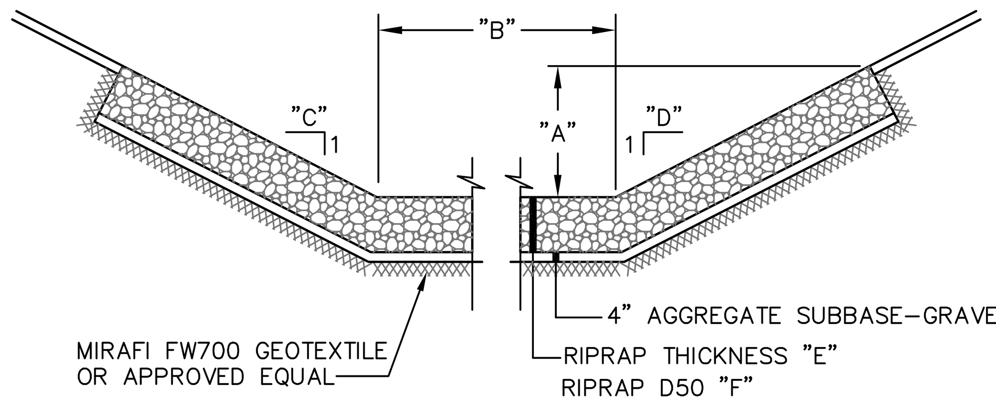
NTS



DITCH	"A"	"B"	"C"	"D"	"E"
TOE DITCH	2'	2'	2'	2'	NAG S75
DP–10 DITCH SEGMENTS 1 & 2	2'	2'	2'	2'	NAG S75
DITCH 4B–1	2'	2'	2'	2'	NAG S75
MAINTENANCE ROAD DITCH	3'	2'	2'	2'	NAG S75

GRASS DITCH

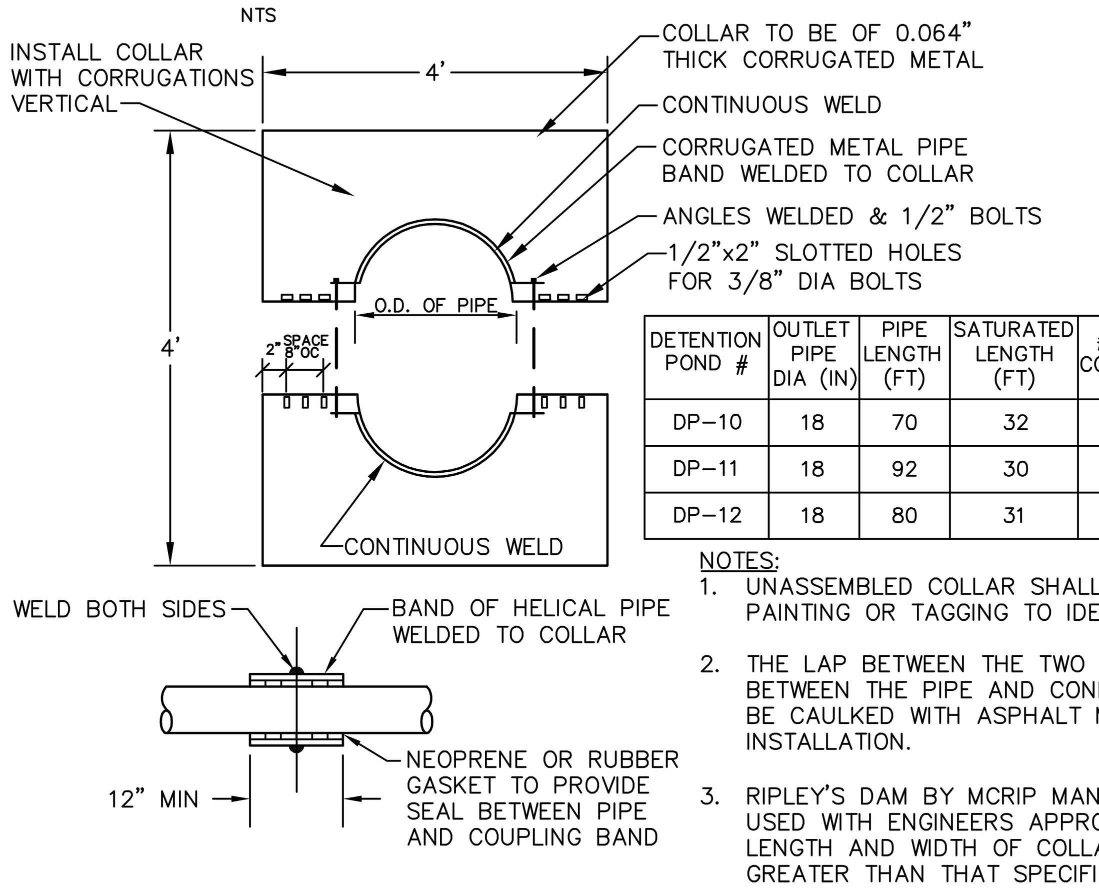
NTS



DITCH	"A"	"B"	"C"	"D"	"E"	"F"
DP–10 DITCH SEGMENT 3	2'	2'	2'	2'	9"	4"
DP–10 EMERGENCY SPILLWAY	2'	10'	2'	2'	9"	4"

RIPRAP DITCH

NTS

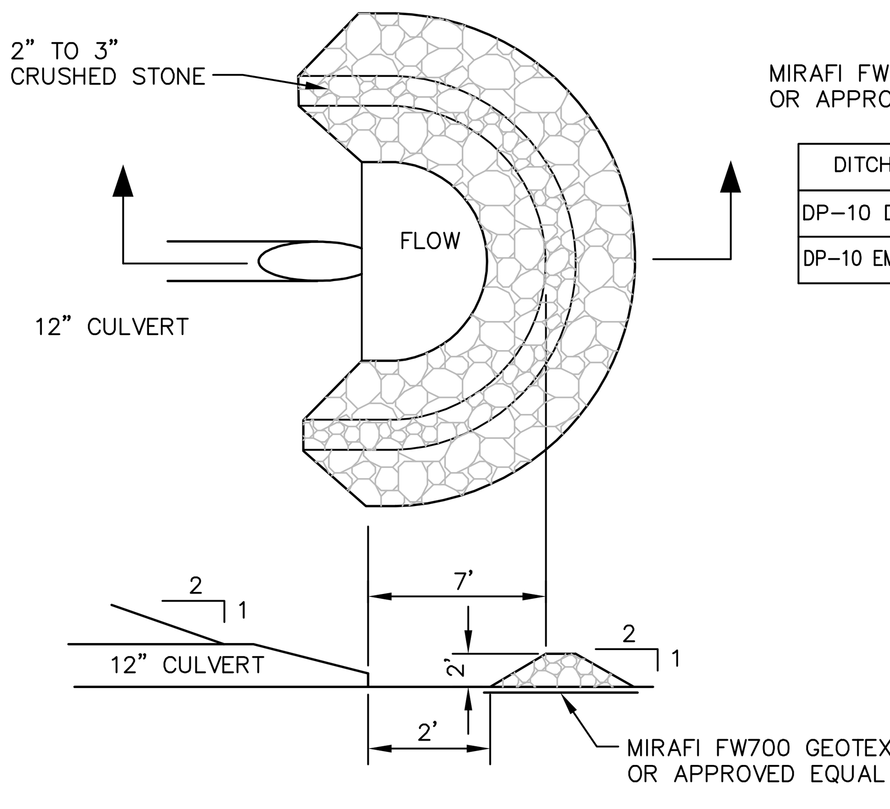


DETENTION POND #	OUTLET PIPE DIA (IN)	PIPE LENGTH (FT)	SATURATED LENGTH (FT)	# OF COLLARS	SPACING (FT)
DP–10	18	70	32	2	11
DP–11	18	92	30	2	10
DP–12	18	80	31	2	10

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



RIPRAP CULVERT INLET PROTECTION (TEMPORARY)

NTS

EROSION AND SEDIMENTATION CONTROL
TEMPORARY AND PERMANENT

A. GENERAL

1. Soil erosion and sediment control will be done in accordance with the Maine Erosion and Sediment Control: Best Management Practices, Maine Department of Environmental Protection, March 2003.

2. The contractor 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, shall be temporarily stabilized within 7 days of the disturbance.

4. 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. Suitable topsoil will be stripped and stockpiled for reuse in final grading. Topsoil will be stockpiled in a manner such that natural drainage is not obstructed and no off–site sediment damage will result. If a stockpile is necessary, the side slopes 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 temporarily seeded with Aroostook rye, annual or perennial ryegrass, within 7 days of formation, or temporarily mulched if seeding cannot be done within the recommended seeding dates. Recommended seeding dates and application rates are as follows:

* Aroostook Rye: Recommended Seeding Dates: 9/15 – 11/1
  Application Rate: 112 lbs/acre

* Annual Ryegrass: Recommended Seeding Dates: 4/1 – 7/1
  Application Rate: 40 lbs/acre

* Perennial Ryegrass: Recommended Seeding Dates: 8/15 – 9/15
  Application Rate: 40 lbs/acre

Mulch:

o Hay or Straw: Application Rate: 1.5 – 2.0 tons/acre. Anchor with mulch netting (installed per manufacturer's recommendations)

o Wood Fiber Cellulose: Application Rate: 4,000 lbs/acre. Anchoring not required

B. TEMPORARY MEASURES

1. Silt Fence

(a) Silt fence will be installed prior to and downgradient of all construction activity where soil disturbance may result in erosion.

(b) The height of a silt fence will not exceed 36 inches.

(c) Unless a prefabricated system is utilized, the filter fabric will be purchased in a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are necessary, filter cloth will be spliced together only at a support post, with a minimum 6–inch overlap, and securely sealed.

(d) Posts will be spaced a maximum of 10 feet apart at the barrier location and driven securely into the ground (minimum of 12 inches). When extra strength fabric is used without the wire support fence, post spacing will not exceed 6 feet.

(e) A trench will be excavated approximately 6 inches wide and 6 inches deep along the line of posts and upgradient from the barrier.

(f) The fabric will not extend more than 36 inches above the original ground surface. Filter fabric will not be stapled to existing trees.

(g) When extra strength filter fabric and closer post spacing are used, the wire mesh support fence may be eliminated. In such a case, the filter fabric will be stapled or wired directly to the posts with all other provisions of item (f) applying.

(h) The trench will be backfilled and the soil compacted over the filter fabric.

(i) Silt fences will be removed when they have served their useful purpose, but not before the upgradient areas have been permanently stabilized.

(j) Silt fences will be inspected immediately after each rainfall, which exceeds 1 inch in a 24–hour period, and at least daily during prolonged rainfall. If there are any signs of erosion or sedimentation below them, appropriate repairs will be made. 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.

(k) Should the fabric on a silt fence decompose or become ineffective prior to the end of the expected usable life, and the barrier still be necessary, the fabric will be replaced promptly.

(l) Sediment deposits should be removed after each storm event if significant buildup has occurred or if deposits exceed 15 inches in depth.

(m) In lieu of providing the 4" x 4" trench for conditions of frozen ground, severe rocky soil or hummucky conditions with large roots, or other prohibitive conditions. A wood waste compost/bark mulch filler berm may be used in such situations.

2. Stone Check Dams

(a) Stone check dams should be constructed of 2 to 3 inch stone. The stone should be placed according to the configuration shown on the detail. Hand or mechanical placement will be necessary to achieve complete coverage of the ditch or swale and to ensure that the center of the dam is lower than the edges.

(b) Check dams should be installed as the swale is being constructed.

(c) Sediment will be removed from behind the check dams when it has accumulated to one half of the original height of the dam.

(d) Check dams will be removed when the grass has matured sufficiently to protect the ditch or swale. The area beneath the check dams will be seeded and mulched immediately after the check dams are removed.

(e) Regular inspections will be made to ensure that the center of the dam is lower than the edges. Erosion caused by high flows around the edges of the dam will be corrected. If evidence of siltation in the water is apparent downstream from the check dam, the check dam will be inspected and adjusted. Check dams will be checked for sediment accumulation after each significant rainfall.

CONSTRUCTION SEQUENCE

1. Construct temporary sediment and erosion control facilities. Erosion and sediment measures shall be installed prior to any earth moving operation in the area of work.
2. All permanent ditches are to be stabilized with vegetation or stone check dams prior to directing runoff to them.
3. Inspect and maintain all erosion and sediment control measures.
4. Complete permanent erosion control measures which may include seeding, mulching, and landscaping.
5. Remove all temporary erosion control measures.
6. Each stage will be stabilized prior to initiating the next stage.
7. Any exposed areas will be hay mulched prior to winter shutdown, if necessary.

EROSION CONTROL MEASURES

1. The smallest practical area of land shall be exposed to construction at any one time.
2. The temporary erosion control measures shall be maintained until permanent erosion control measures are present.
3. All areas disturbed by construction shall have available loam placed before seeding (or an acceptable alternative).
4. After construction is terminated, all temporary erosion control measures shall be removed and accumulated sediment disposed of in a secure location.
5. Mulch shall be mowings of acceptable herbaceous growth, free from noxious weeds or woody stems, and shall be dry.

3. Wood Waste Compost/Bark Mulch Filter Berms

(a) The filter berm shall consist of an approved wood waste compost/bark mulch mix or recycled composted bark flume grit and fragmented wood generated from water–flume log handling systems or small shredding of stumpage (6 inches long x 1/2" dia.). The mixture needs to be a well–graded blend of organic and mineral substance. The composition is usually manufactured on or off site and by blending it with a well graded sand and gravel. The objective is a tight, heavy, non–erodible mixture that is not composed of one uniform material, i.e. just bark mulch will not suffice. Comparable composted mixes can be used upon approval of the Department of Environmental Protection, Bureau of Land and Water Quality.

(b) The mix shall conform to the following standards:

* Moisture Content 30 – 60%
* PH–5.0–8.0
* Screen Size – 100% less than 3" max.; 70% less than one inch.
* No less than 40% organic material (dry weight) by loss of ignition.
* No stones larger than 2 inch diameter.
* Silts, clays or sugar sands are not acceptable in the mix.

(c) Installation and Size of Berm:

The dimensions of the berm are more a function of the strength of the material than the flows (forces) it will encounter. At a minimum the berm shall be 4 feet wide and 18 inches high. The berm shall be placed, uncompacted along a relatively level contour. Wherever possible the existing surface must be scoured and the mixture keyed in like any other sediment control measure.

(d) Maintenance:

All deficiencies shall be immediately corrected with additional material place on top of the berm to reach the desired height. When the berm is decomposed, clogged with sediment, eroded, or becomes ineffective, it shall be replaced.

(e) Clean up and Retrieval:

At the end of the job, an erosion control berm shall be removed or spread out so that the native earth can be seen below.

(f) 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. The rocks shall be laid on geotextile to facilitate removal and the geotextile shall be wrapped over the core layer of stone and then covered with another layer of erosion control mix. The center core of stone shall be approx. 12 inches high or two–thirds the height of the filter berm. Rock filter berms shall be a minimum of 18 inches high by 4 feet wide.

4. Stabilized Construction Entrance

(a) Aggregate size: Use 2 inch stone, or reclaimed or recycled concrete equivalent.

(b) Aggregate thickness: Not less than eight inches.

(c) Width: 16 foot minimum, but not less than the full width of where ingress or egress occurs.

(d) Length: as required, but not less than 50 feet.

(e) Geotextile: To be placed over the entire area to be covered with aggregate. Piping of surface water under entrance shall be provided as required. All piping is impossible, a mountable berm with 5:1 slopes will be permitted.

(f) Criteria for Geotextile: The filter cloth shall be woven or NON–WOVEN fabric consisting only of continuous chain polymeric filaments or yards of polyester. The fabric shall be inert to commonly encountered chemicals, hydrocarbons, mildew and rot resistant.

(1) Acceptable materials are Trivira Spunbound 1135, Mirafi 600X, or equivalent.
(2) Fabrics not meeting these specifications may be used only when design procedure and supporting documentation are supplied to determine aggregate depth and fabric strength.

(g) Maintenance: The entrance shall be maintained in a condition which will prevent tracking of sediment onto public rights–of–way. When washing is required, it shall be done in on an area stabilized with aggregate which drains into an approved sediment trapping device. All sediment shall be prevented from entering storm drains, ditches, or waterways.

5. Erosion Control Mats

(a) During the growing season (April 15 to September 15) use mats specified in the drawings or, if not specifically identified, use North American Green S75 or equal or mulch with netting on:

* The base of grassed waterways and steep slopes (>15 percent)
* Any disturbed soil within 100 feet of streams and wetlands.

During the late fall and winter (September 15 to April 15) use heavy grade mats specified in the drawings or, if not specifically specified, use North American Green SC150 or equal on all areas noted above, plus use lighter grade mats or mulch with netting on:

* Sideslopes of grassed waterways
* Moderate slopes (>8 percent)

(2) Install mats in accordance with manufacturers' recommendations.

C. PERMANENT MEASURES

1. Riprapped Aprons and Plunge Pools

(a) Construct riprapped aprons in accordance with the details shown on the drawings.

(b) Stone for riprap will consist of sub–angular field stone or rough unhewn quarry stone. The stone will be hard and of such quality that it will not disintegrate on exposure to water or weathering, be chemically stable and suitable in all other respects for the purpose intended. The bulk specific gravity (saturated surface–dry basis) of the individual stones will be at least 2.5.

(c) The riprap should be placed so that it produces a dense well–graded mass of stone with a minimum of voids. The desired distribution of stones throughout the mass may be obtained by selective loading at the quarry, controlled clumping of successive loads during final placing, or by combination of these methods. The riprap should be placed to its full thickness on one operation. The riprap should not be placed in layers. The riprap should not be placed by dumping into chutes or similar methods which are likely to cause segregation of the various stone sizes. Care should be taken not to dislodge the underlying material when placing the stones.

The finished slope should be free of pockets of small stone or clusters of large stones. Hand placing may be necessary to achieve the required grades and a good distribution of stone sizes. Final thickness of the riprap blanket should be within plus or minus 1/4 of the specified thickness.

(d) Riprap will be inspected periodically to determine if high flows have caused scour beneath the riprap or dislodged any of the stone. If repairs are needed, they should be accomplished immediately.

2. Topsoil, Seed, Mulch

(a) Topsoil: Use stockpiled materials spread to the depths shown on the plans, if available. Approved topsoil substitutes may be used (refer to Section C–2 of Erosion and Sediment Control BMP, see Note 2).

(b) Seeding should be completed by August 15 of each year. Late season seeding may be done between August 15 and September 15. Areas not seeded or which do not obtain satisfactory growth by October 1, will be seeded with Aroostook Rye or mulched at rates previously specified herein. After November 1, or the first killing frost, disturbed areas should be treated as specified in (c) below.

SEEDING SPECIFICATIONS

Permanent Seeding (120 lbs/acre)		Temporary Seeding (120 lbs/acre)
Tall Fescue	54 lbs/acre	(Aroostook Rye 100%)
Red Fescue	25 lbs/acres	
Red Top	5 lbs/acres	
Ladino Clover	13 lbs/acre	
Annual Ryegrass	8 lbs/acre	
Birdsfoot Trefoil	5 lbs/acre	
Timothy	10 lbs/acre	

(2) Fertilizer: Apply 1300 pounds per acre of 10–10–10 fertilizer or equivalent per acre (29.8 lbs/1,000 sq. ft.).

(3) Lime: Apply ground limestone at a rate of 3 tons per acre (138 lbs/1,000 sq. ft.).

(4) Mulch: Mulch with hay or straw at 2.0 – 3.0 tons per acre, or 2–3 bales per 1,000 sq. ft.

Anchor mulch with mulch netting installed per manufacturer's recommendations.

(c) 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. The following methods may be used to perform a dormant seeding:

(1) Prepare the seedbed, add the required amounts of lime and fertilizer, then mulch and anchor. After the first killing frost and before snow fall, broadcast or hydroseed the selected seed mixture. Double the regular seeding rates for this type seeding.

(2) When soil conditions permit, between the first killing frost and before snow fall, prepare the seedbed, lime and fertilize, apply the selected seed mixture, and mulch and anchor. Double the regular seeding rates for this type of seeding.

Dormant seedings need to be anchored extremely well on slopes, ditch bases and areas of concentrated flows.

Dormant seeding requires inspection and reseeding as needed in the spring. All areas where cover is inadequate must be immediately reseeded and mulched as soon as possible.

(3) Erosion Control Mats

(a) During the growing season (April 15–Sept 15) use mats indicated on drawings or, if not specified use North American Green S75 or equal or mulch with netting on:

* The base of grassed waterways
* Steep slopes (>15%)
* Any disturbed soil within 100 feet of lakes, streams and wetlands

During the late fall and winter (Sept 15–April 15) use heavy grade mats indicated on drawings or, if not specified use North American Green SC150 or equal on all areas noted above plus use lighter grade mats or mulch with netting on:

* Side slopes of grassed waterways
* Moderate slopes (>8%)

(b) Install mats in accordance with manufacturers' recommendations.

3. Lined Ditches

On designated ditches, use reinforced mats (North American Green as specified or approved equal) as permanent stabilization. Install mats in accordance with manufacturers' recommendations.

D. 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 detention ponds, berms, and service roads;

b. Construct upslope stormwater diversion berms, ditches, culvert outlets, and control structures:

c. Clear and grub Cell areas;

d. Construct service road;

e.. Construct Cell base grade and underdrain system;

f. Construct Cell liner system, and leachate collection system;

g. Operate Cell;

h. As permanent erosion control measures become stabilized, remove temporary measures (e.g., silt fence, stone check dams); and

i. Install intermediate and final cover on cells filled to capacity in areas shown in the Cell Development Plans – Appendix C of this application.

E. CONSTRUCTION INSPECTIONS

Inspections will be undertaken by qualified personnel to ensure 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.

REV.	BY	DATE	STATUS
		7/15	ISSUED FOR MEDEP SOLID WASTE PERMIT APPLICATION

JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SECTIONS AND DETAILS

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DESIGN BY: PCM
DRAWN BY: SJM
DATE: 12/5/2014
CHECKED BY:
LMN: NONE
CTB: SME–STD

JOB NO. 14101.00 DWG FILE DETAILS

C–308

APPENDIX L

LEACHATE DISPOSAL CONTRACTS

AMENDMENT TO LEACHATE
DISPOSAL AGREEMENT

This Amendment to Leachate Disposal Agreement ("Amendment"), made and entered into as of this 2nd day of November, 2006 by and between RED SHIELD ENVIRONMENTAL, LLC, a Delaware limited liability company ("Red Shield"), and NEW ENGLAND WASTE SERVICES OF ME, LANDFILL OPERATION COMPANY, LLC ("NEWSMELOC"), a Maine limited liability company with a place of business in Saco, Maine.

<u>WITNESSETH</u>:

WHEREAS, NEWSMELOC and Fort James Operating Company ("FJ") entered into a Leachate Disposal Agreement (the "Agreement"), dated as of February 5, 2004;

WHEREAS, FJ has ceased operation of the WTP (as defined in the Agreement) and, on or about this date, is conveying the WTP and certain other assets of FJ located in Old Town, Maine to the State of Maine, acting by and through the Maine Rural Development Authority (the "State"), which in turn, on or about this date, is conveying such assets to Red Shield; and

WHEREAS, in order to induce Casella Waste Systems, Inc., an affiliate of NEWSMELOC, to enter into certain agreements in connection with such asset transfers, all of FJ's rights and obligations under the Agreement have been assigned to and assumed by Red Shield, under an assignment and assumption agreement of near or even date herewith, to which assignment and assumption NEWSMELOC hereby consents; and

WHEREAS, the parties are willing to agree to certain amendments to the Agreement;

NOW, THEREFORE, in consideration of the terms and conditions of this Amendment and the mutual benefits to be derived, the parties hereto agree as follows:

1. The recitals and identification of the parties to this Amendment set forth above are incorporated by this reference as though fully set forth herein.

2. The Agreement is hereby amended to cause all references to "leachate" to mean "the liquid or semi-solid residue from waste deposited at the Landfill and (i) either collected within a liner system to be installed at the Landfill, or (ii) otherwise collected at the Landfill for disposal."

3. The first recital of the Agreement is hereby amended and restated in its entirety as follows:

> WHEREAS, FJ owns and intends in the future to operate a certain Wastewater Treatment Plant located at the FJ paper mill in Old Town, Maine (the "WTP"), that is intended to provide for the treatment and disposal of wastewater pursuant to duly issued and valid licenses and permits; and

4. The definition of Landfill Sale Agreement is hereby amended to mean the Amended and Restated Agreement Regarding Solid Waste Disposal Facility Acquisition and Operation dated February 5, 2004, as amended by the First Amendment to the Amended and Restated Agreement Regarding Solid Waste Disposal Facility Acquisition and Operation of near or even date herewith.

5. The fifth recital if the Agreement is hereby amended by deleting the words "to the WTP" therefrom.

6. Section 1.1 of the Agreement is hereby amended and restated in its entirety as follows:

> 1.1 During the term of the capacity commitments under Section 5.1 of the Landfill Sale Agreement, FJ or its successors and assigns or successor owners, shall provide at least one source for treatment of leachate produced at the Landfill (the "Source" or "Sources"), for a five-year rolling average of up to fifteen million (15,000,000) gallons of leachate per year (the "Disposal Average"), which may include by way of example and not in limitation, processing at its WTP subject to the conditions specified herein, processing at the Old Town waste water treatment facility, and/or processing at the Brewer waste water treatment facility; provided, however, that in no event shall FJ be obligated to provide one or more sources of treatment for more than seventeen million five hundred thousand (17,500,000) gallons of leachate in any single year.
>
> The Disposal Average will be calculated over a rolling five-year period. At the end of each five-year period, any unused capacity shall be credited to NEWSMELOC for the following rolling five-year period, and FJ shall bill NEWSMELOC for the disposal of any leachate in excess of the Disposal Average for the cost incurred by FJ with respect to such excess.

7. Section 1.2 of the Agreement is hereby amended and restated in its entirety as follows:

1.2 Each owner and/or operator of a Source shall only be required to receive and treat leachate from the Landfill at such Source in accordance with all applicable laws, regulations, permits, approvals and the provisions set forth herein during the term of this Agreement.

