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CIVIL ENGINEERING • SURVEYING • LANDSCAPE ARCHITECTURE

# STORMWATER MANAGEMENT REPORT

# For

# INDOOR RECREATION COMPLEX
# ARUNDEL, MAINE

Prepared for:

BDF Holdings, LLC
4 Jeffreys Way
Kennebunk, Maine 04043

Prepared by:

Sebago Technics, Inc.
75 John Roberts Rd, Suite 4A
South Portland, ME 04106

**June 2024**


06/12/2024

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# STORMWATER MANAGEMENT REPORT
# INDOOR RECREATION COMPLEX
# ARUNDEL, MAINE

## 1. Introduction

This amended Stormwater Management Plan Report has been prepared for BDF Holdings, LLC to address the potential impacts associated with the proposed development located at Heavy Hammer Lane in Arundel. The stormwater management approach outlined in this report has been designed to suit and to comply with applicable regulatory requirements.

## 2. Existing Conditions

The existing site, as known as Lot 4, is part of a 4-lot subdivision with approximately 30 acres in totality and is accessed from Heavy Hammer Lane, off of Alfred Road (US Route 111) in Arundel, Maine. Lot 1 is a house lot accessed off Alfred Road, Lot 2 is a commercial space accessed off Heavy Hammer Lane, and lots 3 and 4 are undeveloped and accessed off Heavy Hammer Lane with approved site plans with the Town of Arundel.

The project site is bounded by Alfred Road to the north, New Road residents to the east and south, and wooded areas to the west. Under existing conditions, runoff from the site flows in two directions; northeast towards the existing stream and southwest towards existing wetlands. The topography of the site varies throughout the parcel with minimum slopes between 2% and 7% and maximum slopes 33% or greater.

The site is identified as Zone X (outside 500-year floodplain) per the FEMA Flood Insurance Rate Map for the Town of Arundel, Maine, York County, Community Panel Number 230192-0005-C with an effective date of effective date June 4, 1996.

## 3. Soils

Soil characteristics were obtained from the USDA United States Department of Agriculture and Natural Resources Conservation Service's (NRCS) Web Soil Survey. The Hydrologic Groups (HSG) of the soils is classified by Technical Release TR-55 of the Soil Conservation Service as follows:

| Soil Type | Symbol | HSG | Drainage Class |
|---|---|---|---|
| Allagash | AlB | B | Well drained |
| Elmwood | EmB | B | Moderately well drained |
| Lyman-Rock | LyB | D | Somewhat excessively drained |
| Lyman-Rock | LyC | D | Somewhat excessively drained |
| Lyman-Rock | LyE | D | Somewhat excessively drained |
| Skerry | SkB | C/D | Moderately well drained |

Hydrologic Soil Group boundaries are delineated on the Watershed Map. The NRCS Soil Report is included in Appendix 4.

## 4. Proposed Site Improvements

The proposed development will focus on Lot 4. In the previously approved site plan application, Lot 4 had proposed one 4,800 square-foot building with an apartment and office space as well as a 12' x 60' lean-to off the side, one 10,000 square-foot warehouse building, and a 7-unit campground with associated parking, utilities, and stormwater.

This amendment proposes to change the 10,000 square-foot warehouse into an indoor sports complex and remove the campground entirely. Associated parking, private utilities, and landscaped areas are proposed changes to Lot 4 from the previous application. The amended project will result in the creation of +/- 2.97 acres of impervious area and +/- 5.61 acres of developed area. As a result of these areas being close to the previously designed and approved plans, stormwater infrastructure remained the same sizes as previously approved. The wet pond is designed to treat and detain areas from Lot 4 and Lot 3. Lot 3 development has been previously approved by the Arundel Planning Board, this report and model accounts for approximately 50,000 square feet of impervious area and 15,000 square feet of landscaped area.

The project's Stormwater Management Plan is designed to use infrastructure, a wet pond, one underdrained soil filter, and a stone drip edge to be able to adequately treat, control, and detain stormwater runoff from the proposed site improvements.

## 5. Existing Conditions Model

The existing conditions watershed plan consists of five (5) sub catchments labeled 1.0 through 5.0, respectively. Five locations were identified as Study Points (SP) for comparing peak runoff rates.

SP1 is located along the northeasterly boundary of the parcel representing stormwater drainage entering the unnamed stream identified in the northeastern corner of the site.

SP2 is located along the northeasterly boundary of the parcel representing stormwater drainage running off the parcel toward residential house lots accessed off New Road.

SP3 is located along the easterly boundary of the parcel representing stormwater drainage running off the parcel toward residential house lots accessed off New Road.

SP4 is located along the southeasterly boundary of the parcel representing stormwater drainage running off the parcel toward residential houses accessed off New Road.

SP5 is located along the southwesterly boundary of the parcel representing stormwater drainage entering the stream identified in the southwestern corner of the site.

## 6. Proposed Conditions Model

The post-conditions watershed area consists of the same overall area as the pre-conditions plan, however, the pre-conditions catchments have been broken into smaller watersheds, subcatchments, as a result of the proposed development.

SP1, made up of subcatchments 1.1S, 1.2S, and 1.4S is located along the eastern boundary of the parcel representing stormwater drainage entering the stream identified in the northeastern corner of the site. Approximately 8.1 acres drain to SP1.

SP2, made up of subcatchment 2.0S, is located along the eastern boundary of the parcel representing stormwater drainage running off the parcel toward residential homes accessed off New Road. Approximately 0.7 acres drain to SP2.

SP3, made up of subcatchments 3.0S, 3.1S, 3.2S and 1.3S is located along the eastern boundary of the parcel representing stormwater drainage running off the parcel toward residential homes accessed off New Road. Approximately 6.4 acres drain to SP3..

SP4, made up of subcatchment 4.0S, is located along the south eastern boundary of the parcel representing stormwater drainage running off the parcel toward residential homes accessed off New Road. Approximately 3.2 acres drain to SP4.

SP5, made up of subcatchment 5.0S, is located along the south western boundary of the parcel representing stormwater drainage entering the stream identified in the southwestern corner of the site. Approximately 16.0 acres drain to SP5.

The Best Management Practices, including a wet pond, an underdrained soil filter, and a drip edge, used in this plan have been designed and sized in accordance with DEP BMP standards contained within Chapter 500 and the BMP Manual. Sizing calculations can be found in Appendix 1.

## 7. Stormwater Management

Basic Standard - Chapter 500, Section 4(B)

Since the project will disturb more than one (1) acre of land area, MDEP Basic Standards apply, requiring that grading or other construction activities on the site do not impede or otherwise alter drainage ways to have an unreasonable adverse impact. We have avoided adverse impacts by providing an Erosion & Sedimentation Control Plan, and an Inspection, Maintenance and Housekeeping Plan (Appendix 3) to be implemented during construction and post-construction stabilization of the site. These construction requirements have been developed following Best Management Practice guidelines.

General Standard - Chapter 500, Section 4(C)

Since the project will create more than one (1) acre of impervious surface, MDEP General Standards apply, which require a project's stormwater management system to include treatment measures that will mitigate for the increased frequency and duration of channel erosive flows due to runoff from smaller storms, provide for effective treatment of pollutants in stormwater, and mitigate potential temperature impacts. The General Standards require treatment of no less than 95% of the site's created impervious area and no less than 80% of the site's created developed area (landscaped area and impervious area combined). To mitigate the changes in hydrologic patterns due to the development of this project, one underdrained soil filter, one wet pond, and one roof drip edge have been implemented into the stormwater management infrastructure.

BMP sizing and treatment calculations are provided in Appendix 1.

Through the use of the aforementioned BMP's 98% of new impervious area and 83% of new developed area will be receiving treatment. This meets the requirements for the Maine DEP General Standards.

Flooding Standard - Chapter 500, Section 4(F)

The proposed development will comply with the MDEP and the Town of Arundel Flooding Standards. The Flooding Standard requires a project's stormwater management system detain, retain, or result in the infiltration of stormwater from 24-hour storms of the 5, 10, and 25-year frequencies such that the peak flows of stormwater from the project site do not exceed the peak flows of stormwater prior to undertaking the project. As such, a runoff evaluation was performed using the methodology outlined in the USDA Soil Conservation Service's "Urban Hydrology for Small Watersheds - Technical Release #55 (TR-55)". HydroCAD computer software was utilized to perform the calculations.

Runoff curve numbers were determined for each of the watersheds by measuring the area of each hydrologic soil group within each type of land cover. The type of land cover was determined based on survey data, field reconnaissance, and aerial photography. Times of concentration were determined from site topographic maps in accordance with SCS procedures.

The 24-hour rainfall values utilized in the hydrologic model were obtained from Appendix H of MDEP's Chapter 500: Stormwater Management (effective date August 2015). Rainfall values for York County are listed in the table below.

| **Storm Frequency Precipitation (in./24 hr) York County** | |
|---|---|
| 2-year | 3.3 |
| 10-year | 4.9 |
| 25-year | 6.2 |

The following table presents the results of the peak runoff calculations at the analysis points for the existing and proposed conditions.

The HydroCAD Data output sheets from this analysis are appended to this report (Appendix 2A and 2B) along with the Stormwater Management Plans (Appendix 5). The model predicts that the peak runoff rates in the post-development condition at Study Points 1 through 5 are at or below pre-development peak runoff rates for the 2, 10, and 25-year storm events with implantation of the proposed stormwater management practices.

| Stormwater Peak Discharge Summary Table | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Study Point** | **2-Year Storm** | | | **10-Year Storm** | | | **25-Year Storm** | | |
| | **Pre (cfs)** | **Post (cfs)** | **Diff. (cfs)** | **Pre (cfs)** | **Post (cfs)** | **Diff. (cfs)** | **Pre (cfs)** | **Post (cfs)** | **Diff. (cfs)** |
| SP1 | 6.6 | 4.0 | -2.6 | 15.5 | 10.6 | -4.9 | 23.7 | 17.4 | -6.3 |
| SP2 | 0.3 | 0.1 | -0.2 | 1.1 | 0.7 | -0.4 | 1.9 | 1.3 | -0.6 |
| SP3 | 3.4 | 1.7 | -1.7 | 6.9 | 5.3 | -1.6 | 10.0 | 8.6 | -1.4 |
| SP4 | 4.7 | 4.7 | 0.0 | 9.6 | 9.6 | 0.0 | 13.8 | 13.8 | 0.0 |
| SP5 | 10.6 | 10.2 | -0.4 | 25.6 | 24.7 | -0.9 | 39.4 | 38.0 | -1.4 |

## 8. Summary

The proposed amended development has been designed to manage stormwater runoff through Best Management Practices approved by MDEP. Stormwater BMP's provide treatment to 98% (95% required) of impervious areas, and 83% (80% required) of the total developed area. Peak runoff rates discharging from the site will be at or below pre-development conditions for the 2, 10, and 25-year storm events at all study points. Additionally, erosion and sedimentation controls along with associated maintenance and housekeeping procedures have been outlined to prevent unreasonable impacts on the site and to the surrounding environment.

Prepared by:

SEBAGO TECHNICS, INC.

Kailey M. Daigle, EI
Civil Engineer

Christopher P. Taylor, PE
Project Manager

KMD/CPT

# Appendix 1

## Stormwater Quality Calculations

**Table 1: MDEP GENERAL STANDARD CALCULATIONS**

**Job # 20126-03**

| AREA ID | WATERSHED SIZE (S.F.) | EXISTING ONSITE IMPERVIOUS AREA TO REMAIN (S.F.) | NEW ONSITE IMPERVIOUS AREA (S.F.) | EXISTING ONSITE LANDSCAPED AREA TO REMAIN (S.F.) | NEW ONSITE LANDSCAPED AREA (S.F.) | NET NEW DEVELOPED AREA (S.F.) | NET EXISTING DEVELOPED AREAS (S.F.) | TREATMENT PROVIDED? | IMPERVIOUS AREA TREATED (S.F.) | LANDSCAPED AREA TREATED (S.F.) | DEVELOPED AREA TREATED (S.F.) | TREATMENT BMP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1.1** | 196,523 | 20,126 | 6,417 | 7,960 | 25,101 | 31,518 | 28,086 | NO | 0 | 0 | 0 | |
| **1.2** | 127,441 | 16,409 | 0 | 25,260 | 4,141 | 4,141 | 41,669 | NO | 0 | 0 | 0 | |
| **1.3** | 52,377 | 0 | 49,020 | 0 | 3,357 | 52,377 | 0 | YES | 49,020 | 3,357 | 52,377 | WP |
| **1.4** | 30,721 | 4,278 | 4,927 | 5,787 | 15,729 | 20,656 | 10,065 | YES | 9,205 | 21,516 | 30,721 | UDSF1 |
| **2** | 31,059 | 0 | 0 | 0 | 3,950 | 3,950 | 0 | NO | 0 | 0 | 0 | |
| **3** | 50,414 | 0 | 0 | 0 | 7,567 | 7,567 | 0 | NO | 0 | 0 | 0 | |
| **3.1** | 170,420 | 0 | 62,849 | 0 | 48,506 | 111,355 | 0 | YES | 62,849 | 48,506 | 111,355 | WP |
| **3.2** | 5,962 | 0 | 5,962 | 0 | 0 | 5,962 | 0 | YES | 5,962 | 0 | 5,962 | DRIPEDGE |
| **4** | 140,104 | 0 | 0 | 0 | 0 | 0 | 0 | NO | 0 | 0 | 0 | |
| **5** | 695,624 | 0 | 0 | 0 | 3,990 | 3,990 | 0 | NO | 0 | 0 | 0 | |
| | | | | | | 0 | 0 | NO | 0 | 0 | 0 | |
| | | | | | | 0 | 0 | NO | 0 | 0 | 0 | |
| | | | | | | 0 | 0 | NO | 0 | 0 | 0 | |
| | | | | | | 0 | 0 | NO | 0 | 0 | 0 | |
| | | | | | | 0 | 0 | NO | 0 | 0 | 0 | |
| | | | | | | 0 | 0 | NO | 0 | 0 | 0 | |
| | | | | | | 0 | 0 | NO | 0 | 0 | 0 | |
| | | | | | | | | | | | | |
| **TOTAL (S.F.)** | **1,500,645** | **40,813** | **129,175** | **39,007** | **112,341** | **241,516** | **79,820** | | **127,036** | **73,379** | **200,415** | |

| | | | |
|---|---|---|---|
| **TOTAL NEW IMPERVIOUS AREA (S.F.)** | **129,175** | **TOTAL DEVELOPED AREA (S.F.)** | **241,516** |
| **TOTAL IMPERVIOUS AREA RECEIVING TREATMENT (S.F.)** | **127,036** | **TOTAL AREA RECEIVING TREATMENT (S.F.)** | **200,415** |
| **% OF IMPERVIOUS AREA RECEIVING TREATMENT** | **98.34%** | **% OF AREA RECEIVING TREATMENT** | **82.98%** |

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South Portland, Maine 04106
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| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| JOB | 20126-03 | | | | | | | | | | | | | |
| SHEET NO. | 1 | | | | | | OF | 1 | | | | | | |
| CALCULATED BY | KMD | | | | | | DATE | 3/30/2023 | | | | | | |
| FILE NAME | | | | | | | PRNT DATE | 6/11/2024 | | | | | | |

**UNDERDRAINED SOIL FILTER**

Task: Calculate water quality volume per MDEP chapter 500 regulations

1. Maine DEP Chapter 500, Section 4.C.(3)(b)

References

a. "must detain a runoff volume equal to 1.0 inch times the subcatchment's impervious area plus 0.4 inch times the subcatchment's landscaped area"

2. Maine DEP Best Management Practices Stormwater Manual, Section 7.1

a. "surface should represent 5% of impervious area and 2% of landscaped area"

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tributary to Underdrained Filter | | UDSF1 | | | | | | | | | | | | |
| Landscaped Area | | 21,516.00 | SF | | | | | | | | | | | |
| Impervious Area | | 9,205.00 | SF | | | | | | | | | | | |
| Minimum Surface Area | | | | | | | | | | | | | | |
| Required | (2% X Landscaped + 5%" X Impervious) | | | | | | | | | | | | | |
| Total Landscaped Area | | 21,516.00 | SF | Area | 430.3 | SF | | | | | | | | |
| Total Impervious Area | | 9,205.00 | SF | Area | 460.3 | SF | | | | | | | | |
| Required Minimum Surface Area | | | | | 890.6 | SF | | | | | | | | |
| Provided Surface Area | | | | | 996.0 | SF | | | | | | | | |
| Treatment Volume | | | | | | | | | | | | | | |
| Required | (0.4" X Landscaped + 1.0" X Impervious) | | | | | | | | | | | | | |
| Landscaped Area | | 21,516.00 | SF | Volume | 717.2 | | | | | | | | | |
| Impervious Area | | 9,205.00 | SF | Volume | 767.1 | | | | | | | | | |
| Treatment Volume Required | | | | | 1,484.3 | CF | 0.034 | AF | | | | | | |
| Provided Treatment Volume | | | | | 2,151.0 | CF | ELEV. 195.50-197.00 | | | | | | | |
| Sediment Pre-Treatment | | | | | | | | | | | | | | |
| Per Reference 2, Chapter 7.1 | | "Pretreatment devices shall be provided to minimize discharge of sediment to the soil filter" | | | | | | | | | | | | |
| Annual Sediment Load: | | 55 cubic feet per acre per year of sanded area | | | | | | | | | | | | |
| Area to be sanded: | | 9,205.00 | SF | | | | | | | | | | | |
| Sediment Volume | | 12 | CF | | | | | | | | | | | |
| Provided | | 83 | CF | 6 | Inch Deep Forebay | | with area of | | | | 166 | sf | | |

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**(207) 856-0277 FAX (207) 856-2206**

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| CHECKED BY | CPT | | |
| FILE NAME | | PRINT DATE | 6/11/2024 |

*ORIFICE SIZING CALCULATION*

**Stormwater BMP:** UDSF 1

Orifice Equation $Q = CA\sqrt{(2gh)}$

Q = Rate of Discharge (cfs)
A = Orifice Area (sf)
G = Gravitational Constant (32.2 $ft/s^2$)
h = Depth of water above the flow line (center) of the orifice (ft)
C = 0.6 Orifice coefficient (usually assumed = 0.6)

Average discharge rate required to drawdown the treatment volume in a desired amount of time is:

$$Q = \frac{WQv}{Tcf}$$

TV = Treatment Volume (cf)
T = Target Drain Time (Hours)
cf = Conversion Factor = 3600 sec/hr

TV = 1,484 cf
t = 24 hr

$$Q = \frac{TV}{tCF}$$ 0.02 cfs Target Rate for 24 hour discharge

surface area of filter = 996 SF

hmax = 1.49 ft h/2= 0.74 ft

$$A = \frac{Q}{C\sqrt{(2gh)}}$$ A = 0.004 sf = 0.60 sq. in.

