



# **Stormwater Management Report For**

**Mattakeesett Village  
7&15 Mattakeesett St.  
Pembroke, MA 02359**

**February 3, 2023**

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## **TABLE OF CONTENTS**

### **1. NARRATIVE**

- 1.1 EXECUTIVE SUMMARY
- 1.2 APPROVALS BEING SOUGHT
- 1.3 FEMA – FLOODPLAIN SUMMARY
- 1.4 ON-SITE SOIL INFORMATION
- 1.5 WETLANDS AND ENVIRONMENTAL RESOURCE AREAS ANALYSIS
- 1.6 OBJECTIVE OF CALCULATIONS
- 1.7 METHODOLOGY
- 1.8 SITE HYDROLOGY
- 1.9 MASSDEP STORMWATER STANDARDS
- 1.10 BEST MANAGEMENT PRACTICES
- 1.11 PIPE SIZING
- 1.12 CONCLUSION
- 1.13 FIGURES:
  - FIG 1 AERIAL MAP
  - FIG 2 USGS MAP
  - FIG 3 FEMA FLOODPLAIN MAP
  - FIG 4 NHESP MAP
  - FIG 5 MASSDEP WETLANDS MAP

### **2. MA DEP CHECKLIST FOR STORMWATER REPORT**

- 2.1 DEP STORMWATER CHECKLIST
- 2.2 ILLICIT DISCHARGE STATEMENT

### **3. HYDROCAD MODEL**

- 3.1 EXISTING HYDROLOGY
- 3.2 PROPOSED HYDROLOGY
- 3.3 PRE AND POST DEVELOPMENT WATERSHED FIGURES

### **4. STORMWATER MANAGEMENT CALCULATIONS**

- 4.1 RECHARGE CALCULATIONS
- 4.2 DRAWDOWN CALCULATIONS
- 4.3 WATER QUALITY CALCULATIONS
- 4.4 TOTAL SUSPENDED SOLIDS CALCULATIONS

### **5. LONG-TERM POLLUTION PREVENTION AND OPERATION & MAINTENANCE PLAN**



- 5.1 BMP MAP
- 5.2 OPERATION & MAINTENANCE NARRATIVE
- 5.3 MAINTENANCE MATRIX

## **6. SOILS TESTING DATA**

- 6.1 TEST PIT LOGS
- 6.2 NRCS WEB SOIL SURVEY

## **7. HYDRAULIC PIPE ANALYSIS & SIZING**

## **8. PROJECT PLANS – DATED 2/3/23 (Under Separate Cover)**



## **1.1 EXECUTIVE SUMMARY**

In accordance with the provisions of the Town of Pembroke Zoning Bylaws, the Applicant, Weathervane at Mattakeesett, LLC., proposes to construct two (2) multifamily buildings consisting of 66 age restricted units comprised of 17 affordable units and 49 market rate units at 7/15 Mattakeesett Street in Pembroke, Massachusetts. The project includes the construction of site parking which provides for a total of 109 spaces.

The property at 7 & 15 Mattakeesett Street is bound by Center Cemetery to the North, Mattakeesett Street to the South, and commercial businesses to the east and West. The Parcels C914 and C915, combined are approximately 3.27 acres and is owned by Washington RE Holdings, LLC. Please refer to the Existing Conditions Plan, enclosed with the plan set.

The property (to be referred to as “the site”) is located within the Center Protection Zoning District and the Residential A Zoning District. The site consists of a former funeral home building, a garage, paved parking and driveways.

## **1.2 APPROVALS BEING SOUGHT**

The Stormwater Report is being filed with the Pembroke Zoning Board as part of the Comprehensive Permit submission. The Applicant requests that the permit approvals encompass the entirety of the scope listed below, and as shown in the accompanying plan set:

- The demolition of all existing structures and associated site infrastructure
- The construction of a two (2) three (3) story apartment buildings, with 24 units in proposed in Building 1, and 42 units proposed in Building 2.
- There are 80 surface parking spaces and 26 garage parking spaces proposed (12 spaces in Building 1 and 14 spaces in Building 2).
- Two (2) entrances from Mattakeesett Street.
- Supporting site infrastructure including a stormwater management system, utilities, pavement and landscaping.

## **1.3 FEMA – FLOODPLAIN SUMMARY**

The parcel is shown on two (2) FEMA Flood Insurance Rate Map Panels including 25023C0204K and also 25023C0208K. Both maps are shown on the FEMA website with the “Active” map dated 7/6/2021. The site is located within Zone X, which is defined as areas determined to be outside the 500-year floodplain and determined to be outside the 1% and 0.2% annual chance floodplain.

## **1.4 ON-SITE SOIL INFORMATION**





The Natural Resource Conservation Service (NRCS) maps the majority of the site as Deerfield loamy fine sand, Soil Map Unit 256A, classified as Hydrologic Soil Group (HSG) "A." The developed portion of the site is mapped as Merrimac-Urban land complex, Soil Map Unit 626B.

CDG has performed several rounds of test pits at the site on 11/1/21, 8/17/22 and 1/14/23, all performed by a Title V Licensed Soil Evaluator and some were witnessed by the Pembroke Board of Health Agent (which is noted on the enclosed test pit logs). The test pits within the proposed infiltration basin are TP-2, TP-3 and TP-4, as shown on the Test Pit Plan within the site plan set. The test pits revealed a subsurface comprised of loamy sand, consistent with an "A" soil. An infiltration rate of 2.41 inches per hour was used in the HydroCAD model as this rate is consistent with a loamy sand.

Please refer to Section 6 for the test pit logs.