8. Section 1.3 of the Agreement is hereby amended by replacing the word "WTP" with the following: "Source designated by FJ from time to time and at any time, at NEWSMELOC's sole cost and expense, subject, however, to the reimbursement provisions hereof,".

9. Section 1.4 of the Agreement is hereby amended and restated in its entirety as follows:

1.4 NEWSMELOC shall exercise its best and most diligent efforts to cooperate with FJ to establish a leachate disposal agreement with the City of Old Town as one of the Sources.

10. Section 3.1 of the Agreement is hereby amended to read in its entirety as follows:

3.1 There shall be no fee for the treatment of Landfill leachate at the WTP. Effective as of the earlier of (a) the Start Date (as defined in a certain "Old Town Leachate Agreement" by and among Red Shield, NEWSMELOC, and the City of Old Town, of near or even date hereof), or (b) fifty-six (56) days following the date hereof, FJ shall reimburse NEWSMELOC for the cost of disposal fees assessed to, and incurred by NEWSMELOC for the disposal of leachate at the other Sources designated by FJ, not including transportation costs, testing costs, costs of pretreating leachate, or other costs (the "Additional Costs"); provided, however, that in the event the Additional Costs at Sources other than WTP exceed the Additional Costs NEWSMELOC would incur to dispose of leachate at the WTP, under the terms of this Agreement, FJ shall reimburse NEWSMELOC for the difference within thirty (30) days after receipt of NEWSMELOC's invoice thereof. For the year ending on the first anniversary of the Start Date, the disposal fee for which FJ shall reimburse NEWSMELOC shall not exceed $300,000 plus fifty percent (50%) of any incremental disposal costs (in excess of $300,000) and any Additional Costs incurred by NEWSMELOC that exceed the Additional Costs NEWSMELOC would incur to dispose of leachate at the WTP.

11. Articles 4, 5 and 6 of the Agreement shall only apply to the disposal of leachate at WTP.

12. Section 4.4.8 of the Agreement is hereby deleted in its entirety.

13. The Agreement is hereby amended by inserting Article 6A after Article 6 as follows:

ARTICLE 6A. RULES AND REQUIREMENTS AT OTHER SOURCES

NEWSMELOC shall comply with, observe and perform at its sole cost and expense, subject to section 3.1 of the Agreement, as amended hereby, the requirements of each other Source regarding leachate disposal procedures, limitations on leachate, and leachate sampling and monitoring requirements, including, without limitation, any chemical pretreatment of the leachate.

14. Section 7.3 of the Agreement is hereby amended by replacing the words "accept and treat leachate from NEWSMELOC" in the third line with the following "dispose, or cause to be disposed, leachate from NEWSMELOC, at any and all Sources,".

15. The Agreement is hereby amended by inserting the following section:

12.3 Either party may terminate this Agreement in the event that NEWSMELOC is recirculating all of the leachate produced at the Landfill, and has obtained all permits, licenses, and approvals necessary in order to do so.

16. Section 14.7 of the Agreement is hereby amended to read in its entirety as follows:

14.7 This Agreement shall not be assigned by either party without the written consent of the other, which consent shall not be unreasonably withheld or delayed. Notwithstanding the preceding sentence, however, this Agreement may be assigned by NEWSMELOC without consent to any entity controlling, controlled by, or under common control with NEWSMELOC, provided, however, that such entity shall by virtue of such assignment assume all of the liabilities, obligations and commitments of NEWSMELOC hereunder and provided further that NEWSMELOC shall not be relieved of any such liabilities, obligations and commitments hereunder.

17. The Agreement is hereby amended by deleting in its entirety the "Acknowledgement of Arbitration" provision therefrom.

18. Notwithstanding anything in the Agreement to the contrary, Red Shield shall have the unrestricted right to mortgage and pledge its rights under the

Agreement without the State's consent, and encumber 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.

19. In all other respects, the Agreement shall remain in full force and effect in accordance with its terms.

[Signature page follows]

IN WITNESS WHEREOF, the undersigned have caused this Amendment to be executed and delivered by their duly authorized representatives as of the day and year first above written.

NEW ENGLAND WASTE SERVICES
OF ME, LANDFILL OPERATING
COMPANY, LLC

By:____________________
Name: Brian Oliver
Title: Authorized Agent

RED SHIELD ENVIRONMENTAL, LLC

By:____________________
Name: Edward T. Paslawski
Title: Chairman

ASSIGNMENT AND ASSUMPTION OF LEASES AND CONTRACTS

THIS ASSIGNMENT AND ASSUMPTION OF LEASES AND CONTRACTS ("Agreement") is made effective as of this 31st day of October, 2008 ("Effective Date"), by and among **Red Shield Environmental, LLC**, a Delaware limited liability company ("Red Shield"), **RSE Pulp & Chemical, LLC**, a Delaware limited liability company (together with Red Shield, "Assignors"), and **Red Shield Acquisition, LLC**, a Delaware limited liability company ("Assignee").

RECITALS

WHEREAS, Assignors filed a voluntary petition for relief under Chapter 11 of the Bankruptcy Code on June 27, 2008 and, since that time, Assignors have remained in possession of their property and continued to operate their businesses pursuant to Sections 1107 and 1108 of the Bankruptcy Code; and

WHEREAS, Assignors, intending to sell substantially all of their business assets and to assign certain of their contractual and Lease obligations to Assignee, entered into an Asset Purchase Agreement, dated as of October 22, 2008, by and among Assignors and Assignee (the "Asset Purchase Agreement"); and

WHEREAS, pursuant to the Asset Purchase Agreement, Assignors desire to assign to Assignee their entire interest in and to the Assumed Contracts and the Leases listed on Schedule 2.1(a) of the Asset Purchase Agreement as of the Closing (the "Assumed Leases"), all of which are further described on Exhibit A attached hereto and made a part hereof, and Assignee desires to accept such assignment and to assume all liabilities and obligations of each Assignor under the Assumed Contracts and Assumed Leases, in each case only to the extent arising and relating to the period from and after the Effective Date, consistent with the terms of the Asset Purchase Agreement; and

WHEREAS, capitalized terms used herein without definition shall have the meanings ascribed to such terms in the Asset Purchase Agreement.

NOW, THEREFORE, in consideration of the covenants herein contained, and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

1. Assignment. Assignors, for themselves, their successors and assigns, hereby irrevocably convey, sell, assign, set over and transfer unto Assignee as of the Effective Date, all of Assignors' right, title and interest in and to the Assumed Contracts and Assumed Leases, the receipt and delivery of each of which is expressly acknowledged by Assignee; such assignment is being made pursuant to the terms of, and subject to the limitations set forth in, the Asset Purchase Agreement.

2. Assumption. In accordance with the Asset Purchase Agreement and the Assumed Contracts and Assumed Leases, Assignee, for itself, its successors and assigns, hereby assumes and agrees to observe, keep, carry out, perform and satisfy all Assumed Liabilities under the Assumed Contracts and Assumed Leases from and after the Effective Date (the "Assumed

Obligations"). Assignee and Assignors hereby covenant and agree that Assignee shall be directly liable under each Assumed Contract and Assumed Lease for the payment, performance, observance and satisfaction of all of the Assumed Obligations when and in the manner required by each Assumed Contract and Assumed Lease in the same manner as if Assignee had originally been named as an original party under each Assumed Contract and Assumed Lease and had executed and delivered the same. Without limiting the foregoing, Assignee acknowledges that, to the extent any payments are required to cure defaults under the Assumed Contracts and Leases in accordance with 11 U.S.C. § 365, Assignee shall be solely responsible for the making of such payments.

3. Indemnification. Assignee shall defend, indemnify and hold Assignors harmless from and against any and all damages, losses, liabilities, judgments, suits, actions, causes of action, equitable proceedings, claims, demands, costs and expenses (including, without limitation, reasonable attorneys' fees and charges) arising out of, as a result of or incidental to any failure by Assignee for whatever reason to observe, keep, carry out, perform and satisfy any or all of the Assumed Obligations as, with and in the manner required by the Assumed Contracts and Assumed Leases.

4. Further Assurances. Assignors, at Assignee's expense, agree to execute all papers and perform such other acts, as Assignee may deem necessary to secure for Assignee the rights herein assigned.

5. Headings. The headings used herein are inserted for convenience of reference only and shall not define, limit, extend or describe the scope of this Agreement or affect the construction or interpretation hereof.

6. Binding Effect. This Agreement shall be binding upon, and shall inure to the benefit of and be enforceable by, the parties hereto and their respective successors and permitted assigns.

7. Complete Agreement; Purchase Agreement Controls. This Agreement and the Asset Purchase Agreement set forth the entire agreement by and between Assignors and Assignee concerning the subject matter hereof; provided, however, nothing in this Agreement shall expand upon or limit any right, benefit, responsibility, liability or obligation of Assignee or Assignors arising under the Asset Purchase Agreement, which Asset Purchase Agreement shall govern as to the representations and warranties of the parties with respect to the Assumed Contracts and Assumed Leases transferred pursuant to this Agreement. In the event of a conflict between the provisions of this Agreement, on the one hand, and the provisions of the Asset Purchase Agreement, on the other hand, the provisions of the Asset Purchase Agreement shall control.

8. Governing Law; Jurisdiction. This Agreement shall be governed, construed and interpreted by, and in accordance with, the laws of the State of Maine, excluding choice of law rules or rulings. This Agreement is subject to any order of the Bankruptcy Court applicable hereto.

9. Counterparts; Facsimile Signatures. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall

constitute one and the same instrument. This Agreement may be executed and delivered by facsimile.

[Signatures are on the following page]

IN WITNESS WHEREOF, this Agreement has been duly executed by each of the parties hereto with the intention that this Agreement be effective as of the Effective Date.

RED SHIELD ENVIRONMENTAL, LLC

By:______________________________
Name: Edward T. Paslawski
Title: Manager

RSE PULP & CHEMICAL, LLC

By:______________________________
Name: Edward T. Paslawski
Title: Manager

RED SHIELD ACQUISITION, LLC

By: ______________________________
Name: Lynn Tilton
Title: Sole Manager

IN WITNESS WHEREOF, this Agreement has been duly executed by each of the parties hereto with the intention that this Agreement be effective as of the Effective Date.

RED SHIELD ENVIRONMENTAL, LLC

By:____________________________
Name: Edward T. Paslawski
Title: Manager

RSE PULP & CHEMICAL, LLC

By:____________________________
Name: Edward T. Paslawski
Title: Manager

RED SHIELD ACQUISITION LLC

By: ____________________________
Name: Lynn Tilton
Title: Sole Manager

EXHIBIT A

ASSUMED CONTRACTS AND ASSUMED LEASES

1. Labor Agreement between Red Shield Environmental, LLC (Old Town, Maine) and United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union (USW) — AFL-CIO, CLC, on behalf of its Local Union #4-0080 (November 2, 2006 – September 30, 2011).

2. NEWSME, LLC (Landfill)

   A) Amendment and Restatement of Agreement Regarding Solid Waste Disposal Facility Acquisition and Operation, dated February 5, 2004, as amended from time to time.

   B) Fuel Supply Agreement, dated as of November 2, 2006.

   C) Old Town Leachate Disposal Agreement, dated as of November 2, 2006.

   D) Leachate Disposal Agreement, dated as of February 5, 2004, as amended by Amendment to Leachate Disposal Agreement, dated as of November 2, 2006.

3. Central National Gottesman, Inc.

   Woodpulp Sales Agency Agreement, dated as of April 13, 2007.

4. Linde Inc./BOC (Oxygen)

   Product Agreement, dated by last signature as of August 14, 2007.

5. Nalco Company (Waste Treatment)

   Recovery Boiler Leak Indication Agreement, dated September 7, 2007.

6. PP&L Great Works, LLC (Water and Power)

   Facilities Agreement dated as of March 2, 2000 as amended from time to time.

   No defaults; no cure costs.
   Related Agreements (Non-Executory) being conveyed to Purchaser:
   Separation Agreement dated as of March 2, 2000.
   Reciprocal Easement Agreement dated February 28, 2000.

7. PPL EnergyPlus, LLC

   Standby Facilities Use Agreement dated November 2, 2006.

8. Independent Consultant Agreement between The Net Works and Red Shield Environmental, LLC dated December 7, 2006.

9. The Net Works Statement of Work for WSI EmailPlus between Red Shield Environmental, LLC and The Net Works dated December 7, 2006.

10. Consent to Software License Assignment and Release Letter Agreement between ABB Inc., Georgia-Pacific Corporation and Red Shield Environmental, LLC dated November 1, 206.

11. Telecommunications Service Agreement between Red Shield Environmental, LLC and Mid-Maine Communications.

12. Contract for the Acquisition and Implementation of SAP Business One between N'ware Technologies, Inc. and RSE Pulp & Chemical, LLC dated March 27, 2007.

13. License Upgrade for SAP Business One between N'ware Technologies and RSE Pulp & Chemical, LLC dated October 29, 2007.

14. SAP Business One Software License Agreement between SAP America, Inc. and RSE Pulp & Chemical, LLC dated May 31, 2007.

15. End user Software License Agreement and Maintenance Agreement between Ceecom, Inc. and RSE Pulp & Chemical, LLC.

16. Software License Agreement, dated March 4, 2008, by and between Capstone Technology Corporation and Sellers.

INDUSTRIAL WASTEWATER DISCHARGE PERMIT

In accordance with the provisions of the Sewer and Pretreatment Ordinance, Chapter 31 of the City Ordinances:

NEWSME, LLC
2828 Bennoch Road
Alton, ME 04468

is hereby authorized to discharge leachate from the above identified facility into the City of Brewer's Water Pollution Control Facility in accordance with the effluent limitations, monitoring requirements, and other conditions set forth in this permit.

All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of this permit.

This permit shall become effective on March 3, 2013 and shall expire at midnight on March 2, 2018.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application must be filed for reissuance of this permit a minimum of 90 days prior to the above expiration date. If the permittee makes timely application for reissuance, but the City does not reissue a permit prior to the expiration date, the permittee shall have the right to continue to discharge under the terms and conditions of the most recent expired permit for a period of time not to exceed 90 days.

This permit may be appealed to the Brewer City Council within 30 days of the date of issue.

By: Kenneth W Locke
Director of Environmental Services

Kenneth W. Locke

Lucien J Colburn
Pretreatment Coordinator

Lucien J. Colburn

Issued this Third day of November, 2012.

INDUSTRIAL WASTEWATER DISCHARGE PERMIT

In accordance with the provisions of the Sewer and Pretreatment Ordinance, Chapter 31 of the City Ordinances:

NEWSME, LLC
2828 Bennoch Road
Alton, ME 04468

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All discharges authorized herein shall be consistent with the terms and conditions of this permit. The discharge of any pollutant identified in this permit more frequently than or at a level in excess of that authorized shall constitute a violation of this permit.

This permit shall become effective on March 3, 2008 and shall expire at midnight on March 2, 2013.

The permittee shall not discharge after the date of expiration. If the permittee wishes to continue to discharge after this expiration date an application must be filed for reissuance of this permit a minimum of 90 days prior to the above expiration date. If the permittee makes timely application for reissuance, but the City does not reissue a permit prior to the expiration date, the permittee shall have the right to continue to discharge under the terms and conditions of the most recent expired permit for a period of time not to exceed 90 days.

This permit may be appealed to the Brewer City Council within 30 days of the date of issue.

By: Kenneth W Locke
Director of Environmental Services

Kenneth W. Locke

Lucien J Colburn
Pretreatment Coordinator

Lucien J. Colburn

Issued this Third day of March, 2008.

Industry Name NEWSME, LLC Permit No. 37-2679-07

Part 1 - APPLICABLE EFFLUENT LIMITATIONS

SECTION 1 - EFFLUENT DISCHARGE LIMITS

A. The City of Brewer's Treatment Facility will be considered as the ~~primary~~ secondary discharge location.

B. During the effective period of this permit, the permittee is required to contact the City of Brewer's Water Pollution Control Facility for **authorization** from the Director or his representative to discharge leachate into the designated disposal point at the City of Brewer's Water Pollution Control Facility. The leachate will have to be sampled and analyzed by the City of Brewer the first day that leachate is trucked to the Water Pollution Control Facility..

Description of Designated Disposal Point:

The leachate will be discharged into the #1 Primary Clarifier at the head end of the treatment facility. A permanent 6" line is installed in the Clarifier launder to discharge leachate below the water surface to help eliminate odors during receiving of leachate. The disposal point may be changed by the Water Pollution Control Facility when it deems necessary. (At the discretion of the Brewer WPCF, delivery of leachate may be stopped at any time due to excess municipal flow, operational problems that may cause interference or passthrough, or any leachate condition that may jeopardize the biological system.(ie:excess volume, high ammonia content, toxicity due to odor control chemicals, etc.)

Any other discharge is prohibited

C. During the effective period of this permit, the discharge from designated disposal point shall not exceed the following effluent limitations. In addition, the discharge shall comply with all other applicable regulations and standards contained in Chapter 31 of the City Ordinances and all current EPA pretreatment requirements for Industrial users.

EFFLUENT LIMITATIONS

LOCAL LIMITS

Parameter	Discharge Limits
Arsenic	0.10 mg/l
Cadmium	0.14 mg/l
Chromium	2.64 mg/l
Copper	2.59 mg/l
Cyanide	0.25 mg/l
Lead	0.26 mg/l
Mercury	0.02 mg/l
Molybdenum	0.77 mg/l
Nickel	2.59 mg/l
Selenium	10.01 mg/l
Silver	0.66 mg/l
Zinc	MAHL

D. The permittee shall not discharge leachate into the designated disposal point;

(1) Having a pH lower than 5.5 or higher than 11.0, or having any other corrosive property capable of causing damage or hazards to structures, equipment or personnel of the sewer system. (If at any time, an odor masking or eliminating agent (ex. Shock) is used in any application, the Brewer WPCF will be notified prior to shipping any leachate. The Brewer WPCF will also receive prior notification any time caustic or acid is used to clean leachate collection lines, equipment, or tank on the truck or at the landfill.)

(2) Having a temperature higher than 105°F

(3) Causing interference with the Brewer Water Pollution Control Facility. Interference shall mean a discharge which alone or in conjunction with a discharge or discharges from other sources, both (1) inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and (2) therefore is a cause of a violation of any requirements of the POTW's MEPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State and local regulations): Section 405 of the Clean Water Act, The Solid Waste Disposal Act (SWDA) (also referred to as RCRA, and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the (SWDA), the Clean Air Act, the

Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

(4) Causing a Pass Through of the Brewer Water Pollution Control Facility. A Pass Through shall mean a discharge that exits the POTW into the receiving waters in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's MEPDES permit (including an increase in the magnitude or duration of the violation).

(5) Containing petroleum oil, non-biodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through.

(6) Containing any pollutant including oxygen demanding pollutants (e.g., BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference or pass through.

(7) Containing pollutants which result in the presence of toxic gases, vapors or fumes within the Brewer WPCF in a quantity that may cause acute worker health and safety problems.

(8) Containing any gasoline, benzene, naphtha, fuel oil or other flammable or explosive liquids, solids or gases, and any material having a flash point of 140°F or below.

(9) Containing any grease or oils of petroleum origin, whether emulsified or not, in excess of 100 mg/l or containing substances which may solidify or become viscous between 32°F and 140°F.

(10) Containing any sand, shavings, metal, glass, rags, plastics, wood, or any other substance capable of causing obstructions or interference with the operation of the treatment facility.

Industry Name NEWSME, LLC Permit NO. 37-2679-07

PART 2 - MONITORING AND REPORTING REQUIREMENTS

SECTION 1 - MONITORING REQUIREMENTS

A. For the effective period of this permit the permittee shall monitor leachate for the following:

Parameter	(units)	Location	Frequency	Type	Notes
Conductance	(umhos/cm)	(1)	X 3 months	Comp	(2)
Flow	(gpd)	(1)	X 3 months		(7)
pH	(stu)	(1)	X 3 months	Grab	(2) (3)
BOD	(mg/l)	(1)	X 3 months	Comp	(2)
COD	(mg/l)	(1)	X 3 months	Comp	(2)
Hardness	(mg/l)	(1)	X 3 months	Comp	(2)
TDS	(mg/l)	(1)	X 3 months	Comp	(2)
TSS	(mg/l)	(1)	X 3 months	Comp	(2)
Oil & Grease	(mg/l)	(1)	X 3 months	Grab	(2) (4)
Alkalinity	(mg/l)	(1)	X 3 months	Comp	(2)
Arsenic	(mg/l)	(1)	X 3 months	Comp	(2)
Barium	(mg/l)	(1)	X 3 months	Comp	(2)
Cadmium	(mg/l)	(1)	X 3 months	Comp	(2)
Calcium	(mg/l)	(1)	X 3 months	Comp	(2)
Chloride	(mg/l)	(1)	X 3 months	Comp	(2)
Chromium	(mg/l)	(1)	X 3 months	Comp	(2)
Copper	(mg/l)	(1)	X 3 months	Comp	(2)
Cyanide	(mg/l)	(1)	X 3 months	Grab	(2) (5)
Iron	(mg/l)	(1)	X 3 months	Comp	(2)
Lead	(mg/l)	(1)	X 3 months	Comp	(2)
Magnesium	(mg/l)	(1)	X 3 months	Comp	(2)
Manganese	(mg/l)	(1)	X 3 month	Comp	(2)
Mercury *	(mg/l)	(1)	X 3 months	Comp	(2)
Molybdenum	(mg/l)	(1)	x 3 months	Comp	(2)
Nickel	(mg/l)	(1)	X 3 months	Comp	(2)
Phosphorus	(mg/l)	(1)	X 3 months	Comp	(2)
Selenium	(mg/l)	(1)	X 3 months	Comp	(2)
Silver	(mg/l)	(1)	X 3 months	Comp	(2)
Sodium	(mg/l)	(1)	X 3 months	Comp	(2)
Sulfate	(mg/l)	(1)	X 3 months	Comp	(2)
Vanadium	(mg/l)	(1)	X 3 months	Comp	(2)
Zinc	(mg/l)	(1)	X 3 months	Comp	(2)
EPA 624 Volatile Organics	(mg/l)	(1)	X ~~3~~6 months	Comp/ Grab	(6)
EPA 625 Semi-Volatile Organics	(mg/l)	(1)	X ~~3~~6 months	Grab Grab	(6)

Industry Name NEWSME, LLC Permit No. 37-2679-07

Ammonia Nitrogen	(mg/l)	(1)	X 3 months	Grab (2)
Organic Nitrogen	(mg/l)	(1)	X 3 months	Grab (2)
TKN	(mg/l)	(1)	X 3 months	Grab (2)

Notes:

(1) Samples are collected from the leachate storage tank as it is pumped to the tank truck before it is delivered to the treatment plant. One quarterly sample will be collected by Brewer WPCF personnel in conjunction with NEWSME Landfill Operations, LLC (to be paid for by NEWSME Landfill Operations, LLC) during the annual inspection of the site. (Only if leachate is hauled into Brewer during any calendar year)

(2) Definitions of sample types can be found in Part 4 Section 1 of this permit.

(3) The pH will be sampled for each tanker and recorded.

~~(4) The Oil & Grease is a quarterly test.~~

(4) Mercury samples will be collected using EPA Method 1669, and tested using EPA Method 1631.

(5) A grab sample for Cyanide will be randomly ~~be~~ collected from one tanker.

(6) These parameters will be monitored ~~quarterly~~ semi-annually.

(7) The combined volume of the tankers delivered will be totaled to provide the calculated flow for the sampling period.

(8) Volatile Organics and Semi-Volatile Organics ~~may~~ will be tested ~~decreased from 4x/yr to~~ 2x/yr. ~~if results in the first year of the permit are Non-detect, or below water quality standards.~~

B. All handling and preservation of collected samples and laboratory analysis of samples shall be performed in accordance with 40 CFR, Part 136 and amendments thereto unless specified otherwise in the monitoring conditions of this permit.

SECTION 2 - REPORTING REQUIREMENTS

A. Monitoring Reports

Quarterly reports are required for all parameters listed. Reports are due on the 15th day of the month following the end of the quarter. The reports are due on April 15, July

15, October 15 and January 15. (If leachate is hauled to the Brewer WPCF, the last two testing quarter lab analyses will be sent to Brewer for review, prior to leachate acceptance.)

B. ~~The City of Brewer Water Pollution Control Facility will accept analytical results collected from one of the quarterly analysis that the permittee is required to complete.~~
(If deemed necessary by the WPCF, the Permittee will assess the need for compliance schedules in accordance with 40 CFR 403.8 (f)(1)(iv).
(If deemed necessary by the WPCF, the Permittee will assess the need for a slug control plan in accordance with 40 CFR 403.8 (f)(2)(v).

C. If the permittee monitors any pollutants more frequently than required by this permit and such monitoring is performed using testing and sampling procedures approved hereunder, the results of such monitoring shall be submitted to the City's Water Pollution Control Facility with the next quarterly report after the results become available.

D. All reports required by this permit shall be submitted to the City of Brewer's Water Pollution Control Facility at the following address, or such other person and address as the City may designate:

City of Brewer Water Pollution Control Facility
Attn.: Lucien Colburn, Pretreatment Coordinator
37 Oak Street
Brewer, Maine 04412

or City of Brewer Water Pollution Control Facility
Attn.: Kenneth Locke, Director of Environmental Services
37 Oak Street
Brewer, Maine 04412

Part 3 - SPECIAL CONDITIONS

SECTION 1 - ADDITIONAL/SPECIAL MONITORING REQUIREMENTS

A. Forward a copy of the existing or modified spill prevention and control plan to the Brewer WPCF Director.

B. If results indicate that a violation has occurred of pollutants that are limited in the permit the permittee must notify the City of Brewer's WPCF Director within 24 hours of becoming aware of the violation. The permittee must repeat the sampling and pollutant analysis and submit, in writing, the results of this second analysis within 30 days of becoming aware of the violation.