Diam = 0.87 in

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| FILE NAME | | PRNT DATE | 6/11/2024 |

## Treatment Calculations for Proposed Roof Drip Edge Filter

Water Quality Volume Calculation

| | | | |
|---|---|---|---|
| Total Impervious Area | 5,962 | SF | |
| WQV Required = 1" x Impervious Area | | | |
| WQV Required | 496.8 | CF | |
| Length of Trench | 120.0 | FT | |
| Width of Trench | 7.5 | FT | |
| Depth of Stone | 1.0 | FT | 40% porosity |
| Depth of Sand Media | 1.0 | FT | 25% porosity |

*WQV Provided = Area of Trench x (Depth of Stone x Stone Porosity + Depth of Sand x Sand Porosity)

| | | |
|---|---|---|
| Total WQV Provided | 585.0 | CF |

*The stone reservoir volume for the drip edge filter was designed to provide the storage required to convey the water quality storm (storm that generates 1" of runoff over the roof) through the filter media under the stone, which is naturally sandy and well-drained.
**Capacity for large storm: To meet the Chapter 500 Flooding Standards requirements, the reservoir needs to provide a minimum storage capacity for the direct entry of the rain precipitation from a 24-hour, 25-year storm (5 + inches) or an overflow may be needed or provided for.

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75 John Roberts Road Suite 4A
South Portland, Maine 04106
**Tel. (207) 200-2100**

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| FILE NAME | | PRNT DATE | 6/11/2024 |

Task: Calculate wetpond volumes based on MDEP Chapter 500 regulation

References 1. Maine DEP Chapter 500, Section 4.C.(3)(b)

a. "must detain, above a wetpond's permanent pool, a runoff volume equal to 1.0 inch times the subcatchment's impervious area plus 0.4 inch times the subcatchment's landscaped area"

b. "must have a storage volume below the permanent pool elevation at least equal to 2.0 inches times the subcatchment's impervious area plus 0.68 inches times the subcatchment's non-impervious developed area.

c. A mean depth of at least three feet and a length to width ratio of 3:1 or greater.

Tributary to Wetpond: WP

| | | | |
|---|---|---|---|
| Landscaped Area | 51,863.00 | SF | |
| Impervious Area | 111,869.00 | SF | |

Permanent Pool Volume (PPV)

Required (0.8" X Landscaped + 2.0" X Impervious)

| | | | | | |
|---|---|---|---|---|---|
| Total Landscaped Area | 51,863.00 | | Volume | 3,457.5 | |
| Total Impervious Area | 111,869.00 | | Volume | 18,644.8 | |
| | | PPV Required | | 22,102.4 | CF |
| | | Provided PPV | | 32,962.0 | CF |

(Elevation 185 to Elevation 191)

Water Quality Volume

Required (0.4" X Landscaped + 1.0" X Impervious)

| | | | | | | |
|---|---|---|---|---|---|---|
| Landscaped Area | 51,863.00 | | Volume (CF) | 1,729 | | |
| Impervious Area | 111,869.00 | | Volume (CF) | 9,322 | | |
| | | CPV Required | | 11,051 | 0.254 | AF |
| | | Provided Treatment Volume | | 14,916.0 | ELEV: 191 - 192.30 | |
| | | Length of underdrained gravel trench outlet | | 58.0 | LF | (8' Minimum) |
| | | (3 LF per 1,000 CF of CPV) | | | | |

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75 John Roberts Road Suite 4A
South Portland, Maine 04106
**Tel. (207) 200-2100**

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References 2. Maine DEP BMP Manual, Volume III, May 2016

Mean Depth Per Chapter 4 of Reference 2, Mean depth shall be the pond volume one foot below the permanent pool elevation divided by the pond surface area one foot below permanent pool elevation

| | | | |
|---|---|---|---|
| Permanent Pool Elevation: | 191.0 | | |
| Pond Volume at Elevation | 190.0 | Volume: | 24,745.0 CF |
| Pond Area at Elevation | 190.0 | Area: | 7,620.0 SF |
| | | Mean Depth: | 3.25 Feet |

Length to Width

"a minimum length to width ratio of 3:1" (Reference 1)

| | | |
|---|---|---|
| Wetpond Length | 170.0 | FT |
| Wetpond Width | 55.0 | FT |
| Length to Width Ratio | 3.09 | |

Sediment Pre-Treatment

Per Reference 2, Chapter 7.1 "Pretreatment devices shall be provided to minimize discharge of sediment to the soil filter"

| | | |
|---|---|---|
| Annual Sediment Load: | 55 cubic feet per acre per year of sanded area | |
| Area to be sanded: | 111,869.00 | SF |
| Sediment Volume | 141 | CF |
| Provided | 1,219 | CF |

12 Inch Deep Forebay with area of 1219 sf

**SEBAGO TECHNICS, INC.**
75 John Roberts Road, Suite 4A
South Portland, Maine 04106
**(207) 856-0277 FAX (207) 856-2206**

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| FILE NAME | 20126 WQC | PRINT DATE | 6/11/2024 |

*ORIFICE SIZING CALCULATION*

**Stormwater BMP:** Wetpond

Orifice Equation $Q = CA\sqrt{(2gh)}$

Q = Rate of Discharge (cfs)
A = Orifice Area (sf)
G = Gravitational Constant (32.2 $ft/s^2$)
h = Depth of water above the flow line (center) of the orifice (ft)
C = 0.6 Orifice coefficient (usually assumed = 0.6)

Average discharge rate required to drawdown the treatment volume in a desired amount of time is:

$$Q = \frac{WQv}{Tcf}$$

TV = Treatment Volume (cf)
T = Target Drain Time (Hours)
cf = Conversion Factor = 3600 sec/hr

TV = 12,632 cf
t = 24 hr

$$Q = \frac{TV}{tCF}$$ 0.15 cfs Target Rate for 24 hour discharge

surface area of filter = 2,504 SF

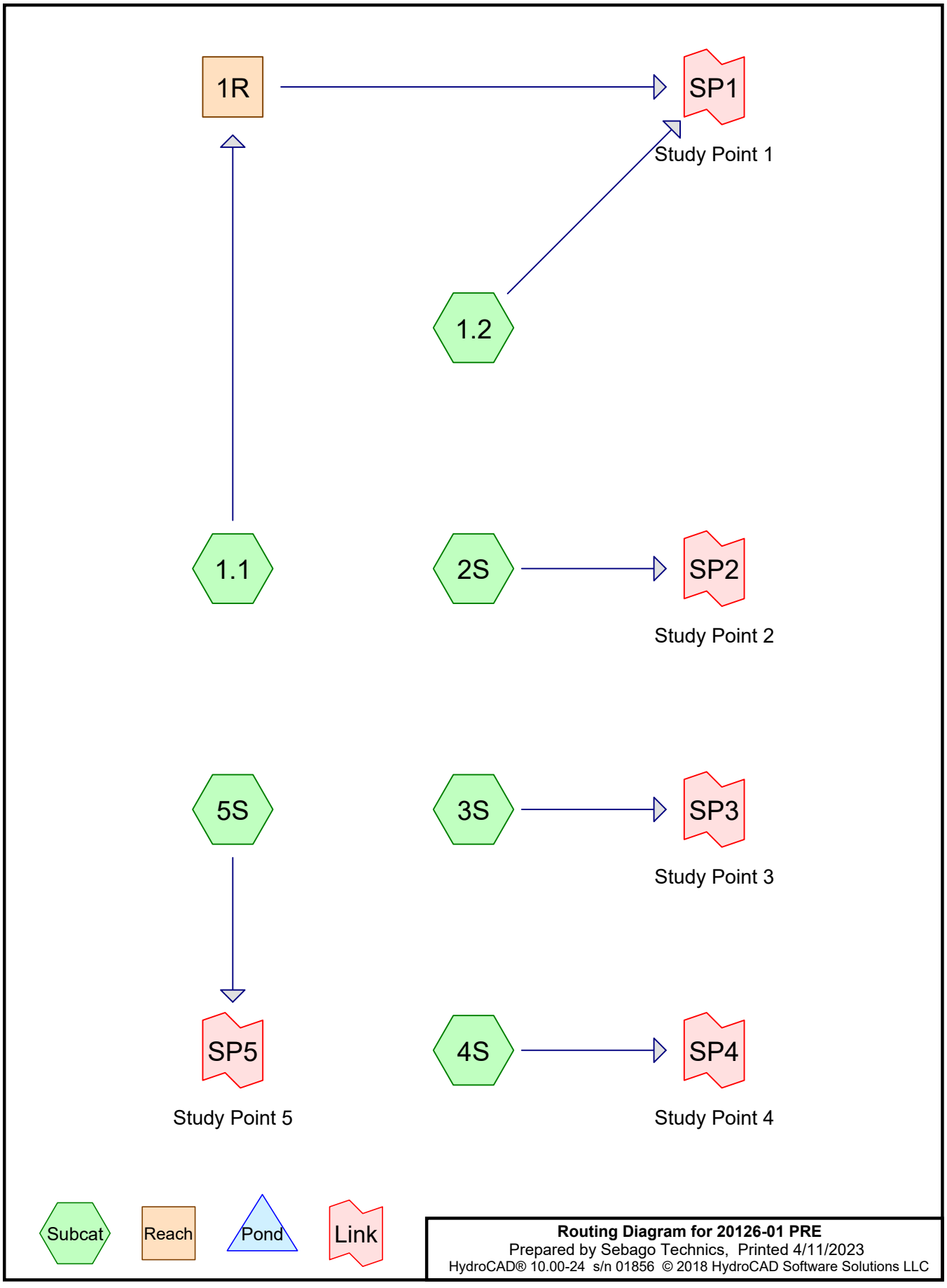
hmax = 5.04 ft h/2= 2.52 ft

$$A = \frac{Q}{C\sqrt{(2gh)}}$$ A = 0.019 sf = 2.75 sq. in.

| Diam = | 1.87 | in |
|---|---|---|

# Appendix 2A

## Existing Conditions
## HydroCAD Summary




**Routing Diagram for 20126-01 PRE**
Prepared by Sebago Technics, Printed 4/11/2023
HydroCAD® 10.00-24 s/n 01856 © 2018 HydroCAD Software Solutions LLC

## Area Listing (selected nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.646 | 61 | >75% Grass cover, Good, HSG B (1.1) |
| 1.173 | 80 | >75% Grass cover, Good, HSG D (1.1, 1.2) |
| 1.286 | 98 | Impervious Area (1.1, 1.2) |
| 9.924 | 55 | Woods, Good, HSG B (1.1, 1.2, 2S, 5S) |
| 21.420 | 77 | Woods, Good, HSG D (1.1, 1.2, 2S, 3S, 4S, 5S) |
| **34.450** | **71** | **TOTAL AREA** |

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1.1:** Runoff Area=317,407 sf 12.48% Impervious Runoff Depth=0.84"
Flow Length=759' Tc=24.6 min CN=69 Runoff=3.9 cfs 0.508 af

**Subcatchment1.2:** Runoff Area=160,799 sf 10.20% Impervious Runoff Depth=1.10"
Flow Length=814' Tc=25.4 min CN=74 Runoff=2.8 cfs 0.340 af

**Subcatchment2S:** Runoff Area=39,499 sf 0.00% Impervious Runoff Depth=0.49"
Flow Length=262' Tc=10.1 min CN=61 Runoff=0.3 cfs 0.037 af

**Subcatchment3S:** Runoff Area=122,651 sf 0.00% Impervious Runoff Depth=1.28"
Flow Length=396' Tc=11.7 min CN=77 Runoff=3.4 cfs 0.301 af

**Subcatchment4S:** Runoff Area=140,103 sf 0.00% Impervious Runoff Depth=1.28"
Flow Length=175' Tc=6.0 min CN=77 Runoff=4.7 cfs 0.344 af

**Subcatchment5S:** Runoff Area=720,186 sf 0.00% Impervious Runoff Depth=0.89"
Flow Length=1,221' Tc=19.0 min CN=70 Runoff=10.6 cfs 1.222 af

**Reach 1R:** Avg. Flow Depth=0.16' Max Vel=2.24 fps Inflow=3.9 cfs 0.508 af
n=0.035 L=480.0' S=0.0333 '/' Capacity=86.6 cfs Outflow=3.9 cfs 0.508 af

**Link SP1: Study Point 1** Inflow=6.6 cfs 0.848 af
Primary=6.6 cfs 0.848 af

**Link SP2: Study Point 2** Inflow=0.3 cfs 0.037 af
Primary=0.3 cfs 0.037 af

**Link SP3: Study Point 3** Inflow=3.4 cfs 0.301 af
Primary=3.4 cfs 0.301 af

**Link SP4: Study Point 4** Inflow=4.7 cfs 0.344 af
Primary=4.7 cfs 0.344 af

**Link SP5: Study Point 5** Inflow=10.6 cfs 1.222 af
Primary=10.6 cfs 1.222 af

**Total Runoff Area = 34.450 ac Runoff Volume = 2.751 af Average Runoff Depth = 0.96"**
**96.27% Pervious = 33.164 ac 3.73% Impervious = 1.286 ac**

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1.1:** Runoff Area=317,407 sf 12.48% Impervious Runoff Depth=1.89"
Flow Length=759' Tc=24.6 min CN=69 Runoff=9.6 cfs 1.145 af

**Subcatchment1.2:** Runoff Area=160,799 sf 10.20% Impervious Runoff Depth=2.28"
Flow Length=814' Tc=25.4 min CN=74 Runoff=6.0 cfs 0.703 af

**Subcatchment2S:** Runoff Area=39,499 sf 0.00% Impervious Runoff Depth=1.31"
Flow Length=262' Tc=10.1 min CN=61 Runoff=1.1 cfs 0.099 af

**Subcatchment3S:** Runoff Area=122,651 sf 0.00% Impervious Runoff Depth=2.54"
Flow Length=396' Tc=11.7 min CN=77 Runoff=6.9 cfs 0.596 af

**Subcatchment4S:** Runoff Area=140,103 sf 0.00% Impervious Runoff Depth=2.54"
Flow Length=175' Tc=6.0 min CN=77 Runoff=9.6 cfs 0.681 af

**Subcatchment5S:** Runoff Area=720,186 sf 0.00% Impervious Runoff Depth=1.96"
Flow Length=1,221' Tc=19.0 min CN=70 Runoff=25.6 cfs 2.704 af

**Reach 1R:** Avg. Flow Depth=0.28' Max Vel=3.15 fps Inflow=9.6 cfs 1.145 af
n=0.035 L=480.0' S=0.0333 '/' Capacity=86.6 cfs Outflow=9.6 cfs 1.145 af

**Link SP1: Study Point 1** Inflow=15.5 cfs 1.847 af
Primary=15.5 cfs 1.847 af

**Link SP2: Study Point 2** Inflow=1.1 cfs 0.099 af
Primary=1.1 cfs 0.099 af

**Link SP3: Study Point 3** Inflow=6.9 cfs 0.596 af
Primary=6.9 cfs 0.596 af

**Link SP4: Study Point 4** Inflow=9.6 cfs 0.681 af
Primary=9.6 cfs 0.681 af

**Link SP5: Study Point 5** Inflow=25.6 cfs 2.704 af
Primary=25.6 cfs 2.704 af

**Total Runoff Area = 34.450 ac Runoff Volume = 5.927 af Average Runoff Depth = 2.06"**
**96.27% Pervious = 33.164 ac 3.73% Impervious = 1.286 ac**

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment1.1:** Runoff Area=317,407 sf 12.48% Impervious Runoff Depth=2.87"
Flow Length=759' Tc=24.6 min CN=69 Runoff=15.0 cfs 1.742 af

**Subcatchment1.2:** Runoff Area=160,799 sf 10.20% Impervious Runoff Depth=3.35"
Flow Length=814' Tc=25.4 min CN=74 Runoff=8.8 cfs 1.032 af

**Subcatchment2S:** Runoff Area=39,499 sf 0.00% Impervious Runoff Depth=2.14"
Flow Length=262' Tc=10.1 min CN=61 Runoff=1.9 cfs 0.162 af

**Subcatchment3S:** Runoff Area=122,651 sf 0.00% Impervious Runoff Depth=3.65"
Flow Length=396' Tc=11.7 min CN=77 Runoff=10.0 cfs 0.857 af