### **1.5 WETLANDS AND ENVIRONMENTAL RESOURCE AREAS ANALYSIS**

The site does not contain any environmental resource areas that are jurisdictional through MassDEP or the Pembroke Conservation Commission. The site does not contain any areas designated as estimated or priority endangered species habitat, certified vernal pools or Areas of Critical Environmental Concern. The site does not contain areas classified as Estimated Habitats of Rare Wildlife by the Natural Heritage and Endangered Species Program of the Division of Fisheries and Wildlife.

### **1.6 OBJECTIVE OF CALCULATIONS**

The purpose of this stormwater analysis is to examine the stormwater runoff from the proposed site based upon the Massachusetts Department of Environmental Protection Stormwater Management Policy and the applicable provisions of the Town of Pembroke Bylaws and regulations.

The goal of the stormwater management system design on this project is to comply with the MA Stormwater Management Requirements and provide improved water quality, reduce post-development peak runoff rates below pre-development peak flow rates, maximize the opportunities for recharge and infiltration, and protect the surrounding area from any potential flooding and/or environmental impacts associated with the unmitigated condition. The following stormwater hydrology calculations were performed using the 2-year, 10-year, 25-year, and 100-year frequency, Type III, 24-hour SCS design storms (NOAA 14) and were compared for both pre-development and post-development conditions.

### **1.7 METHODOLOGY**



We utilized the latest version of Hydro CAD for the overall stormwater hydrology/routing analysis to assess and compare peak rates of runoff at the various discharge points from the subject property. We then utilized the Hydraflow Storm Sewers Extension Pack through AutoCAD Civil 3d to analyze the pipe design and to select appropriate pipe sizing.

Refer to Section 3 – Hydrocad Model, which includes the detailed print-out of the HydroCAD Model Reports for the 2, 10, 25 and 100-year storms as well as Section 7 – Hydraulic Pipe Analysis / Sizing, which includes the Hydraflow reports for the 10 and 100-year storms for pipe capacity analysis and sizing.

## **1.8 SITE HYDROLOGY**

### **Existing Conditions**

Please refer to the attached Existing Conditions Watershed Analysis Plan in Section 3.3. The property has been divided into four (4) subcatchment areas based on the existing site topography and flow paths. These subcatchments then combine where appropriate from an analysis standpoint where they discharge toward adjacent rights-of-ways, abutting commercial properties and to existing drainage infrastructure. Each subcatchment area has been analyzed and assigned an appropriate Curve Number to represent the existing vegetative cover and underlying soils conditions. Times of concentration have been computed and the extent of pervious vs. impervious cover computed. This data was then input into HydroCAD to determine peak rates of runoff at the various design points which provide the locations for which to compare existing versus proposed conditions to document compliance that the peak rates have been reduced in the regulatory storm events as required. A Summary table is provided in the Hydrology Model Results and Conclusions Section below.

For the purposes of this analysis, the pre- and post- development drainage conditions were analyzed at three (3) “design points” where stormwater runoff currently drains to under existing conditions. The design points are described below:

- Design Point #1 (PD1) is to the west of the Site.
- Design Point #2 (PD2) is to the south of the Site towards Center Cemetery.
- Design Point #3 (PD3) is to the southeast of the Site.

The existing site consists of approximately 3.27± acres of land, formerly home to a funeral home business. The site includes a large residential style building (that was used as the funeral home) and a separate garage. The site has four (4) existing entrances from Mattakeesett Street. There are bituminous drives from each access point and striped parking spaces near the entrances. The



site is primarily comprised of dense vegetated/wooded areas to the north of the former funeral home and associated parking lot. The site generally conveys stormwater in a northerly direction.

A more comprehensive description of the existing subcatchment areas is provided below:

- Subcatchment EW-1 is approximately 939 SF consisting of grass area and a portion of the existing paved parking at the southeastern corner of the site. Stormwater in this location flows to the west (DP1). This area is mostly pervious surface (CN: 51) and the minimum time of concentration of 6.0 minutes is used.
- Subcatchment EW-2 is approximately 67,472 SF consisting of a portion of the existing parking area and a large majority of the wooded area on site. Stormwater in this subwatershed flows overland to the south towards DP2. This area is mostly pervious (CN: 32) and a time of concentration of 11.1 minutes was calculated.
- Subcatchment EW-3 is approximately 45,878 SF consisting of a portion of the existing paved parking and building, the existing leaching field and some woods. Stormwater sheet flows overland to the south (DP3) without treatment or attenuation. This area is mostly impervious with some pervious surfaces (CN: 39). The minimum time of concentration of 6.0 minutes is used.
- Subcatchment EW-4 is approximately 30,979 SF of paved parking and access drives along with a portion of the buildings. Most of the runoff in this watershed is collected via catchbasins and underground drainage that outlets to an existing drainage basin. The overflow of the basin discharges into EW-2 and eventually to DP-2. The area consists mostly of impervious surfaces (CN: 87). The minimum time of concentration of 6.0 minutes is used.

### **Proposed Conditions**

The proposed Project consists of two (2) multifamily buildings consisting of 66 age restricted units comprised of 17 affordable units and 49 market rate units at 7/15 Mattakeesett Street in Pembroke, Massachusetts. The project includes the construction of site parking which provides for a total of 109 spaces. The project will also include landscaping improvements, utilities, and a modernized stormwater management system. The proposed parking areas and access drives have been designed to drain into deep sump hooded catch basins or trench drains. The catch basins will capture and convey stormwater runoff, via an underground pipe system, to a sediment forebay and eventually to an infiltration basin. Pretreatment of stormwater runoff will be provided by a combination of the deep-sump hooded catch basins and sediment forebay prior to the infiltration basin. Rooftop runoff has been designed to flow directly to the infiltration basin.