PART 4 - STANDARD CONDITIONS

SECTION 1 - DEFINITIONS

Unless the context indicates otherwise, the meaning of the terms and abbreviations used in this permit shall be as defined in the City's Sewer and Pretreatment Ordinance, Chapter 31 of the City of Brewer Ordinances and as it may be amended from time to time. Terms not defined by the City of Brewer's Sewer and Pretreatment Ordinance shall be as defined in the Pretreatment Regulations of the U.S. EPA, found in CFR 40, Part 403. Terms not defined by either of the above-described sources shall have their customary dictionary meaning.

A. Grab sample, for monitoring requirements, is defined as an individual sample which is taken from a Wastestream(s) on a one time basis without regard to the flow in the Wastestream(s) and without consideration of time.

B. Composite sample: The sample resulting from the combination of individual wastewater samples taken at selected intervals based on an increment of either flow or time.

C. Daily maximum effluent limit is defined as the maximum allowable discharge of pollutant during a calendar day. Where daily maximum limitations are expressed in units of mass, the daily discharge is the total mass discharged over the course of the day. Where daily maximum limitations are expressed in terms of a concentration, the daily discharge is the flow weighted average measurement of the pollutant derived from all measurements taken that day.

D. Monthly average effluent limit is defined as the arithmetic average of all daily determinations of concentration made during a calendar month.

E. Sanitary Sewage (same as Domestic Sewage) is defined as water and water-carried wastes normally discharged into sanitary sewers from dwellings, including single family homes, multi-family homes and motels, from office buildings, factories and institutions, but not including storm water drainage or surface water drainage and not including industrial wastes as defined in the Sewer/Pretreatment Ordinance (Chapter 31) and as same may be amended from time to time.

SECTION 2 - GENERAL CONDITIONS

A. Duty to Comply

The permittee must comply with all conditions of this permit. Failure to comply with the requirements of these regulations will be grounds for administrative action, or enforcement proceedings including civil or criminal penalties, as the same may be provided by law, injunctive relief, termination of sewer service and summary abatements.

B. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment from noncompliance with this permit, including additional monitoring to determine the impact of the discharge.

C. Permit Action

This permit may be modified, revoked and reissued, or terminated for causes including, but not limited to, the following:

a. Violation of any terms or conditions of this permit;

b. Obtaining this permit by misrepresentation;

c. A change in any condition that requires either a temporary or permanent reduction or elimination of the authorized discharge;

d. Information indicating that the permitted discharge poses a threat to human health or welfare;

e. Upon the request of the permittee, provided such request does not create a violation of any existing applicable requirements, standards, laws, or rules and regulations;

f. Material or substantial alterations or additions to the discharger's operation or level of production which were not covered in the effective permit;

g. To incorporate any existing, new or revised Federal, State, or Local Pretreatment Standards or requirements which the City is required to incorporate into this permit by any State and/or Federal agency.

The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

D. Property and Contract Rights

The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights.

E. Termination

This Industrial Wastewater Discharge Permit shall be subject to the terms and conditions of a contract between the parties, as well as the terms and conditions of the permit.

F. Limitation on Transfer

This permit is not transferable to any other owner without the written approval of the Superintendent of the City of Brewer's Water Pollution Control Facility. Application for discharge permit must be submitted by the new owner within thirty (30) days of transfer of ownership.

G. Dilution

The permittee shall not in any way attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in this permit.

SECTION 3 - OPERATION & MAINTENANCE OF POLLUTION CONTROLS

A. Proper Operation & Maintenance

The permittee shall at all times properly operate and maintain all systems of treatment and control which are used by the permittee to achieve compliance with the conditions of this permit.

B. Duty to Halt or Reduce Activity

Upon reduction, loss or failure of any pretreatment equipment, the permittee shall, to the extent necessary to maintain compliance with its permit, control production or all discharges or both until operation of the equipment is restored or an alternate, equally effective method of pretreatment is used. The permittee shall notify the POTW prior to any alternate method used. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

C. Removed Substances

Solids, sludges, filter backwash, or other pollutants removed in the course of pretreatment shall be disposed of in accordance section 405 of the Clean Water Act and subtitles C and D of the Resource Conservation Recovery Act. When requested, the permittee shall submit a plan for such disposal to the Director of the Water Pollution Control Facility within 30 days of said request.

SECTION 4 - MONITORING AND RECORDS

A. Representative Sampling

Samples and measurements shall be representative of the leachate and shall be done on a day of normal to maximum process operation. All samples shall be taken at the monitoring point specified in this permit.

B. Inspection and Entry

The permittee shall allow the Director of the Brewer Water Pollution Control Facility, or an authorized representative, to:

Enter upon the permittee's premises where a regulated facility or activity is located, or where records must be kept underthe conditions of this permit;

Have access to and copy any records that must be kept under the conditions of this permit;

Inspect facilities, equipment, practices, or operations regulated or required under this permit;

Sample or monitor, for the purpose of assuring permit compliance, any substances or parameters at any location;

Inspect any production, manufacturing, fabricating or storage area where pollutants, regulated under this permit, could be discharged to the sewer system or POTW.

C. Retention of Records

1. The permittee shall retain the records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings, copies of all reports required by this permit, for a period of at least 3 years from the date of the sample, measurement or report. This period may be extended by written request of the Director of the Water Pollution Control Facility at anytime.

2. All records that pertain to matters that are the subject of enforcement activities brought by the City of Brewer of which the permittee receives written notice shall be retained and preserved by the permittee until all enforcement and any appeal activities have concluded.

D. Record Contents

Records of sampling information shall include:

- The date, exact place, time and methods of sampling or measurements, and sampling preservation;

- Who performed the sampling or measurements;
- The date(s) analyses were performed;
- Who performed the analyses;
- The analytical techniques or methods used; and
- The results of such analyses.

E. Signatory Requirements

All reports and information submitted to the City of Brewer's Water Pollution Control Facility shall be signed and certified as indicated below.

1. All permit applications shall be signed as follows:
   - By a principal executive officer of at least the level of Environmental Compliance Manager.
2. All other correspondence, reports and self monitoring reports shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
   - The authorization is made in writing by the person described above.
   - The authorization specifies either an individual or person having responsibility for the overall operation of the regulated operation or facility.
3. Certification. Any person signing a document required by this permit shall make the following certification:

   "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."

F. Falsifying Information

Knowingly making any false statement on any report or other document required by this permit or knowingly rendering any monitoring device or method inaccurate, may result in punishment under criminal law proceedings as well as being subjected to civil penalties and injunctive relief, as the same may be permitted by law.

SECTION 5 - ADDITIONAL REPORTING REQUIREMENTS

A. Planned Changes

The permittee shall give notice to the Director of the Brewer Water Pollution Control Facility 90 days prior to any facility expansion or process modifications which result in a new or substantially increased discharge or a change in the nature of the discharge. A substantial change shall be defined as any 10 percent increment deviation from existing production or waste generation levels.

B. Duty to Provide Information

The permittee shall furnish to the City of Brewer Water Pollution Control Facility, within a reasonable time, any information requested by the Brewer WPCF to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.

SECTION 6 - ENFORCEMENT

The permittee will be subject to Civil Penalties of up to $1,000.00 dollars per day per permit violation. In addition, the permittee violating any of the provisions of this permit, or causing a deposit or obstruction, or causing or contributing to damage to or otherwise inhibiting the City of Brewer's Water Pollution Control system, or causing or contributing to a violation of the City's MEPDES permit shall be liable to the City of Brewer for any expense, loss, or damage caused or contributed to by such a violation or discharge. Refusal to pay the assessed costs shall constitute a violation of this permit. Any person who willfully or negligently violates permit conditions is subject to criminal penalties of a fine of up to $10,000.00 dollars per violation, or by imprisonment, or both. The permittee may also be subject to sanctions under State and/or Federal law.

NEWSME Landfill Operations, LLC hereby acknowledges that it's Environmental Compliance Manager has read and understands the Terms and conditions of this Industrial Wastewater Discharge Permit.

Date: 3/3/08

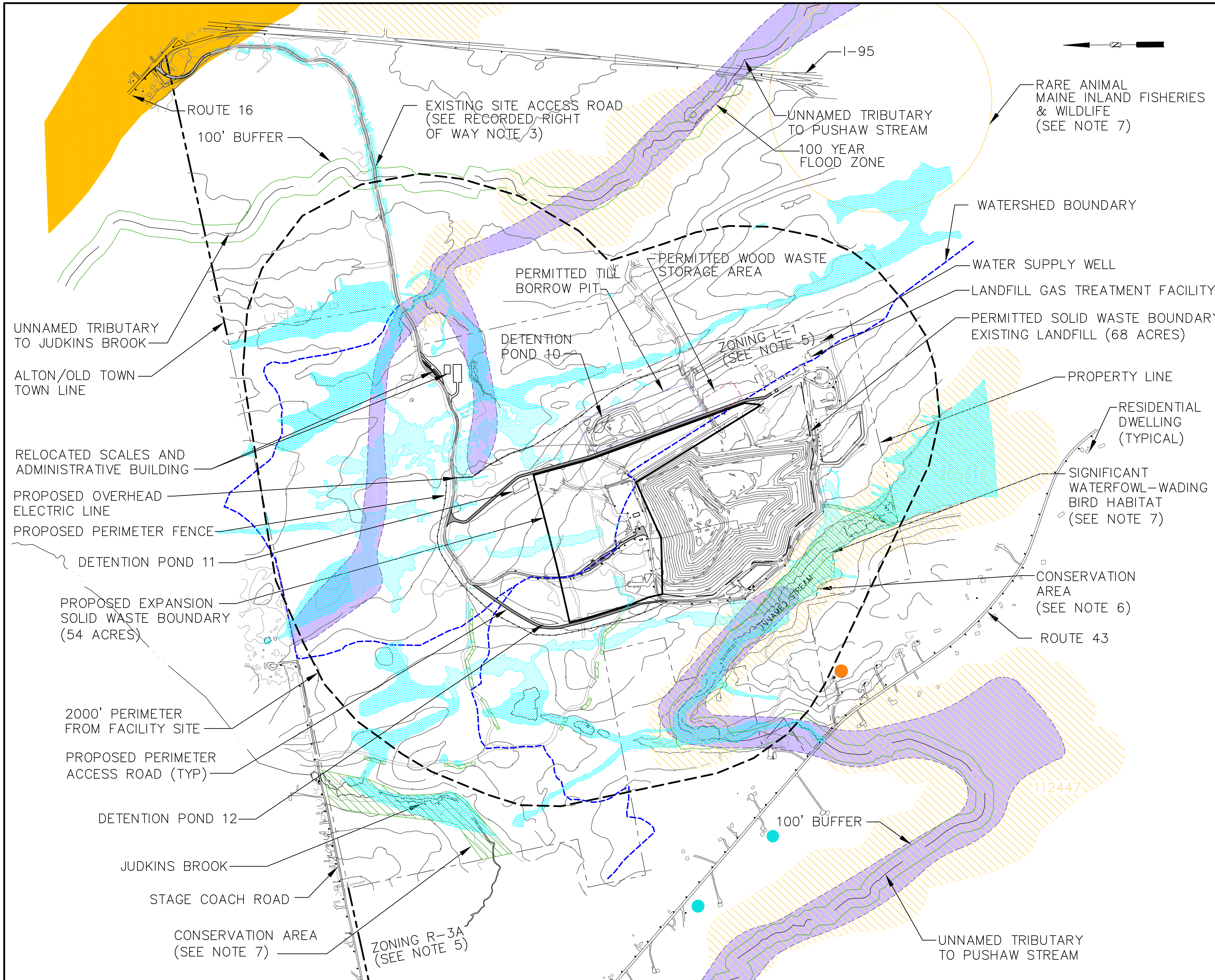
NEWSME Landfill Operations, LLC

By: [signature]

It's Environmental Compliance Manager
Duly Authorized

APPENDIX M

SITE AND SURROUNDINGS MAP, USGS TOPOGRAPHIC MAP, TAX MAP WITH LIST OF ABUTTERS



NOTES:

1. EXISTING GROUND CONTOURS FROM JULY 31, 2014 AND APRIL 17, 2004. AERIAL SURVEY PERFORMED BY AERIAL SURVEY AND PHOTO, INC. OF NORRIDGEWOCK, MAINE.

2. 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.

3. 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).

4. THERE ARE NO HISTORICAL OR ARCHAEOLOGICAL SITE IDENTIFIED WITHIN THE 2000 FOOT PERIMETER FROM THE FACILITY SITE.

5. 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).

6. 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). LOCATIONS ARE APPROXIMATE.

7. 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 MAIN DEPARTMENT OF AGRICULTURE AND FORESTRY (OCTOBER 7, 2014 CORRESPONDENCE). THE MAINE DEPARTMENT OF INLAND FISHERIES AND WILDLIFE, WILDLIFE DIVISION, IDENTIFIED POTENTIAL SIGNIFICANT WATERFOWL-WADING BIRD HABITATS AND A WOOD TURTLE OBSERVATION BUFFER NEAR THE SITE (OCTOBER 6, 2014 AND NOVEMBER 5, 2014 CORRESPONDENCE). THERE HAVE BEEN NO OTHER UNIQUE AREAS IDENTIFIED WITHIN THE GENERAL VICINITY OF THE SITE.

8. 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 2301120002A DATED APRIL 1978)

STANTEC WETLANDS (2004, 2008, 2014 AND 2015 DELINEATION)

GROUNDWATER YIELDS GREATER THAN 10 GPM SIGNIFICANT SAND & GRAVEL AQUIFER MGS SURVEY OPEN FILE 08-07 BY TOLMAN AND LANCTOT, 2008.

CONSERVATION AREAS

YIELD BETWEEN 5 AND 10 GALLONS PER MINUTE

YIELD BETWEEN 10 AND 15 GALLONS PER MINUTE

MAPPING SOURCE: MAINE GEOLOGICAL SURVEY WATER WELL DATABASE, DATED AUGUST 28, 2014.

250 0 500 1000 FEET

SITE SURROUNDINGS MAP
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DWG: BUFFERPLAN	LMN: Surroundings-PRES	CTB: SiteSurroundings	REV: 7/14/15

USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OLD TOWN QUADRANGLE
MAINE–PENOBSCOT CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—2001

PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
DERIVED FROM IMAGERY DATED........1981
PHOTOINSPECTED USING IMAGERY TAKEN........1998
NO MAJOR CULTURE OR DRAINAGE CHANGES OBSERVED
SURVEY CONTROL CURRENT AS OF........1981
BOUNDARIES, OTHER THAN CORPORATE, REVISED........2000
PROJECTION........TRANSVERSE MERCATOR
1000-METER UNIVERSAL TRANSVERSE MERCATOR GRID........ZONE 19
10,000-FOOT STATE GRID TICKS........MAINE, EAST ZONE
UTM GRID DECLINATION........0°13' EAST
2001 MAGNETIC NORTH DECLINATION........18°00' WEST
VERTICAL DATUM........NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM........NORTH AMERICAN DATUM OF 1927 (NAD 27)
North American Datum of 1983 (NAD 83) is shown by dashed corner ticks. The values of the shift between NAD 27 and NAD 83 for 7.5-minute intersections are obtainable from National Geodetic Survey NADCON software
There may be private inholdings within the boundaries of Federal and State reservations shown on this map

NORTH

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of photography. 1

SCALE 1:24 000

1 .5 0 1
MILES
1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10 000
FEET
1 .5 0 KILOMETERS 1 2
1000 0 METERS 1000 2000

CONTOUR INTERVAL 10 FEET
CONTROL ELEVATIONS SHOWN TO THE NEAREST 0.1 FOOT
OTHER ELEVATIONS SHOWN TO THE NEAREST FOOT
To convert feet to meters multiply by .3048
To convert meters to feet multiply by 3.2808

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, P.O. BOX 25286, DENVER, COLORADO 80225
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

MAINE
QUADRANGLE LOCATION

1	2	3	1 South Lagrange 2 Greenbush 3 Olamon 4 Pushaw Lake 5 Otter Chain Ponds 6 Bangor 7 Veazie 8 Chemo Pond
4		5	
6	7	8	

ADJOINING 7.5' QUADRANGLE NAMES

ROAD LEGEND
Improved Road
Unimproved Road
Trail
Interstate Route
U. S. Route
State Route

OLD TOWN, MAINE
PROVISIONAL EDITION 1998
44068-H6-TF-024

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	Lawrence H. Steeves – Heirs
2	52	Raymond A. Perkins
2	53	United Cerebral Palsy
2	55	Robyn Emmons
2	54	Gregg & Evlynn Wallace
2	51	New England Waste Services
3	53	SSR, LLC
3	6B	Scott E. Bergquist
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	54B	SSR, LLC
3	58B	SSR, LLC
3	1A	University of Maine System
3	1B	SSR, LLC

ALTON

MAP NO.	LOT NO.	NAME
8	102	NewsMe Landfill Operations LLC
8	104	Tasanee Lolonga
8	106	Karl Held
8	107	Harry & Tammy Feero
8	108	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	121	Anthony & Cynthia Brown
8	121.1	Mary St. Louis/Cynthia & Anthony Brown
8	122	NewsMe Landfill Operations LLC
8	122.1	NewsMe Landfill Operations LLC
8	123	Jennifer & Richard Paradise
8	124	Margo 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, (2015).

250 0 500 1000 FEET

TAX MAP OF
PROPERTY ABUTTERS
JUNIPER RIDGE LANDFILL EXPANSION
OLD TOWN, MAINE

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DWG: AREAMAP LMN: TAX MAP CTB: SME-STD REV: 7/17/2015

	Map No.	Lot No.	First Name	Last Name	Title	Company	Address1	Address2	City	State	Zip
Town of Alton						Town of Alton	3352 Bennoch Road		Alton	ME	04468
City of Old Town						City of Old Town	265 Main Street		Old Town	ME	04468
P.I.N.						Penobscot Indian Nation	12 Wabanaki Way		Indian Island	ME	04468
Landfill Advisory Committee			Bill	Thompson	Chair	Landfill Advisory Committee	12 Wabanaki Way		Indian Island	ME	04468
			Dana	Snowman			120 Old Stagecoach Road		Alton	ME	04468
			Laura	Sanborn			2845 Bennoch Road		Alton	ME	04468
			Clyde	Grant			181 Oak Street		Old Town	ME	04468
			Ralph	Leonard			96 Sargent Drive		Old Town	ME	04468
			Ted	Shina			769 West Old Town Road		Old Town	ME	04468
			Chuck	Leithiser			394 Fourth Street		Old Town	ME	04468
			Bill	Mayo	City Manager	City of Old Town	265 Main Street		Old Town	ME	04468
			David	Russell		City of Old Town	265 Main Street		Old Town	ME	04468
			Peter	Dufour			230 West Old Town Road		Old Town	ME	04468
Old Town	2	40 &41	Laurent J. and Barbara L.	Beauregard			273 Washington Street		Brewer	ME	04412
	2	44	Robert W. and Wendy	Hall			631 West Old Town Road		Old Town	ME	04468
	2	46	Thomas Dunn and	Karen Bertolino			579 West Old Town Road		Old Town	ME	04468
	2	47	Lawrence	Steeves Heirs			216 Sycamore Street		Holbrook	MA	02343
	2	52	Raymond A.	Perkins			55 Old Brooklyn Turnpike		Windham	CT	06280
	2	53				United Cerebral Palsy	700 Mount Hope Avenue	Suite 320	Bangor	ME	04401
	3	1A				University of Maine System	107 Maine Avenue		Bangor	ME	04401
	3	6B	Scott E.	Bergquist			474 South 2550 West		Springville	UT	84663
	3	7A	Angela D.	Cyr			449 West Old Town Road		Old Town	ME	04468
	3	15				NEWSME Landfill Operations LLC	282 Bennoch Road		Alton	ME	04468
	3	41C	Herbert A.	Robertson, Jr.			163 Clewleyville Road		Eddington	ME	04428
	3	53,45B,50A,54B,58B,1B				SSR, LLC	PO Box 435		Stillwater	ME	04489
	2	55	Robyn	Emmons			488 West Old Town Road		Old Town	ME	04468
	2	51				New England Waste Services of Maine	358 Emerson Mill Road		Hampden	ME	04444
	2	54	Gregg P. and Evlynn	Wallace			526 West Old Town Road		Old Town	ME	04468
Alton	8	102,122,122-1				NEWSME Landfill Operations LLC	282 Bennoch Road		Alton	ME	04468
	8	104	Tasanee	Lolonga			157 Massapoag Ave		N. Easton	MA	02356
	8	106	Karl	Held			2351 Cochran Road		Dallas	GA	30132
	8	107	Harry & Tammy	Feero			1118 Southgate Rd.		Argyle	ME	04468
	8	108,109,111,112	Win & Nancy	Chaiyabhat			PO Box 34		Searsport	ME	04974
	8	113	Jesse	Pekkala			PO Box 471		Telluride	CO	81435
	8	114	Charles	Tringale III			250 Old Stagecoach Rd.		Alton	ME	04468
	8	116	Anthony	Madden			PO Box 499		Milford	ME	04461
	8	117	Challis	Randall			220 Old Stagecoach Rd.		Alton	ME	04468
	8	117.1				Town of Alton	3352 Bennoch Road		Alton	ME	04468
	8	118	Kenneth	Gray			PO Box 357		Old Town	ME	04468
	8	119	Kathryn	Pelletier			198 Old Stage Coach Rd.		Alton	ME	04468
	8	119.1	Ruth	Dalton			206 Old Stagecoach Rd.		Alton	ME	04468
	8	121	Anthony & Cynthia	Brown			11 Chamberlain Road		Seymour	CT	06483
	8	121.1	Mary St. Louis/Cynthia and Anthony Brown				PO Box 394		Stillwater	ME	04489
	8	123	Jennifer & Richard	Paradise			38 John St.		Wells	ME	04090
	8	124	Margo	Diaz			156 Old Stagecoach Rd.		Alton	ME	04468

APPENDIX N

CURRENT SWPP PLAN

casella
waste systems inc.

Stormwater Pollution Prevention Plan
Juniper Ridge Landfill
Old Town, Maine

Prepared for:
NEWSME Landfill Operations, LLC
110 Main Street
Saco, Maine 04072

Revised by:
Sevee & Maher Engineers, Inc.
4 Blanchard Road
Cumberland Center, Maine 04021

April 18, 2006
Revision 1.1: December 2007
Revision 2.1: July 2009
Revision 3.1: June 2011
Revision 4.1: June 2013

Juniper Ridge Landfill
Storm Water Pollution Prevention Plan
Revision Tracking Sheet

Revision Number	Date of Revision	Description	Remove Page(s) From Existing SWPPP	Insert Page(s) Containing Revisions Into SWPPP
0.0	Sept. 2005	Initial SWPPP developed by Summit Environmental Consultants, Inc.		
1.0	04/18/2006	Updated in accordance with Maine MSGP	All Pages	All revised pages
1.1	12/18/2007	Revised Language - many pages	All Pages	All revised pages
2.1	7/31/2009	Revised Language - many pages	All Pages	All revised pages
3.1	**6/27/2011**	Revised Language - many pages	All Pages	All revised pages
	6/27/2011	Removed note referencing required Maine MSGP requirements	Section 1	1
	6/27/2011	Revised Language - Landfills fall under Sector L of Maine MSGP	Section 2	2
	6/27/2011	Revised Language - Revisions to timing regarding when SWPPP must be updated	Section 3	3
	6/27/2011	Revised Language - Added discription of new stormwater detention ponds	Section 5	5-6
	6/27/2011	Revised Language - Added reference to unnamed tributary of Pushaw Stream	Section 6	8
	6/27/2011	Revised Language - Revisions to definiton of Non-Stormwater Discharges	Section 8	10-12
	6/27/2011	Revised Language - Revision and additions to the table of Potential Pollutant Sources	Section 9	13-17
	6/27/2011	Revised Language - Minor revisions to language.	Section 10	19-21, 24-26, 29-30
	6/27/2011	Revised Language - Added general information on maintenance requirements based on inspection findings	Section 11	31
	6/27/2011	Revised Language - Minor revisions to language.	Section 12	34
	6/27/2011	Updated and reformatted historical sampling table	Section 13	35
	6/27/2011	Revised Language - Added requirements for when stormwater evaluation should take place and corrective action reporting.	Section 14	36-40
	6/27/2011	Revised Language - Added requirements for when stormwater monitoring should take place.	Section 15	36-41
	6/27/2011	Revised Language - Added requirements for the annual reporting of stormwater monitoring results.	Section 16	42

Revision Number	Date of Revision	Description	Remove Page(s) From Existing SWPPP	Insert Page(s) Containing Revisions Into SWPPP
	6/27/2011	Updated Site Plans	Attachment 3	Attachment 3
	6/27/2011	Updated Significant Spills and Leak Table	Attachment 4	Attachment 4
	6/27/2011	Revised Form to include certification that wastewater created by washing trucks or equipiment eposed to landfill waste ios disposed of as required by NPDES requiremnts	Attachment 5	Attachment 5
	6/27/2011	Remove Failure to Certify Form and Replace with Weekly Inspection Forms	Attachment 6	Attachment 6
	6/27/2011	Replace Attachment 8- Spill Prevention, Control & Countermeasure Plan with Corrective Action Report Form	Attachment 8	Attachment 6
4.1	**6/13/2013**	Revised Language - many pages	All Pages	All revised pages
	6/13/2013	Revised Certification Page with DEP required certification language	Certification Page	iii
	6/13/2013	Revised Language - Minor revisions to language.	Section 2	3
	6/13/2013	Revised Language - Minor revisions to language.	Section 4	4
	6/13/2013	Revised Language - Added discription of revised stormwater detention ponds (added pond #9 and removed pond #7C)	Section 5	5-8
	6/13/2013	Revised Language - Revision and additions to the table of Potential Pollutant Sources	Section 9	12-16
	6/13/2013	Revised Language - Minor revisions to language.	Section 10	17-18, 26-29
	6/13/2013	Revised Language - Added Gas Flare to Weekly Insepction Table	Section 10	20
	6/13/2013	Revised Language - Minor revisions to language.	Section 12	34
	6/13/2013	Updated and reformatted historical sampling table	Section 13	35
	6/13/2013	Revised Language -Minor revisions to language	Section 15	39
	6/13/2013	Added MEDEP letter on 2011 NOI Renewal	Attachment 1	Attachment 1
	6/13/2013	Revised Team Roster - Removed Dan Dutile and added Jeffrey Pelletier and Anita Verrill	Attachment 2	Attachment 2
	6/13/2013	Updated Site Plans	Attachment 3	Attachment 3
	6/13/2013	Updated Significant Spills and Leak Table	Attachment 4	Attachment 4
	6/13/2013	Revised Form to include certification language for non-Stormwater discharges per DEP letter	Attachment 5	Attachment 5
	6/13/2013	Revised Weekly Inspection Forms to match those being used by JRL	Attachment 6	Attachment 6
	6/13/2013	Replaced with MEDEP Quarterly Site Compliance Evaluation/Inspection form	Attachment 9	Attachment 9
	6/13/2013	Replaced with most recent revision (February 3, 2012) of MEDEP Standard Operation Procedures and Visual Monitoring Guidelines	Attachment 10	Attachment 10
	6/13/2013	Replaced with most recent versions of MEDEP Visual Monitoring Form and Visual Monitoring Form Instructions	Attachment 11	Attachment 11

Table of Contents

PAGE

Table of Contents, Continued

Certification

Facility Certification

I certify this Stormwater Pollution Plan has been prepared in accordance with good engineering practices. Qualified personnel properly gathered and evaluated information submitted for this Plan. The information in this Plan, to the best of my knowledge is accurate and complete.