**Subcatchment4S:** Runoff Area=140,103 sf 0.00% Impervious Runoff Depth=3.65"
Flow Length=175' Tc=6.0 min CN=77 Runoff=13.8 cfs 0.979 af

**Subcatchment5S:** Runoff Area=720,186 sf 0.00% Impervious Runoff Depth=2.96"
Flow Length=1,221' Tc=19.0 min CN=70 Runoff=39.4 cfs 4.085 af

**Reach 1R:** Avg. Flow Depth=0.36' Max Vel=3.69 fps Inflow=15.0 cfs 1.742 af
n=0.035 L=480.0' S=0.0333 '/' Capacity=86.6 cfs Outflow=14.9 cfs 1.742 af

**Link SP1: Study Point 1** Inflow=23.7 cfs 2.774 af
Primary=23.7 cfs 2.774 af

**Link SP2: Study Point 2** Inflow=1.9 cfs 0.162 af
Primary=1.9 cfs 0.162 af

**Link SP3: Study Point 3** Inflow=10.0 cfs 0.857 af
Primary=10.0 cfs 0.857 af

**Link SP4: Study Point 4** Inflow=13.8 cfs 0.979 af
Primary=13.8 cfs 0.979 af

**Link SP5: Study Point 5** Inflow=39.4 cfs 4.085 af
Primary=39.4 cfs 4.085 af

**Total Runoff Area = 34.450 ac Runoff Volume = 8.858 af Average Runoff Depth = 3.09"**
**96.27% Pervious = 33.164 ac 3.73% Impervious = 1.286 ac**

## Summary for Subcatchment 1.1:

Runoff = 15.0 cfs @ 12.35 hrs, Volume= 1.742 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 39,612 | 98 | Impervious Area |
| | 137,161 | 55 | Woods, Good, HSG B |
| | 83,698 | 77 | Woods, Good, HSG D |
| | 28,160 | 61 | >75% Grass cover, Good, HSG B |
| | 28,776 | 80 | >75% Grass cover, Good, HSG D |
| | 317,407 | 69 | Weighted Average |
| | 277,795 | | 87.52% Pervious Area |
| | 39,612 | | 12.48% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 9.6 | 94 | 0.1276 | 0.16 | | **Sheet Flow, A - B**<br>Woods: Light underbrush n= 0.400 P2= 3.30" |
| 4.6 | 201 | 0.0210 | 0.72 | | **Shallow Concentrated Flow, B - C**<br>Woodland Kv= 5.0 fps |
| 0.2 | 59 | 0.0200 | 4.84 | 5.94 | **Pipe Channel, C - D**<br>15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31'<br>n= 0.020 Corrugated PE, corrugated interior |
| 4.5 | 225 | 0.0278 | 0.83 | | **Shallow Concentrated Flow, D - E**<br>Woodland Kv= 5.0 fps |
| 5.7 | 180 | 0.0110 | 0.52 | | **Shallow Concentrated Flow, E - F**<br>Woodland Kv= 5.0 fps |
| 24.6 | 759 | Total | | | |

## Summary for Subcatchment 1.2:

Runoff = 8.8 cfs @ 12.35 hrs, Volume= 1.032 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 16,409 | 98 | Impervious Area |
| | 82,595 | 77 | Woods, Good, HSG D |
| | 39,478 | 55 | Woods, Good, HSG B |
| | 22,317 | 80 | >75% Grass cover, Good, HSG D |
| | 160,799 | 74 | Weighted Average |
| | 144,390 | | 89.80% Pervious Area |
| | 16,409 | | 10.20% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 17.3 | 140 | 0.0643 | 0.13 | | **Sheet Flow, A - B**<br>Woods: Light underbrush n= 0.400 P2= 3.30" |
| 7.1 | 274 | 0.0164 | 0.64 | | **Shallow Concentrated Flow, B - C**<br>Woodland Kv= 5.0 fps |
| 1.0 | 400 | 0.0333 | 6.66 | 86.53 | **Trap/Vee/Rect Channel Flow, C - D**<br>Bot.W=10.00' D=1.00' Z= 3.0 '/' Top.W=16.00'<br>n= 0.035 Earth, dense weeds |
| 25.4 | 814 | Total | | | |

## Summary for Subcatchment 2S:

Runoff = 1.9 cfs @ 12.15 hrs, Volume= 0.162 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| Area (sf) | CN | Description |
|---|---|---|
| 28,449 | 55 | Woods, Good, HSG B |
| 11,050 | 77 | Woods, Good, HSG D |
| 39,499 | 61 | Weighted Average |
| 39,499 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.8 | 49 | 0.0816 | 0.12 | | **Sheet Flow, A - B**<br>Woods: Light underbrush n= 0.400 P2= 3.30" |
| 3.3 | 213 | 0.0469 | 1.08 | | **Shallow Concentrated Flow, B - C**<br>Woodland Kv= 5.0 fps |
| 10.1 | 262 | Total | | | |

## Summary for Subcatchment 3S:

Runoff = 10.0 cfs @ 12.16 hrs, Volume= 0.857 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| Area (sf) | CN | Description |
|---|---|---|
| 122,651 | 77 | Woods, Good, HSG D |
| 122,651 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.0 | 40 | 0.0500 | 0.09 | | **Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.30" |
| 0.5 | 62 | 0.1613 | 2.01 | | **Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps |
| 4.2 | 294 | 0.0544 | 1.17 | | **Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps |
| 11.7 | 396 | Total | | | |

## Summary for Subcatchment 4S:

Runoff = 13.8 cfs @ 12.09 hrs, Volume= 0.979 af, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| Area (sf) | CN | Description |
|---|---|---|
| 140,103 | 77 | Woods, Good, HSG D |
| 140,103 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.1 | 20 | 0.1000 | 0.11 | | **Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.30" |
| 1.9 | 155 | 0.0718 | 1.34 | | **Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps |
| 1.0 | | | | | **Direct Entry, DE** |
| 6.0 | 175 | Total | | | |

## Summary for Subcatchment 5S:

Runoff = 39.4 cfs @ 12.27 hrs, Volume= 4.085 af, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| Area (sf) | CN | Description |
|---|---|---|
| 227,221 | 55 | Woods, Good, HSG B |
| 492,965 | 77 | Woods, Good, HSG D |
| 720,186 | 70 | Weighted Average |
| 720,186 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.3 | 46 | 0.0869 | 0.12 | | **Sheet Flow, A - B**<br>Woods: Light underbrush n= 0.400 P2= 3.30" |
| 2.7 | 243 | 0.0905 | 1.50 | | **Shallow Concentrated Flow, B - C**<br>Woodland Kv= 5.0 fps |
| 3.8 | 220 | 0.0364 | 0.95 | | **Shallow Concentrated Flow, C - D**<br>Woodland Kv= 5.0 fps |
| 5.7 | 470 | 0.0766 | 1.38 | | **Shallow Concentrated Flow, D - E**<br>Woodland Kv= 5.0 fps |
| 0.5 | 242 | 0.0454 | 8.05 | 64.43 | **Channel Flow, E - F**<br>Area= 8.0 sf Perim= 12.0' r= 0.67'<br>n= 0.030 Earth, grassed & winding |
| 19.0 | 1,221 | Total | | | |

## Summary for Reach 1R:

Inflow Area = 7.287 ac, 12.48% Impervious, Inflow Depth = 2.87" for 25YR event
Inflow = 15.0 cfs @ 12.35 hrs, Volume= 1.742 af
Outflow = 14.9 cfs @ 12.38 hrs, Volume= 1.742 af, Atten= 0%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.69 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.12 fps, Avg. Travel Time= 7.2 min

Peak Storage= 1,941 cf @ 12.38 hrs
Average Depth at Peak Storage= 0.36'
Bank-Full Depth= 1.00' Flow Area= 13.0 sf, Capacity= 86.6 cfs

10.00' x 1.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 16.00'
Length= 480.0' Slope= 0.0333 '/'
Inlet Invert= 189.00', Outlet Invert= 173.00'

‡

## Summary for Link SP1: Study Point 1

Inflow Area = 10.978 ac, 11.71% Impervious, Inflow Depth = 3.03" for 25YR event
Inflow = 23.7 cfs @ 12.37 hrs, Volume= 2.774 af
Primary = 23.7 cfs @ 12.37 hrs, Volume= 2.774 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

## Summary for Link SP2: Study Point 2

Inflow Area = 0.907 ac, 0.00% Impervious, Inflow Depth = 2.14" for 25YR event
Inflow = 1.9 cfs @ 12.15 hrs, Volume= 0.162 af
Primary = 1.9 cfs @ 12.15 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

## Summary for Link SP3: Study Point 3

Inflow Area = 2.816 ac, 0.00% Impervious, Inflow Depth = 3.65" for 25YR event
Inflow = 10.0 cfs @ 12.16 hrs, Volume= 0.857 af
Primary = 10.0 cfs @ 12.16 hrs, Volume= 0.857 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

## Summary for Link SP4: Study Point 4

Inflow Area = 3.216 ac, 0.00% Impervious, Inflow Depth = 3.65" for 25YR event
Inflow = 13.8 cfs @ 12.09 hrs, Volume= 0.979 af
Primary = 13.8 cfs @ 12.09 hrs, Volume= 0.979 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

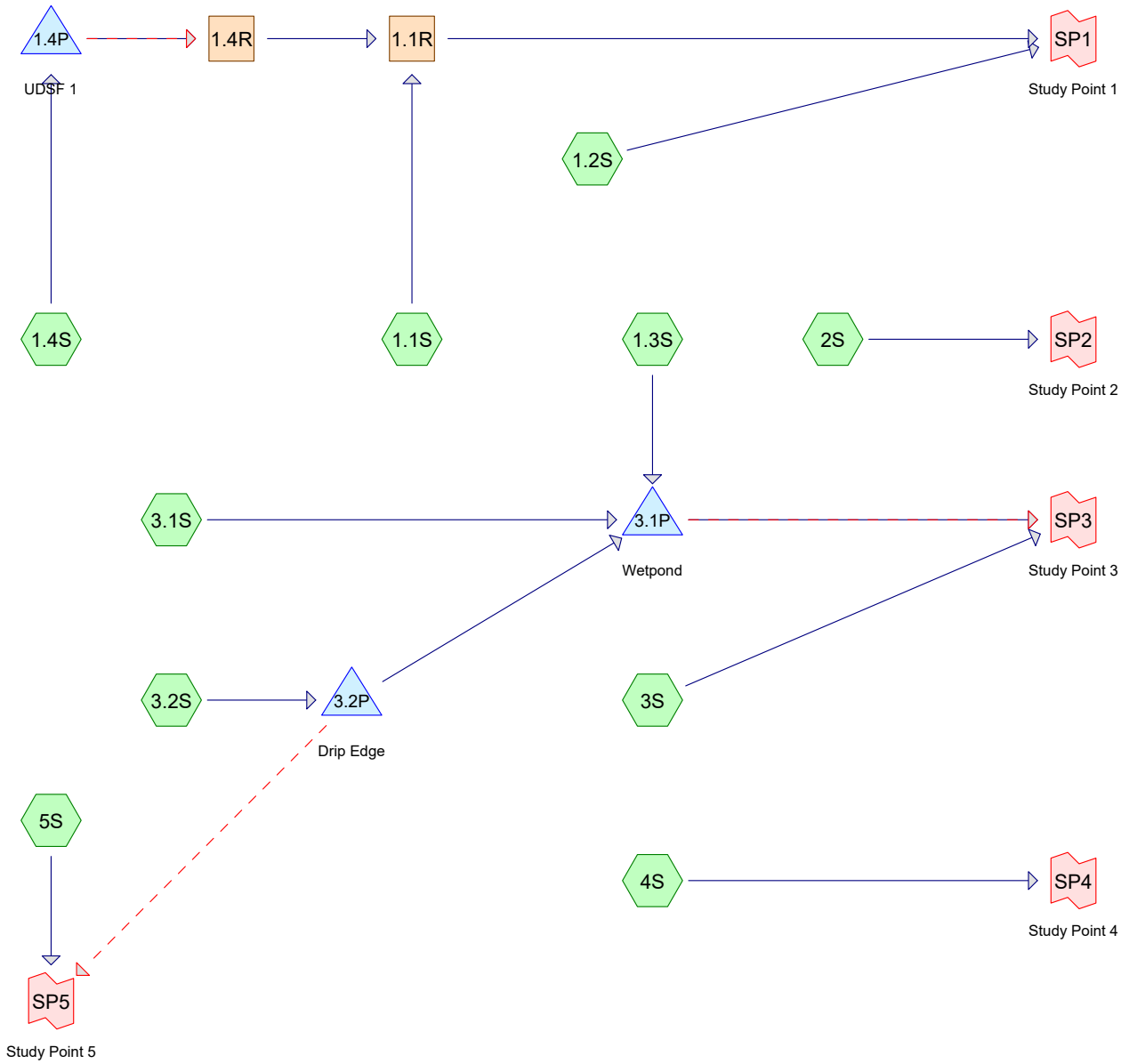
## Summary for Link SP5: Study Point 5

Inflow Area = 16.533 ac, 0.00% Impervious, Inflow Depth = 2.96" for 25YR event
Inflow = 39.4 cfs @ 12.27 hrs, Volume= 4.085 af
Primary = 39.4 cfs @ 12.27 hrs, Volume= 4.085 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

# Appendix 2B

## Proposed Conditions
## HydroCAD Summary




Subcat Reach Pond Link

**Routing Diagram for 20126-03 POST**
Prepared by Sebago Technics, Printed 6/11/2024
HydroCAD® 10.20-4b s/n 00643 © 2023 HydroCAD Software Solutions LLC

## Area Listing (all nodes)

| Area (acres) | CN | Description (subcatchment-numbers) |
|---|---|---|
| 0.945 | 61 | >75% Grass cover, Good, HSG B (1.1S, 1.2S, 1.4S, 2S, 3.1S, 5S) |
| 2.530 | 80 | >75% Grass cover, Good, HSG D (1.1S, 1.2S, 1.3S, 1.4S, 2S, 3.1S, 3S) |
| 3.902 | 98 | Impervious Area (1.1S, 1.2S, 1.3S, 1.4S, 3.1S, 3.2S) |
| 0.143 | 58 | Meadow, non-grazed, HSG B (3.1S, 5S) |
| 0.828 | 78 | Meadow, non-grazed, HSG D (3.1S, 5S) |
| 8.179 | 55 | Woods, Good, HSG B (1.1S, 1.2S, 2S, 5S) |
| 17.922 | 77 | Woods, Good, HSG D (1.1S, 1.2S, 2S, 3.1S, 3S, 4S, 5S) |
| **34.450** | **74** | **TOTAL AREA** |

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 1.1S:** Runoff Area=196,523 sf 13.51% Impervious Runoff Depth=0.84"
Flow Length=941' Tc=24.2 min CN=69 Runoff=2.4 cfs 0.314 af

**Subcatchment 1.2S:** Runoff Area=127,441 sf 12.88% Impervious Runoff Depth=1.05"
Flow Length=508' Tc=9.5 min CN=73 Runoff=3.0 cfs 0.255 af

**Subcatchment 1.3S:** Runoff Area=52,377 sf 93.59% Impervious Runoff Depth=2.96"
Flow Length=463' Tc=6.0 min CN=97 Runoff=3.8 cfs 0.296 af

**Subcatchment 1.4S:** Runoff Area=30,721 sf 29.96% Impervious Runoff Depth=1.41"
Flow Length=185' Tc=6.0 min CN=79 Runoff=1.2 cfs 0.083 af

**Subcatchment 2S:** Runoff Area=31,059 sf 0.00% Impervious Runoff Depth=0.38"
Flow Length=259' Tc=9.8 min CN=58 Runoff=0.1 cfs 0.022 af

**Subcatchment 3.1S:** Runoff Area=170,420 sf 36.88% Impervious Runoff Depth=1.77"
Flow Length=655' Tc=7.4 min CN=84 Runoff=7.7 cfs 0.576 af

**Subcatchment 3.2S:** Runoff Area=5,962 sf 100.00% Impervious Runoff Depth=3.07"
Tc=6.0 min CN=98 Runoff=0.4 cfs 0.035 af

**Subcatchment 3S:** Runoff Area=50,414 sf 0.00% Impervious Runoff Depth=1.28"
Flow Length=336' Tc=9.6 min CN=77 Runoff=1.5 cfs 0.124 af

**Subcatchment 4S:** Runoff Area=140,104 sf 0.00% Impervious Runoff Depth=1.28"
Flow Length=175' Tc=6.0 min CN=77 Runoff=4.7 cfs 0.344 af

**Subcatchment 5S:** Runoff Area=695,624 sf 0.00% Impervious Runoff Depth=0.89"
Flow Length=1,221' Tc=19.0 min CN=70 Runoff=10.2 cfs 1.180 af

**Reach 1.1R:** Avg. Flow Depth=0.12' Max Vel=1.88 fps Inflow=2.5 cfs 0.397 af
n=0.035 L=480.0' S=0.0333 '/' Capacity=86.6 cfs Outflow=2.4 cfs 0.397 af

**Reach 1.4R:** Avg. Flow Depth=0.09' Max Vel=0.88 fps Inflow=0.0 cfs 0.083 af
18.0" Round Pipe n=0.013 L=60.0' S=0.0025 '/' Capacity=5.3 cfs Outflow=0.0 cfs 0.083 af

**Pond 1.4P: UDSF 1** Peak Elev=197.00' Storage=2,143 cf Inflow=1.2 cfs 0.083 af
Primary=0.0 cfs 0.083 af Secondary=0.0 cfs 0.000 af Outflow=0.0 cfs 0.083 af