Please refer to the attached Proposed Conditions Watershed Analysis Plan. The proposed project has been divided into five (5) subcatchment areas and the stormwater infiltration BMPs have been modeled. Appropriate Times of Concentration and Curve Numbers have been assigned for each catchment area. A more comprehensive description of the proposed subcatchment areas is provided below:

- Subcatchment 2-S is approximately 24,394 SF of the proposed building roof which is proposed to discharge directly to the infiltration basin. This area is completely impervious (CN: 98) and the minimum time of concentration of 6.0 minutes is used.
- Subcatchment PW-1 is approximately 939 SF of the landscape/grass area at the southeastern corner of the property. The stormwater in this location flows overland offsite in the northeast direction to (DP-1). This area is completely pervious surfaces (CN: 39) and a minimum time of concentration of 6.0 minutes is used.
- Subcatchment PW-2 is approximately 18,204 SF of the existing woods and proposed landscaped area. Stormwater in this location runs overland to the north (DP-2). The area consists primarily pervious surfaces (CN: 33). The minimum time of concentration of 6.0 minutes is used.
- Subcatchment PW-3 is approximately 14,053 SF of the pervious area to the west of the east of the proposed development. This area is proposed to be pervious and landscaped (CN: 38). A calculated time of concentration of 8.5 minutes is used.
- Subcatchment PW-4 is 87,306 SF mostly consisting of the paved parking and access drives, as well as some landscaped area (CN: 85). This area is captured via catchbasins and transported via underground pipe network to a sediment forebay and infiltration basin. that flows towards 3A/Lincoln Street (PD4). The minimum time of concentration of 6.0 minutes is used.

### **Hydrology Model Results and Conclusions**

While the project is a mix of new and redevelopment, the goal of the stormwater design for the project is to fully comply with the Massachusetts Stormwater Policy and the Town of Pembroke Regulations. This analysis confirms that the stormwater system is receiving proper treatment and peak rates of runoff have been reduced to below pre-development rates using stormwater Best Management Practices including deep sump hooded catch basins, a sediment forebay and infiltration basin.

The results of the pre- and post-development hydrology calculations provided in Section 3 are summarized in the following tables:



Table 1.8.1 shows the peak rate of runoff for the existing site as well as for the developed site at 2, 10, 25 and 100-year design storms.

**Table 1.8.1**

Point of Analysis	2-Year Storm (cfs)			10-Year Storm (cfs)			25-Year Storm (cfs)			100-Year Storm (cfs)		
	Existing	Proposed	Δ	Existing	Proposed	Δ	Existing	Proposed	Δ	Existing	Proposed	Δ
PD1	0.00	0.00	0.00	0.02	0.00	-0.02	0.04	0.01	-0.03	0.08	0.03	-0.05
PD2	0.00	0.00	0.00	2.85	0.00	-2.85	4.39	0.01	-4.38	8.28	0.16	-8.12
PD3	0.00	0.00	0.00	0.04	0.01	-0.03	0.40	0.08	-0.32	1.47	0.34	-1.13

As shown in Table 1.8.1, the peak stormwater runoff generated by the development are the same or less in post development conditions versus the existing conditions, for every storm. Refer to Section 3 for the complete HydroCAD Analysis that documents the above results as well as the Existing and Proposed Conditions Watershed Plans, also enclosed in Section 3.

### **1.9 Massachusetts Department of Environmental Protection- Stormwater Standards**

The following section describes each of the ten (10) Massachusetts Stormwater Management Standards and describes how the project complies with each.

Standard 1: No New Untreated Discharges – No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

**There are no new stormwater conveyances proposed with this project. The stormwater management system has been designed to direct stormwater runoff from impervious areas through various stormwater systems designed to capture, convey, treat, detain, and recharge.**

Standard 2: Peak Rate Attenuation – Stormwater management systems have been designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

**Table 1.8.1, above, shows the reduction in peak flow rates in the 2, 10, 25 and 100 year storms at design points 1, 2, and 3.**

Standard 3: Recharge – Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-



development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

**The stormwater system has been designed to comply with the recharge requirements for both the MA Stormwater Management Regulations. Refer to Section 4 for a summary of the stormwater recharge calculations.**

Standard 4: Water Quality – Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS).

**The project utilizes deep sump hooded catch basins, a properly sized sediment forebay and an infiltration basin.**

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPL) – For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

**This project is not considered a LUHPPL. This standard does not apply.**

Standard 6: Critical Areas – Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

**There are no critical areas in or near the project site however, water quality calculations use the 1-inch treatment.**

Standard 7: Redevelopment and Other Projects Subject to the Standards only to the maximum extent practicable – A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also



comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

**The project qualifies as a partial redevelopment and partial new development. The existing stormwater management systems conveys stormwater without treatment or attenuation. The proposed system provides significantly improved treatment (80% TSS Removal or greater), groundwater recharge and peak rate attenuation, exceeding the minimum requirements.**

Standard 8: Construction Period Pollution Prevention Plan and Erosion and Sedimentation Control – A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

**An Erosion and Sedimentation Controls Plan has been incorporated into the Site Plans.**

Standard 9: Operation and Maintenance Plan – A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

**A long-term Operation and Maintenance Plan has been incorporated herein. See Section 5.**

Standard 10: Prohibition of Illicit Discharges – All illicit discharges to the stormwater management system are prohibited.

**An Illicit Discharge Compliance Statement is included as required and is enclosed in Section 2.2.**

### **1.10 BEST MANAGEMENT PRACTICES (BMP'S)**

A series of deep sump hooded catch basins, a sediment forebay and infiltration basin, will be used to treat stormwater runoff on the site. See Section 4 for stormwater management calculations.