______________________________	____________________
Signature	*Date*

1.0 Introduction

Introduction

NEWSME Landfill Operations, LLC (NEWSME) DBA Juniper Ridge Landfill (JRL) has prepared this Stormwater Pollution Prevention Plan (SWPPP) to:

- comply with the State of Maine Department of Environmental Protection (MEDEP) Multi Sector General Permit for Stormwater Discharge Associated with Industrial Activity (MSGP) for "point source" discharges of stormwater to water bodies of the United States,
- develop appropriate "Best Management Practices" (BMPs) and controls to reduce the potential for stormwater related pollution,
- provide guidance to a Pollution Prevention Team (PPT) that will oversee the requirements of the Maine MSGP, and
- provide a comprehensive tool for JRL personnel to aid in regulatory compliance.

How To Use The SWPPP

The Table of Contents directs the reader to specific sections of the SWPPP. This SWPPP has been prepared for operations at the JRL and is designed to provide facility personnel with the following:

- an understanding of the Maine MSGP,
- information about the importance of BMPs regarding operational procedures at the JRL,
- protocols to help JRL personnel adhere to specific environmental regulations, and
- a reference to assist facility personnel performing environmental compliance related tasks at the facility.

2.0 Regulatory Overview

Why at JRL?

Any facility with a Standard Industrial Classification Code listed in the MSGP which discharges stormwater to a water of the U.S. is required to comply with the MSGP. Although there is no Code for landfills, JRL operations fall under Sector L (Landfills) of the MSGP. In addition to the specific requirements under Sector L, the Maine MSGP requires compliance with the following general requirements:

- formation of a Pollution Prevention Team (PPT),
- assessment of the facility for potential pollutants,
- development of a Site Plan,
- identification of historical releases,
- evaluation of existing monitoring data,
- instituting and maintaining BMPs,
- training employees,
- performing stormwater monitoring, and
- performing required reporting and record keeping.

Attachment 1 contains the Notice of Intent (NOI) to comply with the MSGP requirements.

Environmental policies incorporated into this document will work when properly implemented at JRL.

3.0 Maintaining Certification and Availability of the SWPPP

Maintaining the SWPPP

The Maine MSGP requires that the SWPPP be amended whenever there is a significant change or significant effect on the discharge or potential for discharge of pollutants resulting from a:

- change in facility design or construction,
- change in facility operation,
- change in facility maintenance,
- finding during an inspection or monitoring, and/or
- release of hazardous substances.

SWPPP Review, Certification & Availability

JRL has the SWPPP signed by a Corporate Officer as defined in the Maine MSGP and is required to maintain the signed plan at the facility for a period of three years from expiration of coverage under the MSGP. A copy of the SWPPP is kept onsite and available for review by the MEDEP at the time of a facility inspection. The SWPPP is also available for any federal or local agency approving stormwater management plans or any operation of a municipal separate storm sewer receiving discharge from the facility.

In the event the facility is notified by an MEDEP inspector that the SWPPP does not meet one or more of the minimum requirements of the Maine MSGP, identification of those provisions will be made. In addition, the MEDEP inspector may notify the facility in writing that the SWPPP will be updated. If notified, the SWPPP will be updated within 30 calendar days of receipt of any such notification and the facility would be required to submit annual reports for the next three consecutive permit years. Annual report is submitted to the MEDEP by May 9th of each permit year.

Accurate Records

Accurate records of the following criteria are maintained for at least three years after expiration of coverage under the MSGP. These include the following:

- spill or leaks (reportable quantities*),
- BMP failures and/or inspection reports,
- corrective measures,
- environmental problems, and/or
- stormwater monitoring (analytical and visual).

*Note: JRL has a policy that requires spills (regardless of the volume of material being spilled) be reported to the MDEP Spill Response Group.

4.0 Pollution Prevention Team

Introduction

The following section provides a brief overview of how JRL's PPT is formed and its associated responsibilities in accordance with the Maine MSGP.

PPT Members

Members of the PPT include, but not be limited to, the following persons:

- Environmental Manager,
- Environmental Technician, and
- Landfill Supervisor

PPT Responsibilities

The PPT has many responsibilities to ensure compliance on a day-to-day basis with the Maine MSGP. These responsibilities include the following:

1. implement Maine MSGP requirements at JRL,

2. define an appropriate set of goals (i.e. BMPs) to ensure stormwater discharges are in compliance with Maine MSGP, state and local standards,

3. be aware of changes that are made to facility operations or infrastructure, to determine whether these changes will affect the SWPPP, and

4. maintain communication with management and environmental compliance personnel to ensure a cooperative partnership that promotes and maintains facility compliance with the Maine MSGP.

Roster

Attachment 2 is a Member Roster of PPT members. This roster will be available to JRL personnel. Should changes to the PPT be made, the PPT roster will be updated in the SWPPP as required.

5.0 Site Description

Introduction

The following section provides a brief overview of JRL facility operations.

JRL Operations

NEWSME operates a solid waste landfill located south of Route 16 in Old Town, Maine, immediately west of the Interstate 95. Operations at the facility include:

- landfilling of solid waste,
- leachate and methane gas collection,
- limited equipment repair and maintenance, and
- administration.

Site Plan

Attachment 3 includes a general Site Locus, Site Plan, and Outfall Drainage Boundaries. The Site Plan identifies stormwater flow direction, existing structural BMPs, surface wastewater bodies, potential pollutant sources where significant materials are exposed (including active landfill cells, leachate storage tank and leachate transfer station), operational activities exposed to stormwater, and stormwater outfalls. The Outfall Drainage Boundary Plan shows the drainage area associated with each outfall. A Site Plan Checklist is also included in Attachment 3 for updating the Site Plan, as needed.

The Site Plan identifies the active landfill cells, as well as cells that are planned for the near future. As cells are closed, the Site Plan will be updated. Most inactive areas are covered with geomembrane allowing stormwater to flow off the landfill into designated channels and swales. On the west side of the facility, runoff is directed to detention ponds, allowing for sediment to settle prior to controlled discharge to off-site receiving waters. On the east side of the facility, runoff is either directed through a detention pond (east of Maintenance Building area) or through a series of drainage ditches and culverts, then discharged to off-site receiving waters. Precipitation falling onto the active cell drains into the landfill and is collected in the liner leachate collection system.

Detention Pond 1 outlet is designated as Outfall No. 1. Detention Pond 2 outlet is designated as Outfall No. 2. Detention Pond 5 outlet is designated as Outfall No. 3. Detention Pond 6 outlet is designated as Outfall No. 4. Stormwater from these ponds ultimately flows to an unnamed tributary of Pushaw Stream.

Continued on next page

Site Description, Continued

Temporary Detention Ponds 7A and 7B reduce stormwater flow rate from the geomembrane cover of the current active landfill Cells 7 and 8, and discharge to a drainage ditch and culvert and into Detention Pond 6.

The north (entrance) portion of the facility includes a scale house and scale, an office building, stormwater loading station (used for the watering of roads for dust control), vehicle/equipment parking area, and access road to the active cell on the facility perimeter road. The remainder of the landfill infrastructure includes a stormwater storage pond, an above-ground leachate storage tank, a leachate haul truck loading station, a maintenance building, a storage tent (Rubb Building), several soil stockpile areas, groundwater and surface water monitoring locations and a landfill perimeter access road and security fence.

Stormwater on the northeast side of the facility flows in a northeasterly direction to Outfall No. 5. Outfall No. 5 is a natural drainage channel located approximately 2,200 feet northeast of the facility's office building. Areas of the facility that ultimately discharge to Outfall No. 5 include the maintenance building, drainage from Detention Pond 9 the wood waste storage area, the borrow pit, construction laydown areas and several soil stockpile areas.

Leachate collected within the landfill's leachate collection system is currently conveyed by gravity to pumping areas (sumps) within the landfill. The leachate is pumped from sump areas through leachate transport force mains to the leachate storage tank. Leachate is pumped from the leachate storage tank to tanker trucks at the leachate loading rack. Tanker trucks are filled at the leachate transfer station for offsite disposal of leachate. Typically, tank trailers with capacities of 6,000 to 8,000 gallons are used to transport the leachate for offsite disposal.

Overflow or spillage of leachate at the loading rack will flow by gravity to a catch basin, then through piping to a pump station that pumps leachate back to the leachate storage tank.

Continued on next page

Site Description, Continued

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 force main to a loading rack adjacent to the Office Building. Water trucks used for site dust control are filled at this loading rack.

Spillage or overflow at this loading rack will flow to a catch basin then through piping back to the geomembrane-lined storage pond.

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.

In the event that the leachate storage tank is full, leachate may also be stored in the geomembrane-lined storage pond. If leachate is discharged to the pond, water within the pond will be considered leachate and will be disposed of in the same way leachate from the storage tank is handled.

6.0 Receiving Waters and Wetlands

Introduction

The following section provides the names of receiving waters that may receive discharges of stormwater from the JRL facility in accordance with the Maine MSGP and to comply with the State of Maine's impaired waters (Section 303(d)).

Conclusion

Runoff from developed areas of the site discharge to unnamed tributaries of Pushaw Stream. The unnamed tributary of Pushaw Stream is not listed as an impaired water as defined in the MEDEP impaired waters list (Section 303(d)).

7.0 Spills and Leaks

Introduction

The following section identifies areas where potential spills and leaks could contribute pollutants to stormwater discharges in accordance with the Maine MSGP.

Regulatory Overview

The Maine MSGP requires that any significant spills and leaks of toxic or hazardous pollutants that occurred within the three years prior to the submission of the Notice of Intent (NOI) be listed within the SWPPP. Any significant spills or leaks that occur during the period of the MSGP will be placed in the SWPPP. Significant spills and leaks include hazardous substances in excess of the reportable quantity (RQ) under the Clean Water Act or the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Significant spills and leaks also include releases of oil or hazardous substances that are not in excess of their RQ.

Releases

Documented significant spills or leaks of pollutants as described above at the JRL facility are listed in Attachment 4. Attachment 4 is updated when periodic amendments are made to the SWPPP associated with site changes. Between these updates a record of spills and leaks which occurred since the last update are maintained on the facility's environmental database, which are available for review upon request, and a component of the SWPPP.

8.0 Non-Stormwater Discharges

Introduction

The following section provides a summary of evaluation for the presence of non-stormwater discharges and certification of non-stormwater discharges at the JRL facility in accordance with the Maine MSGP.

Regulatory Overview

As part of the Maine MSGP, the JRL will certify annually that the site has been tested and/or evaluated for non-stormwater discharges. Examples of common non-stormwater discharges at a landfill include:

- leachate,
- landfill gas condensate,
- vehicle wash water, and
- drained free liquids.

Requirement

The annual evaluation used to certify non-stormwater discharges is conducted as follows:

- review the prohibited discharges listed in this section,
- review the allowed discharges listed in this section,
- review the operations conducted and confirm that no prohibited discharges occur and identify any allowed non-stormwater discharges that occur,
- inspect the outfalls during dry weather to assess if any prohibited non-stormwater discharges are occurring during a quarterly site compliance evaluation, and
- document the non-stormwater evaluation on the Non-Stormwater Discharge Assessment and Certification Form in Attachment 5.

Continued on next page

Non-Stormwater Discharges, Continued

Prohibited Discharges

Specific discharges are prohibited by the Maine MSGP for industrial activities as identified in Sector L of the Maine MSGP. None of these prohibited discharges occur at the JRL facility:

- leachate,
- gas collection condensate,
- drained free liquids,
- contaminated groundwater, and
- contact wash water from washing truck equipment exteriors and surface areas that have come in direct contact with solid waste at the landfill facility.

Allowable Non-Stormwater Discharges

Specific non-stormwater discharges are allowed in accordance with the Maine MSGP. Although not occurring at the present time, the following non-stormwater discharges will be allowed to occur at the JRL facility:

- Discharges from firefighting activities;
- External building wash-down that does not use detergents;
- Lawn watering;
- Uncontaminated groundwater;
- Uncontaminated springs;
- Air conditioning condensate;
- Irrigation drainage;
- Uncontaminated foundation or footing drains where flows are not contaminated with process materials such as solvents, or in contact with soils where spills or leaks of toxic or hazardous materials have occurred;
- Incidental windblown mist from cooling towers that collects on rooftops or adjacent portions of a facility, but not intentional discharges from a cooling tower (e.g., “piped” cooling tower blow-down or drains);
- Uncontaminated utility vault dewatering; and
- Hydrostatic test water that does not contain any treatment chemicals and is not contaminated with process chemicals.

9.0 Summary of Potential Pollutant Sources

Introduction

The following section identifies industrial materials and activities at the JRL that are exposed (or may be exposed) to stormwater in accordance with the Maine MSGP. Any operation or equipment working on the active cell(s) of the landfill are not considered a potential pollutant source since stormwater or pollutants flow into the landfill and are captured within the leachate collection system. The locations of potential pollutants sources are described below along with the associated pollutants, the likelihood of pollutants coming in contact with stormwater and the stormwater controls implemented to prevent or minimize stormwater contamination. The stormwater controls are listed with the letters "SC" and "NSC", which denote structural and non-structural controls.

Potential Pollutant Sources	Locations	Associated Pollutants or Pollutant Parameters	Likelihood of Contact With Stormwater (Low, Medium, High)	Stormwater Controls (as defined in next Section)
Exposed soil and unseeded topsoil.	On areas of final or soil intermediate cover and new cell construction; vegetative soil stockpile area; and permitted borrow pit.	Sediments and suspended solids.	High - Placement of intermediate cover and new cell construction is an ongoing process.	SC1, SC2, SC3, SC4, SC6, and NSC2.
Access roads	Main entrance road and perimeter access roads.	Sediments and suspended solids.	High - Roads currently paved and unpaved, and subject to ongoing traffic/use.	SC3, NSC2 and NSC9, and NSC11.
Vehicles and Material handling equipment.	Parking areas, access roads and within active cell.	Sediments, engine coolant, hydraulic and motor oil, diesel fuel, and grease.	Low - vehicles are on a periodic maintenance program and well maintained.	NSC1, NSC2, and NSC5.

Continued on next page

Summary of Potential Pollutant Sources, Continued

Potential Pollutant Sources	Locations	Associated Pollutants or Pollutant Parameters	Likelihood of Contact With Stormwater (Low, Medium, High)	Stormwater Controls (as defined in next Section)
Leachate	Possible leachate seeps from inactive landfill cells, possible leaks through leachate storage pond liner, possible leaks from leachate pumping/transfer system, possible spills at the leachate transfer station, and possible leaks/spills from leachate tankers.	Bacteria, BOD, COD, pH, nutrients, and chlorides (from leachate).	Low - Landfill areas are monitored on a daily basis, and leaks and/or seeps would be observed and quickly contained. A catch basin is installed at each leachate transfer station to collect spills during tanker loading.	SC7, NSC2, and NSC5.
900,000 Gallon Leachate Storage Tank	Possible leaks from tank	Bacteria, BOD, COD, pH, nutrients, and chlorides (from leachate).	Low – The tank is monitored regularly, has a leak detection system, automated alarms, and level controls, and is located within a lined secondary containment berm.	SC7, NSC2, and NSC5, and NSC12.

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Summary of Potential Pollutant Sources, Continued

Potential Pollutant Sources	Locations	Associated Pollutants or Pollutant Parameters	Likelihood of Contact With Stormwater (Low, Medium, High)	Stormwater Controls (as defined in next Section)
Vehicle & equipment maintenance activities.	Inside maintenance garage.	Sediments, engine coolant, hydraulic and motor oil, diesel fuel, gasoline, greases.	Low – Building is equipped with an oil/water separator. Maintenance performed inside of garage or with spill containment and response materials immediately available.	NSC1, NSC2, NSC5, NSC6, NSC7, NSC8, and NSC9.

Continued on next page

Summary of Potential Pollutant Sources, Continued

Potential Pollutant Sources	Locations	Associated Pollutants or Pollutant Parameters	Likelihood of Contact With Stormwater (Low, Medium, High)	Stormwater Controls (as defined in next Section)
Vehicle and Equipment Fueling – one 300-gallon hydraulic oil, one 500-gallon diesel tank and one 2,500-gallon dedicated diesel truck	In active cell of landfill.	Diesel fuel Hydraulic oil	Low – the tanks do not have secondary containment. Small spills from fueling activities would be absorbed by material in landfill or collected in leachate collection system.	NSC1, NSC2, NSC5, NSC6, NSC7, and NSC8.
Administration Building heating oil tank (275-gallons).	Inside administration building	No. 2 heating oil.	Low - Leakage or spills from these tanks would remain inside of building.	NSC1, NSC2, NSC5, NSC6, NSC7, and NSC8.
500-gallon motor oil tank, and 500 -gallon hydraulic oil tanks.	Inside maintenance garage.	Motor oil and hydraulic oil.	Low – leakage from any of these tanks would likely remain inside building.	NSC1, NSC2, NSC5, NSC6, NSC7 and NSC8
Small containers (55-gallon drums) of miscellaneous oil.	Inside maintenance garage.	Waste oil and miscellaneous virgin oil.	Low – most containers are stored on spill pallets; leakage from any of these drums would likely remain inside building.	NSC1, NSC2, NSC5, NSC6, NSC7 and NSC8

Continued on next page

Summary of Potential Pollutant Sources, Continued

Potential Pollutant Sources	Locations	Associated Pollutants or Pollutant Parameters	Likelihood of Contact With Stormwater (Low, Medium, High)	Stormwater Controls (as defined in next Section)
1,500 gallon gas tank for refueling. 1,500 gallon diesel tank. Small 50 gallon containers and a 250-gallon tank of miscellaneous odor control liquid.	Inside canvas storage building.	Diesel fuel, Gasoline and Odor Control Liquid.	Low – two 1,500 gallon tanks are within secondary containment measures, most containers are stored on spill pallets; leakage from any of these drums would likely remain inside building.	NSC1, NSC2, NSC5, NSC6, NSC7 and NSC8
Soil stockpiles for cell, drainage way and access road maintenance, and cover system construction.	Various	Sediment and suspended solids.	Medium – most exposed material is covered with mulch; stormwater could carry sediments into drainage swales.	SC1, SC2, SC4, NSC1, NSC2, and NSC9.
Windblown litter in active portions of the landfill.	Various	Litter	High - litter is exposed to stormwater; litter is picked up on a regular basis from ditches and from base of litter fencing.	SC5, NSC1, NSC2, and NSC9.

10.0 Stormwater Controls

Introduction

The following section provides a summary of existing stormwater BMPs (structural and non-structural, identified by number) selected for each potential pollutant source identified in the previous table. BMPs are provided for those materials or activities exposed to stormwater in accordance with appropriate sections of the Maine MSGP.

Structural (SC) BMPs

Structural BMPs at the JRL facility include (or will be installed when a specific activity warrants):

- SC1 - Drainage channels/check dams
- SC2 - Riprap and level spreaders
- SC3 – Bark mulch sediment berms and/or silt fence/hay bales
- SC4 – Sedimentation/detention ponds
- SC5 - Litter fencing
- SC6 - Intermediate or final cover
- SC7 - Liner & leachate collection system

Refer to Figure 2 - Site Plan in Attachment 3 for the location of structural BMPs.

SC1 - Drainage Channels and Check Dams

Drainage channels collect and convey stormwater off of landfill surfaces. Stormwater runoff from non-active areas of the landfill is collected by drainage ways located within and at the perimeter of the areas. The channels are tributary to the detention ponds. Check dams are typically constructed within individual grass-lined drainage channels to slow stormwater flow and collect sediments prior to runoff entering the detention ponds.

SC2 – Riprap and Level Spreaders

Riprap is used to dissipate hydraulic energy associated with runoff and protects the drainage channels and culvert pipe inlets and outlets from erosion.

Level Spreaders are used to spread collected water on a wide area so that erosion of the receiving area is minimized.

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Stormwater Controls, Continued

SC3 – Bark Mulch Sediment Berms and/or Silt Fence/ Haybales

Many down gradient areas of the facility consist of established vegetation providing filtering of overland runoff (i.e., removal of sediment and phosphorus) prior to discharge off-site or into watercourses. To intercept and retain sediment from disturbed areas, these areas are further protected by the use of sediment barriers such as bark mulch sediment berms and/or silt fence and haybales.

SC4 – Sedimentation/ Detention Ponds

Five permanent detention ponds (Ponds 1, 2, 5, 6, and 9) and two temporary detention ponds (Ponds 7A and 7B) act as the discharge point(s) for on-site stormwater runoff associated with much of the facility, including the active side of the landfill. The remainder of the runoff (overland flow) is handled through vegetative buffers. The detention ponds provide (via outlet structures) a means of controlled discharge off-site to tributaries of Pushaw Stream.

SC5 - Litter Fencing

Following acceptance of waste at the facility, litter fencing (in addition to daily cover) is used as necessary to control windblown litter from the active cell.

SC6 - Intermediate or Final Cover

Landfill cover materials (both soil and synthetic) are selected to retard downward movement of stormwater while allowing vegetation to grow and lateral movement of stormwater off of the cells. The design of both intermediate and final covers is specified in the landfill-operating license issued by the MEDEP. In addition to minimizing infiltration, the vegetation facilitates water removal through evapo-transpiration.

SC7 - Liner & Leachate Collection System

The landfill is constructed with a composite liner to contain leachate and waste within the cells. A leachate collection system consisting of sand, stone, and a network of pipes located immediately above the liner collects and conveys leachate to sump areas within the active cell. From the sump areas, leachate is pumped through leachate transport piping to the leachate storage tank. Leachate is periodically transferred from the leachate storage tank to tanker trucks via a pump station and leachate transfer station.

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Stormwater Controls, Continued

Non-Structural BMPS

Non-structural BMPs at the JRL facility include:

- NSC1 - Training
- NSC2 - Inspections
- NSC3 - Inbound recyclable & waste control
- NSC4 - Hazardous materials storage
- NSC5 - Spill Controls
- NSC6 - Overfill prevention
- NSC7 - Liquid waste control
- NSC8 - Releases & notification procedure
- NSC9 - Good housekeeping measures
- NSC10 - Record keeping & reporting
- NSC11 – Sweeping paved areas

NSC1 - Training

Annual, periodic, and new employee training will be conducted to introduce and enforce controls contained in this SWPPP.

NSC2 - Inspections

The following inspections will be conducted by qualified JRL personnel:
- facility inspections, and
- load inspections.

Facility Inspections

As required by the MSGP, active areas of the JRL facility are to be inspected weekly (at a minimum). Attachment 6 contains a Weekly Inspection Form to be completed during the weekly inspections. Completed Weekly Inspection Forms are maintained in a separate inspections binder, which is considered part of the SWPPP.

The following table provides a summary of the areas and protocols for conducting the weekly inspections.

Continued on next page

Stormwater Controls, Continued

Area	On a Weekly Basis, Inspect the ...
Access Roads	Access roads (including the main entrance road) for debris, staining, erosion, damage, excessive dust and damaged vegetation.
Landfill	Landfill areas for unacceptable materials, fluid leakage, staining, areas of settlement, erosion, leachate release, and vectors.
Stockpiles	Tipping, material storage areas, vegetative stockpile areas, and active areas of borrow pit for material migration, staining, erosion, and damage.
Truck Scale	Truck scale for staining.
Machinery & Equipment	Machinery & equipment for fluid leakage, staining and waste (if outside of the active cell).
Maintenance Garage	Garage area (inside and out) for incompatible materials, odors, staining, uncovered materials (i.e., batteries), universal wastes, and good housekeeping practices.
Tanks on top of landfill	Rusting, leaks and staining.
Spill Kits	Spill kit for the maintenance garage, scale house, and loading rack to ensure an adequate supply of adsorbents.
Gas Flare	Gas flare area for incompatible materials, odors, staining, universal wastes, and good housekeeping practices.
Leachate Storage Tank and Transfer Station	Storage tank for adequate freeboard, tank secondary containment area and transfer area for odors, staining, leaks, and damaged equipment. Verify that catch basin is draining to leachate pump station and that leachate pump station is functioning properly.
Geomembrane-Lined Pond, Pump Station and Transfer Station	Pond for adequate freeboard, visible portions of the pond liner for damage, pump station for leakage and transfer area for odors, staining, leaks, and damaged equipment. Verify pump station is operating properly.
Inactive Cells	Verify only clean stormwater discharged to sedimentation/ detention ponds. Leachate impacted stormwater will be properly transferred to the leachate collection system.
Drainage Channels & Check Dams	Channels and check dams for particulate manner, litter, sheens, siltation, and damage.
Pond Outfalls	Outfalls for siltation, erosion, sheens, odors, staining or signs of stormwater impacts from pollutants.
Detention Ponds	Ponds for particulate matter, sheen, odors, or staining.
Litter Fencing	Mesh and posts for integrity and any damage from wind, debris or equipment.
Landfill Cover	Soil and vegetation for indication of erosion or stressed vegetation.
Administrative Building	Area around the fill pipe for the 275-gallon heating oil tank for signs of overfills.