**Pond 3.1P: Wetpond** Peak Elev=192.77' Storage=21,740 cf Inflow=11.8 cfs 0.907 af
Primary=1.2 cfs 0.885 af Secondary=0.0 cfs 0.000 af Outflow=1.2 cfs 0.885 af

**Pond 3.2P: Drip Edge** Peak Elev=202.99' Storage=0 cf Inflow=0.4 cfs 0.035 af
Primary=0.4 cfs 0.035 af Secondary=0.0 cfs 0.000 af Outflow=0.4 cfs 0.035 af

**Link SP1: Study Point 1** Inflow=4.0 cfs 0.653 af
Primary=4.0 cfs 0.653 af

**Link SP2: Study Point 2** Inflow=0.1 cfs 0.022 af
Primary=0.1 cfs 0.022 af

**Link SP3: Study Point 3** Inflow=1.7 cfs 1.009 af
Primary=1.7 cfs 1.009 af

**Link SP4: Study Point 4** Inflow=4.7 cfs 0.344 af
Primary=4.7 cfs 0.344 af

**Link SP5: Study Point 5** Inflow=10.2 cfs 1.180 af
Primary=10.2 cfs 1.180 af

**Total Runoff Area = 34.450 ac Runoff Volume = 3.230 af Average Runoff Depth = 1.13"**
**88.67% Pervious = 30.548 ac 11.33% Impervious = 3.902 ac**

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 1.1S:** Runoff Area=196,523 sf 13.51% Impervious Runoff Depth=1.89"
Flow Length=941' Tc=24.2 min CN=69 Runoff=6.0 cfs 0.709 af

**Subcatchment 1.2S:** Runoff Area=127,441 sf 12.88% Impervious Runoff Depth=2.20"
Flow Length=508' Tc=9.5 min CN=73 Runoff=6.6 cfs 0.537 af

**Subcatchment 1.3S:** Runoff Area=52,377 sf 93.59% Impervious Runoff Depth=4.55"
Flow Length=463' Tc=6.0 min CN=97 Runoff=5.7 cfs 0.456 af

**Subcatchment 1.4S:** Runoff Area=30,721 sf 29.96% Impervious Runoff Depth=2.72"
Flow Length=185' Tc=6.0 min CN=79 Runoff=2.2 cfs 0.160 af

**Subcatchment 2S:** Runoff Area=31,059 sf 0.00% Impervious Runoff Depth=1.11"
Flow Length=259' Tc=9.8 min CN=58 Runoff=0.7 cfs 0.066 af

**Subcatchment 3.1S:** Runoff Area=170,420 sf 36.88% Impervious Runoff Depth=3.18"
Flow Length=655' Tc=7.4 min CN=84 Runoff=13.8 cfs 1.036 af

**Subcatchment 3.2S:** Runoff Area=5,962 sf 100.00% Impervious Runoff Depth=4.66"
Tc=6.0 min CN=98 Runoff=0.7 cfs 0.053 af

**Subcatchment 3S:** Runoff Area=50,414 sf 0.00% Impervious Runoff Depth=2.54"
Flow Length=336' Tc=9.6 min CN=77 Runoff=3.0 cfs 0.245 af

**Subcatchment 4S:** Runoff Area=140,104 sf 0.00% Impervious Runoff Depth=2.54"
Flow Length=175' Tc=6.0 min CN=77 Runoff=9.6 cfs 0.681 af

**Subcatchment 5S:** Runoff Area=695,624 sf 0.00% Impervious Runoff Depth=1.96"
Flow Length=1,221' Tc=19.0 min CN=70 Runoff=24.7 cfs 2.612 af

**Reach 1.1R:** Avg. Flow Depth=0.23' Max Vel=2.80 fps Inflow=7.0 cfs 0.868 af
n=0.035 L=480.0' S=0.0333 '/' Capacity=86.6 cfs Outflow=7.0 cfs 0.868 af

**Reach 1.4R:** Avg. Flow Depth=0.45' Max Vel=2.32 fps Inflow=1.0 cfs 0.160 af
18.0" Round Pipe n=0.013 L=60.0' S=0.0025 '/' Capacity=5.3 cfs Outflow=1.0 cfs 0.160 af

**Pond 1.4P: UDSF 1** Peak Elev=197.10' Storage=2,351 cf Inflow=2.2 cfs 0.160 af
Primary=1.0 cfs 0.160 af Secondary=0.0 cfs 0.000 af Outflow=1.0 cfs 0.160 af

**Pond 3.1P: Wetpond** Peak Elev=193.52' Storage=34,181 cf Inflow=19.9 cfs 1.545 af
Primary=3.5 cfs 1.521 af Secondary=0.0 cfs 0.000 af Outflow=3.5 cfs 1.521 af

**Pond 3.2P: Drip Edge** Peak Elev=203.11' Storage=27 cf Inflow=0.7 cfs 0.053 af
Primary=0.6 cfs 0.053 af Secondary=0.0 cfs 0.000 af Outflow=0.6 cfs 0.053 af

**Link SP1: Study Point 1** Inflow=10.6 cfs 1.405 af
Primary=10.6 cfs 1.405 af

**Link SP2: Study Point 2** Inflow=0.7 cfs 0.066 af
Primary=0.7 cfs 0.066 af

**Link SP3: Study Point 3** Inflow=5.3 cfs 1.766 af
Primary=5.3 cfs 1.766 af

**Link SP4: Study Point 4** Inflow=9.6 cfs 0.681 af
Primary=9.6 cfs 0.681 af

**Link SP5: Study Point 5** Inflow=24.7 cfs 2.612 af
Primary=24.7 cfs 2.612 af

**Total Runoff Area = 34.450 ac Runoff Volume = 6.554 af Average Runoff Depth = 2.28"**
**88.67% Pervious = 30.548 ac 11.33% Impervious = 3.902 ac**

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment 1.1S:** Runoff Area=196,523 sf 13.51% Impervious Runoff Depth=2.87"
Flow Length=941' Tc=24.2 min CN=69 Runoff=9.4 cfs 1.079 af

**Subcatchment 1.2S:** Runoff Area=127,441 sf 12.88% Impervious Runoff Depth=3.26"
Flow Length=508' Tc=9.5 min CN=73 Runoff=9.9 cfs 0.794 af

**Subcatchment 1.3S:** Runoff Area=52,377 sf 93.59% Impervious Runoff Depth=5.84"
Flow Length=463' Tc=6.0 min CN=97 Runoff=7.3 cfs 0.586 af

**Subcatchment 1.4S:** Runoff Area=30,721 sf 29.96% Impervious Runoff Depth=3.86"
Flow Length=185' Tc=6.0 min CN=79 Runoff=3.2 cfs 0.227 af

**Subcatchment 2S:** Runoff Area=31,059 sf 0.00% Impervious Runoff Depth=1.88"
Flow Length=259' Tc=9.8 min CN=58 Runoff=1.3 cfs 0.112 af

**Subcatchment 3.1S:** Runoff Area=170,420 sf 36.88% Impervious Runoff Depth=4.38"
Flow Length=655' Tc=7.4 min CN=84 Runoff=18.8 cfs 1.429 af

**Subcatchment 3.2S:** Runoff Area=5,962 sf 100.00% Impervious Runoff Depth=5.96"
Tc=6.0 min CN=98 Runoff=0.8 cfs 0.068 af

**Subcatchment 3S:** Runoff Area=50,414 sf 0.00% Impervious Runoff Depth=3.65"
Flow Length=336' Tc=9.6 min CN=77 Runoff=4.4 cfs 0.352 af

**Subcatchment 4S:** Runoff Area=140,104 sf 0.00% Impervious Runoff Depth=3.65"
Flow Length=175' Tc=6.0 min CN=77 Runoff=13.8 cfs 0.979 af

**Subcatchment 5S:** Runoff Area=695,624 sf 0.00% Impervious Runoff Depth=2.96"
Flow Length=1,221' Tc=19.0 min CN=70 Runoff=38.0 cfs 3.945 af

**Reach 1.1R:** Avg. Flow Depth=0.30' Max Vel=3.28 fps Inflow=10.8 cfs 1.306 af
n=0.035 L=480.0' S=0.0333 '/' Capacity=86.6 cfs Outflow=10.8 cfs 1.306 af

**Reach 1.4R:** Avg. Flow Depth=0.76' Max Vel=2.98 fps Inflow=2.7 cfs 0.227 af
18.0" Round Pipe n=0.013 L=60.0' S=0.0025 '/' Capacity=5.3 cfs Outflow=2.7 cfs 0.227 af

**Pond 1.4P: UDSF 1** Peak Elev=197.23' Storage=2,630 cf Inflow=3.2 cfs 0.227 af
Primary=1.6 cfs 0.212 af Secondary=1.1 cfs 0.015 af Outflow=2.7 cfs 0.227 af

**Pond 3.1P: Wetpond** Peak Elev=194.05' Storage=43,697 cf Inflow=26.5 cfs 2.083 af
Primary=6.6 cfs 2.058 af Secondary=0.0 cfs 0.000 af Outflow=6.6 cfs 2.058 af

**Pond 3.2P: Drip Edge** Peak Elev=203.41' Storage=93 cf Inflow=0.8 cfs 0.068 af
Primary=0.6 cfs 0.068 af Secondary=0.0 cfs 0.000 af Outflow=0.6 cfs 0.068 af

**Link SP1: Study Point 1** Inflow=17.4 cfs 2.099 af
Primary=17.4 cfs 2.099 af

**Link SP2: Study Point 2** Inflow=1.3 cfs 0.112 af
Primary=1.3 cfs 0.112 af

**Link SP3: Study Point 3** Inflow=8.6 cfs 2.410 af
Primary=8.6 cfs 2.410 af

**Link SP4: Study Point 4** Inflow=13.8 cfs 0.979 af
Primary=13.8 cfs 0.979 af

**Link SP5: Study Point 5** Inflow=38.0 cfs 3.945 af
Primary=38.0 cfs 3.945 af

**Total Runoff Area = 34.450 ac Runoff Volume = 9.571 af Average Runoff Depth = 3.33"**
**88.67% Pervious = 30.548 ac 11.33% Impervious = 3.902 ac**

## Summary for Subcatchment 1.1S:

Runoff = 9.4 cfs @ 12.34 hrs, Volume= 1.079 af, Depth= 2.87"
Routed to Reach 1.1R :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 26,543 | 98 | Impervious Area |
| | 10,050 | 61 | >75% Grass cover, Good, HSG B |
| | 23,011 | 80 | >75% Grass cover, Good, HSG D |
| | 91,105 | 55 | Woods, Good, HSG B |
| | 45,814 | 77 | Woods, Good, HSG D |
| | 196,523 | 69 | Weighted Average |
| | 169,980 | | 86.49% Pervious Area |
| | 26,543 | | 13.51% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 4.9 | 37 | 0.1080 | 0.13 | | **Sheet Flow, A - B**<br>Woods: Light underbrush n= 0.400 P2= 3.30" |
| 0.1 | 33 | 0.4242 | 4.56 | | **Shallow Concentrated Flow, B - C**<br>Short Grass Pasture Kv= 7.0 fps |
| 9.8 | 526 | 0.0162 | 0.89 | | **Shallow Concentrated Flow, C - D**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.1 | 60 | 0.0490 | 8.55 | 15.11 | **Pipe Channel, D - E**<br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.020 Corrugated PE, corrugated interior |
| 9.3 | 285 | 0.0105 | 0.51 | | **Shallow Concentrated Flow, E - F**<br>Woodland Kv= 5.0 fps |
| 24.2 | 941 | Total | | | |

## Summary for Subcatchment 1.2S:

Runoff = 9.9 cfs @ 12.13 hrs, Volume= 0.794 af, Depth= 3.26"
Routed to Link SP1 : Study Point 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 16,409 | 98 | Impervious Area |
| | 1,232 | 61 | >75% Grass cover, Good, HSG B |
| | 28,169 | 80 | >75% Grass cover, Good, HSG D |
| | 39,478 | 55 | Woods, Good, HSG B |
| | 42,153 | 77 | Woods, Good, HSG D |
| | 127,441 | 73 | Weighted Average |
| | 111,032 | | 87.12% Pervious Area |
| | 16,409 | | 12.88% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 7.0 | 50 | 0.0800 | 0.12 | | **Sheet Flow, A - B**<br>Woods: Light underbrush n= 0.400 P2= 3.30" |
| 1.6 | 70 | 0.0214 | 0.73 | | **Shallow Concentrated Flow, B - C**<br>Woodland Kv= 5.0 fps |
| 0.9 | 388 | 0.0374 | 7.05 | 91.71 | **Trap/Vee/Rect Channel Flow, C - D**<br>Bot.W=10.00' D=1.00' Z= 3.0 '/' Top.W=16.00'<br>n= 0.035 Earth, dense weeds |
| 9.5 | 508 | Total | | | |

## Summary for Subcatchment 1.3S:

Runoff = 7.3 cfs @ 12.08 hrs, Volume= 0.586 af, Depth= 5.84"
Routed to Pond 3.1P : Wetpond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 49,020 | 98 | Impervious Area |
| | 3,357 | 80 | >75% Grass cover, Good, HSG D |
| | 52,377 | 97 | Weighted Average |
| | 3,357 | | 6.41% Pervious Area |
| | 49,020 | | 93.59% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.2 | 114 | 0.0263 | 1.60 | | **Sheet Flow, A - B**<br>Smooth surfaces n= 0.011 P2= 3.30" |
| 0.9 | 149 | 0.0168 | 2.63 | | **Shallow Concentrated Flow, B - C**<br>Paved Kv= 20.3 fps |
| 1.0 | 200 | 0.0050 | 3.21 | 2.52 | **Pipe Channel, C - D**<br>12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'<br>n= 0.013 Corrugated PE, smooth interior |
| 2.9 | | | | | **Direct Entry, DE** |
| 6.0 | 463 | Total | | | |

## Summary for Subcatchment 1.4S:

Runoff = 3.2 cfs @ 12.09 hrs, Volume= 0.227 af, Depth= 3.86"
Routed to Pond 1.4P : UDSF 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 9,205 | 98 | Impervious Area |
| | 10,600 | 61 | >75% Grass cover, Good, HSG B |
| | 10,916 | 80 | >75% Grass cover, Good, HSG D |
| | 30,721 | 79 | Weighted Average |
| | 21,516 | | 70.04% Pervious Area |
| | 9,205 | | 29.96% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.3 | 17 | 0.0200 | 0.98 | | **Sheet Flow, A - B** Smooth surfaces n= 0.011 P2= 3.30" |
| 0.0 | 8 | 0.3000 | 3.83 | | **Shallow Concentrated Flow, B - C** Short Grass Pasture Kv= 7.0 fps |
| 2.4 | 160 | 0.0250 | 1.11 | | **Shallow Concentrated Flow, C - D** Short Grass Pasture Kv= 7.0 fps |
| 3.3 | | | | | **Direct Entry, DE** |
| 6.0 | 185 | Total | | | |

## Summary for Subcatchment 2S:

Runoff = 1.3 cfs @ 12.15 hrs, Volume= 0.112 af, Depth= 1.88"
Routed to Link SP2 : Study Point 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| Area (sf) | CN | Description |
|---|---|---|
| 1,789 | 61 | >75% Grass cover, Good, HSG B |
| 2,161 | 80 | >75% Grass cover, Good, HSG D |
| 25,732 | 55 | Woods, Good, HSG B |
| 1,377 | 77 | Woods, Good, HSG D |
| 31,059 | 58 | Weighted Average |
| 31,059 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.5 | 47 | 0.0851 | 0.12 | | **Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.30" |
| 3.3 | 212 | 0.0472 | 1.09 | | **Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps |
| 9.8 | 259 | Total | | | |

## Summary for Subcatchment 3.1S:

Runoff = 18.8 cfs @ 12.10 hrs, Volume= 1.429 af, Depth= 4.38"
Routed to Pond 3.1P : Wetpond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 62,849 | 98 | Impervious Area |
| | 13,483 | 61 | >75% Grass cover, Good, HSG B |
| | 35,023 | 80 | >75% Grass cover, Good, HSG D |
| | 1,182 | 58 | Meadow, non-grazed, HSG B |
| | 35,683 | 78 | Meadow, non-grazed, HSG D |
| | 22,200 | 77 | Woods, Good, HSG D |
| | 170,420 | 84 | Weighted Average |
| | 107,571 | | 63.12% Pervious Area |
| | 62,849 | | 36.88% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.3 | 90 | 0.0120 | 1.11 | | **Sheet Flow, A - B**<br>Smooth surfaces n= 0.011 P2= 3.30" |
| 0.0 | 10 | 0.3330 | 4.04 | | **Shallow Concentrated Flow, B - C**<br>Short Grass Pasture Kv= 7.0 fps |
| 3.5 | 130 | 0.0080 | 0.63 | | **Shallow Concentrated Flow, C - D**<br>Short Grass Pasture Kv= 7.0 fps |
| 0.9 | 315 | 0.0100 | 5.94 | 10.50 | **Pipe Channel, D - E**<br>18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38'<br>n= 0.013 Corrugated PE, smooth interior |
| 1.7 | 110 | 0.0250 | 1.11 | | **Shallow Concentrated Flow, E - F**<br>Short Grass Pasture Kv= 7.0 fps |
| 7.4 | 655 | Total | | | |

## Summary for Subcatchment 3.2S:

Runoff = 0.8 cfs @ 12.08 hrs, Volume= 0.068 af, Depth= 5.96"
Routed to Pond 3.2P : Drip Edge