### **1.11 PIPE SIZING**

Refer to Section 7 for the output results from the Hydraflow Sewer Storm Sewers Extension for AutoCAD Civil 3D. Hydraflow utilized the Rational Method. The tributary area for each inlet/subcatchment area has been computed along with pipe length, slope and friction



coefficient. The Rational Method is then utilized to determine the hydraulic grade line. For design purposes, this approach was used to size the pipes such that the 10-year storm event is contained within the pipe. The 100-year storm was then checked to confirm the hydraulic grade line for the pipe network does not exceed the rim elevations of the drainage structures. In addition, pipe velocities were checked to be within the range of 2fps to 10 fps flowing 1/3 full.

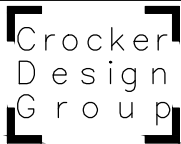
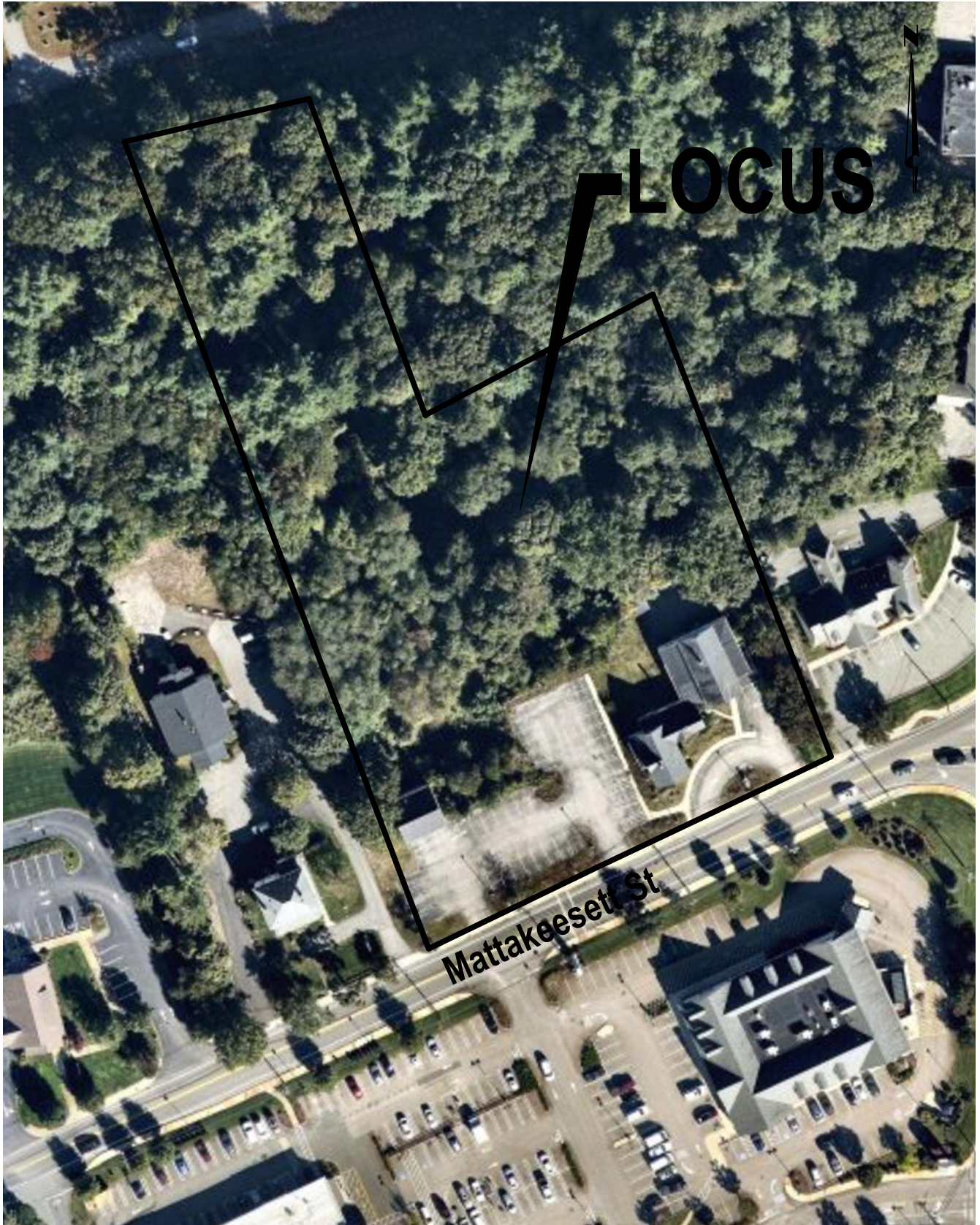
### **1.12 CONCLUSION**

In conclusion, the project has been designed in accordance with the requirements of the MA DEP's Stormwater Management Standards.