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Stormwater Controls, Continued

As required by the Maine MSGP, inactive areas of the JRL facility are to be inspected at a minimum on a quarterly basis.

Load Inspections

Vehicles containing waste materials for disposal at the facility will be inspected by a qualified JRL representative prior to and after tipping. Should the inspection reveal unacceptable materials within the load, the load will be rejected. Should the inspection reveal unacceptable materials within the load after tipping, the load will be placed back into the container or the unacceptable materials portion will be segregated (if possible) and placed back into the container.

In some instances, unacceptable materials may be found after the tipping vehicle leaves the site. Should this occur, unacceptable materials will be properly containerized and/or stored so that the potential for the material to come into contact with stormwater is mitigated. Unacceptable materials will be disposed off-site at a properly licensed facility.

Load Inspection - Rejection Assessment

Tipping areas will be inspected for residual pollutant materials after a rejection has occurred. If residual pollutant materials are found, they will be cleaned up and disposed following sound environmental practices.

Load Inspection - Inspector Requirements

Facility personnel who inspect incoming loads will, at a minimum, be trained to identify suspect asbestos containing materials, oils, and/or hazardous materials. The facility will have qualified staff to handle and/or contain unacceptable materials should they be brought to the JRL facility.

Load Inspection - Vendors / Services

At a minimum, JRL will coordinate with the following types of vendors/services so that in the event that unacceptable materials are found on-site, they will be handled and removed from the site in a timely fashion:

- hazardous waste cleanup and transportation contractor, and treatment, storage and/or disposal facility.
- asbestos abatement contractor, and
- fire department.

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Stormwater Controls, Continued

Load Inspection - Identification of Unacceptable Materials

In addition to standard identification of acceptable and unacceptable materials, there are warning signs to assist in determining if a load may contain an unacceptable material. If liquids, evidence of reactions (i.e., steam, smoke), odors and/or excessive dust or particulates are observed, the following actions will be performed:

- Ask the driver about the contents,
- Stop the unloading process, and
- Notify the Pollution Prevention Team (PPT) Leader.

Load Inspection - Tipping Area Personnel

The following table defines how materials should be handled during the off-loading procedures at the tipping area.

Step	Action
1	Direct truck to the appropriate tipping area.
2	Direct the driver to uncover the truck and/or open the trailer door for visual inspection.
3	Direct the driver to open/raise the can and/or to start the truck hydraulics to off-load materials.
4	Inspect contents as they are off-loaded from the vehicle for unacceptable waste materials.

If the load is …	Action
acceptable	Send the vehicle back to the scale to be weighed.
unacceptable by assessing the load prior to tipping	Reject the vehicle and fill out the required load rejection forms.
unacceptable due to a few pieces of material after tipping	Reload the vehicle with the unacceptable materials.
unacceptable due to a large quantity of unacceptable materials.	1) Reload the contents of the load, if possible, 2) Explain nature of rejection to the driver, 3) Notify General Management, and 4) Explain conditions for future returns & dismiss vehicle

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Stormwater Controls, Continued

NSC3 - Inbound Recyclable Waste Control Program

An Inbound Recyclable & Waste Control Program has been established at the JRL facility. Employees who are involved with any portion of the delivery procedure will become familiar with this program and will be required to fully understand:

- Delivery procedures - "how to make you way through the facility",
- Acceptable materials,
- Unacceptable materials, and
- Responsibilities and liabilities.

NSC4 - Hazardous Materials Program & Storage

Hazardous wastes are not accepted at the JRL facility; however, certain hazardous materials are used to support facility operations. The following table identifies locations of hazardous materials and petroleum products handled at the JRL facility:

Location	Description of Hazardous Materials
Maintenance Garage	Virgin and waste oils, No. 2 fuel oil, coolant, and grease. Miscellaneous materials stored in flammable storage cabinets.
Storage Tanks (various locations)	Diesel fuel.
Equipment	Diesel fuel, hydraulic oil, gasoline, motor oil, grease, etc.

Labels

Hazardous materials at the JRL facility are labeled with the following information:

- type of material,
- hazards (i.e., flammable, reactive, corrosive), and
- quantity.

Continued on next page

Stormwater Controls, Continued

Compatibility

Hazardous materials are stored in locations that are safe and compatible with other stored materials and in accordance with the Facility's SPPC plan. Contact the PPT Leader with questions regarding compatibility, proper storage, and segregation. Incompatible materials will be segregated for proper disposal.

Material Safety Data Sheets

Under the JRL Hazard Communication Program, employees who have the potential to come into contact with hazardous materials will be properly trained in the use and understanding of Material Safety Data Sheets (MSDS). MSDS are located in the administrative office, or maintenance garage and available for review by employees at any time.

Batteries

Batteries are stored indoors and will not come into contact with stormwater.

NSC5 - Spill Controls

This section provides information pertaining to spills of oil, and/or potentially hazardous or hazardous materials. Several of the main variables for the prevention or handling of a spill include:

- pre-planning and prevention
- identification and isolation, and
- containment and clean up.

Pre-Planning

In most instances, pre-planning can prevent a spill from occurring. In the event of a spill, pre-planning will enable proper assessment and correct handling of the situation. Pre-planning will provide the knowledge to:

- ➢ notify the proper people in the event of a spill,
- ➢ locate appropriate response materials, and
- ➢ provide a quicker response time.

Continued on next page

Stormwater Controls, Continued

Prevention

JRL understands that not all spills can be avoided; however, some situations may be avoided with proper training. Spill prevention suggestions include:

- proper load inspection prior to tipping,
- no overfilling of vehicles and equipment with liquids and/or materials,
- performing inspections of the facility, and
- proper identification of potentially hazardous situations.

JRL's Spill Prevention, Control and Countermeasure (SPCC) Plan is maintained in the Administrative Office on-site, which provides the requirements for reporting, storing, and inspection of petroleum products in quantities of 55-gallons or greater.

Identification

Identification of potential releases or actual releases is facilitated by:

- training,
- awareness of surroundings,
- identification of warning signs (i.e., puddles, staining, reactions, or odors).

Specific identification of hazardous materials releases will be addressed in the JRL safety and environmental training programs.

If a release of material is observed, the following steps should be taken:

1) Note the appearance, color, and odor of the material while maintaining a safe distance from the release.

2) Note the approximate size of the release.

3) Contact the PPT Leader for isolation, containment, and clean-up instructions.

Spill Controls - Isolation

After initial identification of a spill, the impacts of the spill need to be minimized. Once the proper personal protective equipment is donned, an exclusion area should be established and personnel, materials, and equipment with the potential of coming in contact with the material of concern should be moved.

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Stormwater Controls, Continued

Spill Controls - Containment

Once a released material has been evaluated and isolation measures completed, containment can commence by surrounding the release with a barrier to prevent migration. Examples of barriers maintained at the JRL facility are:

1. absorbent booms,
2. spill mats/pillows,
3. speedi-dri absorbent, and
4. sand and soil.

Location of Spill Control Materials

Spill control materials are stored within the maintenance garage, near the tanks in the active portion of the landfill, and other areas of the facility as deemed appropriate by the PPT Leader.

Spill Controls - Clean-up

Once the release has been contained, the following steps (at a minimum) should be performed:

1. Place sorbents inside of the containment area to absorb any liquids.

2. Obtain the appropriate tools (i.e., non-sparking) to pick up the material.

3. Place impacted materials into an appropriate container.

4. Decontaminate equipment and tools used to clean up the release.

5. Place container(s) in the designated containment area for subsequent disposal.

NSC6 - Overfill Prevention Program

The overfill prevention program is established to identify steps to be taken to protect the JRL and personnel from impacts due to overfilled machinery and equipment with materials such as gasoline, diesel fuel, oils or other miscellaneous liquids.

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Stormwater Controls, Continued

Common Sense

By using common sense and the following basic guidelines, JRL can prevent spill and/or leaks. The following precautions are examples that can be followed:

- do not "top off" any vehicle or piece of equipment with fuel,
- if there is a small amount of liquid left in a container, say "we'll use it later" instead of trying to "fit" it in.
- do not leave the vehicle, equipment or machinery unattended while fueling,
- have a towel, rag or some type of absorbent material nearby in case of accidental overfilling, and
- TAKE YOUR TIME TO ENSURE THAT THERE ARE NO SPILLS!!!

NSC7 - Liquid Waste Control

This section will identify the protocols and procedures JRL will follow when a liquid waste is generated on-site. A liquid waste is any type of undesirable fluid, which cannot be reused at the JRL facility.

Storage

Liquids that are identified as waste will be stored within the maintenance garage with the exception of waste oil collected in a tank in the active cell of the landfill. The liquid wastes need to be:

- properly sealed,
- segregated into compatible areas, and
- labeled with name of material, date of generation, and potential hazards.

Training

At least one individual per shift will be trained to properly handle liquid wastes generated on-site. Training will consist of, at a minimum, the following:

- hazard communication,
- personal protective equipment use,
- what to do in case of an emergency,
- basic clean-up and storage procedures, and
- inspection and reporting procedures.

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Stormwater Controls, Continued

NSC8 - Releases & Notification Procedure

The Environmental Incidents are to be recorded and kept on file in the Facility's environmental database, which is by reference part of the SWPPP for future reference and for updating the SWPPP. The information for each incident that will be recorded in the database is demonstrated on the form in Attachment 7. Note that notification of reportable releases may be required to be reported to, at a minimum, the MEDEP and the local fire department. These notifications will be performed by the PPT Leader or other designated JRL representatives.

NSC9 - Good Housekeeping Measures

Common sense is a key component in preventing potential stormwater impacts. Common good housekeeping protocols to be conducted on a daily, weekly and monthly basis include:

- picking up spilled material,
- stockpile management,
- keeping machinery and equipment clean,
- sweeping,
- preventive maintenance,
- providing protected storage areas for significant materials,
- following manufacturer maintenance schedules,
- litter control, and
- other corrective actions.

Continued on next page

Stormwater Controls, Continued

NSC10-Record Keeping & Reporting

Each supervisor and/or manager submits reports on the safe and environmentally sound performance of the department for which they are responsible.

The JRL operation is inspected at routine intervals. These intervals have been established as set forth above at frequencies to anticipate predictable problems before they arise. Inspection reports will be maintained in the Environmental Compliance Manager's office with the SWPPP.

The system for inspection, measurement, and reporting is an integral part of each employee's job duties. Anyone observing or suspecting an environmental problem is obligated to act on it without delay, report it verbally, and then file the appropriate written report.

JRL management will review the status of operations with regard to environmental issues, safety, and effective documentation each month. This will ensure that JRL is taking pro-active steps to eliminate and prevent potential environmental mishaps.

Waste hauling trucks that enter the facility are either weighed as they enter and exit the facility, or provide JRL with weight slips from other State of Maine certified scales. The content of each load (i.e., ash, wastewater sludge, cover soil, etc.) is recorded by the scale keeper. Scale records are then tabulated and allow JRL to determine the type and quantity (tonnage) of material that has been deposited in the landfill during any period of time. A summary of waste type and quantities is submitted to the MEDEP Bureau of Remediation and Waste Management on a monthly basis. Aerial survey of the landfill solid waste disposal area is typically performed twice per year to evaluate the effectiveness of waste compaction and to determine the approximate density of waste placed within the landfill.

Continued on next page

Stormwater Controls, Continued

NSC11-Sweeping Paved Areas

The objective of JRL's street sweeping is to remove sediment, salt, sand, leaves, litter, and other debris from the facility's paved areas to limit the quantity of dust and sediment runoff from the paved roadways.

JRL sweeps the facility's paved roads in the spring after winter sanding operations are completed. Sweepings are disposed of within the active area of the landfill in a location that is not prone to erosion or sedimentation. Other sweeping of paved roads at the site is performed on an as-needed basis throughout the spring, summer, and fall months.

NSC12-Wastewater/ Process Water Containment

The MSGP requires that wastewater and process water ASTs be fitted with secondary containment sufficient to contain 100% of the contents of the AST. The containment structures will be visually inspected at least once per year.

11.0 Maintenance of Stormwater Controls

Introduction

The following section provides a summary of temporary measures and corrective actions so that proper operation of structural stormwater controls at the JRL facility are maintained in accordance with the Maine MSGP.

General

BMPs are maintained in operating order. If inspections identify BMPs that are not performing effectively, maintenance to correct any identified faulty BMP need to be performed before the next anticipated storm event. If maintenance of the BMP is impracticable before the next storm event, maintenance is scheduled as soon as possible but no later than 12 weeks after date of discovery of the faulty BMP unless authorized by MEDEP. The reason for any delay beyond 12 weeks will be documented in the SWPPP.

Maintenance of Drainage Channels and Check Dams

During weekly inspection of the facility, structural BMPs are to be inspected to assess their functionality. Drainage channels and check dams will be inspected to evaluate overall condition and to determine if sand, dirt and/or other particulate matter has accumulated within the structures. If excessive deposits are observed to have accumulated, the channel should be cleaned prior to the next storm event or snow melt. Damaged check dams should be repaired. The following table provides maintenance procedures for these structures:

If …	Then…
there is no significant accumulation with the drainage channel	do not clean and continue the weekly inspection program.
there is significant silt, debris, etc. in front of the check dam(s)	remove the material and inspect the condition of the check dam(s).
after inspection of the check dam(s) it is determined that they are satisfactory	leave alone and continue the weekly inspection program.
after inspection of the check dam(s) it is determined that they are unsatisfactory	repair or replace.

Continued on next page

Maintenance of Stormwater Controls, Continued

Maintenance of Detention Ponds

During the weekly inspections, the detention ponds areas will be inspected for:

- oily sheens,
- litter,
- unusually high turbidity,
- odor,
- silt buildup at inlets and outlets, and
- stressed vegetation around the perimeter.

If …	Then….
there is litter in or near the detention ponds	remove and properly dispose of litter.
there is any type of oily sheen , odor or increased turbidity	the PPT Leader should be contacted and proper corrective actions taken.
there is silt passing into the pond outlet pipe	clean out the silt and excavate soils near the outlet pipe inlet to allow water to accumulate and reduce in velocity prior to discharge.

Riprap and Level Spreaders

The riprap areas and level spreaders will be inspected for:

- litter,
- damage,
- silt buildup
- stressed vegetation

If …	Then….
there is litter	remove and properly dispose of litter.
there is accumulated silt that inhibits proper operation of the riprap and/or level spreaders	the PPT Leader should be contacted and proper corrective actions taken.

Continued on next page

Maintenance of Stormwater Controls, Continued

Litter Fencing

The litter fencing will be inspected for:

- litter, and
- damage,

If …	Then….
there is litter in or along the litter fencing	remove and properly dispose of litter.
there is damage to the litter fencing and/or posts	the PPT Leader should be contacted and repairs or other corrective actions performed.

12.0 Sediment & Erosion Control Plan

Introduction

- The landfill is designed and constructed under careful consideration to minimizing sedimentation and erosion. The following describes the materials that are kept on hand, and describes the actions that will be taken in the event erosion is observed.

Materials Kept on Hand or Readily Available

The following materials will be kept on hand at JRL, or are readily available and applied as temporary stabilization if deemed necessary.

Product	Description
Seed	Grass seed
Mulch	Wood chips and bark mulch
Cover materials	Geotextile fabrics and membranes
Other BMPs	Hay bales, silt fence, erosion control mix Stone

Actions

JRL will implement the following actions if any of the following conditions are identified during the inspection process.

If the inspection identifies…..	Then…..
erosion of the stockpile and/or landfill face areas	seed and mulch, place hay bales, or apply erosion control mix stockpile to prevent further erosion and/or sedimentation.
erosion of the inactive areas of the landfill, and surrounding areas	apply topsoil, seed, and mulch until vegetation is re-established and the area is stabilized.
erosion and/or sedimentation at the areas where disposal activity has ceased and final vegetation has not occurred	apply mulch, topsoil and seed (as necessary), and/or geotextile materials to assist in the stabilization of area.

13.0 Stormwater Sampling Data

Introduction

The following section provides a summary of 2010 through 2012 stormwater discharge sampling at the JRL facility. Current and historical data is maintained (and available) in the Compliance Records Binder.

Historical Sampling

Monitoring data for 2010 through 2012 is summarized in the table below.

Year 2010												
Outfall Number	Quarter Monitored				Quarter Sampled				Results			
									Flow (Yes / No)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	✓	✓	✓	✓			✓		No	No	Yes	No
2	✓	✓	✓	✓				✓	No	No	No	Yes
3	✓	✓	✓	✓			✓	✓	No	No	Yes	Yes
4	✓	✓	✓	✓					No	No	No	No
5				✓								No
Year 2011												
Outfall Number	Quarter Monitored				Quarter Sampled				Results			
									Flow (Yes / No)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	✓	✓	✓	✓	✓	✓	✓	✓	Yes	Yes	Yes	Yes
2	✓	✓	✓	✓	✓		✓	✓	Yes	No	Yes	Yes
3	✓	✓	✓	✓	✓		✓	✓	Yes	No	Yes	Yes
4	✓	✓	✓	✓	✓			✓	Yes	No	No	Yes
5	✓	✓	✓	✓					No	No	No	No
Year 2012												
Outfall Number	Quarter Monitored				Quarter Sampled				Results			
									Flow (Yes / No)			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	✓	✓		✓		✓		✓	No	Yes		Yes
2	✓	✓		✓		✓		✓	No	Yes		Yes
3	✓	✓		✓				✓	No	No		Yes
4	✓	✓		✓		✓			No	Yes		No
5	✓	✓		✓					No	No		No

14.0 Comprehensive Site Compliance Evaluation

Introduction

The following section describes the Quarterly Site Compliance Evaluation procedures and the methods that are required by the Maine MSGP.

Why Inspect?

The Quarterly Comprehensive Site Compliance Evaluations at the JRL are designed to evaluate areas contributing to stormwater discharge associated with industrial activities at the landfill. Quarterly Comprehensive Site Compliance Evaluations ensure that the facility is operating in accordance with the requirements of the MSGP.

Quarterly Inspection

A designated, qualified individual(s) will conduct an evaluation of the site at least four (4) times per calendar year in accordance with the Maine MSGP. Quarterly Comprehensive Site Compliance Evaluations will be evenly spaced with a minimum of sixty (60) days between inspections. One of the evaluation events will be conducted within 24 hours of a qualifying storm event. As part of the evaluation, the criteria presented in the table below are addressed and documented.

Criteria	Description
Inspection	A regular weekly inspection will be conducted for those areas where industrial material or activities come into contact with stormwater and areas where spills and leaks have occurred in the past three (3) years (see Attachment 4).
Evaluate	Results of the quarter's Weekly Inspections and Quarterly Visual Monitoring (see Stormwater Monitoring Requirements in following section) will be reviewed to evaluate the effectiveness of the BMPs described in this SWPPP.

Continued on next page

Comprehensive Site Compliance Evaluation, Continued

Criteria	Description
Corrective Action Report	If new BMPs need to be implemented, or existing BMPs need to be changed, a Corrective Action will be initiated. The following describes the MSGP requirements for Corrective Actions for Non- Structural BMPs and Structural BMPs. • Corrective Action for Non-Structural BMPs: 1. Complete the Corrective Action Form (Attachment 8) and retain it on-site (i.e., no submittal to MEDEP is necessary). 2. Initiate the new or modified non-structural BMP within 5 days of the inspection. • Corrective Action for Structural BMPs: 1. Notify MEDEP by phone, email, or mail of the structural deficiency within 14 business days of the inspection. 2. Complete the Corrective Action Form (Attachment 8) and provide it to MEDEP. 3. Implement any temporary BMPs as soon as practicable to protect stormwater, and 4. Complete the Corrective Action before the next anticipated storm event if practicable, or within 12 weeks of the inspection if impracticable. The MEDEP may be contacted for authorization to complete the Corrective Action after the 12 week time frame if necessary.

Continued on next page

Comprehensive Site Compliance Evaluation, Continued

Quarterly Inspection (continued)

Criteria	Description
Revise	Plan revisions requiring changes to BMPs are incorporated into the SWPPP within 30 calendar days following structural inspection.

Criteria	Description
Prepare/Retain Report	A Quarterly Compliance Evaluation Report are prepared that summarizes the results of the weekly (see Attachment 6) and quarterly visual (see Attachment 11) inspections. This report identifies the date of inspection and the personnel conducting the inspection, and major observations. At least one of the quarterly reports will include a Non-Stormwater Discharge Certification.
Certify	A member of the JRL management or other responsible person with authority for the environmental compliance of the facility will certify that the facility is in compliance by signing the report.

A form for the Quarterly Site Compliance Evaluation Report is contained in Attachment 9.

Management's Role

JRL management will review each Quarterly Compliance Evaluation Report. Reports will be initialed by the Environmental Manager, and forwarded if necessary to the General Manager for input along with recommendations or comments. The Environmental Manager will evaluate the seriousness and content of the inspection data and inspector's evaluations.

15.0 Stormwater Monitoring Requirements

Introduction

This section provides a summary of the stormwater monitoring requirements required in the Maine MSGP. Included are Quarterly Visual Monitoring Requirements. At this time, the JRL Facility is not subject to stormwater effluent limitation guidelines (set forth in Appendix L of the MEDEP MSGP). As per MEDEP notice, analytical monitoring relating to landfill operations of the leachate system at the facility sufficiently fulfills these requirements.

Quarterly Visual Monitoring - Requirements

Quarterly visual monitoring is applicable to facilities covered under the MSGP, regardless of the facility's sector or industrial activity. Quarterly visual monitoring of stormwater outfall discharges will be made during daylight hours and during a qualifying storm event that is either precipitation, ice or snow melt that produces a measurable discharge at an outfall, which has been preceded by 72 hours without rain. Visual observations of samples will be made within the first 60 minutes (not to exceed 2.25 hours) of when runoff begins discharging from the facility. Monitoring is required to be conducted in accordance with the MEDEP Visual Monitoring Procedures contained in Attachment 10. Monitoring instructions are included in the Stormwater Monitoring Plan (SMP) provided in Attachment 10. Certification of documentation is required on the Visual Monitoring Form in Attachment 11.

In the event that no stormwater event occurred that produced runoff from the facility during a monitoring quarter, JRL is excused from visual monitoring for that quarter provided that documentation is provided. The Visual Monitoring Form in Attachment 11 will be used to document non-qualifying storm events..

Continued on next page

Stormwater Monitoring Requirements, Continued

Qualified individuals

The Environmental Manager will be responsible for stormwater monitoring at the JRL Facility. The Environmental Manager and the Environmental Technician are qualified individuals who have been properly trained in the practices and procedures to adequately perform environmentally related stormwater monitoring and sampling.

JRL's QA/QC

The JRL facility implements the following protocols to maintain QA/QC:

Item	Description
Personnel	• Only qualified individuals are responsible for stormwater monitoring (including sample collection).
Decontamination	• Decontaminate any field equipment prior to and after use, when applicable.
Materials	• Use of clean sample bottles and containers.
Equipment	• Equipment is calibrated in the field prior to use, if applicable.

Continued on next page

Stormwater Monitoring Requirements, Continued

General Monitoring Exceptions

The following exception may be applied to any monitoring required under the Maine MSGP.

Adverse Weather Conditions. Adverse weather conditions are those which are dangerous or create inaccessibility for personnel and may include such things as local flooding, high winds, electrical storms, drought, excessive rain, frozen conditions and icing. If adverse weather conditions prevent the collection of samples these conditions will be documented in the SWPPP.

Other Monitoring Requirements

The MEDEP is authorized to provide written notice to any facility under the Maine MSGP, if they are required to conduct sampling for impaired water impact, including those facilities that may be otherwise exempt from the sampling requirements of the Maine MSGP, to require discharge sampling. This sampling could be for a specific monitoring period and for specific parameters and includes frequency, period of monitoring, sample types, and reporting requirements.

16.0 Reporting Monitoring Results

Introduction

The following section provides a summary of reporting requirements and deadlines that apply to the types of stormwater monitoring required by the Maine MSGP.

Reporting of Visual Monitoring

According to the Maine MSGP, visual monitoring results will be retained with the SWPPP. The results of the visual monitoring are maintained at the facility in a separate binder associated with the SWPPP and are submitted to the MEDEP only upon request.

Reporting of Weekly Inspections

Weekly Inspection results are retained in a separate binder associated with the SWPPP.

Reporting of Quarterly Site Compliance Report

Quarterly Site Compliance Reports are retained in a separate binder associated with the SWPPP.

Reporting of Benchmark Sampling

Benchmark sampling results will be retained in a separate binder associated with the SWPPP.

Annual Reporting and SWPPP Submission

The facility is not required to submit the SWPPP nor any annual reports to MEDEP unless inspection by MEDEP identifies deficiencies in the development or implementation of any portion of the SWPPP, and the MEDEP provides written notice. If required by MEDEP, the SWPPP and associated records would need to be submitted within 30 days of written notice, and Annual reports would need to be submitted for three years by May 9 of each year. The annual report would need to be submitted on Department Form BEPLW1201, available from MEDEP. The report would summarize the function of BMPs, results of visual, benchmark, and numeric monitoring, location of significant spills, quarterly site inspections, and implemented or planned corrective actions.

Continued on next page

Reporting Monitoring Results, Continued

Reporting of Numeric Limitation Monitoring

Numeric Limitation Monitoring is not required by the MEDEP at this time. When Numeric Limitation Monitoring is required, it is due by the 15th day of the month following the monitoring period for each year of the Maine MSGP. The completed report would be submitted to:

Maine Department of Environmental Protection
Stormwater Coordinator
17 State House Station
Augusta, Maine 04333-0017

17.0 Retention of Records

Documents

The JRL facility will retain copies of SWPPP and reports and certifications required by the Maine MSGP, and records of data used to complete the Notice of Intent to be covered by the Maine MSGP, for a period of at least three years from the date that the facility's coverage under this permit expires or is terminated. This period may be extended by request of the MEDEP at any time.

Accessibility

The JRL facility will retain a copy of the SWPPP required by the Maine MSGP (including either a paper or electronic copy) at the facility from the date of permit coverage to the date of permit coverage ceases. The JRL facility will make a copy of the SWPPP available to the public if requested to do so in writing.