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| | Area (sf) | CN | Description |
|---|---|---|---|
| * | 5,962 | 98 | Impervious Area |
| | 5,962 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.0 | | | | | **Direct Entry, DE** |

## Summary for Subcatchment 3S:

Runoff = 4.4 cfs @ 12.13 hrs, Volume= 0.352 af, Depth= 3.65"
Routed to Link SP3 : Study Point 3

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| Area (sf) | CN | Description |
|---|---|---|
| 42,847 | 77 | Woods, Good, HSG D |
| 7,567 | 80 | >75% Grass cover, Good, HSG D |
| 50,414 | 77 | Weighted Average |
| 50,414 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.7 | 66 | 0.1515 | 0.16 | | **Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.30" |
| 0.6 | 61 | 0.0983 | 1.57 | | **Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps |
| 0.5 | 71 | 0.2113 | 2.30 | | **Shallow Concentrated Flow, C - D** Woodland Kv= 5.0 fps |
| 1.8 | 138 | 0.0652 | 1.28 | | **Shallow Concentrated Flow, D - E** Woodland Kv= 5.0 fps |
| 9.6 | 336 | Total | | | |

## Summary for Subcatchment 4S:

Runoff = 13.8 cfs @ 12.09 hrs, Volume= 0.979 af, Depth= 3.65"
Routed to Link SP4 : Study Point 4

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| Area (sf) | CN | Description |
|---|---|---|
| 140,104 | 77 | Woods, Good, HSG D |
| 140,104 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.1 | 20 | 0.1000 | 0.11 | | **Sheet Flow, A - B** Woods: Light underbrush n= 0.400 P2= 3.30" |
| 1.9 | 155 | 0.0718 | 1.34 | | **Shallow Concentrated Flow, B - C** Woodland Kv= 5.0 fps |
| 1.0 | | | | | **Direct Entry, DE** |
| 6.0 | 175 | Total | | | |

## Summary for Subcatchment 5S:

Runoff = 38.0 cfs @ 12.27 hrs, Volume= 3.945 af, Depth= 2.96"
Routed to Link SP5 : Study Point 5

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25YR Rainfall=6.20"

| Area (sf) | CN | Description |
|---|---|---|
| 3,990 | 61 | >75% Grass cover, Good, HSG B |
| 5,053 | 58 | Meadow, non-grazed, HSG B |
| 405 | 78 | Meadow, non-grazed, HSG D |
| 199,980 | 55 | Woods, Good, HSG B |
| 486,196 | 77 | Woods, Good, HSG D |
| 695,624 | 70 | Weighted Average |
| 695,624 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 6.3 | 46 | 0.0869 | 0.12 | | **Sheet Flow, A - B**<br>Woods: Light underbrush n= 0.400 P2= 3.30" |
| 2.7 | 243 | 0.0905 | 1.50 | | **Shallow Concentrated Flow, B - C**<br>Woodland Kv= 5.0 fps |
| 3.8 | 220 | 0.0364 | 0.95 | | **Shallow Concentrated Flow, C - D**<br>Woodland Kv= 5.0 fps |
| 5.7 | 470 | 0.0766 | 1.38 | | **Shallow Concentrated Flow, D - E**<br>Woodland Kv= 5.0 fps |
| 0.5 | 242 | 0.0454 | 8.05 | 64.43 | **Channel Flow, D - E**<br>Area= 8.0 sf Perim= 12.0' r= 0.67'<br>n= 0.030 Earth, grassed & winding |
| 19.0 | 1,221 | Total | | | |

## Summary for Reach 1.1R:

Inflow Area = 5.217 ac, 15.73% Impervious, Inflow Depth = 3.00" for 25YR event
Inflow = 10.8 cfs @ 12.32 hrs, Volume= 1.306 af
Outflow = 10.8 cfs @ 12.35 hrs, Volume= 1.306 af, Atten= 0%, Lag= 1.8 min
Routed to Link SP1 : Study Point 1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.28 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.69 fps, Avg. Travel Time= 11.7 min

Peak Storage= 1,573 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.30' , Surface Width= 11.80'
Bank-Full Depth= 1.00' Flow Area= 13.0 sf, Capacity= 86.6 cfs

10.00' x 1.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 16.00'
Length= 480.0' Slope= 0.0333 '/'
Inlet Invert= 189.00', Outlet Invert= 173.00'

‡

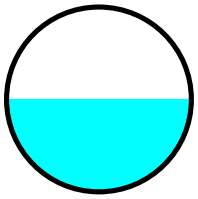
## Summary for Reach 1.4R:

Inflow Area = 0.705 ac, 29.96% Impervious, Inflow Depth = 3.86" for 25YR event
Inflow = 2.7 cfs @ 12.14 hrs, Volume= 0.227 af
Outflow = 2.7 cfs @ 12.14 hrs, Volume= 0.227 af, Atten= 0%, Lag= 0.2 min
Routed to Reach 1.1R :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.98 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 0.94 fps, Avg. Travel Time= 1.1 min

Peak Storage= 53 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.76' , Surface Width= 1.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 5.3 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.0025 '/'
Inlet Invert= 192.50', Outlet Invert= 192.35'



## Summary for Pond 1.4P: UDSF 1

Inflow Area = 0.705 ac, 29.96% Impervious, Inflow Depth = 3.86" for 25YR event
Inflow = 3.2 cfs @ 12.09 hrs, Volume= 0.227 af
Outflow = 2.7 cfs @ 12.14 hrs, Volume= 0.227 af, Atten= 16%, Lag= 3.2 min
Primary = 1.6 cfs @ 12.14 hrs, Volume= 0.212 af
Routed to Reach 1.4R :
Secondary = 1.1 cfs @ 12.14 hrs, Volume= 0.015 af
Routed to Reach 1.4R :

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 197.23' @ 12.14 hrs Surf.Area= 2,239 sf Storage= 2,630 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 267.2 min ( 1,082.5 - 815.3 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 195.50' | 5,088 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 195.50 | 996 | 0 | 0 |
| 196.00 | 1,225 | 555 | 555 |
| 197.00 | 1,966 | 1,596 | 2,151 |
| 198.00 | 3,165 | 2,566 | 4,716 |
| 198.10 | 4,265 | 371 | 5,088 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 193.00' | **12.0" Round Culvert**<br>L= 26.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 193.00' / 192.75' S= 0.0096 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf |
| #2 | Device 1 | 193.33' | **0.9" Vert. Orifice** C= 0.600 Limited to weir flow at low heads |
| #3 | Device 2 | 195.50' | **2.410 in/hr Filter Media over Surface area** |
| #4 | Device 1 | 197.00' | **2.0" x 2.0" Horiz. OCS-1 X 24.00** C= 0.600<br>Limited to weir flow at low heads |
| #5 | Secondary | 197.10' | **10.0' long x 6.0' breadth Broad-Crested Rectangular Weir**<br>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<br>Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83 |

**Primary OutFlow** Max=1.6 cfs @ 12.14 hrs HW=197.23' TW=193.25' (Dynamic Tailwater)
- **1=Culvert** (Passes 1.6 cfs of 7.3 cfs potential flow)
  - **2=Orifice** (Orifice Controls 0.0 cfs @ 9.46 fps)
    - **3=Filter Media** (Passes 0.0 cfs of 0.1 cfs potential flow)
  - **4=OCS-1** (Orifice Controls 1.5 cfs @ 2.30 fps)

**Secondary OutFlow** Max=1.1 cfs @ 12.14 hrs HW=197.23' TW=193.25' (Dynamic Tailwater)
- **5=Broad-Crested Rectangular Weir** (Weir Controls 1.1 cfs @ 0.85 fps)

## Summary for Pond 3.1P: Wetpond

Inflow Area = 5.252 ac, 51.51% Impervious, Inflow Depth = 4.76" for 25YR event
Inflow = 26.5 cfs @ 12.10 hrs, Volume= 2.083 af
Outflow = 6.6 cfs @ 12.50 hrs, Volume= 2.058 af, Atten= 75%, Lag= 23.9 min
Primary = 6.6 cfs @ 12.50 hrs, Volume= 2.058 af
Routed to Link SP3 : Study Point 3
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link SP3 : Study Point 3

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 194.05' @ 12.50 hrs Surf.Area= 18,653 sf Storage= 43,697 cf

Plug-Flow detention time= 347.6 min calculated for 2.057 af (99% of inflow)
Center-of-Mass det. time= 340.2 min ( 1,127.2 - 787.0 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 191.00' | 64,673 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 191.00 | 8,813 | 0 | 0 |
| 192.00 | 12,956 | 10,885 | 10,885 |
| 193.00 | 16,161 | 14,559 | 25,443 |
| 194.00 | 18,540 | 17,351 | 42,794 |
| 195.00 | 20,876 | 19,708 | 62,502 |
| 195.10 | 22,564 | 2,172 | 64,673 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 188.00' | **18.0" Round Culvert**<br>L= 42.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 188.00' / 187.75' S= 0.0060 '/' Cc= 0.900<br>n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf |
| #2 | Device 1 | 188.50' | **1.9" Vert. Low Flow Orifice** C= 0.600<br>Limited to weir flow at low heads |
| #3 | Device 2 | 191.00' | **2.410 in/hr Gravel Trench over Surface area above 191.00'**<br>Excluded Surface area = 8,813 sf |
| #4 | Device 1 | 192.30' | **1.0' long x 0.75' rise Sharp-Crested Rectangular Weir**<br>2 End Contraction(s) 1.0' Crest Height |
| #5 | Device 1 | 193.70' | **2.0" x 2.0" Horiz. OCS-2 X 24.00** C= 0.600<br>Limited to weir flow at low heads |
| #6 | Secondary | 194.10' | **15.0' long x 10.0' breadth Broad-Crested Rectangular Weir**<br>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60<br>Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64 |

**Primary OutFlow** Max=6.6 cfs @ 12.50 hrs HW=194.05' TW=0.00' (Dynamic Tailwater)
- **1=Culvert** (Passes 6.6 cfs of 19.6 cfs potential flow)
  - **2=Low Flow Orifice** (Orifice Controls 0.2 cfs @ 11.26 fps)
    - **3=Gravel Trench** (Passes 0.2 cfs of 0.5 cfs potential flow)
  - **4=Sharp-Crested Rectangular Weir** (Orifice Controls 4.4 cfs @ 6.96 fps)
  - **5=OCS-2** (Orifice Controls 1.9 cfs @ 2.84 fps)

**Secondary OutFlow** Max=0.0 cfs @ 0.00 hrs HW=191.00' TW=0.00' (Dynamic Tailwater)
- **6=Broad-Crested Rectangular Weir** ( Controls 0.0 cfs)

## Summary for Pond 3.2P: Drip Edge

Inflow Area = 0.137 ac,100.00% Impervious, Inflow Depth = 5.96" for 25YR event
Inflow = 0.8 cfs @ 12.08 hrs, Volume= 0.068 af
Outflow = 0.6 cfs @ 12.16 hrs, Volume= 0.068 af, Atten= 29%, Lag= 4.6 min
Primary = 0.6 cfs @ 12.16 hrs, Volume= 0.068 af
Routed to Pond 3.1P : Wetpond
Secondary = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link SP5 : Study Point 5

Routing by Dyn-Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 203.41' @ 12.16 hrs Surf.Area= 900 sf Storage= 93 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.4 min ( 745.1 - 744.7 )

| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 202.99' | 593 cf | **Custom Stage Data (Prismatic)**Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Voids (%) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|---|
| 202.99 | 375 | 0.0 | 0 | 0 |
| 203.00 | 900 | 25.0 | 2 | 2 |
| 203.99 | 900 | 25.0 | 223 | 224 |
| 204.00 | 900 | 40.0 | 4 | 228 |
| 204.99 | 900 | 40.0 | 356 | 584 |
| 205.00 | 900 | 100.0 | 9 | 593 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Primary | 201.00' | **6.0" Round Culvert**<br>L= 80.0' CPP, square edge headwall, Ke= 0.500<br>Inlet / Outlet Invert= 201.00' / 200.60' S= 0.0050 '/' Cc= 0.900<br>n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.20 sf |
| #2 | Secondary | 204.50' | **120.0' long x 2.0' breadth Broad-Crested Rectangular Weir**<br>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<br>Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32 |

**Primary OutFlow** Max=0.6 cfs @ 12.16 hrs HW=203.41' TW=193.64' (Dynamic Tailwater)
└**1=Culvert** (Barrel Controls 0.6 cfs @ 3.00 fps)

**Secondary OutFlow** Max=0.0 cfs @ 0.00 hrs HW=202.99' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** ( Controls 0.0 cfs)

## Summary for Link SP1: Study Point 1

Inflow Area = 8.142 ac, 14.71% Impervious, Inflow Depth = 3.09" for 25YR event
Inflow = 17.4 cfs @ 12.18 hrs, Volume= 2.099 af
Primary = 17.4 cfs @ 12.18 hrs, Volume= 2.099 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

## Summary for Link SP2: Study Point 2

Inflow Area = 0.713 ac, 0.00% Impervious, Inflow Depth = 1.88" for 25YR event
Inflow = 1.3 cfs @ 12.15 hrs, Volume= 0.112 af
Primary = 1.3 cfs @ 12.15 hrs, Volume= 0.112 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

## Summary for Link SP3: Study Point 3

Inflow Area = 6.409 ac, 42.21% Impervious, Inflow Depth > 4.51" for 25YR event
Inflow = 8.6 cfs @ 12.23 hrs, Volume= 2.410 af
Primary = 8.6 cfs @ 12.23 hrs, Volume= 2.410 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

## Summary for Link SP4: Study Point 4

Inflow Area = 3.216 ac, 0.00% Impervious, Inflow Depth = 3.65" for 25YR event
Inflow = 13.8 cfs @ 12.09 hrs, Volume= 0.979 af
Primary = 13.8 cfs @ 12.09 hrs, Volume= 0.979 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

## Summary for Link SP5: Study Point 5

Inflow Area = 15.969 ac, 0.00% Impervious, Inflow Depth = 2.96" for 25YR event
Inflow = 38.0 cfs @ 12.27 hrs, Volume= 3.945 af
Primary = 38.0 cfs @ 12.27 hrs, Volume= 3.945 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs

# Appendix 3

## Inspection, Maintenance and Housekeeping Plan

**INSPECTION, MAINTENANCE, AND HOUSEKEEPING PLAN**

**For:**
**Fitzpatrick Development**
**Arundel, Maine**

**By:**
**Sebago Technics, Inc.**
**75 John Roberts Road, Suite 4A**
**South Portland, Maine**

## Introduction

The following plan outlines the anticipated inspection and maintenance procedures for the erosion and sedimentation control measures as well as stormwater management facilities for the amended project. This plan also outlines several housekeeping requirements that shall be followed during and after construction. These procedures shall be followed in order to ensure the intended function of the designed measures and to prevent unreasonably adverse impacts to the surrounding environment.

The procedures outlined in this Inspection, Maintenance and Housekeeping Plan are provided as an overview of the anticipated practices to be used on this site. In some instances, additional measures may be required due to unexpected conditions. For additional detail on any of the erosion and sedimentation control measures or stormwater management devices to be utilized on this project, refer to the most recently revised edition of the "Maine Erosion and Sedimentation Control BMP" manual and/or the "Stormwater Management for Maine: Best Management Practices" manual as published by the Maine Department of Environmental Protection (MDEP).

## During Construction

1. **Inspection:** During the construction process, it is the Contractor's responsibility to comply with the inspection and maintenance procedures outlined in this section. These responsibilities include inspecting disturbed and impervious areas, erosion control measures, materials storage areas that are exposed to precipitation, and locations where vehicles enter or exit the site. These areas shall be inspected at least once a week as well as before and after a storm event (0.5" of rainfall), and prior to completing permanent stabilization measures. A person with knowledge of erosion and stormwater control, including the standards and conditions in any applicable permits, shall conduct the inspections.

2. **Maintenance:** All measures shall be maintained in an effective operating condition until areas are permanently stabilized. If Best Management Practices (BMPs) need to be maintained or modified, additional BMPs are necessary, or other corrective action is needed, implementation must be completed within 7 calendar days and prior to any storm event (0.5" of rainfall).

3. **Documentation:** A log summarizing the inspections and any corrective action taken must be maintained on-site. The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of erosion and sedimentation controls, material storage areas, and vehicle access points to the site. Major observations must include BMPs that need maintenance, BMPs that failed

to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. The permittee shall retain a copy of the log for a period of at least three years from the completion of permanent stabilization.

4. **Specific Inspection and Maintenance Tasks:** The following is a list of erosion control and stormwater management measures and the specific inspection and maintenance tasks to be performed during construction.

A. Sediment Barriers:

- Hay bale barriers, silt fences, and filter berms shall be inspected immediately after each rainfall and at least daily during prolonged rainfall.
- If the fabric on a silt fence or filter barrier should decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, it shall be replaced.
- Sediment deposits should be removed after each storm event (0.5" of rainfall). They must be removed before deposits reach approximately one-half the height of the barrier.
- Filter berms shall be reshaped as needed.
- Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required should be dressed to conform to the existing grade, prepared, and seeded.

B. Riprap Materials:

- Once a riprap installation has been completed, it should require very little maintenance. It shall, however, be inspected periodically to determine if high flows have caused scour beneath the riprap or dislodged any of the stone.

C. Erosion Control Blankets:

- Inspect these reinforced areas semi-annually and after significant rainfall events for slumping, sliding, seepage, and scour. Pay close attention to unreinforced areas adjacent to the erosion control blankets, which may experience accelerated erosion.
- Review all applicable inspection and maintenance procedures recommended by the specific blanket manufacturer. These tasks shall be included in addition to the requirements of this plan.