### **1.13 Figures**

- FIG 1 AERIAL MAP
- FIG 2 USGS MAP
- FIG 3 FEMA FLOODPLAIN MAP
- FIG 4 NHESP MAP
- FIG 5 MASSDEP WETLANDS MAP





2 SHARP STREET, UNIT A  
HINGHAM, MA 02043

Project

**MATTAKEESETT  
VILLAGE**

**7 & 15 MATTAKEESETT ST  
PEMBROKE MA 02359**

Prepared for

**WEATHERVANE AT  
MATTAKEESETT, LLC**

**190 OLD DERBY STREET  
HINGHAM, MA 02043**

Drawing Title

**AERIAL PLAN**

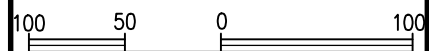
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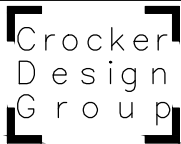
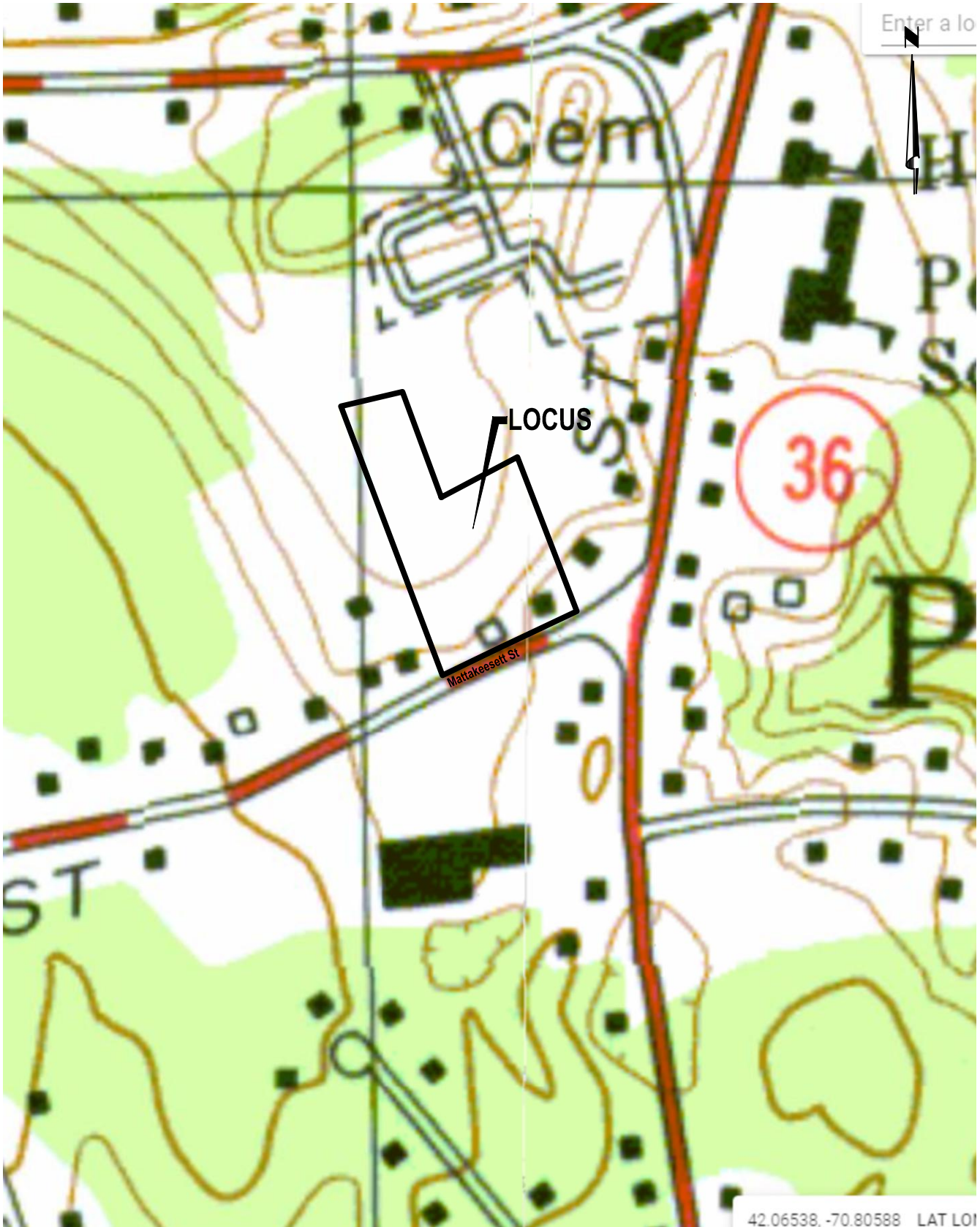
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2 SHARP STREET, UNIT A  
HINGHAM, MA 02043