18.0 Documentation of Permit Eligibility - Endangered Species

Endangered Species

The Endangered Species Act of 1973 required federal agencies, such as EPA, to ensure that Maine MSGP permits authorizing discharges to water of the United States are not likely to jeopardize the continued existence of a federally listed species or adversely modify critical habitat of such species.

Based on review of the SWPPP prepared by the prior owner/operator of the JRL (Best Judgment, Criteria D of Addendum A of the MSGP), there is no reason to believe that there would be adverse impacts to endangered species due to stormwater discharge at the site.

A Letter requesting a review and confirmation of no impacts on listed or eligible species or critical habitat was requested from the Maine Department of Inland Fisheries and Wildlife. A copy of the response is included in Attachment 12**.**

Attachment 1

Notice of Intent

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PAUL R. LEPAGE
GOVERNOR

PATRICIA AHO
ACTING COMMISSIONER

July 15, 2011

NEWSME LANDFILL OPERATIONS LLC
2828 BENNOCH RD
OLD TOWN, ME 04468-4214

RE: Multi-Sector General Permit (Stormwater Discharge Associated with Industrial Activity)

Dear Brian G Oliver:

The Maine Department of Environmental Protection ("DEP") is in receipt of your 2011 NOI renewal, and has processed your Notice of Intent ("NOI") application for NEWSME LANDFILL OPERATIONS LLC. You are authorized to discharge stormwater associated with Multi-Sector activity pursuant to the terms and conditions imposed by DEP's *Multi-Sector General Permit for Stormwater Discharge Associated with Industrial Activity*. The facility permit number is **MER05B477** at 2828 BENNOCH RD, OLD TOWN, ME. Please refer to this permit number in all future correspondence regarding this general permit. The active date of permit coverage is April 26, 2011. The 2011 *Multi-Sector General Permit for Stormwater Discharge Associated with Industrial Activity* is a five-year permit. The Department plans subsequent re-issuance of the 2011 Multi Sector General Permit in the spring of 2016.

DEP's Multi-Sector General Permit containing the terms and conditions which you are now held accountable is available at our website at www.mainedep.com (enter keyword MSGP).

If you have any questions concerning the Multi-Sector General Permit, please contact staff at one of our offices:

Augusta, Main Office - (207) 287-7688
Bangor, Eastern Maine Regional Office - (207) 941-4570
Portland, Southern Maine Regional Office - (207) 822-6300
Presque Isle, Northern Maine Regional Office - (207) 764-0477

Sincerely,

Teco Brown

Teco Brown, Director
Bureau of Land & Water Quality

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 04769-2094
(207) 764-0477 FAX: (207)760-3143

web site: www.maine.gov/dep

Attachment 2

Pollution Prevention Team Roster

Pollution Prevention Team Roster

Introduction The following worksheet provides information about the Pollution Prevention Team (PPT) members, their responsibilities and contact numbers.

PPT Leader: Jeremy Labbe Title: Environmental Manager & Landfill Engineer
Common Hours: 8 am to 5 pm Phone Number: 207-862-4200 Ext.233
207-217-7988 (Cell)
Responsibilities: Facility licensing and environmental compliance.

Member 1: Jeffrey Pelletier Title: Environmental Technician
Common Hours: 8 am to 5 pm Phone Number: 207-862-4200

Responsibilities: Environmental inspections and sampling.

Member 2: Anita Verrill Title: Environmental Technician
Common Hours: 8 am to 5 pm Phone Number: 207-862-4200 Ext. 241
857-259-0773 (Cell)
Responsibilities: Environmental compliance.

Member 3: Eric Nute Title: Landfill Supervisor
Common Hours: 8 am to 5 pm Phone Number: 207-394-4369
207-852-0340 (Cell)
Responsibilities: Supervisor of landfill operations.

Member 4: Wayne Boyd Title: Operations Manager
Common Hours: 8 am to 5 pm Phone Number: 207-862-4200 Ext. 224
207-694-5510 (Cell)
Responsibilities: Management of entire facility.

Attachment 3

Site Location Map

Site Plan

Site Drainage Boundaries

Site Plan Checklist

Site Plan Checklist

Introduction

Use the following checklist when preparing a Site Plan for the facility.

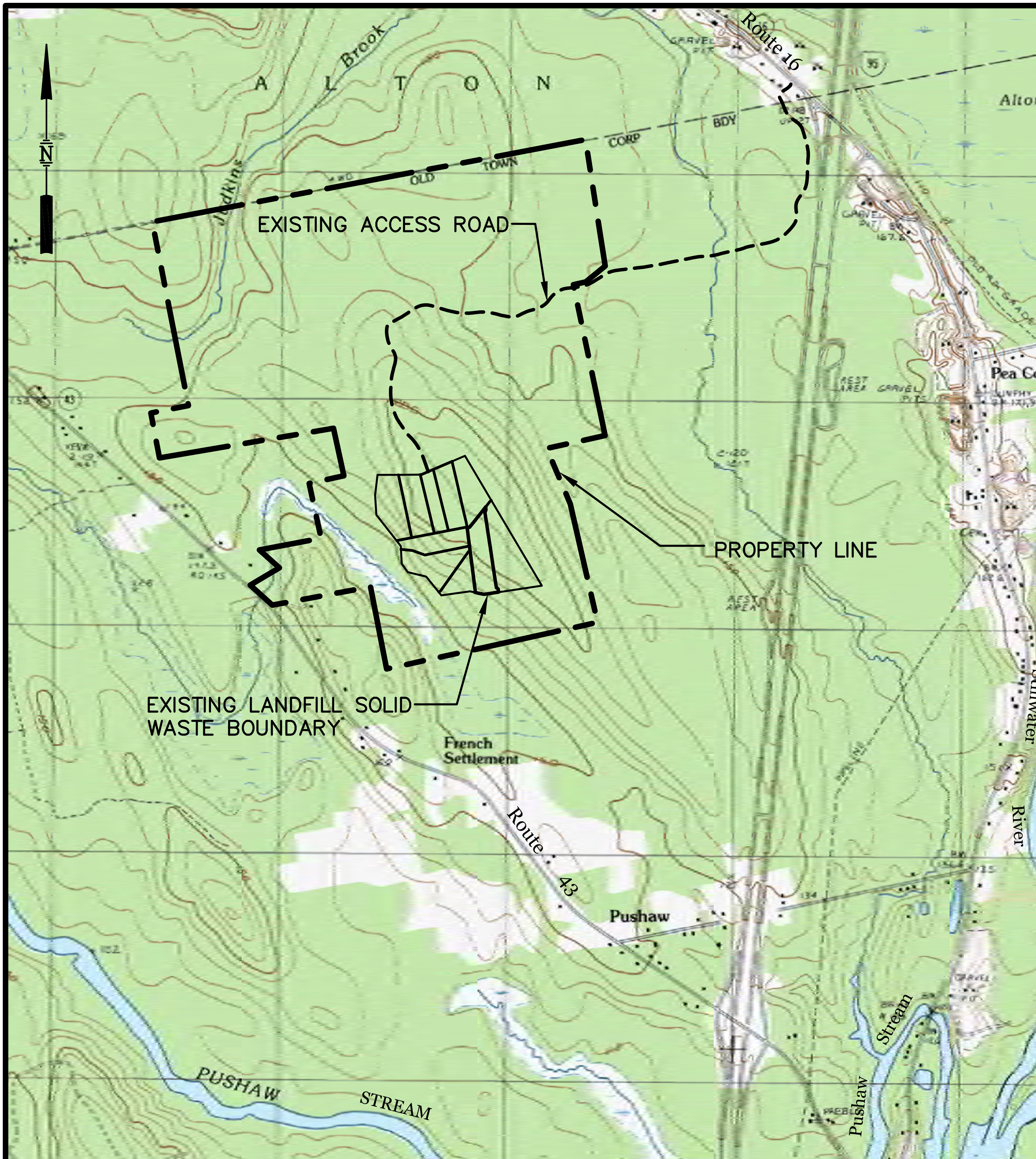
How does it apply?

The following features are required to be indicated on a Site Plan per the Maine MSGP.

Checklist

The Site Plan including the following features;

- Approximate Drainage Boundaries _________
- Boundaries of impervious surfaces
- Structural stormwater BMPs including:
  - Flow diversion structures _________
  - Sedimentation/detention ponds _________
  - Vegetative swales _________
  - Sediment traps _________
- Surface water bodies _________
- Locations of potential pollutant sources _________
- Locations of significant spills and/or leaks including:
- Activities exposed to stormwater including:
  - Fueling locations _________
  - Vehicle/equipment washing and maintenance areas _________
  - Storage and cleaning areas
  - Loading and unloading areas _________
  - Locations of liquid storage tanks _________
  - Material processing _________
  - Transfer or storage areas _________
  - Access roads _________
  - Rail tracks _________
  - Machinery _________
  - Active and closed landfill cells _________
  - Any dumping locations _________
  - Leachate collection and handling systems _________
- Stormwater outfalls and conveyances _________
- Non-stormwater discharges _________
- Any run-on from adjacent properties that could impact stormwater _________



BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE:
OLD TOWN, MAINE–1988

1000 0 2000 4000 FEET

FIGURE 1
SITE LOCATION MAP
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE
STORMWATER POLLUTION
PREVENTION PLAN

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: SITELOC LMN: NONE CTB: SME–STD REV: 5/17/2013

\\Nserver\cfs\Casella\OldTownLandfill\SWPPP\Acad\Figures\SITELOC.dwg, 5/17/2013 7:42:12 AM, sjm

NOTES

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO, NORRIDGEWOCK, MAINE. PHOTO DATE NOVEMBER 6, 2012. VERTICAL DATUM BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM MAINE STATE COORDINATE SYSTEM EAST ZONE, NAD 83. GROUND CONTROL BY PLISGA & DAY, BANGOR, MAINE. STANDARD PRACTICE DICTATES THAT PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.
2. WETLAND BOUNDARIES DELINEATED BY WOODLOT ALTERNATIVES, INC. OF TOPSHAM, MAINE IN 2004, 2005, 2006 AND 2008. ADDITIONAL WETLAND BOUNDARIES DELINEATED AND REVISED BY STANTEC, DATED FEBRUARY 8, 2012.
3. DRAWINGS ARE FOR PERMITTING 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. SEE ATTACHED FIGURE 3 FOR OUTFALL DRAINAGE BOUNDARIES.

LEGEND

- 170 EXISTING CONTOUR
- WETLAND DELINEATED
- DIRECTION OF STORMWATER FLOW IN SITE DRAINAGE CHANNEL

75 0 150 300 FEET

FIGURE 2
SITE PLAN
JUNIPER RIDGE LANDFILL
STORMWATER POLLUTION
PREVENTION PLAN

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DWG: SITEPLAN-2012 LMN: SITE PLAN CTB: SITE PLAN REV: 6/7/2013

N

NOTES

1. BASE MAP PREPARED BY AERIAL SURVEY & PHOTO, NORRIDGEWOCK, MAINE. PHOTO DATE NOVEMBER 6, 2012. VERTICAL DATUM BRASS PLUG AT PUMP STATION. HORIZONTAL DATUM MAINE STATE COORDINATE SYSTEM EAST ZONE, NAD 83. GROUND CONTROL BY PLISGA & DAY, BANGOR, MAINE. STANDARD PRACTICE DICTATES THAT PLANS COMPILED IN THIS MANNER SHOULD BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

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4. LOCATION OF ALL UTILITIES, POWER & COMMUNICATIONS, WATER, SEWER ETC NOT SHOWN ON THIS PLAN.

LEGEND

EXISTING CONTOUR
WETLAND DELINEATED
DRAINAGE SUBCATCHMENT BOUNDARY
4 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, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DWG: SITEPLAN-2012 LMN: DRAINAGE PLAN CTB: SITE PLAN REV: 6/13/2013

Attachment 4

Significant Spills and Leaks

Significant Spills and Leaks

Introduction

A list of significant spills and leaks for the three years prior to the preparation of this SWPPP is required to be documented pursuant to the Maine MSGP. The list of significant spills and leaks is also required to be maintained for the term of the Maine MSGP. Any significant spills and leaks are to be listed using this form and for the purposes of updating the SWPPP.

Note: Significant spills include, but are not limited to, releases of oil or hazardous substances.

Date	Source		Location	Description			Response Procedure		
	Spill	**Leak**		**Material**	**Quantity**	**Source**	**Amount of material recovered**	**Stormwater Exposed?**	**Follow Up Measures**
11/18/10	X		Access road north of scales	Motor Oil	2 gallons	Truck malfunction.	8 gallons	None	Absorbed, sand placed, then swept and disposed of in landfill.
2/26/11	X		Paved access road	Solid Waste – Ash	Portion of truck load	Truck off road due to winter conditions	All material spilled	None	Spilled ash cleaned up and transferred to landfill.
4/15/11	X		Paved access road near landfill entrance	Wood Ash	10 cubic feet	Overloaded ash truck	15 cubic feet	None	Road Swept with landfill sweeper. Other areas cleaned by contractor.
7/14/11		X	North end of scales.	Leachate	< 1 gallon	Truck damage to seal.	5 gallons	None	Area swept and material disposed of in landfill.
7/25/11	X		Cell 5 Pump Station	Leachate	5-8 gallons	Cleaning activities.	8 gallons	None	Gravel removed and placed in landfill
8/5/11	X		Paved access r	Diesel Fuel	< 1 gallon	Unknown	1 gallon	None	Absorbed and disposed of in landfill
11/8/11	X		Gravel Pad near maintenance area	Anti-Freeze	2 gallons	Truck malfunction	4 gallons	None	Gravel removed and placed in landfill
11/9/11	X		Gravel pad near scale house	Motor Oil	2 gallons	Punctured oil pan.	5 gallons	None	Gravel removed and placed in landfill. Truck drained and towed off-site.
11/18/11	X		LFG flare drain	Leachate	50 gallons	Cracked pipe.	50 gallons	None	Condensate pumped and affected soil material removed and disposed of in landfill.
7/27/12	X		Designated gravel parking area	Diesel	5 gallons	John Deere 400 Truck malfunctions.	5 gallons	None	Soil removed and disposed of in landfill. Truck parked in landfill until maintenance performed.
8/5/12	X		Access road and scales	Free liquid from pulping process.	< 50 gallons	Unallowed liquid in wood knot waste	50 gallons	None	Scales closed for cleaning and washing. Street swept and washed. Soil removed and disposed of in landfill.
10/12/12	X		Overflow from Cell 7 onto intermediate cover and down gradient stormwater controls.	Leachate (CDD Fines.	Unknown	Significant unforecast rain event	All on intermediate cover	Yes.	Excavator revised flow patterns to remediate overflow. Industrial cleaning service washed intermediate cover. Stormwater controls were tested for levels of conductivity and no additional remediation required.

Attachment 5

Non-Stormwater Discharge Assessment & Certification Form

Non-Stormwater Discharge Assessment and Certification Form

Introduction

Use the following form to assess the stormwater discharge at the identified outfalls from the facility. The form will be filled out and certified annually by a responsible person and retained in the SWPPP.

Outfall Observed	Method Used for Evaluation	Results	Potential Pollutant Sources	Conducted By/Date
Outfall #1	Visual Inspection		Leachate, gas collection condensate, drained free liquids, contaminated groundwater, and wash water from truck/equipment washing.	
Outfall #2	Visual Inspection		Leachate, gas collection condensate, drained free liquids, contaminated groundwater, and wash water from truck/equipment washing.	
Outfall #3	Visual Inspection		Leachate, gas collection condensate, drained free liquids, contaminated groundwater, and wash water from truck/equipment washing.	
Outfall #4	Visual Inspection		Leachate, gas collection condensate, drained free liquids, contaminated groundwater, and wash water from truck/equipment washing.	
Outfall #5	Visual Inspection		Leachate, gas collection condensate, drained free liquids, contaminated groundwater, and wash water from truck/equipment washing.	

Certification

I certify that truck wash wastewater created from washing trucks or equipment that have been in direct contact with the landfill waste is disposed of as required by NPDES requirements.

I certify under penalty of perjury that this document and 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(s) who manage the system, 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.

I certify that stormwater outfalls to surface waters at this facility have been evaluated and found to be free of non-Stormwater discharges.

Name:	Telephone:
Signature:	Date:

Notes:
1. The outfall tested is indicated on the Site Plan.
2. The method used to evaluate or test for potential pollutants should be determined through visual.
3. The results of the evaluation should be recorded as flow, no flow, oil observed, sheens, etc.
4. Potential pollutant sources include significant materials, oils and hazardous materials.

Attachment 6

Weekly Inspection Form

WEEKLY INSPECTION FORM – SPCC/SWPPP COMPLIANCE
JUNIPER RIDGE LANDFILL

Areas Inspected	On a Weekly Basis, Inspect the ...	Findings		Corrective Actions Taken (use notes section as needed)
		In Compliance	Needs Attention	
Access Roads	Access roads (including the main entrance road) for debris, staining, erosion, damage, excessive dust and damaged vegetation.			
Landfill	Landfill areas for unacceptable materials, fluid leakage, staining, areas of settlement, erosion, leachate release, and vectors.			
Stockpiles	Tipping, material storage areas, vegetative stockpile areas, and active areas of borrow pit for material migration, staining, erosion, and damage.			
Truck Scale	Truck scale for staining.			
Machinery & Equipment	Machinery & equipment for fluid leakage, staining and waste (if outside of the active cell).			
Maintenance Garage	Garage area (inside and out) for incompatible materials, odors, staining, uncovered materials (i.e., batteries), universal wastes, and good housekeeping practices.			
	500-gallon motor oil tank			
	500-gallon hydraulic oil tank			
	55-gallon drums and 5-gallon pails on spill pallet			
Rubb Building	Rubb Building (inside and out) for incompatible materials, odors, staining, universal wastes, and good housekeeping practices. Inspect waste oil storage area, and all chemical storage inside and contained.			
	1,500-gallon diesel tank			
	1,500-gallon gas tank			
	250-gallon tank of odor control liquid			
	55-gallon drums on spill pallets			
Tanks on top of landfill	2,500-gallon diesel fuel truck for rusting, leaks and staining.			
	500-gallon diesel fuel tank for rusting, leaks and staining			
	300-gallon hydraulic oil tank for rusting, leaks and staining			
Spill Kits	Spill kit for the maintenance garage, scale house, and loading rack to ensure an adequate supply of adsorbents.			
Gas Flare	Gas flare area for incompatible materials, odors, staining, universal wastes, and good housekeeping practices.			

WEEKLY INSPECTION FORM – SPCC/SWPPP COMPLIANCE
JUNIPER RIDGE LANDFILL

Areas Inspected	On a Weekly Basis, Inspect the ...	Findings		Corrective Actions Taken (use notes section as needed)
		In Compliance	Needs Attention	
Leachate Storage Tank and Transfer Station	Storage tank for adequate freeboard, tank secondary containment area and transfer area for odors, staining, leaks, and damaged equipment. Verify that catch basin is draining to leachate pump station and that leachate pump station is functioning properly.			
Geomembrane-Lined Pond, Pump Station and Transfer Station	Pond for adequate freeboard, visible portions of the pond liner for damage, pump station for leakage and transfer area for odors, staining, leaks, and damaged equipment. Verify pump station is operating properly.			
Inactive Cells	Verify only clean stormwater discharged to sedimentation/ detention ponds. Leachate impacted stormwater will be properly transferred to the leachate collection system.			
Drainage Channels & Check Dams	Channels and check dams for particulate manner, litter, sheens, siltation, and damage.			
Stormwater and Pond Outfalls	Outfalls for siltation, erosion, sheens, odors, staining or signs of stormwater impacts from pollutants.			
Detention Ponds	Ponds for particulate matter, sheen, odors, or staining.			
Litter Fencing	Mesh and posts for integrity and any damage from wind, debris or equipment.			
Landfill Cover	Soil and vegetation for indication of erosion or stressed vegetation.			
Administrative Building	Area around the fill pipe for the 275-gallon heating oil tank for signs of overfills. Outside area free of vehicle leaks/spills.			

Inspection Completed By: ____

Date: ________________________________

WEEKLY INSPECTION FORM – SPCC/SWPPP COMPLIANCE
JUNIPER RIDGE LANDFILL

NOTES:

Completed Inspection Forms are maintained in the Compliance Records Binder

Attachment 7

Environmental Incident Report Form

Environmental Incident Report Form

Introduction

The Environmental Incident Report form below is to be filled out and kept on file with the SWPPP. Please note that notification to the MEDEP & local fire department may be required to be made. The PPT Leader or other designated JRL personnel will make notifications should they be required.

Environmental Incident Report

Complete the sections below where applicable.

Date of release: ____________

Type of release: Spill [ ] Leak [ ]

Weather: __________________ Responders: __________________

Location (give details): ____

____

Material released: ____________ Quantity: ____________

Source of release (if Known): ____________________________________

____

Reason: ____

Amount recovered: __________________

Material fully recovered yes [ ] no [ ]

Disposal method: ____

Preventative measures taken: __________________________________

Comments: ____

____

Attachment 8

Corrective Action Report (CAR)

Maine's Multi-Sector General Permit
Corrective Action Report (C.A.R)

A. General Information

Facility Name:					
Permit Number:					
Contact Person:				**Title:**	
Phone:		**Ext:**		**Email:**	
C.A.R Date:					
Site Inspection or Site Compliance Evaluation Date:					

B. Report Information

If a non-structural BMP is found to be deficient, this form must be kept in the facility's SWPPP.

Is there a structural or non-structural BMP deficiency?	☐ **Structural**	☐ **Non-Structural**	☐ **Both**

If non-structural BMP deficiencies are identified please use the table below (See Section C for Structural):

Non-structural BMP	Location	Deficiency	Corrective Actions (Start and Stop Dates)	SWPPP Modifications

C. If structural BMP deficiencies are identified please complete the following information:

If a structural BMP is found to be deficient, excluding routine maintenance, this report must be kept with the facility's SWPPP and you must notify the regional stormwater inspector within (14) business days by phone, email, or USPS. If a non-structural BMP is found to be deficient, this form must be kept in the facility's SWPPP.

Description of BMP and the deficiency: (Please include the reason for the deficiency)________________
____
____
____

Location of BMP:____

Description of planned corrective actions including any temporary BMPs:__________________________
____
____
____

Are other Department licenses or permits required? Yes ☐ No ☐

If so what, and have they been obtained?____
____

Date of construction or completion of corrective action:_______________________________

Date of SWPPP modifications:____

Note: If existing structural BMPs require modification or if additional structural BMPs are necessary, implementation must be completed before the next anticipated storm event to the greatest extent practicable, but not more than twelve (12) weeks after discovery of the deficiency unless otherwise authorized by the Department. Temporary BMPs must be implemented as soon as practicable after the Site Compliance Evaluation or site inspection is complete.

Signature of Responsible Official: 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 gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate and compete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowingly violating the law.

Name: ______________________________ Date: ________________________

Signature: ____

Attachment 9

Quarterly Compliance Evaluation Report

Quarterly Site Compliance Evaluation/Inspection

Name of Qualified Inspector(s) Completing Evaluation/Inspection: ______________________________ **Date:**________________

______________________________ **Date:**________________

Are industrial materials, residue, or trash on the ground? **Yes** □ **No** □

If yes, state corrective action____

Date corrective action was completed____

Are there any leaks or spills from industrial equipment, drums, barrels, tanks or containers onsite? **Yes** □ **No** □

If yes, state corrective action____

Date corrective action was completed____

Is there offsite tracking of industrial materials or sediment where vehicles enter or exit the site? **Yes** □ **No** □

If yes, state corrective action____

Date corrective action was completed____

Is there blowing or whirling of raw, final, or waste materials? **Yes** □ **No** □

If yes, state corrective action____

Date corrective action was completed____

Are all stormwater BMPs identified in the SWPP operating correctly? **Yes** □ **No** □

If no, state corrective action____

Date corrective action was completed____

Are additional BMPs required for potential pollutants or an industrial activity **Yes** □ **No** □
If yes document & update SWPPP

If yes, state corrective action____

Date corrective action was completed____

Are there signs of erosion in stormwater conveyances or at outfalls? **Yes** □ **No** □

If yes, state corrective action____

Date corrective action was completed____

Evidence of industrial material, residue, trash or sediment in stormwater conveyance? **Yes** □ **No** □

If yes, state corrective action____

Date corrective action was completed____

Has industrial activity been added or the site expanded? **Yes** □ **No** □
If yes, document in SWPPP & on site map

If yes, state corrective action or additional BMPs required_____________________________

____

Date corrective action or BMPs implemented_______________________________________

Have the locations of any of the potential pollutants or material storage changed? **Yes** □ **No** □

If yes, state corrective action or additional BMPs required____

____

If yes, document in the SWPPP & on site map____

Are there any non-stormwater discharges? **Yes** □ **No** □

If yes, what are they?

____

Are the non-stormwater discharges authorized under the MSGP? **Yes** □ **No** □

If no, have all the outfalls been inspected for unauthorized non-stormwater discharges? **Yes** □ **No** □

State corrective actions for all unauthorized non-stormwater discharges._______________________________

____

Are any modifications required to be made to the SWPPP or Site Map(s)
□ No modification required
□ SWPPP requires modification
□ Map(s) require modification

All required changes have been made to the Plan Date:________________ Initials:________________
All required changes have been made to the Site Map(s) Date:________________ Initials:________________

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 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 fines and imprisonment for knowingly violating the law.

Authorized Signature:____ **Date**:___________________________

Attachment 10

<u>MEDEP Visual Monitoring Procedures</u>

Bureau of Land and Water Quality
Division of Watershed Management
Industrial Stormwater Program

Standard Operating Procedures and Visual Monitoring Guidelines for Stormwater Discharges Associated With Industrial Activities.

1. **APPLICABILITY.** This Standard Operating Procedure (SOP) applies to all industrial facilities covered under Maine's Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activity. Permitted facilities are required to perform quarterly visual monitoring of their stormwater discharges and record and maintain the results in the facility's Stormwater Pollution Prevention Plans (SWPPP).