D. Stabilized Construction Entrances/Exits:

- The exit shall be maintained in a condition that will prevent tracking of sediment onto public rights-of-way.
- When the control pad becomes ineffective, the stone shall be removed along with the collected soil material. The entrance should then be reconstructed.
- Areas that have received mud-tracking or sediment deposits shall be swept or washed. Washing shall be done on an area stabilized with aggregate, which drains

into an approved sediment-trapping device (not into storm drains, ditches, or waterways).

E. Temporary Seed and Mulch:

- Mulched areas should be inspected after rain events to check for rill erosion.
- If less than 90% of the soil surface is covered by mulch, additional mulch shall be applied in bare areas.
- In applications where seeding and mulch have been applied in conjunction with erosion control blankets, the blankets must be inspected after rain events for dislocation or undercutting.
- Mulch shall continue to be reapplied until 95% of the soil surface has established temporary vegetative cover.

F. Stabilized Temporary Drainage Swales:

- Sediment accumulation in the swale shall be removed once the cross section of the swale is reduced by 25%.
- The swales shall be inspected after rainfall events. Any evidence of sloughing of the side slopes or channel erosion shall be repaired and corrective action should be taken to prevent reoccurrence of the problem.
- In addition to the stabilized lining of the channel (i.e. erosion control blankets), stone check dams may be needed to further reduce channel velocity.

5. **Housekeeping:** The following general performance standards apply to the proposed project.

A. Spill prevention: Controls must be used to prevent pollutants from being discharged from materials on-site, including storage practices to minimize exposure of the materials to stormwater, and appropriate spill prevention, containment, and response planning and implementation.

B. Groundwater protection: During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors, accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials.

C. Fugitive sediment and dust: Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control.

D. Debris and other materials: Litter, construction debris, and chemicals exposed to stormwater must be prevented from becoming a pollutant source.

E. Trench or foundation dewatering: Trench dewatering is the removal of water from trenches, foundations, cofferdams, ponds, and other areas within the construction area

that retain water after excavation. In most cases, the collected water is heavily silted and hinders correct and safe construction practices. The collected water must be removed from the ponded area, either through gravity or pumping, and must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved.

**Post-Construction**

1. **Inspection:** After construction, it is the responsibility of the owner or assigned heirs to comply with the inspection and maintenance procedures outlined in this section. All measures must be maintained in effective operating condition. The owner shall inspect and maintain the BMPs, including but not limited to any parking areas, catch basins, drainage swales, detention basins and ponds, pipes and related structures, in accordance with all municipal and state inspection, cleaning and maintenance requirements of the approved post-construction stormwater management plan.

2. **Specific Inspection and Maintenance Tasks:** The following is a list of permanent erosion control and stormwater management measures and the inspection and maintenance tasks to be performed after construction. If the BMP requires maintenance, repair or replacement to function as intended by the approved post-construction stormwater management plan, the owner or operator of the BMP shall take corrective action(s) to address the deficiency or deficiencies as soon as possible after the deficiency is discovered and shall provide a record of the deficiency and corrective action(s) to the local municipality in the annual report.

   A. Vegetated Areas:

   - Inspect vegetated areas, particularly slopes and embankments, early in the growing season or after heavy rains (>0.5") to identify active or potential erosion problems.
   - Replant bare areas or areas with sparse growth. Where rill erosion is evident, armor the area with an appropriate lining or divert the erosive flows to on-site areas able to withstand the concentrated flows.

   B. Ditches, Swales and Other Open Channels:

   - Inspect ditches, swales, level spreaders and other open stormwater channels in the spring, in the late fall, and after heavy rains to remove any obstructions to flow. Remove accumulated sediments and debris, remove woody vegetative growth that could obstruct flow, and repair any erosion of the ditch lining.
   - Vegetated ditches must be mowed at least annually or otherwise maintained to control the growth of woody vegetation and maintain flow capacity.
   - Any woody vegetation growing through riprap linings must also be removed. Repair any slumping side slopes as soon as practicable.
   - If the ditch has a riprap lining, replace riprap in areas where any underlying filter fabric or underdrain gravel is showing through the stone or where stones have dislodged.

C. Culverts:

- Inspect culverts in the spring, in the late fall, and after heavy rains (>0.5") to remove any obstructions to flow.
- Remove accumulated sediments and debris at the inlet, at the outlet, and within the conduit.
- Inspect and repair any erosion damage at the culvert's inlet and outlet.

D. Removal of Winter Sand:

- Clear accumulations of winter sand in parking lots and along roadways at least once a year, preferably in the spring.
- Accumulations on pavement may be removed by pavement sweeping.
- Accumulations of sand along road shoulders may be removed by grading excess sand to the pavement edge and removing it manually or by a front-end loader or other acceptable method.

E. Roof Drip Edges:

- These structures may not be paved over or altered in anyway. No gutter may be installed on the roof line.
- Debris and sediment buildup shall be removed as needed. Any bare area or erosion rills shall be repaired with new stone.
- See inspection log within Attachment 1 of this document for the inspection requirements of this BMP.

F. Wet Pond

- The pond outlet structure and outlet of the pond should be checked periodically to ensure that flow structures are not blocked by debris. All ditches or pipes connecting ponds in series should be checked for debris that may obstruct flow. Inspections should be conducted monthly during wet weather conditions from March to November.
- The wet pond and outlet should be inspected annually for erosion, destabilization of side slopes, embankment settling and other signs of structural failure. Any signs of erosion shall be immediately repaired to assure stability and proper function.
- The wet pond will be inspected on an annual basis to assure that significant sediment accumulation has not occurred in the pond outlet structure. Whenever the sump is 25% inundated with sediment, the accumulated sediment shall be removed and property disposed of.
- The underdrained gravel trench shall be inspected after every major storm in the first few months to ensure proper function. Thereafter, the gravel trench should be inspected at least once every six months. Inspection consists of verifying that the pond is slowly emptying thorough the gravel filter for short time (12-24 hours) after a storm and that potential clogging material such as accumulations of decaying leaves are removed.
- The top several inches of the gravel in the underdrained trench must be replaced with fresh material when water ponds above the permanent pool for

more than 72 hours. The removed sediments shall be disposed of in an acceptable manner.

- Wet ponds lose 0.5-1.0% of their volume annually due to sediment accumulation. Dredging is required when accumulated volume loss reaches 15%, or approximately every 15-20 years.

G. Underdrained Soil Filter:

- During the first year, the basin shall be inspected semi-annually and following major storm events.
- Debris and sediment buildup shall be removed from the forebay and basin as needed. Mowing of a grassed basin can occur semiannually to a height no less than 6 inches. Any bare area or erosion rills shall be repaired with new filter media or sandy loam then seeded and mulched. Maintaining good grass cover will minimize clogging with fine sediments and if ponding exceeds 48 hours, the top of the filter bed must be rototilled to reestablish the soil's filtration capacity.
- The soil filter should be inspected after every major storm in the first year to be sure it is functioning properly. Thereafter, the filter should be inspected at least once every six months to ensure that it is draining within 48 hours following a one inch storm or greater. Following storms that fill the system and overflow is observed, the soil filter should drain in no less than 36 to 60 hours. If the system drains too fast, an orifice may need to be added on the underdrain outlet or, if already present, may need to be modified.
- Soil Filter Replacement: The top several inches of the filter shall be replaced with fresh material when water ponds on the surface of the bed for more than 72 hours. Removed sediments should be disposed of in an acceptable manner.
- Sediment Removal: Sediment and plant debris should be removed from the pretreatment structure at least annually.
- Mowing: If mowing is desired, only handheld string trimmers or push-mowers are allowed on the filter (no tractor) and the grass bed should be mowed no more than 2 times per growing season to maintain grass heights of no less than 6 inches.
- Fertilization: Fertilization of the underdrained soil filter area should be avoided unless absolutely necessary to establish vegetation.
- Harvesting and Weeding: Harvesting and pruning of excessive growth will need to be done occasionally. Weeding to control unwanted or invasive plants may also be necessary.

**3. Documentation:**

A. The owner or operator of a BMP or a qualified post-construction stormwater inspector hired by that person, shall, as required by the local municipality, provide a completed and signed certification on a form provided by the local municipality, certifying that the person has inspected the BMP(s) and that they are adequately maintained and functioning as intended by the approved post-construction stormwater management plan, or that they required maintenance or repair, including the record of the deficiency and corrective action(s) taken.

B. A log summarizing the inspections and any corrective action taken must be maintained.

The log must include the name(s) and qualifications of the person making the inspections, the date(s) of the inspections, and major observations about the operation and maintenance of controls. Major observations must include BMPs that need maintenance, BMPs that failed to operate as designed or proved inadequate for a particular location, and locations where additional BMPs are needed. For each BMP requiring maintenance, BMP needing replacement, and location needing additional BMPs, note in the log the corrective action taken and when it was taken. The log must be made accessible to the appropriate regulatory agency upon request. A sample "Stormwater Inspection and Maintenance Form" has been included as Attachment 1 of this Inspection, Maintenance, and Housekeeping Plan.

4. **Duration of Maintenance:** Perform maintenance as described and required for any associated permits unless and until the system is formally accepted by a municipality or quasi-municipal district, or is placed under the jurisdiction of a legally created association that will be responsible for the maintenance of the system. If a municipality or quasi-municipal district chooses to accept a stormwater management system, or a component of a stormwater system, it must provide a letter to the MDEP stating that it assumes responsibility for the system. The letter must specify the components of the system for which the municipality or district will assume responsibility, and that the municipality or district agrees to maintain those components of the system in compliance with MDEP standards. Upon such assumption of responsibility, and approval by the MDEP, the municipality, quasi-municipal district, or association becomes a co-permittee for this purpose only and must comply with all terms and conditions of the permit.

## ATTACHMENT 1 – STORMWATER INSPECTION AND MAINTENANCE LOG

**Fitzpatrick Development**
**Heavy Hammer Lane**
**Arundel, Maine**

This log is intended to accompany the Inspection, Maintenance, and Housekeeping Plan for the development of one 4,800 square-foot building, one 10,000 square-foot building, associated parking and access on Lot 4 and the proposed development on Lot 3, located off of Heavy Hammer Lane in Arundel, Maine. The following items shall be checked, cleaned, and maintained on a regular basis as specified in the Maintenance Plan and as described in the sections below. This log shall be kept on file for a minimum of five (5) years and shall be available for review by the Town of Arundel and the Maine DEP. Qualified personnel familiar with the drainage systems and soils shall perform all inspections. A copy of the construction and post-construction maintenance logs are provided.

| INSPECTION MAINTENANCE AND HOUSEKEEPING FORM | | | |
|---|---|---|---|
| **General Information** | | | |
| **Project Name:** | Fitzpatrick Development | **Inspection Date:** | |
| **Project Location:** | Heavy Hammer Lane | **Current Weather:** | |
| | Arundel, Maine | **Date / Amount Last Precip:** | |
| | | | |
| **BMP Owner:** | | **Company conducting inspection:** | |
| **Owner Mailing Address:** | | **Company Mailing Address** | |
| | | | |
| **Owner Phone #:** | | **Company Phone #:** | |
| **Owner Email:** | | **Inspector Name:** | |
| | | **Inspector Email:** | |

| Site Element | Suggested Maintenance (recm'd frequency) | Observations | Inspection Notes/Recommended Action |
|---|---|---|---|
| | | | |
| **Vegetated Areas** | Inspect Slopes/Embankments for erosion (annually) | | |
| | Replant bare areas or areas of sparse growth (annually) | | |
| **Ditches/Swales** | Remove obstructions/debris/sediment (monthly) | | |
| | Inspect for erosion/repair as needed (annually) | | |
| | Remove woody vegetation (annually) | | |
| | Mow vegetated ditches (annually) | | |
| **Catch Basins** | Remove sediment/debris from sump (annually) | | |
| | Remove accumulated debris from inlet grate | | |
| **Culverts** | Remove sediment/debris from inlet/outlet aprons (annually) | | |
| | Inspect inlet/outlet aprons for erosion, repair as needed (annually) | | |
| | Inspect, repair as needed, riprap aprons for dislodged/sparse coverage (annually) | | |
| **Pipe Outlets** | Remove sediment/debris from outlet aprons (annually) | | |
| | Inspect outlet aprons for erosion, repair as needed (annually) | | |
| | Inspect, repair as needed, riprap aprons for dislodged/sparse coverage (annually) | | |

Additional Notes/Observations:

# Underdrain Soil Filter 1

| INSPECTION MAINTENANCE AND HOUSEKEEPING FORM | | | |
|---|---|---|---|
| **General Information** | | | |
| **Project Name:** | Fitzpatrick Development | **Inspection Date:** | |
| **Project Location:** | Heavy Hammer Lane | **Current Weather:** | |
| | Arundel, Maine | **Date / Amount Last Precip:** | |
| | | | |
| **BMP Owner:** | | **Company conducting inspection:** | |
| **Owner Mailing Address:** | | **Company Mailing Address** | |
| | | | |
| **Owner Phone #:** | | **Company Phone #:** | |
| **Owner Email:** | | **Inspector Name:** | |
| | | **Inspector Email:** | |

| BMP Element | Suggested Maintenance (recm'd frequency) | Observations | Inspection Notes/Recommended Action |
|---|---|---|---|
| Underdrained soil filter 1 | | | |
| **Forebay/Pretreatment** | Sediment/Debris Removal (Annually) | | |
| | Inspect for bare areas or rill erosion (Annually) | | |
| **Outlet Control Structure** | Sediment Depth (Annually) | | |
| | Floatables/Debris (Annually) | | |
| **Discharge Pipe** | Ground Stabilized (>1" rain, Annually) | | |
| **Emergency Spillway** | Review for signs of erosion (Twice Annually) | | |
| | Review for signs of discharge (>1" rain, twice annually) | | |
| **Embankments** | Review for signs of erosion (Twice Annually) | | |
| **Filter Bed** | Trim overgrown vegetation with string trimmer (annually) | | |
| | Review basin for evidence of vehicular traffic or storage of snow within footprint (annually) | | |
| | Confirm pond drains in 24-48 hours for water quality volume (annually) | | |

Additional Notes/Observations:

# Roof Drip Edge Filter

| INSPECTION MAINTENANCE AND HOUSEKEEPING FORM | | | |
|---|---|---|---|
| **General Information** | | | |
| **Project Name:** | Fitzpatrick Development | **Inspection Date:** | |
| **Project Location:** | Heavy Hammer Lane | **Current Weather:** | |
| | Arundel, Maine | **Date / Amount Last Precip:** | |
| | | | |
| **BMP Owner:** | | **Company conducting inspection:** | |
| **Owner Mailing Address:** | | **Company Mailing Address** | |
| | | | |
| **Owner Phone #:** | | **Company Phone #:** | |
| **Owner Email:** | | **Inspector Name:** | |
| | | **Inspector Email:** | |

| BMP Element | Suggested Maintenance (recm'd frequency) | Observations | Inspection Notes/Recommended Action |
|---|---|---|---|
| Roof Drip Edge Filter | | | |
| **Pretreatment** | Sediment/Debris Removal (Annually) | | |
| | Inspect for bare areas or rill erosion (Annually) | | |
| **Downstream Structure** | Sediment Depth (Annually) | | |
| | Floatables/Debris (Annually) | | |
| **Discharge Pipe** | Ground Stabilized (>1" rain, Annually) | | |
| **Embankments** | Review for signs of erosion (Twice Annually) | | |
| **Stone** | Trim overgrown vegetation with string trimmer (annually) | | |
| | Review trench for evidence of vehicular traffic or storage of snow within footprint (annually) | | |
| | Confirm no excessive ponding of water (annually) | | |

Additional Notes/Observations:

| INSPECTION MAINTENANCE AND HOUSEKEEPING FORM | | | |
|---|---|---|---|
| **General Information** | | | |
| **Project Name:** | Fitzpatrick Development | **Inspection Date:** | |
| **Project Location:** | Heavy Hammer Lane | **Current Weather:** | |
| | Arundel, Maine | **Date / Amount Last Precip:** | |
| | | | |
| **BMP Owner:** | | **Company conducting inspection:** | |
| **Owner Mailing Address:** | | **Company Mailing Address** | |
| | | | |
| **Owner Phone #:** | | **Company Phone #:** | |
| **Owner Email:** | | **Inspector Name:** | |
| | | **Inspector Email:** | |

| BMP Element | Suggested Maintenance (recm'd frequency) | Observations | Inspection Notes/Recommended Action |
|---|---|---|---|
| Wetpond | | | |
| **Forebay/Pretreatment** | Sediment/Debris Removal (Twice Annually) | | |
| | Inspect for bare areas or rill erosion (Twice Annually) | | |
| **Outlet Control Structure** | Sediment Depth (Twice Annually) | | |
| | Floatables/Debris (Twice Annually) | | |
| **Inlet Pipe** | Sediment/Debris Removal (Twice Annually) | | |
| **Discharge Pipe** | Ground Stabilized (>1" rain, Twice Annually) | | |
| **Emergency Spillway** | Review for signs of erosion (Twice Annually) | | |
| | Review for signs of discharge (>1" rain, Twice Annually) | | |
| **Embankments** | Review for signs of erosion (Twice Annually) | | |
| **Gravel Bench** | Remove debris/leaf litter (Annually) Inspect for signs of significant ponding (Twice Annually). Top several inches of the bench layer to be replaced when water ponds above the permanent pool elevation longer than 72 hours. | | |
| | | | |
| | | | |