Project

**MATTAKESSETT  
VILLAGE**

7 & 15 MATTAKESSETT ST  
PEMBROKE MA 02359

Prepared for

**WEATHERVANE AT  
MATTAKESSETT, LLC**

190 OLD DERBY STREET  
HINGHAM, MA 02043

Drawing Title

**USGS PLAN**

DATE: 2.2.2023

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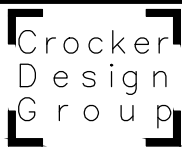
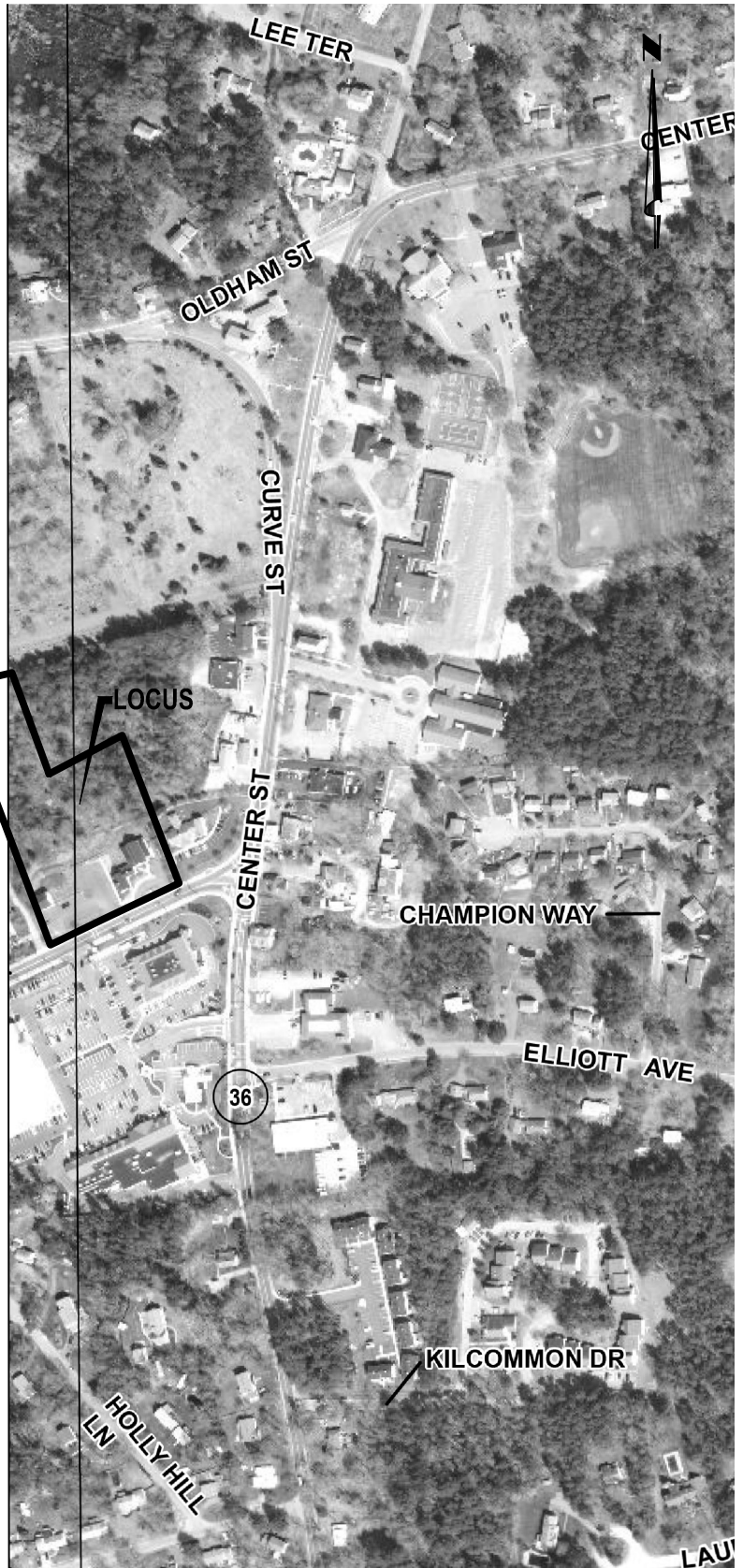
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2 SHARP STREET, UNIT A  
HINGHAM, MA 02043

Project  
**MATTAKEESETT  
VILLAGE**

7 & 15 MATTAKEESETT ST  
PEMBROKE MA 02359

Prepared for  
**WEATHERVANE AT  
MATTAKEESETT, LLC**

190 OLD DERBY STREET  
HINGHAM, MA 02043

Drawing Title **FEMA FLOOD MAP**  
EFFECTIVE PANEL 25023C0204K, 25023C0208K (7/6/2021)

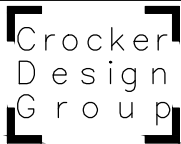
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2 SHARP STREET, UNIT A  
HINGHAM, MA 02043

Project

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VILLAGE**

**7 & 15 MATTAKEESETT ST  
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Prepared for

**WEATHERVANE AT  
MATTAKEESETT, LLC**

**190 OLD DERBY STREET  
HINGHAM, MA 02043**

Drawing Title

**NHESP PLAN**

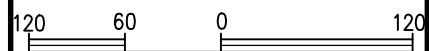
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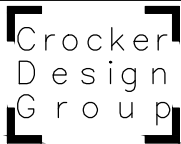
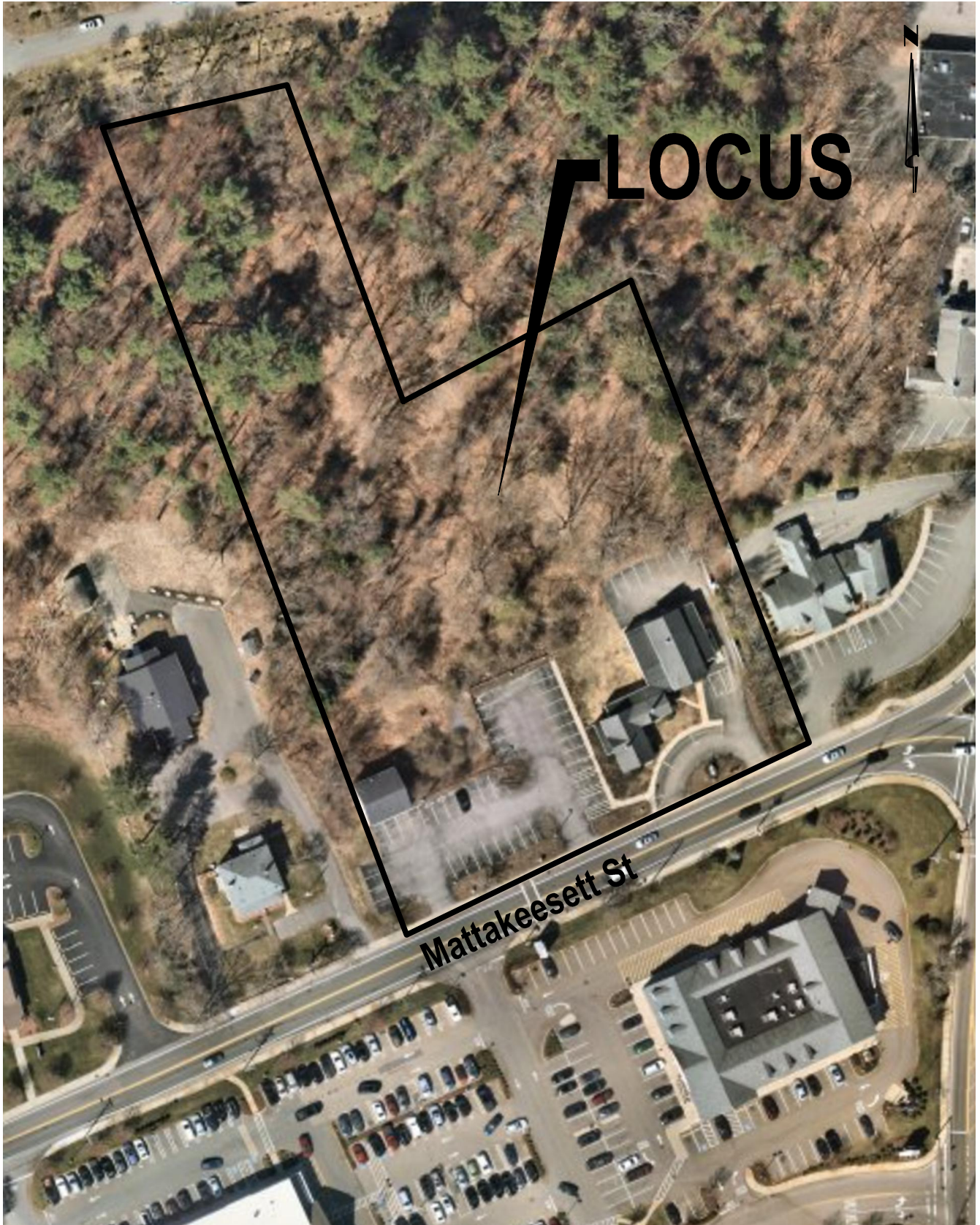
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**X-4**