   Visual monitoring is not required if a facility is participating in a Department Approved Watershed Management Plan or if the facility is conducting Benchmark, Impaired Waters sampling and analysis, or Numeric monitoring for Total Suspended Solids (TSS). Visual monitoring must be resumed if Benchmark monitoring, Numeric monitoring, or Impaired Waters sampling is terminated**.**

2. **PURPOSE.** This document provides guidelines for standardized collection and visual examination of quarterly visual monitoring samples for indicators of stormwater pollution as defined in Part VI of the MSGP and to provide guidelines describing standardized methods of data recording and record keeping of all quarterly visual stormwater discharge monitoring data as described in Part VI of the MSGP.

3. **DEFINITIONS.**

   3.1. MULTI-SECTOR GENERAL PERMIT (MSGP). A general permit for Stormwater Discharges Associated with Industrial Activity. Authorizes the direct discharge or point source discharge of stormwater associated with industrial activity to waters of the State (other than groundwater) or to an MS4 (which discharges to waters of the State), provided the discharge meets the requirements stated in this permit. This permit is effective April 26, 2011 and expires April 25, 2016. It replaces Maine's 2005 MSGP for Industrial Activity issued October 11, 2005.

   3.2. SWPPP. Stormwater Pollution Prevention Plan. A written plan developed and implemented by each permitted facility to reduce or eliminate pollutants which come in contact with stormwater associated with industrial activity. This plan outlines sources of potential stormwater pollutants and the methods by which these pollutants will be reduced or prevented from entering waters of the State.

   3.3. GRAB SAMPLE. A single sample or collection of stormwater taken during a qualifying storm event from a single stormwater outfall. The sample may be collected manually or with an automatic sampler.

3.4. OUTFALL. The point at which any direct discharge of stormwater from an area of industrial activity enters waters of the state, an MS4, or leaves the property. Examples include discharges from ditches, swales, catch basins, culverts or pipes, rills, boat ramps, or treatment systems such as detention ponds where the discharge is a shallow concentrated flow of stormwater that leaves the property or enters waters of the State.

3.5. QUALIFYING STORM EVENT. A storm event that is either precipitation, ice or snow melt that produces a measureable discharge at an outfall that occurs at least 72 hours from a previous measureable storm event.

4. RESPONSIBILITIES.

4.1. MONITORING PROGRAM IMPLEMENTATION. The visual monitoring schedule listed below in this section is also outlined Maine's 2011 MSGP Part VI(H). Visual examinations must be clearly documented and maintained in the facility's SWPPP. The permittee shall perform and document a quarterly visual examination of industrial stormwater discharges from each outfall which discharges stormwater associated with industrial activity from the facility.

4.2. OUTFALL IDENTIFICATION. The permittee shall identify each industrial stormwater outfall at the facility. All outfalls must be clearly identified on the facility site map which is part of the facility's SWPPP and presented in the written text of the SWPPP.

4.3. REPRESENTATIVE OUTFALLS. "Representative outfalls" mean two or more outfalls with a single drainage area that discharge substantially identical effluents, have like industrial activities and significant materials, or practices occurring within the outfalls' designated drainage area. If the facility contains representative outfalls, visual monitoring may be conducted at one of the outfalls during a given monitoring period provided that subsequent samples are taken from a different outfall within the representative outfalls' drainage area. The facility is not required to monitor more than one representative outfall within a designated drainage area per monitoring event as long as the site's SWPPP contains the required information as identified in Part VI (I) of the MSGP.

4.4. EMPLOYEE TRAINING. The permittee shall ensure that all facility personnel involved in stormwater sampling are properly trained. Staff involved in sampling shall:

a. Be familiar with the site map and outfall locations
b. Walk the site to physically identify each sampling location
c. Become familiar with local rainfall and drainage patterns
d. Become competent with proper sample collection procedures

Personnel involved in sampling should also be trained in all facility safety procedures as they apply to stormwater sampling. If possible, the same individual should carry out the collection and examination of discharges for the entire permit term. Written documentation signed by the SWPPP team leader certifying that all personnel involved in sampling have been properly trained should be documented in the SWPPP.

4.5. SAMPLE COLLECTION FREQUENCY. Visual examination of industrial stormwater discharges must be performed once per monitoring quarter. If a qualifying storm event does not occur at the facility for a particular monitoring quarter, the permittee is excused from visual monitoring for that quarter, provided the permittee documents in the monitoring records that no qualifying event occurred. The Visual Monitoring Form shall be used to document both qualifying and non-qualifying storm events. Schedule of monitoring quarters is listed below.

- First: January 1 – March 31
- Second: April 1 – June 30
- Third: July 1 – September 30
- Fourth: October 1 – December 31

All other time specific sampling requirements are to be performed in accordance with the parameters outlined in the procedures section of this document.

4.6. RECORD KEEPING AND REPORTING. The permittee shall maintain all visual monitoring reports/records onsite with the SWPPP. The permittee is not required to submit visual monitoring results to DEP unless specifically requested to do so, or if the facility is required to submit an annual report as described in Part III (D)(1) of the MSGP. Requirements for recording visual examination data are outlined in the procedures section of this document.

5. PROCEDURES

5.1. SAMPLE COLLECTION TIMING. A grab sample must be collected from each facility outfall (except representative outfalls) once per quarter during a qualifying storm event. During a qualifying storm event, a grab sample for visual examination should be collected during the first 60 minutes or as soon thereafter, but must not to exceed 2.25 hours of when runoff begins discharging from an outfall. During monitoring quarters when snow or icemelt represents the only stormwater discharge, a grab sample must also be collected during periods of significant snow or ice melt within the first 60 minutes or as soon thereafter, but not to exceed 2.25 hours of when snow or icemelt begins discharging from an outfall. Stormwater runoff from employee parking lots, administration buildings, and landscaped areas that is not mixed with stormwater associated with industrial activity, or stormwater discharges to municipal sanitary sewers does not need to be sampled.

5.2. SAMPLE CONTAINER CLEANING AND PREPARATION. The facility should have an adequate supply of containers prepared for collection of industrial stormwater samples from each outfall prior to collecting samples for visual examination. All sample containers used for sampling for visual examination should be certified as clean and free of residue. After each use and for cleaning the Imhoff Settling Cone or graduated beaker. A bottle brush will aid in removing any fine sediment trapped in the bottom point of the Imhoff cone:

- Wash containers in a non-phosphate detergent and tap water wash.
- Thoroughly fill and rinse containers with tap water at least three (3) times.
- Store containers closed, and in an area free of dust and other potential sample contaminants.
- If additional containers are needed to collect samples from less accessible outfalls (e.g. buckets which are attached to poles for reaching outfalls), these containers should also be cleaned and prepared as indicated above.

5.3. SAMPLE EXAMINATION. Samples should be examined in clear glass or clear plastic container prepared and cleaned as indicated above, so that all visual monitoring criteria can be observed.

MANUAL GRAB SAMPLE COLLECTION. Manual grab samples should be collected by inserting a container under or downstream of a discharge with the container opening facing upstream, and with the opening of the container completely immersed under water, whenever possible. A sample container at least 1000 ml should be used to collect the sample. The container must be able to be submersed so that the container opening is held under water while still collecting an adequate sample size to make a correct visual inspection. In most cases the sample container can be held in hand while the sample is collected. Less accessible outfalls may require the use of poles and buckets to collect grab samples. Take the grab from the horizontal and vertical center of the outfall. If sampling in a channel, (e.g., ditch, trench, rill) avoid stirring up bottom sediments. Avoid touching the inside of the container to prevent contamination. Transfer sample to a clear glass or plastic container if using another container such as a bucket to collect a sample from a less accessible location. If taking samples from multiple outfalls, label containers with outfall identification prior to taking samples. Make sure samples are securely capped until examination.

COLLECTION OF GRAB SAMPLES BY AUTOMATIC SAMPLER. Facilities which use automatic samplers for stormwater sampling may collect grab samples for visual examination by this method. Programming for collecting grab samples is specific to the type of automatic sampler. All facility personnel who collect stormwater samples using automatic samplers should be properly trained in operation of the sampler before doing so. Several different types of automatic samplers are available for stormwater sampling. However, the following guidelines should be followed when sampling regardless of the type of sampler used. All equipment must be properly cleaned, particularly the tubing and sample containers. Deionized water should be drawn through the sampler to remove any residuals prior to taking samples. Tubing should also be periodically replaced to avoid algae or bacterial growth. Additionally, a distilled/deionized water blank sample should be taken at each outfall sampled to determine if contamination of stormwater samples by the sampling equipment has occurred. Samplers should be used in exact accordance with the manufacturers' instructions. All sampler calibration and maintenance data should be kept on site with the SWPPP.

5.4. SAMPLE EXAMINATION. Visual examination of all grab samples collected must be performed within the first sixty (60) minutes. Bring the collected samples to a well lit indoor area. Pour each sample into a separate 1 L polycarbonate plastic graduated Imhoff settling cone or 1000 ml graduated cylinder. The Imhoff settling cone or beaker should have graduations that allow volume measurement to the nearest milliliter. Record the total sample volume to the nearest milliliter on the visual monitoring form. Examine the samples for the following criteria according to the instructions provided with the visual monitoring form: Foam, odor, clarity, floating solids, suspended solids, color, oil sheen, settled solids, and any other obvious indicators of stormwater pollution. Read the settled solids 1 hour after pouring the sample into the cone, as this assures that all solids are settled out of the water. Settled solids in the bottom of the cone should be measured to the nearest milliliter.

*Note: Clear polycarbonate plastic Imhoff cones are available from several scientific supply companies. You may also purchase 1000 ml graduated beakers from various scientific supply companies.

5.5. SAMPLE DATA RECORDING. Record all sample data on the visual monitoring form after examining the sample for all of the criteria listed in the instructions. The form should include the examination date and time, examination personnel, the nature of the discharge (e.g., rain, snow or icemelt), identification of outfall sampled, quality of the stormwater discharge (including observations of color, odor, clarity, floating solids, settled solids, suspended solids, foam, oil sheen, and any other obvious indicators of stormwater pollution), and probable sources of any observed contamination. The permittee must sign and certify the documentation in accordance with Part VIII (E) of the Maine MSGP. All visual examination reports must be maintained with the facility SWPPP.

5.6. RECOMMENDATIONS FOR SOLVING SAMPLE LOCATION PROBLEMS. Consult guidelines listed below when it is necessary to sample an outfall located at a less than ideal location for sampling.

- PROBLEM: Sampling where stormwater comingles with process water or other non-stormwater discharge.

RECOMMENDATION: Attempt to sample the stormwater discharge before it mixes with the non-stormwater discharge. If this is impossible, sample the discharge and maintain a record of the visual examination data observed under both conditions on site with the SWPPP. This will provide an indication of the contribution of any observable contamination from each source.

- PROBLEM: Numerous small point channels make up an outfall from which it is difficult to collect a sample.

  RECOMMENDATION: Impound channels or join their flow together by building a weir or digging a ditch to collect discharge at a low point for sampling. This artificial collection point should be lined with plastic or filter fabric and stone to prevent infiltration and/or high levels of sediment.

- PROBLEM: Inaccessible discharge point. Examples include underwater discharges or unreachable discharges (e.g., out of a cliff, steep slope or bank of a stream).

  RECOMMENDATION: Go up the pipe to sample (e.g., to the nearest manhole or inspection point). If these are not available, tap into the pipe, or sample at several locations upstream of the pipe if the pipe is the only outfall for the facility.

- PROBLEM: Managing multiple sampling sites to collect grab samples during the first 60 minutes of a measurable storm event.

  RECOMMENDATION: Have a sampling crew ready to help when forecasts indicate that a measurable storm event is likely to occur. If this is not possible, sample the missed outfall locations during other measurable storm events and record this circumstance in the SWPPP.

- PROBLEM: Commingling of parking lot runoff with discharge associated with industrial activity.

  RECOMMENDATION: The combined runoff must be sampled at the discharge point as near as possible to the industrial activity or at the parking lot drain inlet if there is one.

- PROBLEM: Sampling in manholes.

  RECOMMENDATION: Sample with a collection device on the end of a pole to reach stormwater. Personnel sampling in manholes should have confined space safety training and ambient air monitoring sampling devices if manholes have to be entered.

- PROBLEM: Run-on from other property.

RECOMMENDATION: If possible, collect and examine a sample of the stormwater at the border of the property where the run-on occurs. Then, collect and examine a sample of the stormwater at a facility outfall downstream of the run-on point. Note any observable differences between the samples and maintain the documentation with the SWPPP.

- When confronted with other difficult sampling scenarios not addressed above, the permittee should consult DEP for guidance on how to best address the situation.

6. REFERENCES

6.1. GUIDANCE MANUAL FOR THE MONITORING AND REPORTING REQUIREMENTS OF THE NPDES MULTI-SECTOR STORM WATER GENERAL PERMIT
United States Environmental Protection Agency, Office of Water (EN-336), EPA 833-B-99-001(January, 1999)

6.2. NPDES STORM WATER SAMPLING GUIDANCE DOCUMENT
United States Environmental Protection Agency, Office of Water (EN-336), EPA 833-8-92-001 (July, 1992)

6.3. STATE OF MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION MULTI-SECTOR GENERAL PERMIT MAINE POLLUTANT DISCHARGE ELIMINATION SYSTEM STORMWATER DISCHARGE ASSOCIATED WITH INDUSTRIAL ACTIVITY
Maine Department of Environmental Protection, Bureau of Land and Water Quality, Waste Discharge License # W-008227-5Y-B-R (April 25, 2011)

Attachment 11

<u>MEDEP Visual Monitoring Form</u>

<u>MEDEP Visual Monitoring Form Instructions</u>

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 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.

Visual Monitoring Form

Facility Name:_______________________________ Sampler's Name:___________________________
Facility Address:_____________________________ MSGP Permit Number:______________________
____
_____________________________ 72 Hours Since last Measurable Storm? ☐ Yes ☐ No

Measurable Discharge from outfall? ☐ Yes ☐ No

Outfall Number						
Observation Time						
Est. Time from Onset of Runoff						
Discharge Type **(rain, snow melt or ice melt)**						
Sample Volume (ml)						
Color						
Odor						
Clarity						
Floating Solids*						
Settled Solid*						
Suspended Solid*						
Foam						
Oil Sheen						
Possible Source of Any Observed Contamination						

*Enter a description of corresponding criteria for each outfall in the General Comments section of this document.

Under penalty of law I certify that these statements are true and correct pursuant to the terms and conditions stated in the MPDES Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity.

Sample's Signature:___________________________________ Date:_________________________

General Comments

In the comments section, enter physical description of floating, settled, and suspended solids for each outfall sampled. Enter general comments on the condition and appearance of each outfall in the comments section also as indicated in the instructions.	
Outfall 1	Comments:
Outfall 2	Comments:
Outfall 3	Comments:
Outfall 4	Comments:
Outfall 5	Comments:
Outfall 6	Comments:

Completed Reports are maintained in the Compliance Records Binder

Attachment 12

<u>Endangered Species Documentation</u>

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
284 STATE STREET
41 STATE HOUSE STATION
AUGUSTA, ME 04333-0041
TEL: 207-287-8000

PAUL R. LEPAGE
GOVERNOR

CHANDLER E. WOODCOCK
COMMISSIONER

Wildlife Division
73 Cobb Road
Enfield, ME 04493

May 11, 2011

Peter Mailey
Project Engineer
Sevee & Maher Engineers, Inc.

Dear Mr. Mailey:

MDIF&W has reviewed the map of the Juniper Ridge Landfill that you provided for any Maine State Endangered or Threatened Species occurrences and their designated critical habitats in Old Town, Maine. The following is a summary of our findings:

Essential Habitats:

Essential Habitats are defined as "areas currently or historically providing physical or biological features essential to the conservation of an endangered or threatened species in Maine and which may require special management considerations". Essential Habitat protection in Maine currently applies to roseate and least terns, and piping plover nest sites. Additional listed species may receive attention in the future.

There are no **Essential Habitats** associated with the project area (please refer to the enclosed map).

Significant Wildlife Habitats:

The Natural Resources Protection Act (NRPA), administered by the Maine Department of Environmental Protection (DEP), provides protection to certain natural resources including Significant Wildlife Habitats. Significant Wildlife Habitats are defined by the NRPA as:

> Habitat for state and federally listed endangered and threatened species.
>
> High and moderate value deer wintering areas (DWAs) and travel corridors.
>
> High and moderate value inland waterfowl and wading bird habitats (IWWHs), including nesting and feeding areas.
>
> Shorebird nesting, feeding, and staging areas.
>
> Seabird nesting islands.

There is a portion of a mapped, Inland Waterfowl and Wading Bird Habitat (IWWH 205515) located on the southwest side within the property line, but outside of the permitted landfill solid waste boundary (please refer to the attached map). IWWHs are used by waterfowl both seasonally and behaviorally for breeding, migration, staging, and wintering. Wading bird habitats consist of breeding, feeding, roosting, loafing, and migration areas. High and moderate value habitat for inland waterfowl and wading birds includes both the wetland complex and the 250 foot-wide upland zone around it. The Maine Department of Environmental Protection regulates activities within designated Significant Wildlife Habitats.

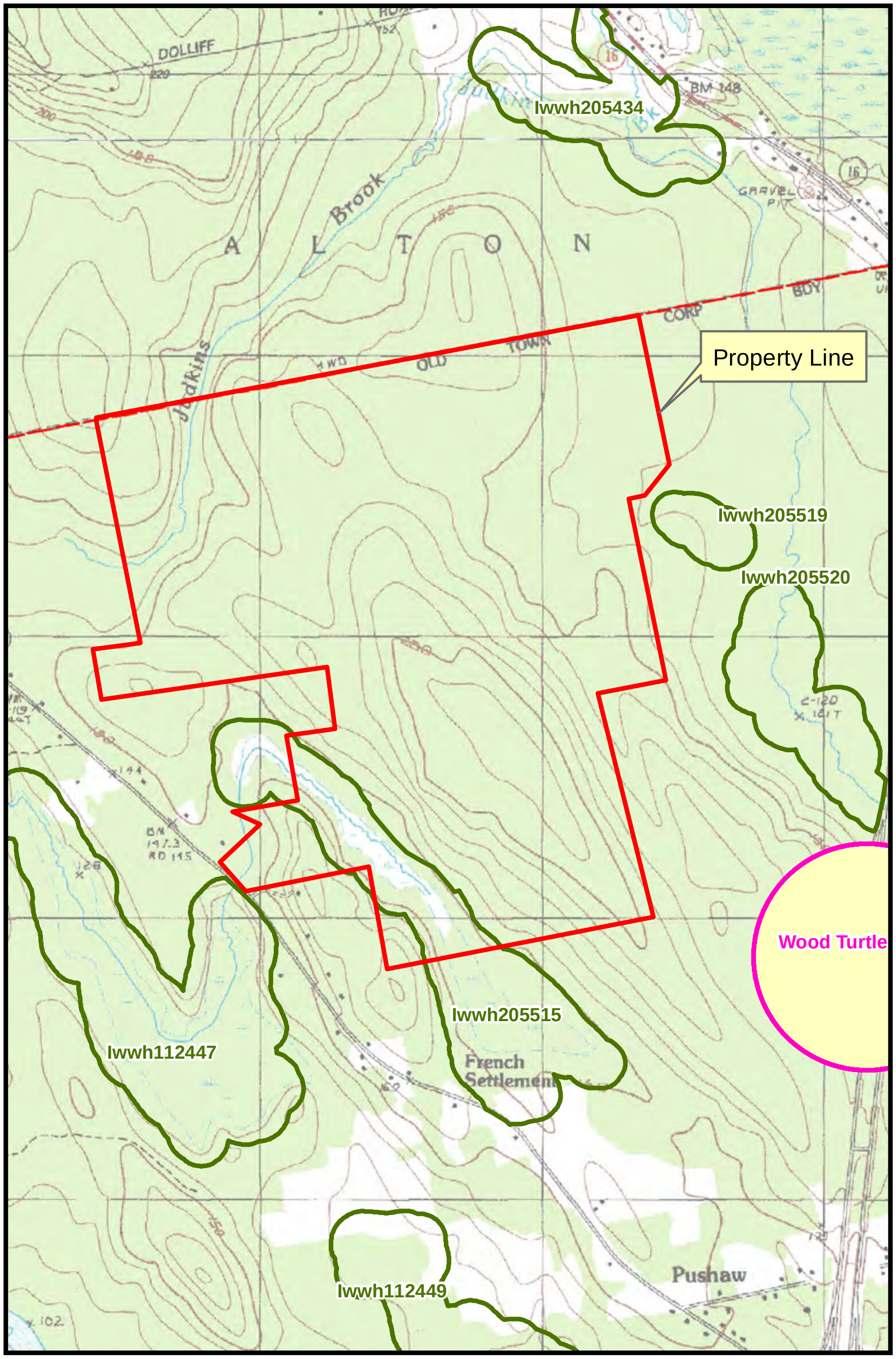
If you need any more information or clarification of the information provided please contact us at 732-4132 or at the address listed below. Thank you for your request for wildlife habitat information.

Sincerely,

Allen R. Starr

Allen R. Starr
Asst. Regional Wildlife Biologist
Phone: 207-732-4132
Fax: 207-732-4405
E-Mail: allen.starr@maine.gov

Search for Wildlife Observations & Habitat -
Juniper Ridge Landfill Facility, Old Town, Maine



Piping Plover / Least Tern Nesting, Feeding, & Brood-rearing Area

Roseate Tern Nesting Area

Deer Winter Area

Inland Waterfowl / Wading Bird Habitat

Tidal Waterfowl / Wading Bird Habitat

Seabird Nesting Island

Shorebird Area

Significant Vernal Pool

Endangered, Threatened, & Special Concern Species Habitat

Township Boundary

County

0 0.1 0.2 0.3 0.4 Miles

1 = 24,000

UTM Projection, Zone 19N, NAD83

N

73 Cobb Road
Enfield, ME 04493
Voice: (207) 732-4132
Fax: (207) 732-4405

May 10, 2011

Attachment 13

<u>Document Control</u>

Document Control

Summary

This Stormwater Pollution Prevention Plan (SWPPP) is a controlled document. Revisions to the SWPPP are recorded on the Revision Tracking Sheet located in the beginning of the SWPPP. Recipients of the SWPPP are recorded on the Distribution Tracking Sheet and on the Distribution Information Sheet. Both of these sheets are included in this attachment.

Each change to the SWPPP is recorded as a revision. Each revision is assigned a unique, two digit revision number (i.e., 1.0). The first digit identifies the revision as a major revision to the SWPPP. The second digit identifies the revision as a minor revision. The tracking sheets will be updated with revision as necessary.

APPENDIX O

HOST COMMUNITY BENEFIT AGREEMENT

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:	STATE OF MAINE
Name:	By Its
Name:	CITY OF OLD TOWN, MAINE By Its City Manager
Name:	CASELLA WASTE SYSTEMS, INC. By Its

{W0423694.1}

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

1	Active Landfill Area	Assume 800 acres of land 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!

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:	STATE OF MAINE
Name:	By: Martha Freeman Its Director, State Planning Office
Irene Hayward Name:	CITY OF OLD TOWN, MAINE By: Margaret Daigle Its City Manager
Name:	CASELLA WASTE SYSTEMS, INC. By: Its Vice President

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 3945 ~~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. Boyja
Name:

Name:

Name:

Name:

NEWSME LANDFILL OPERATIONS, LLC.

By____________

TOWN of ALTON, MAINE

By____________
Selectman

By Ronald F. Boyja
Selectman

By James T. Kennedy Sr.
Selectman

STATE OF MAINE

By Martha Freeman

APPENDIX P

LIABILITY INSURANCE

CERTIFICATE OF LIABILITY INSURANCE

ACORD®

DATE (MM/DD/YYYY): 4/30/2015

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 W. Johnson, Inc.
119 River Street
P.O. Box 279
Montpelier VT 05601-0279

CONTACT NAME: Dayle Smedy
PHONE (A/C, No, Ext): (802)223-7735 FAX (A/C, No): (802)223-7515
E-MAIL ADDRESS: dsmedy@nwjinsurance.com
PRODUCER CUSTOMER ID #: 00004029

INSURED

NEWSME Landfill Operations, LLC
dba Juniper Ridge Landfill
2828 Bennoch Rd
Old Town ME 04468

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : Lexington Insurance Co.	19437
INSURER B : Old Republic Insurance Co.	24147
INSURER C : Steadfast Insurance Co.	26387
INSURER D :	
INSURER E :	
INSURER F :	

COVERAGES **CERTIFICATE NUMBER:** Juniper Ridge LF 2015#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 INSR	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	**GENERAL LIABILITY** X COMMERCIAL GENERAL LIABILITY CLAIMS-MADE X OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: X POLICY PRO-JECT LOC	X		082695204	4/30/2015	4/30/2016	EACH OCCURRENCE	$ 3,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	$ 1,000,000
							MED EXP (Any one person)	$ 5,000
							PERSONAL & ADV INJURY	$ 3,000,000
							GENERAL AGGREGATE	$ 3,000,000
							PRODUCTS - COMP/OP AGG	$ 3,000,000
								$
B	**AUTOMOBILE LIABILITY** X ANY AUTO ALL OWNED AUTOS SCHEDULED AUTOS X HIRED AUTOS X NON-OWNED AUTOS X MCS-90	X		MWTB301234	1/1/2015	1/1/2016	COMBINED SINGLE LIMIT (Ea accident)	$ 3,000,000
							BODILY INJURY (Per person)	$
							BODILY INJURY (Per accident)	$
							PROPERTY DAMAGE (Per accident)	$
								$
								$
	UMBRELLA LIAB / OCCUR EXCESS LIAB / CLAIMS-MADE DEDUCTIBLE RETENTION $						EACH OCCURRENCE	$
							AGGREGATE	$
								$
								$
B	**WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** Y/N ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N **(Mandatory in NH)** If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		MWC30339200	1/1/2015	1/1/2016	X WC STATU-TORY LIMITS / OTH-ER	
							E.L. EACH ACCIDENT	$ 1,000,000
							E.L. DISEASE - EA EMPLOYEE	$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	$ 1,000,000
C	POLLUTION LIABILITY			EPC3564969-16	4/30/2015	4/30/2016	$13,000,000/$13,000,000	
C	Professional Liability			PEC5979843-12	4/30/2015	4/30/2016	$5,000,000/$5,000,000	

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)

CERTIFICATE HOLDER

Maine Department of
Environmental Protection
State House Station 17
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/AMANDA

APPENDIX Q

CIVIL AND CRIMINAL DISCLOSURE STATEMENT

Criminal or Civil Record for the Bureau of General Services

July 2015

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. Anny 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.