Additional Notes/Observations:

# Appendix 4

## Soil Report
## FEMA Map

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

# Custom Soil Resource Report for York County, Maine

## 20126 - Arundel Solar


April 16, 2020

# Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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# Contents

# How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

# Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

# Custom Soil Resource Report
## Soil Map


Map Scale: 1:7,690 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

## MAP LEGEND

**Area of Interest (AOI)**
- Area of Interest (AOI)

**Soils**
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

**Special Point Features**
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

**Water Features**
- Streams and Canals

**Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**Background**
- Aerial Photography

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: York County, Maine
Survey Area Data: Version 18, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Sep 9, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

# Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| AlB | Allagash very fine sandy loam, 3 to 8 percent slopes | 15.6 | 13.5% |
| CrB | Croghan loamy sand, 0 to 8 percent slopes | 2.6 | 2.2% |
| EmB | Elmwood fine sandy loam, 0 to 8 percent slopes | 10.4 | 9.0% |
| LnB | Lyman loam, 3 to 8 percent slopes, rocky | 7.8 | 6.7% |
| LyB | Lyman-Rock outcrop complex, 3 to 8 percent slopes | 7.8 | 6.8% |
| LyC | Lyman-Rock outcrop complex, 8 to 15 percent slopes | 23.9 | 20.7% |
| LyE | Lyman-Rock outcrop complex, 15 to 80 percent slopes | 10.4 | 9.0% |
| MaB | Madawaska fine sandy loam, 0 to 8 percent slopes | 3.9 | 3.4% |
| Sc | Scantic silt loam, 0 to 3 percent slopes | 13.4 | 11.6% |
| SeB | Scio silt loam, 3 to 8 percent slopes | 13.0 | 11.2% |
| SeC | Scio silt loam, 8 to 15 percent slopes | 1.7 | 1.5% |
| SkB | Skerry fine sandy loam, 0 to 8 percent slopes | 5.1 | 4.4% |
| **Totals for Area of Interest** | | **115.6** | **100.0%** |

# Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion

of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

# York County, Maine

## AlB—Allagash very fine sandy loam, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 9k4r
*Elevation:* 10 to 2,000 feet
*Mean annual precipitation:* 30 to 48 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 80 to 160 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Allagash and similar soils:* 88 percent
*Minor components:* 12 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Allagash

#### Setting

*Landform:* Stream terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-loamy glaciofluvial deposits derived from slate

#### Typical profile

*H1 - 0 to 6 inches:* fine sandy loam
*H2 - 6 to 23 inches:* fine sandy loam
*H3 - 23 to 65 inches:* gravelly fine sand

#### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 5.1 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* B
*Hydric soil rating:* No

### Minor Components

#### Madawaska

*Percent of map unit:* 7 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Colton**

*Percent of map unit:* 3 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Allagash, slopes <3%**

*Percent of map unit:* 2 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## CrB—Croghan loamy sand, 0 to 8 percent slopes

**Map Unit Setting**

*National map unit symbol:* 9k5d
*Elevation:* 150 to 2,200 feet
*Mean annual precipitation:* 30 to 50 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 70 to 160 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

*Croghan and similar soils:* 87 percent
*Minor components:* 13 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Croghan**

**Setting**

*Landform:* Outwash plains, outwash deltas
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Sandy glaciofluvial deposits derived from granite and gneiss

**Typical profile**

*Oa - 0 to 2 inches:* highly decomposed plant material
*H1 - 2 to 7 inches:* loamy sand
*H2 - 7 to 28 inches:* sand

*H3 - 28 to 65 inches:* sand

**Properties and qualities**

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to very high (1.42 to 14.17 in/hr)
*Depth to water table:* About 18 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 4.8 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2w
*Hydrologic Soil Group:* A
*Hydric soil rating:* No

## Minor Components

### Naumburg

*Percent of map unit:* 6 percent
*Landform:* Outwash plains, outwash deltas
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

### Adams

*Percent of map unit:* 4 percent
*Landform:* Outwash plains, outwash deltas
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

### Croghan, slopes >8%

*Percent of map unit:* 2 percent
*Landform:* Outwash plains, outwash deltas
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

### Rock outcrop

*Percent of map unit:* 1 percent
*Landform:* Outwash plains, outwash deltas
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

## EmB—Elmwood fine sandy loam, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 9k5h
*Elevation:* 10 to 2,000 feet
*Mean annual precipitation:* 34 to 55 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 80 to 195 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Elmwood and similar soils:* 89 percent
*Minor components:* 11 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Elmwood

#### Setting

*Landform:* Outwash plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-loamy glaciolacustrine deposits

#### Typical profile

*Oa - 0 to 2 inches:* highly decomposed plant material
*H1 - 2 to 15 inches:* fine sandy loam
*H2 - 15 to 21 inches:* very fine sandy loam
*H3 - 21 to 65 inches:* silty clay

#### Properties and qualities

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately high (0.00 to 0.20 in/hr)
*Depth to water table:* About 18 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 9.8 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2w
*Hydrologic Soil Group:* B
*Hydric soil rating:* No

**Minor Components**

**Raynham**

*Percent of map unit:* 3 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Scio**

*Percent of map unit:* 3 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Madawaska**

*Percent of map unit:* 2 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Elmwood, slopes >8%**

*Percent of map unit:* 1 percent
*Landform:* Outwash plains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Buxton**

*Percent of map unit:* 1 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Scantic**

*Percent of map unit:* 1 percent
*Landform:* Coastal plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## LnB—Lyman loam, 3 to 8 percent slopes, rocky

### Map Unit Setting

*National map unit symbol:* 2trq7
*Elevation:* 0 to 520 feet
*Mean annual precipitation:* 36 to 65 inches
*Mean annual air temperature:* 36 to 52 degrees F
*Frost-free period:* 60 to 160 days
*Farmland classification:* Farmland of statewide importance

### Map Unit Composition

*Lyman, rocky, and similar soils:* 86 percent
*Minor components:* 14 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Lyman, Rocky

#### Setting

*Landform:* Hills, mountains
*Landform position (two-dimensional):* Shoulder, summit, backslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

#### Typical profile

*Oe - 0 to 1 inches:* moderately decomposed plant material
*A - 1 to 3 inches:* loam
*E - 3 to 5 inches:* fine sandy loam
*Bhs - 5 to 7 inches:* loam
*Bs1 - 7 to 11 inches:* loam
*Bs2 - 11 to 18 inches:* channery loam
*R - 18 to 28 inches:* bedrock

#### Properties and qualities

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* 11 to 24 inches to lithic bedrock
*Natural drainage class:* Somewhat excessively drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to high (0.00 to 14.03 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 3.4 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 2s
*Hydrologic Soil Group:* D
*Hydric soil rating:* No

**Minor Components**

**Tunbridge, rocky**
*Percent of map unit:* 6 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Shoulder, summit, backslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, side slope, crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Skerry, rocky**
*Percent of map unit:* 5 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Footslope, backslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Microfeatures of landform position:* Closed depressions, closed depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* No

**Hermon, rocky**
*Percent of map unit:* 2 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Shoulder, summit, backslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, side slope, crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Brayton, rocky**
*Percent of map unit:* 1 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Toeslope, footslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Microfeatures of landform position:* Closed depressions, closed depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## LyB—Lyman-Rock outcrop complex, 3 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 2trqh
*Elevation:* 0 to 560 feet
*Mean annual precipitation:* 36 to 65 inches
*Mean annual air temperature:* 36 to 52 degrees F
*Frost-free period:* 60 to 160 days
*Farmland classification:* Not prime farmland

### Map Unit Composition

*Lyman, very stony, and similar soils:* 65 percent
*Rock outcrop:* 20 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Lyman, Very Stony

#### Setting

*Landform:* Hills, mountains
*Landform position (two-dimensional):* Backslope, summit, shoulder
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

#### Typical profile

*Oe - 0 to 1 inches:* moderately decomposed plant material
*A - 1 to 3 inches:* loam
*E - 3 to 5 inches:* fine sandy loam
*Bhs - 5 to 7 inches:* loam
*Bs1 - 7 to 11 inches:* loam
*Bs2 - 11 to 18 inches:* channery loam
*R - 18 to 28 inches:* bedrock

#### Properties and qualities

*Slope:* 3 to 8 percent
*Percent of area covered with surface fragments:* 1.5 percent
*Depth to restrictive feature:* 11 to 24 inches to lithic bedrock
*Natural drainage class:* Somewhat excessively drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to high (0.00 to 14.03 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 3.4 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6s
*Hydrologic Soil Group:* D
*Hydric soil rating:* No

## Description of Rock Outcrop

**Setting**

*Landform:* Hills, mountains
*Landform position (two-dimensional):* Summit, backslope, shoulder
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Igneous and metamorphic rock

**Typical profile**

*R - 0 to 10 inches:* bedrock

**Properties and qualities**

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* 0 inches to lithic bedrock
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to very high (0.00 to 14.17 in/hr)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 8s
*Hydric soil rating:* Unranked

## Minor Components

**Skerry, very stony**

*Percent of map unit:* 5 percent
*Landform:* Mountains, hills
*Landform position (two-dimensional):* Backslope, footslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, side slope, crest
*Microfeatures of landform position:* Closed depressions, closed depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* No

**Brayton, very stony**

*Percent of map unit:* 4 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Footslope, toeslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Microfeatures of landform position:* Closed depressions, closed depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Hermon, very stony**

*Percent of map unit:* 3 percent

*Landform:* Mountains, hills
*Landform position (two-dimensional):* Backslope, summit, shoulder
*Landform position (three-dimensional):* Mountainbase, mountaintop, side slope, crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Tunbridge, very stony**

*Percent of map unit:* 3 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Backslope, summit, shoulder
*Landform position (three-dimensional):* Mountaintop, mountainbase, side slope, crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

## LyC—Lyman-Rock outcrop complex, 8 to 15 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2trqj
*Elevation:* 0 to 790 feet
*Mean annual precipitation:* 36 to 65 inches
*Mean annual air temperature:* 36 to 52 degrees F
*Frost-free period:* 60 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Lyman, very stony, and similar soils:* 62 percent
*Rock outcrop:* 25 percent
*Minor components:* 13 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Lyman, Very Stony**

**Setting**

*Landform:* Hills, mountains
*Landform position (two-dimensional):* Shoulder, summit, backslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

**Typical profile**

*Oe - 0 to 1 inches:* moderately decomposed plant material

*A - 1 to 3 inches:* loam
*E - 3 to 5 inches:* fine sandy loam
*Bhs - 5 to 7 inches:* loam
*Bs1 - 7 to 11 inches:* loam
*Bs2 - 11 to 18 inches:* channery loam
*R - 18 to 28 inches:* bedrock

**Properties and qualities**

*Slope:* 8 to 15 percent
*Percent of area covered with surface fragments:* 1.5 percent
*Depth to restrictive feature:* 11 to 24 inches to lithic bedrock
*Natural drainage class:* Somewhat excessively drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to high (0.00 to 14.03 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 3.4 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 6s
*Hydrologic Soil Group:* D
*Hydric soil rating:* No

## Description of Rock Outcrop

**Setting**

*Landform:* Hills, mountains
*Landform position (two-dimensional):* Summit, shoulder, backslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Igneous and metamorphic rock

**Typical profile**

*R - 0 to 10 inches:* bedrock

**Properties and qualities**

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* 0 inches to lithic bedrock
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to very high (0.00 to 14.17 in/hr)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 8s
*Hydric soil rating:* Unranked

## Minor Components

**Hermon, very stony**

*Percent of map unit:* 4 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Backslope, shoulder, summit
*Landform position (three-dimensional):* Mountaintop, mountainbase, side slope, crest

*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Skerry, very stony**

*Percent of map unit:* 4 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Footslope, backslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Microfeatures of landform position:* Closed depressions, closed depressions, open depressions, open depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* No

**Tunbridge, very stony**

*Percent of map unit:* 3 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Backslope, summit, shoulder
*Landform position (three-dimensional):* Mountaintop, mountainbase, side slope, crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Brayton, very stony**

*Percent of map unit:* 2 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Toeslope, footslope
*Landform position (three-dimensional):* Mountaintop, mountainbase, crest, side slope
*Microfeatures of landform position:* Closed depressions, closed depressions, open depressions, open depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## LyE—Lyman-Rock outcrop complex, 15 to 80 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2trqp
*Elevation:* 0 to 980 feet
*Mean annual precipitation:* 36 to 65 inches
*Mean annual air temperature:* 36 to 52 degrees F
*Frost-free period:* 60 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**

*Lyman, very stony, and similar soils:* 60 percent
*Rock outcrop:* 30 percent
*Minor components:* 10 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Lyman, Very Stony**

**Setting**

*Landform:* Hills, mountains
*Landform position (two-dimensional):* Shoulder, summit, backslope
*Landform position (three-dimensional):* Mountaintop, mountainflank, crest, side slope
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Loamy supraglacial till derived from granite and gneiss and/or loamy supraglacial till derived from phyllite and/or loamy supraglacial till derived from mica schist

**Typical profile**

*Oe - 0 to 1 inches:* moderately decomposed plant material
*A - 1 to 3 inches:* loam
*E - 3 to 5 inches:* fine sandy loam
*Bhs - 5 to 7 inches:* loam
*Bs1 - 7 to 11 inches:* loam
*Bs2 - 11 to 18 inches:* channery loam
*R - 18 to 28 inches:* bedrock

**Properties and qualities**

*Slope:* 15 to 80 percent
*Percent of area covered with surface fragments:* 1.5 percent
*Depth to restrictive feature:* 11 to 24 inches to lithic bedrock
*Natural drainage class:* Somewhat excessively drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to high (0.00 to 14.03 in/hr)
*Depth to water table:* More than 80 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Low (about 3.4 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 7s
*Hydrologic Soil Group:* D
*Hydric soil rating:* No

**Description of Rock Outcrop**

**Setting**

*Landform:* Hills, mountains
*Landform position (two-dimensional):* Summit, shoulder, backslope
*Landform position (three-dimensional):* Mountaintop, mountainflank, crest, side slope, free face
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Parent material:* Igneous and metamorphic rock

**Typical profile**

*R - 0 to 10 inches:* bedrock

**Properties and qualities**

*Slope:* 15 to 80 percent
*Depth to restrictive feature:* 0 inches to lithic bedrock
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to very high (0.00 to 14.17 in/hr)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 8s
*Hydric soil rating:* Unranked

## Minor Components

**Tunbridge, very stony**

*Percent of map unit:* 4 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Backslope, summit, shoulder
*Landform position (three-dimensional):* Mountaintop, mountainflank, side slope, crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Hermon, very stony**

*Percent of map unit:* 3 percent
*Landform:* Mountains, hills
*Landform position (two-dimensional):* Summit, shoulder, backslope
*Landform position (three-dimensional):* Mountaintop, mountainflank, side slope, crest
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Skerry, very stony**

*Percent of map unit:* 2 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Backslope, footslope
*Landform position (three-dimensional):* Mountaintop, mountainflank, crest, side slope
*Microfeatures of landform position:* Open depressions, open depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* No

**Brayton, very stony**

*Percent of map unit:* 1 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Toeslope, footslope
*Landform position (three-dimensional):* Mountaintop, mountainflank, crest, side slope
*Microfeatures of landform position:* Open depressions, open depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

## MaB—Madawaska fine sandy loam, 0 to 8 percent slopes

### Map Unit Setting

*National map unit symbol:* 9k60
*Elevation:* 20 to 2,000 feet
*Mean annual precipitation:* 30 to 50 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 80 to 160 days
*Farmland classification:* All areas are prime farmland

### Map Unit Composition

*Madawaska and similar soils:* 88 percent
*Minor components:* 12 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Madawaska

#### Setting

*Landform:* Stream terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Coarse-loamy glaciofluvial deposits derived from slate

#### Typical profile

*H1 - 0 to 10 inches:* fine sandy loam
*H2 - 10 to 23 inches:* fine sandy loam
*H3 - 23 to 65 inches:* fine sand

#### Properties and qualities

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 18 to 36 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Moderate (about 8.6 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2w
*Hydrologic Soil Group:* B
*Hydric soil rating:* No

**Minor Components**

**Allagash**
*Percent of map unit:* 5 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Croghan**
*Percent of map unit:* 4 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

**Naumburg**
*Percent of map unit:* 2 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Madawaska, slopes >8%**
*Percent of map unit:* 1 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## Sc—Scantic silt loam, 0 to 3 percent slopes

**Map Unit Setting**
*National map unit symbol:* 2slv3
*Elevation:* 10 to 900 feet
*Mean annual precipitation:* 33 to 60 inches
*Mean annual air temperature:* 39 to 45 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* Not prime farmland

**Map Unit Composition**
*Scantic and similar soils:* 85 percent

*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

### Description of Scantic

#### Setting

*Landform:* Marine terraces, river valleys
*Landform position (three-dimensional):* Talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Glaciomarine deposits

#### Typical profile

*Ap - 0 to 9 inches:* silt loam
*Bg1 - 9 to 16 inches:* silty clay loam
*Bg2 - 16 to 29 inches:* silty clay
*Cg - 29 to 65 inches:* silty clay

#### Properties and qualities

*Slope:* 0 to 3 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Poorly drained
*Capacity of the most limiting layer to transmit water (Ksat):* Very low to moderately low (0.00 to 0.06 in/hr)
*Depth to water table:* About 0 to 12 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* Moderate (about 6.3 inches)

#### Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 4w
*Hydrologic Soil Group:* D
*Hydric soil rating:* Yes