2 SHARP STREET, UNIT A  
HINGHAM, MA 02043

Project

**MATTAKEESETT  
VILLAGE**

**7 & 15 MATTAKEESETT ST  
PEMBROKE MA 02359**

Prepared for

**WEATHERVANE AT  
MATTAKEESETT, LLC**

**190 OLD DERBY STREET  
HINGHAM, MA 02043**

Drawing Title

**WETLANDS PLAN**

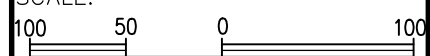
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## **SECTION 2 – STORMWATER CHECKLIST**



# Checklist for Stormwater Report

## A. Introduction

**Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.<sup>1</sup> This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8<sup>2</sup>
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

<sup>1</sup> The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

<sup>2</sup> For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.





# Checklist for Stormwater Report

## B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

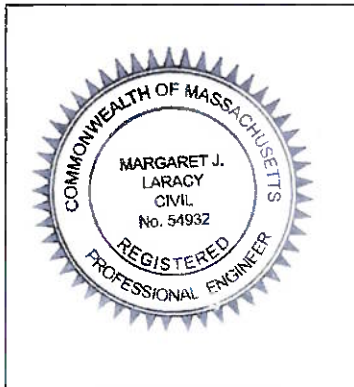
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

### Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



*M. Laracy* 2/3/2023  
Signature and Date

### Checklist

**Project Type:** Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☐ New development
- ☐ Redevelopment
- ☒ Mix of New Development and Redevelopment





# Checklist for Stormwater Report

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## Checklist (continued)

**LID Measures:** Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
  - ☐ Credit 1
  - ☐ Credit 2
  - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): \_\_\_\_\_

## Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

### Standard 3: Recharge

- ☒ Soil Analysis provided.
- ☒ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.
  - ☐ Static
  - ☒ Simple Dynamic
  - ☐ Dynamic Field<sup>1</sup>
- ☒ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
  - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
  - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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<sup>1</sup> 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 3: Recharge (continued)

- ☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

### Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
  - Provisions for storing materials and waste products inside or under cover;
  - Vehicle washing controls;
  - Requirements for routine inspections and maintenance of stormwater BMPs;
  - Spill prevention and response plans;
  - Provisions for maintenance of lawns, gardens, and other landscaped areas;
  - Requirements for storage and use of fertilizers, herbicides, and pesticides;
  - Pet waste management provisions;
  - Provisions for operation and management of septic systems;
  - Provisions for solid waste management;
  - Snow disposal and plowing plans relative to Wetland Resource Areas;
  - Winter Road Salt and/or Sand Use and Storage restrictions;
  - Street sweeping schedules;
  - Provisions for prevention of illicit discharges to the stormwater management system;
  - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
  - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
  - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
  - ☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
    - ☐ is within the Zone II or Interim Wellhead Protection Area
    - ☐ is near or to other critical areas
    - ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
    - ☐ involves runoff from land uses with higher potential pollutant loads.
  - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
  - ☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 4: Water Quality (continued)

- ☒ The BMP is sized (and calculations provided) based on:
  - ☒ The ½" or 1" Water Quality Volume or
  - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

### Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

### Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☐ Critical areas and BMPs are identified in the Stormwater Report.



# Checklist for Stormwater Report

---

## Checklist (continued)

### Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- ☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
  - ☐ Limited Project
  - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
  - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
  - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
  - ☐ Bike Path and/or Foot Path
  - ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☒ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
  - Construction Period Operation and Maintenance Plan;
  - Names of Persons or Entity Responsible for Plan Compliance;
  - Construction Period Pollution Prevention Measures;
  - Erosion and Sedimentation Control Plan Drawings;
  - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
  - Vegetation Planning;
  - Site Development Plan;
  - Construction Sequencing Plan;
  - Sequencing of Erosion and Sedimentation Controls;
  - Operation and Maintenance of Erosion and Sedimentation Controls;
  - Inspection Schedule;
  - Maintenance Schedule;
  - Inspection and Maintenance Log Form.
- ☐ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