7. 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

May 2015

Applicant: NEWSME Landfill Operations LLC
Immediate 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:

DIRECTORS

John W. Casella Director	Edwin Johnson Director

OFFICERS

John W. Casella President Secretary	Brian Oliver Vice President	Edmond Coletta Vice President Treasurer	Edwin Johnson Vice President

PERSONS with MANAGERIAL / EXECUTIVE AUTHORITY:

Regional Vice President: Brian Oliver

EQUITY / DEBT OWNERSHIP:

One Hundred Percent of the Equity in NEWSME Landfill Operations, LLC is held by New England Waste Services of ME, Inc. A disclosure form is attached with respect to 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 9th day of June, 2015

John W. Casella, President and Secretary
NEWSME Landfill Operations, LLC

STATE OF VERMONT
COUNTY OF RUTLAND

On the 9th day of June, 2015, personally appeared John W. Casella, President and Secretary of NEWSME Landfill Operations, LLC and acknowledged the foregoing to be his free act and deed and the free act and deed of NEWSME Landfill Operations, LLC.

Patricia Belden
Notary Public

PATRICIA BELDEN
Notary Public, State of Vermont
My Commission Expires Feb. 10, 2019

Maine Disclosure Form

Name	**NEWSME Landfill Operations, LLC**	
Business Address	358 Emerson Mill Road, Hampden, Maine, 04444	
Home Address (if app.)	Not Applicable	
Date of Formation	September 18, 2003	
Social Security or Tax ID	20-0735025	
Criminal Convictions	No	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
	xxxxx	
Civil Violations	Explain any adjudicated civil violation(s) of environmental laws or rules administered by the State, other states, the United States or another country 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.	
	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	
Civil Proceedings:	**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 wastes and any other information required by the Department of the Attorney General that relates to the enforcement history or character of the applicant.	
	Army Corps of Engineers **U.S. Environmental Protection Agency** **U.S. Fish & Wildlife**	
	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. The Company believes that it is currently in substantial compliance with applicable Federal, state and local environmental laws, permits, orders and regulations.	
Entities in Which Person or Entity Executing Disclosure has 5% or Greater Equity Interest	**None**	

State of Maine
Department of Environmental Protection
Disclosure Statement for New England Waste Services of ME, Inc.

May 2015

Applicant: NEWSME Landfill Operations LLC

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 New England Waste Services of ME, Inc:

DIRECTORS

John W. Casella Director	Edwin D. Johnson Director

OFFICERS

John W. Casella President Secretary	Brian Oliver Vice President	Edwin Johnson Vice President	Edmond R. Coletta Vice President Treasurer

PERSONS with MANAGERIAL / EXECUTIVE AUTHORITY:

Regional Vice President: Brian Oliver

EQUITY / DEBT OWNERSHIP:

One Hundred Percent of the Equity in New England Waste Services of ME, Inc. is held by Casella Waste Systems, 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 9th day of June, 2015

John W. Casella, President and Secretary
New England Waste Services of ME, Inc.

STATE OF VERMONT
COUNTY OF RUTLAND

On the 9th day of June, 2015, personally appeared John W. Casella, President and Secretary of New England Waste Services of ME, Inc. and acknowledged the foregoing to be his free act and deed and the free act and deed of New England Waste Services of ME, Inc.

Patricia Belden
Notary Public

PATRICIA BELDEN
Notary Public, State of Vermont
My Commission Expires Feb. 10, 2019

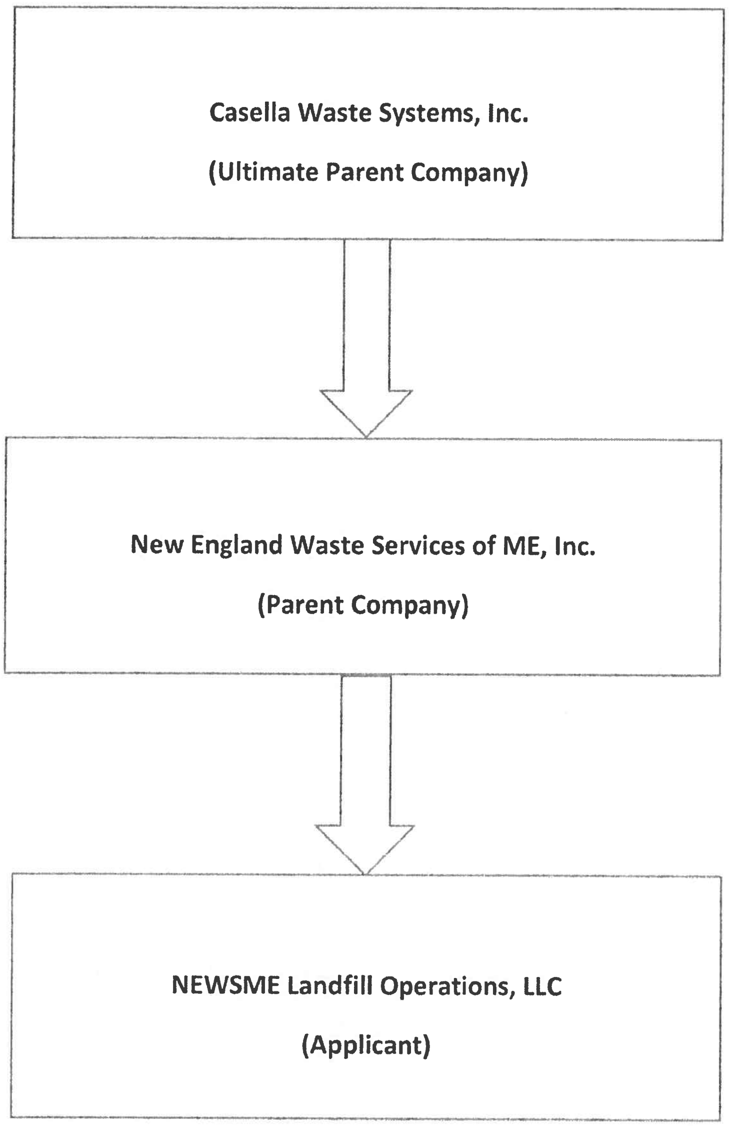
Maine Disclosure Form

Name	**New England Waste Services of ME, Inc.**	
Business Address	135 Presumpscot Street, Unit #1, Portland, ME 04102	
Home Address (if app.)	Not Applicable	
Date of Birth	Incorporated October 11, 1974	
Social Security or Tax ID	01-0329311	
Criminal Convictions	No	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
	xxxxx	
Civil Violations	Explain any adjudicated civil violation(s) of environmental laws or rules administered by the State, other states, the United States or another country 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	
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.	
Civil Proceeding:	**Please see attached**	
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 wastes and any other information required by the Department of the Attorney General that relates to the enforcement history or character of the applicant.	
	Army Corps of Engineers **U.S. Environmental Protection Agency** **U.S. Fish & Wildlife**	
Entities in Which Person or Entity Executing Disclosure has 5% or Greater Equity Interest	**New England Waste Services of ME, Inc. is the owner of:** **NEWSME Landfill Operations LLC (Applicant) and** **Lewiston Landfill LLC** **Pinetree Landfill is a D/B/A of New England Waste Services of ME, Inc.**	

New England Waste Service of ME, Inc.
5 Year Environmental Compliance History

Name of Entity Cited	Location of Alleged Violation	Name of Citing Entity	Type of Notice	Date of Inspection or Incident	Date of Violation/Order	Nature of Violation/Alleged Violation	Disposition	Penalty
New England Waste Services of ME, Inc. (aka Pinetree Landfill)	Pinetree Landfill, Hampden, ME	Town of Brewer, Maine WWTF	Notice of Violation	February 1, 2010	April 1, 2010	NOV issued to PTLF for leachate analysis above allowable arsenic level	Analysis level was 0.102 mg/L which was 0.002 mg/L above the limit of 0.1 mg/L, although the overall average was 0.0951 mg/L. We responded in writing on April 6, 2010; within 10 days of issuance as required in the NOV.	None
New England Waste Services of ME, Inc. (aka Pinetree Landfill)	Pinetree Landfill, Hampden, ME	Bangor WWTF	Notice of Violation	June 22, 2012	June 29, 2012	Notice of Violation was issued by the Bangor WWTF to NEWSME for releasing a load of tank bottom sludge from the leachate storage tank during routine leachate tank cleaning June 20-21, 2012.	Response submitted. See Response to July 9, 2012 Administrative Order below.	None
New England Waste Services of ME, Inc. (aka Pinetree Landfill)	Pinetree Landfill, Hampden, ME	Town of Hermon, Me	Administrative Order	May 2, 2011	July 9, 2012	Administrative Order (AO) issued to NEWSME (Pinetree Landfill) by the Town of Hermon for allegedly releasing a slug of tank bottom sludge during routine leachate tank cleaning. Leachate from the landfill is piped to the Bangor WWTF via Hermon sewer system.	Response was submitted on July 20, 2012 - PTL disagreed with the allegations outlined in the AO; no maintenance activities resulted in any release of sludge. Any discharge to the Hermon WWTF was landfill leachate, any and all sludge from the cleaning was disposed of at the Juniper Ridge Landfill. Copies of disposal tickets were provided with the response. The Town of Hermon responded stating that they disagreed with the PTL's position that the conditions of the AO remain fully active; they requested that the submission of the Standard Operating Procedures that indicates how any release will be prevented during future maintenance activities be submitted by August 10th, 2012. PTL staff met with the Town of Hermon on August 6th, 2012.	None
New England Waste Services of ME, Inc. (aka Pinetree Landfill)	Pinetree Landfill, Hampden, ME	City of Bangor WTP	Notice of Violation	N/A	April 22, 2013	PTL failed to sample and submit results for Total Phosphorous and vanadium during the first quarter of 2013.	Savee & Maher Engineers, Inc. inadvertently omitted the vanadium and total phosphorous analysis from the analysis request form that was submitted to the Laboratory. They tried to contact the lab to retrieve the data for vanadium and total phosphorous but the lab was unable to retrieve the data.	None
New England Waste Services of ME, Inc. (aka Pinetree Landfill)	Pine Tree Landfill Hampden, ME	Bangor WWTF	Notice of Violation	January 13, 2015	January 13, 2015	PTL exceeded the action level limit of .24 mg/l concentration for the pollutant arsenic.	PTL submitted a response outlining the actions taken to investigate potential sources of arsenic in leachate from the landfill.	None

Organizational Chart



Maine Disclosure Form

Name	John W. Casella	
Business Address	25 Greens Hill Lane, Rutland, Vermont 05701	
Home Address (if app.)	67 Ives Avenue, Rutland, Vermont 05701	
Date of Birth	12/05/1950	
Social Security or Tax ID		
Criminal Convictions	No	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
	xxxxx	
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 wastes and any other information required by the Department of the Attorney General that relates 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 05/14/2015	Signature
		John W. Casella

STATE OF VERMONT
COUNTY OF RUTLAND

On the 14th day of May, 2015, personally appeared John W. Casella and acknowledged the foregoing to be his free act and deed.

Patricia Belden
Notary Public

PATRICIA BELDEN
Notary Public, State of Vermont
My Commission Expires Feb. 10, 2019

Maine Disclosure Form

Name	Edwin Johnson	
Business Address	25 Greens Hill Lane, Rutland, Vermont 05701	
Home Address (if app.)	1161 Quarterline Road, Center Rutland, VT 05736	
Date of Birth	09/01/1956	
Social Security or Tax ID		
Criminal Convictions	No	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
	xxxxx	
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 wastes and any other information required by the Department of the Attorney General that relates 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 05/14/2015	Signature
		Edwin Johnson

STATE OF VERMONT
COUNTY OF RUTLAND

On the 14th day of May, 2015, personally appeared Edwin Johnson and acknowledged the foregoing to be his free act and deed.

Patricia Belden
Notary Public

PATRICIA BELDEN
Notary Public, State of Vermont
My Commission Expires Feb. 10, 2019

Maine Disclosure Form

Name	Edmond R. Coletta	
Business Address	25 Greens Hill Lane, Rutland, VT 05701	
Home Address (if app.)	240 Grove St., Rutland, VT 05701	
Date of Birth	11/15/1975	
Social Security or Tax ID		
Criminal Convictions	No	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
	xxxxx	
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 wastes and any other information required by the Department of the Attorney General that relates 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	None	
		Edmond R Coletta
	Date 05/14/2015	Signature
		Edmond R. Coletta

STATE OF VERMONT
COUNTY OF RUTLAND

On the 14th day of May 2015, personally appeared Edmond R. Coletta and acknowledged the foregoing to be his free act and deed.

Patricia Belden
Notary Public

PATRICIA BELDEN
Notary Public, State of Vermont
My Commission Expires Feb. 10, 2019

Maine Disclosure Form

Name	Brian Oliver	
Business Address	110 Main Street, Suite 1308, Saco, Maine 04072	
Home Address (if app.)	10 Dunn Estates Drive, Scarborough Maine 04074	
Date of Birth	07-23-1961	
Social Security or Tax ID		
Criminal Convictions	No	* If yes – Give date and explanation of conviction, together with the State in which the conviction occurred
	xxxxx	
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 wastes and any other information required by the Department of the Attorney General that relates 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	None	
	5/15/15 Date	Signature
		Brian G. Oliver

STATE OF
COUNTY OF

On the 15 day of May 2015, personally appeared Brian Oliver and acknowledged the foregoing to be his free act and deed.

Notary Public

DANIEL J. EMERSON
Notary Public, Maine
My Commission Expires November 18, 2018

APPENDIX R

FAA NOTIFICATION

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

May 14, 2015

14101
20150512 faa.doc

FAA Airport Planner for Maine
Attn: Mr. Ralph Nicosia-Rusin
FAA Airport Division
12 New England Executive Park
Burlington, Massachusetts 01803

Subject: Juniper Ridge Landfill Expansion, Old Town, Maine

Dear Mr. Nicosia-Rusin:

The State of Maine acting through the Bureau of General Services is proposing to expand the Juniper Ridge Landfill (JRL) located in Old Town, Maine. The JRL is owned by the State of Maine and operated by NEWSME Landfill Operations LLC (NEWSME) as a solid waste disposal facility for municipal, industrial, and special waste generated throughout the State of Maine (ref. Figure 1, Site Location Map). The proposed 54-acre Expansion will have a final waste elevation of 390 (datum NAVD 88), consistent with the current JRL. The Expansion has been designed to meet future solid waste disposal needs for the State of Maine, and to provide disposal capacity to extend the life of the existing 68-acre landfill facility for approximately 10 to 12 years. The proposed Expansion is approximately 2-1/2 miles northwest of the Dewitt Field Airport in Old Town, Maine. This notice is being sent in accordance with the requirements of the Maine Department of Environmental Protection (MEDEP) Solid Waste Management Rules Section 401.1.D(4), which requires "Applicants must notify the effected airport and the Federal Aviation Administration (FAA) whenever a new landfill or expansion of an existing landfill is proposed within a 5-mile radius of any airport runway." Please let us know in writing if there are any additional notifications or applications this project will require from the FAA. If you have any questions or require additional information regarding this matter, please do not hesitate to contact us at (207 829-5016).

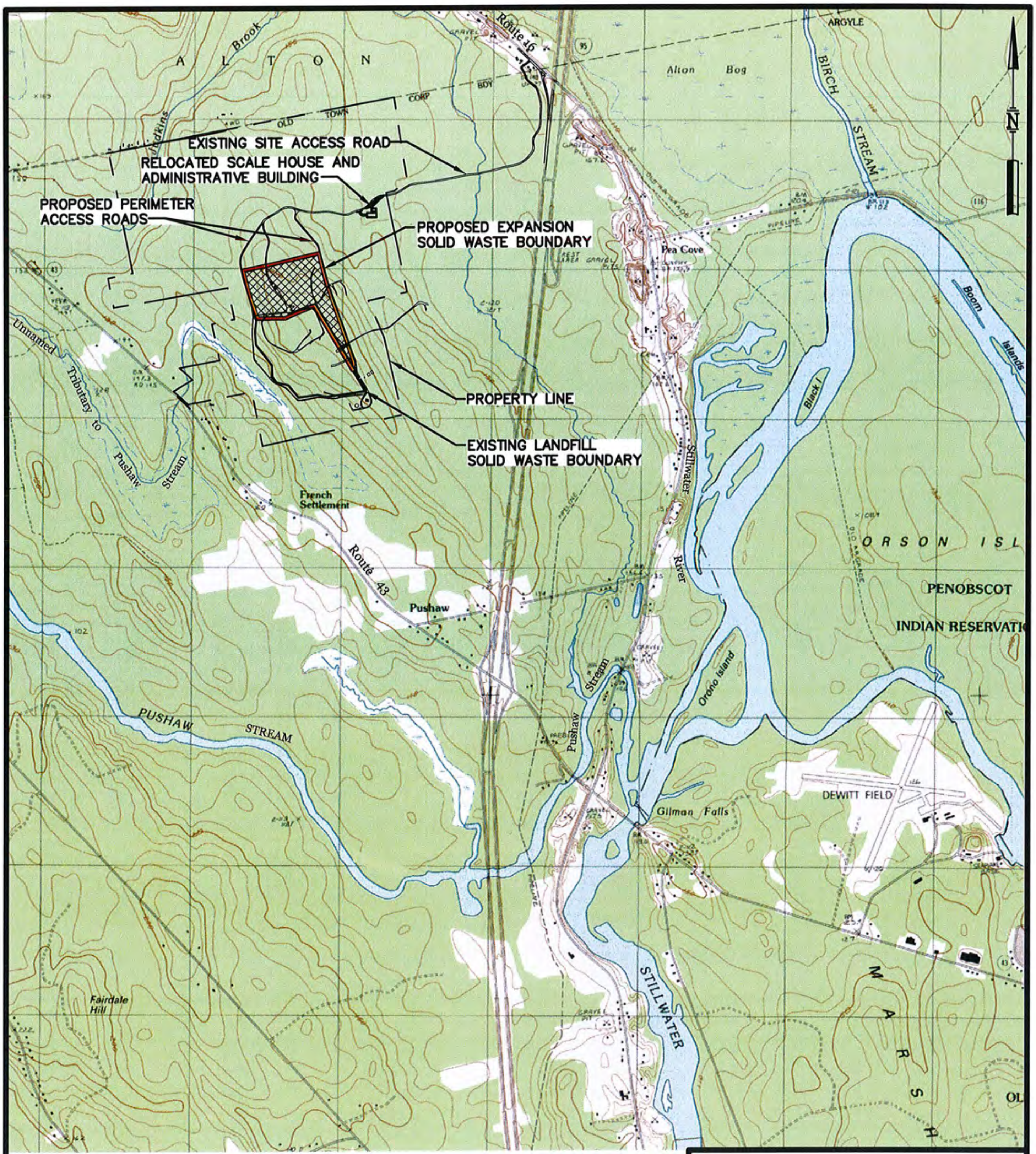
Very truly yours,

SEVEE & MAHER ENGINEERS, INC.

Michael Booth, P.E.
Project Engineer
(cont'd)

4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021 • Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

cc: Lance Farrar, Dewitt Field Airport, Old Town, Maine
Michael Barden, BGS
Don Meagher, NEWSME
David Russell, City of Old Town



NOTE:

BASE MAP ADAPTED FROM 7.5 MIN USGS TOPOGRAPHIC QUADRANGLE OLD TOWN, MAINE–1988

1500 0 3000 6000 FEET

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

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

DWG: SITELOC	LMN: SITELOC	CTB: SME–STD	REV: 5/14/2015

\\Nserver\CFS\Casella\OldTownLandfill\Expansion\9.35MCY-Expansion\Acad\Figures\SITELOC.dwg, 5/14/2015 12:58:16 PM, paf

APPENDIX S

AERIAL PHOTOGRAPHS

150 0 300 600 FEET

AERIAL PHOTO
JUNIPER RIDGE LANDFILL
EXPANSION
OLD TOWN, MAINE

NOTE:

AERIAL IMAGES FROM AERIAL SURVEY & PHOTO, INC., NORRIDGEWOCK, MAINE, DATED MAY 2, 2015, IN STEREO COVERAGE AT A SCALE OF 1"=500'±. THE IMAGES ARE RELATIVE, SO ANY DISCREPANCY IN PLACEMENT IS A DIRECT RESULT IF DISTORTION IN THE RAW IMAGERY SO SCALE IS APPROXIMATE.

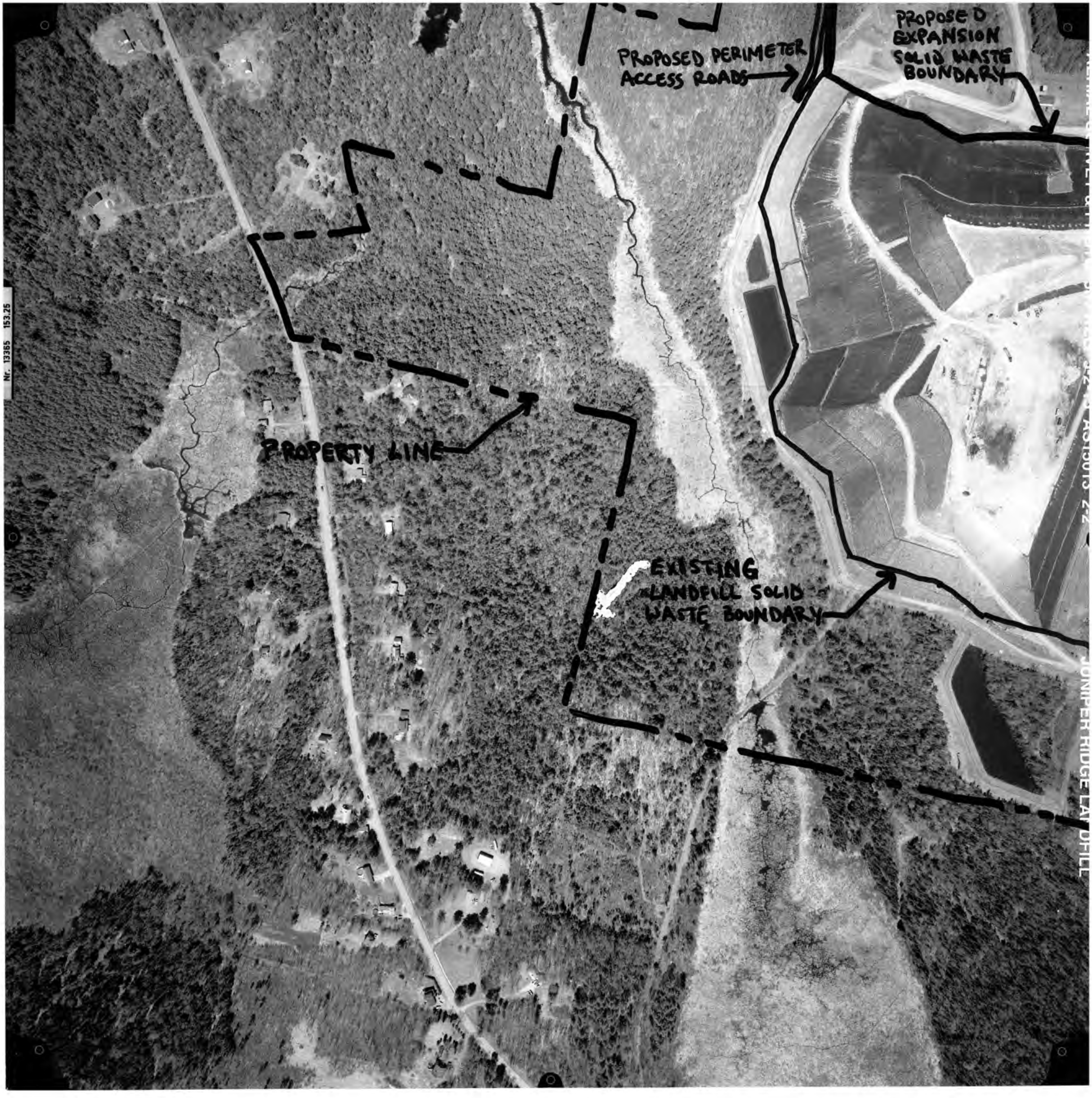
SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE
4 Blanchard Road, PO Box 85A, Cumberland Center, Maine 04021
Phone 207.829.5016 • Fax 207.829.5692 • www.smemaine.com

DWG: AERIAL LMN: AERIAL CTB: SME-STD REV: 7/2/2015


AERIAL SURVEY & PHOTO 500 NEG
AS15013 1-2
JUNIPER RIDGE LANDFILL
PROPOSED PERIMETER ACCESS ROADS
PROPERTY LINE
PROPOSED EXPANSION SOLID WASTE BOUNDARY
EXISTING LANDFILL SOLID WASTE BOUNDARY


PROPOSED PERIMETER ACCESS ROADS
PROPOSED EXPANSION SOLID WASTE BOUNDARY
RELOCATED SCALES AND ADMINISTRATIVE BUILDING
PROPERTY LINE
JUNIPER RIDGE LANDFILL


PROPERTY LINE
AERIAL SURVEY & PHOTO 500 NEG 5-2-15 AS15013 2-3
JUNIPER RIDGE LANDFILL


PROPOSED EXPANSION SOLID WASTE BOUNDARY
PROPOSED PERIMETER ACCESS ROADS
PROPERTY LINE
EXISTING LANDFILL SOLID WASTE BOUNDARY
JUNIPER RIDGE LANDFILL
Nr. 13365 153.25


PROPOSED PERIMETER ACCESS ROADS
PROPOSED EXPANSION SOLID WASTE BOUNDARY
PROPOSED PERIMETER ACCESS ROADS
EXISTING LANDFILL SOLID WASTE BOUNDARY
PROPERTY LINE
AERIAL SURVEY & PHOTO 5-10 NEG 5-2-15 AS15013 2-3 JUNIPER RIDGE LANDFILL
Nr. 13365 153.25