### Minor Components

#### Lamoine

*Percent of map unit:* 8 percent
*Landform:* River valleys, marine terraces
*Landform position (three-dimensional):* Riser, rise
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

#### Biddeford

*Percent of map unit:* 3 percent
*Landform:* Marine terraces, river valleys
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave, linear
*Ecological site:* Marine Terrace Depression (F144BY002ME)
*Hydric soil rating:* Yes

#### Roundabout

*Percent of map unit:* 2 percent
*Landform:* River valleys, marine terraces

*Landform position (three-dimensional):* Tread, talf
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Buxton**

*Percent of map unit:* 2 percent
*Landform:* Marine terraces, river valleys
*Landform position (three-dimensional):* Riser, rise
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Hydric soil rating:* No

## SeB—Scio silt loam, 3 to 8 percent slopes

**Map Unit Setting**

*National map unit symbol:* 9k6l
*Elevation:* 10 to 2,000 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 80 to 160 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

*Scio and similar soils:* 89 percent
*Minor components:* 11 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Scio**

**Setting**

*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Parent material:* Very fine sand glaciolacustrine deposits

**Typical profile**

*H1 - 0 to 7 inches:* silt loam
*H2 - 7 to 26 inches:* silt loam
*H3 - 26 to 36 inches:* silt loam
*H4 - 36 to 65 inches:* very fine sandy loam

**Properties and qualities**

*Slope:* 3 to 8 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 18 to 30 inches

*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 10.1 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

**Minor Components**

**Raynham**

*Percent of map unit:* 6 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Madawaska**

*Percent of map unit:* 5 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## SeC—Scio silt loam, 8 to 15 percent slopes

**Map Unit Setting**

*National map unit symbol:* 9k6m
*Elevation:* 10 to 2,000 feet
*Mean annual precipitation:* 34 to 48 inches
*Mean annual air temperature:* 37 to 46 degrees F
*Frost-free period:* 80 to 160 days
*Farmland classification:* Farmland of statewide importance

**Map Unit Composition**

*Scio and similar soils:* 91 percent
*Minor components:* 9 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Scio**

**Setting**

*Landform:* Lakebeds
*Landform position (two-dimensional):* Backslope
*Landform position (three-dimensional):* Riser

*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Parent material:* Very fine sand glaciolacustrine deposits

**Typical profile**

*H1 - 0 to 7 inches:* silt loam
*H2 - 7 to 26 inches:* silt loam
*H3 - 26 to 36 inches:* silt loam
*H4 - 36 to 65 inches:* very fine sandy loam

**Properties and qualities**

*Slope:* 8 to 15 percent
*Depth to restrictive feature:* More than 80 inches
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 18 to 30 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Available water storage in profile:* High (about 10.1 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 3e
*Hydrologic Soil Group:* C
*Hydric soil rating:* No

**Minor Components**

**Raynham**

*Percent of map unit:* 5 percent
*Landform:* Lakebeds
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Concave
*Across-slope shape:* Linear
*Hydric soil rating:* Yes

**Madawaska**

*Percent of map unit:* 4 percent
*Landform:* Stream terraces
*Landform position (two-dimensional):* Summit
*Landform position (three-dimensional):* Tread
*Down-slope shape:* Linear
*Across-slope shape:* Linear
*Hydric soil rating:* No

## SkB—Skerry fine sandy loam, 0 to 8 percent slopes

**Map Unit Setting**

*National map unit symbol:* 2w9pg

*Elevation:* 160 to 750 feet
*Mean annual precipitation:* 36 to 65 inches
*Mean annual air temperature:* 36 to 52 degrees F
*Frost-free period:* 90 to 160 days
*Farmland classification:* All areas are prime farmland

**Map Unit Composition**

*Skerry and similar soils:* 85 percent
*Minor components:* 15 percent
*Estimates are based on observations, descriptions, and transects of the mapunit.*

**Description of Skerry**

**Setting**

*Landform:* Mountains, hills
*Landform position (two-dimensional):* Footslope, backslope
*Landform position (three-dimensional):* Mountainbase, interfluve
*Down-slope shape:* Convex
*Across-slope shape:* Linear
*Parent material:* Loamy lodgment till derived from granite and gneiss and/or schist over sandy lodgment till derived from granite and gneiss and/or schist

**Typical profile**

*Ap - 0 to 6 inches:* fine sandy loam
*Bs1 - 6 to 20 inches:* gravelly fine sandy loam
*Bs2 - 20 to 25 inches:* gravelly fine sandy loam
*Cd1 - 25 to 34 inches:* gravelly loamy sand
*Cd2 - 34 to 65 inches:* gravelly loamy sand

**Properties and qualities**

*Slope:* 0 to 8 percent
*Depth to restrictive feature:* 21 to 43 inches to densic material
*Natural drainage class:* Moderately well drained
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately low to moderately high (0.01 to 1.42 in/hr)
*Depth to water table:* About 18 to 30 inches
*Frequency of flooding:* None
*Frequency of ponding:* None
*Salinity, maximum in profile:* Nonsaline (0.0 to 1.9 mmhos/cm)
*Available water storage in profile:* Low (about 3.9 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2w
*Hydrologic Soil Group:* C/D
*Hydric soil rating:* No

**Minor Components**

**Colonel**

*Percent of map unit:* 6 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Footslope
*Landform position (three-dimensional):* Mountainbase, interfluve
*Microfeatures of landform position:* Closed depressions, closed depressions
*Down-slope shape:* Linear, concave
*Across-slope shape:* Concave

*Hydric soil rating:* No

**Becket**

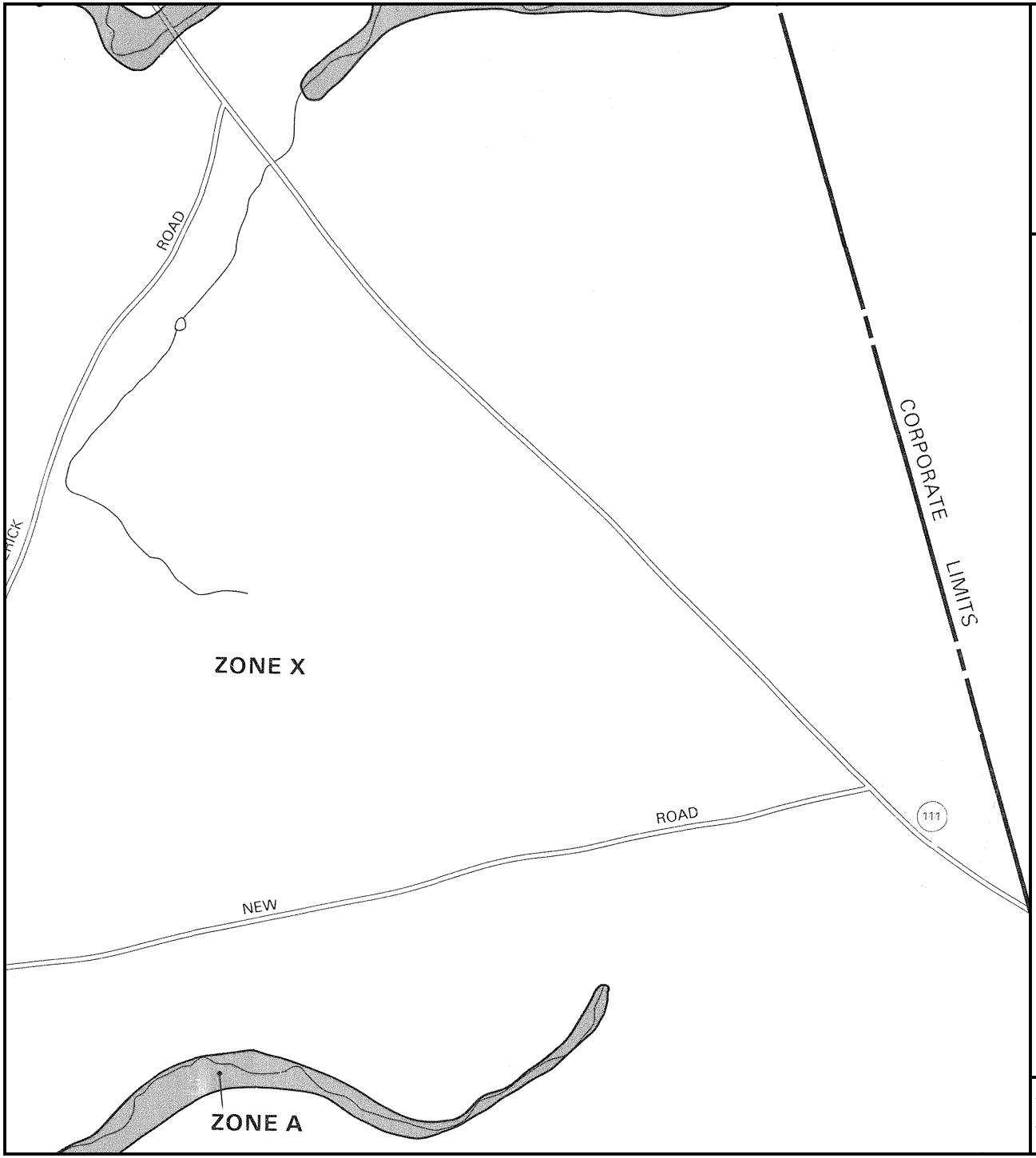
*Percent of map unit:* 4 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Backslope, shoulder, summit
*Landform position (three-dimensional):* Mountainbase, interfluve
*Microfeatures of landform position:* Rises, rises
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No

**Brayton**

*Percent of map unit:* 3 percent
*Landform:* Mountains, hills
*Landform position (two-dimensional):* Toeslope, footslope
*Landform position (three-dimensional):* Mountainbase, interfluve
*Microfeatures of landform position:* Closed depressions, closed depressions
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Hydric soil rating:* Yes

**Hermon**

*Percent of map unit:* 2 percent
*Landform:* Hills, mountains
*Landform position (two-dimensional):* Summit, shoulder, backslope
*Landform position (three-dimensional):* Mountainbase, interfluve
*Microfeatures of landform position:* Rises, rises
*Down-slope shape:* Convex
*Across-slope shape:* Convex
*Hydric soil rating:* No




APPROXIMATE SCALE

1000 0 1000 FEET

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

TOWN OF
ARUNDEL, MAINE
YORK COUNTY

**PANEL 5 OF 10**
(SEE MAP INDEX FOR PANELS NOT PRINTED)

**COMMUNITY-PANEL NUMBER**
**230192 0005 C**

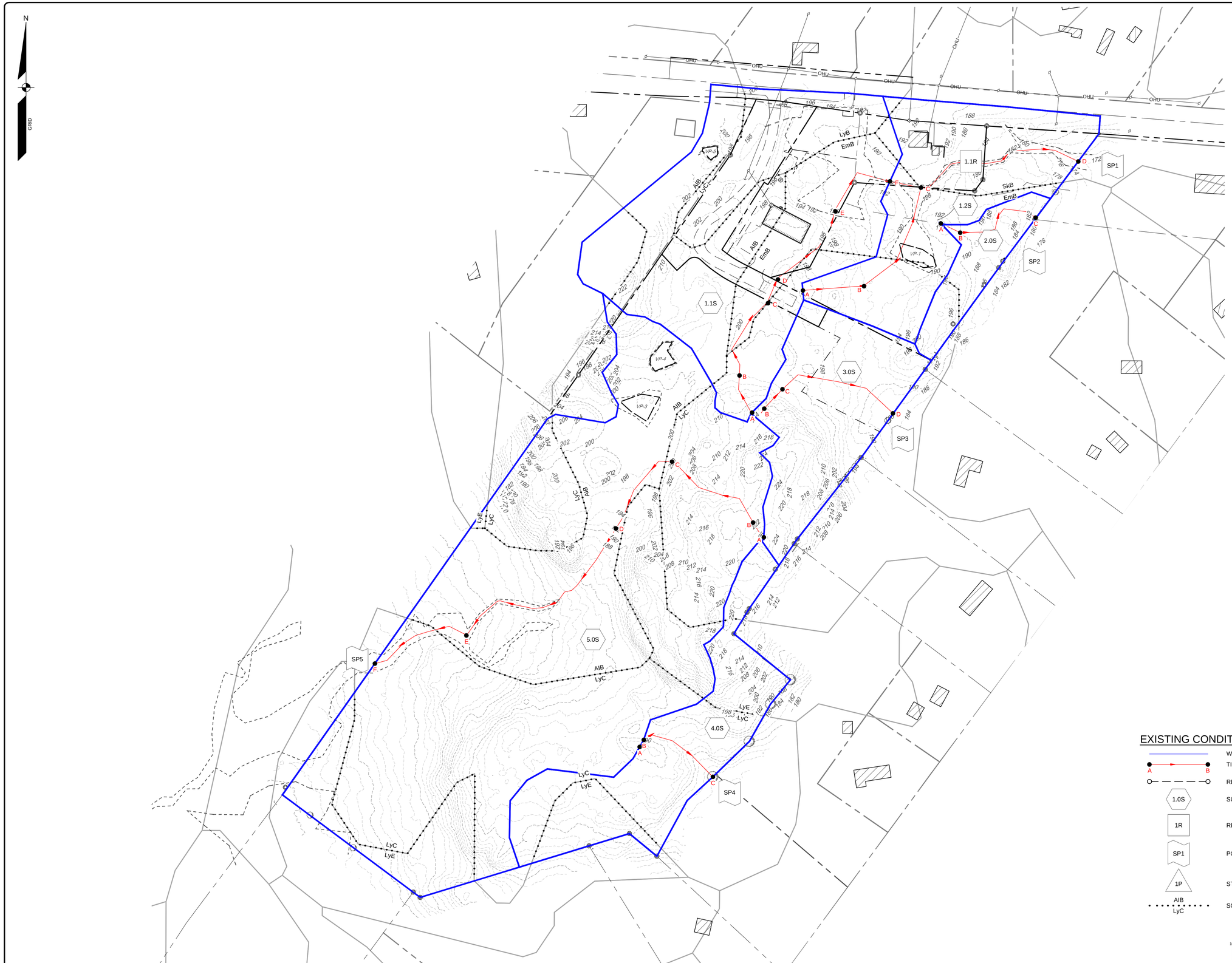
**MAP REVISED:**
**JUNE 4, 1996**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

# Appendix 5

## Stormwater Management Plans




CHRISTOPHER P. TAYLOR, PE 16677

STATE OF MAINE · CHRISTOPHER P. TAYLOR · No. 16677 · LICENSED PROFESSIONAL ENGINEER

08/20/2023

NOT FOR CONSTRUCTION

| REV.: | BY: | DATE: | STATUS: |
|---|---|---|---|
| A. | CPT | 06.20.2023 | PRELIMINARY TOWN SUBMISSION |

THIS PLAN SHALL NOT BE MODIFIED WITHOUT WRITTEN PERMISSION FROM SEBAGO TECHNICS, INC. ANY ALTERATIONS, AUTHORIZED OR OTHERWISE, SHALL BE AT THE USER'S SOLE RISK AND WITHOUT LIABILITY TO SEBAGO TECHNICS, INC.

SEBAGO TECHNICS
WWW.SEBAGOTECHNICS.COM
75 John Roberts Rd.
Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

EXISTING CONDITIONS - STORMWATER

OF:
FITZPATRICK DEVELOPMENT
HEAVY HAMMER LANE
ARUNDEL, MAINE 04046

FOR:
BDF HOLDINGS, LLC.
4 JEFFREY'S WAY
KENNEBUNK, MAINE 04043

| | |
|---|---|
| DESIGNED | KMD |
| DRAWN | KMD/DAB |
| CHECKED | CPT |
| DATE | 08/22/2022 |
| SCALE | 1" = 100' |
| PROJECT | 20126-01 |

20126-01 SWP dwg, TAB SWP-PRE

SHEET 1 OF 2


## PROPOSED CONDITIONS LEGEND

- WATERSHED BOUNDARY
- TIME OF CONCENTRATION (A, B)
- REACH
- 1.0S — SUBCATCHMENT LABEL
- 1R — REACH
- SP1 — POINT OF ANALYSIS
- 1P — STORMWATER TREATMENT/DETENTION POND
- AlB / LyC — NRCS SOILS BOUNDARY

GRAPHIC SCALE
100 0 50 100 200
(IN FEET)
1 INCH = 100FT.

CHRISTOPHER P. TAYLOR, PE 16677

STATE OF MAINE — CHRISTOPHER P. TAYLOR — No. 16677 — LICENSED PROFESSIONAL ENGINEER — 06/12/2024

NOT FOR CONSTRUCTION

| REV.: | BY: | DATE: | STATUS |
|---|---|---|---|
| A | CPT | 06/12/2024 | ISSUED FOR AMENDED SITE PLAN REVIEW |

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SEBAGO TECHNICS
WWW.SEBAGOTECHNICS.COM
75 John Roberts Rd.
Suite 4A
South Portland, ME 04106
Tel. 207-200-2100

PROPOSED CONDITIONS STORMWATER PLAN
OF:
INDOOR RECREATION COMPLEX
LOT 4, HEAVY HAMMER LANE
ARUNDEL, ME 04005
FOR:
BDF HOLDINGS, LLC
4 JEFFREYS WAY
KENNEBUNK, ME 04043

| | |
|---|---|
| DESIGNED | KK |
| DRAWN | STI |
| CHECKED | CPT |
| DATE | 06/12/2024 |
| SCALE | 1" = 100' |
| PROJECT | 20126-03 |

20126-03 SWP-Post.dwg - TAB:SWP-Post

SHEET 2 OF 2