# Checklist for Stormwater Report

---

## Checklist (continued)

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

### Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
  - ☒ Name of the stormwater management system owners;
  - ☒ Party responsible for operation and maintenance;
  - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
  - ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
  - ☒ Description and delineation of public safety features;
  - ☒ Estimated operation and maintenance budget; and
  - ☒ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
  - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
  - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

### Standard 10: Prohibition of Illicit Discharges

- ☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☐ An Illicit Discharge Compliance Statement is attached;
- ☒ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

## **ILLICIT DISCHARGE COMPLIANCE STATEMENT**

### **Standard 10: Massachusetts Stormwater Standards Handbook**

Illicit discharges are defined as discharges into waters of the State or municipal separate stormwater system (MS4) that are not entirely comprised of stormwater. Exclusions for non-stormwater discharges into drainage systems include activities or facilities for firefighting, water line flushing, landscape irrigation, uncontaminated groundwater discharge, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, water used to clean residential buildings without detergents, water used for street washing, and flows from riparian habitats/wetlands. These exclusions are subject to change and are under the discretion of the local governing authority.

To the best of our knowledge and professional belief no illicit discharges to the stormwater system, surface waters, or wetland resource areas will remain on the site after construction. We will agree to implement a pollution prevention plan to prevent illicit discharges into the stormwater management system. The design of the site based on the plans entitled "SITE DEVELOPMENT PLANS: MATTAKEESETT VILLAGE." prepared by Crocker Design Group, 2 Sharp Street, Unit A, Hingham, Massachusetts, show a separation and no direct connection between the stormwater management systems and the wastewater and/ or groundwater on the site. To the maximum extent practicable, the design prevents entry of illicit discharges into the stormwater management system.

Engineer's Name: \_\_\_\_\_  
(please print)

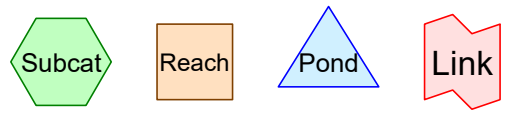
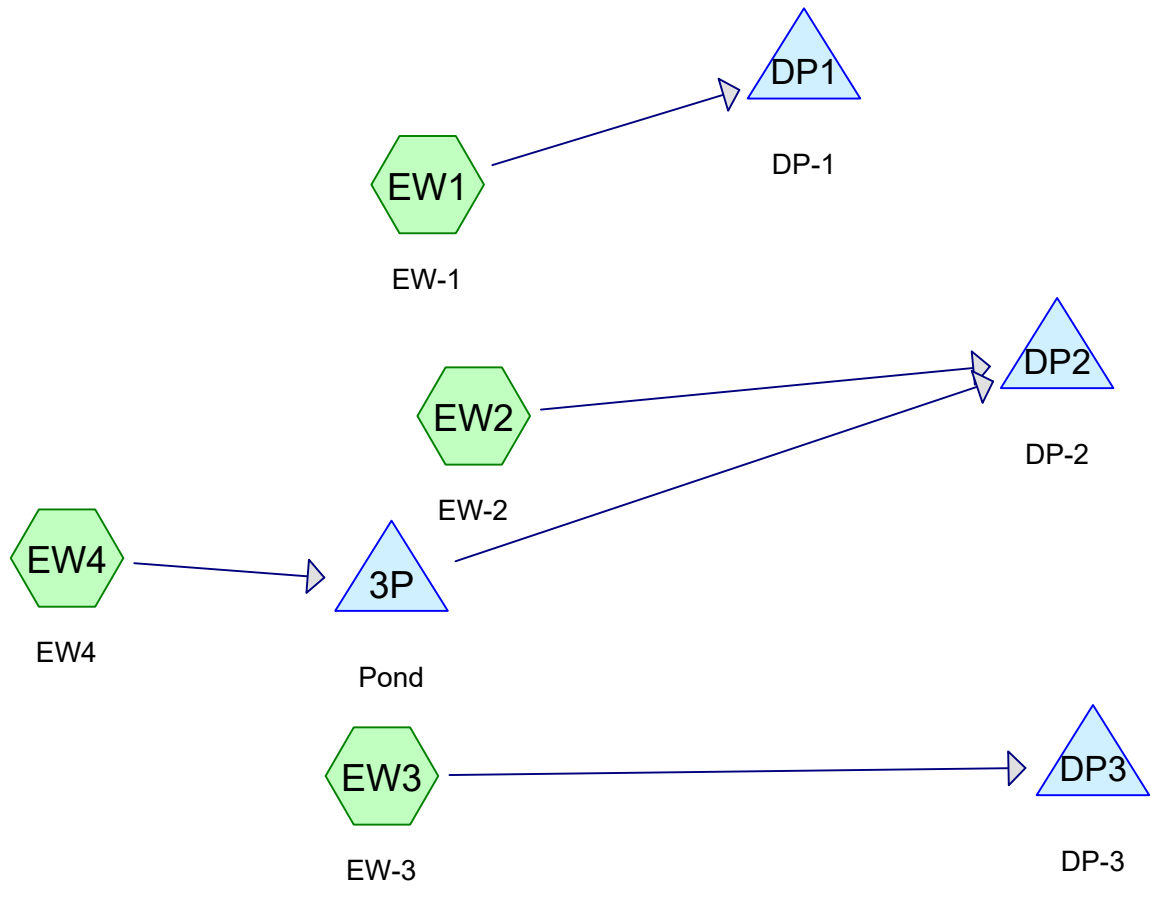
Engineer's Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Company: Crocker Design Group, LLC.

## **SECTION 3 – STORMATER HYDROLOGY MODEL**







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### Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.031	98	(EW2)
0.037	49	50-75% Grass cover, Fair, HSG A (EW1, EW2)
0.197	39	>75% Grass cover, Good, HSG A (EW3, EW4)
0.601	98	Pavement/House (EW3, EW4)
0.117	98	Pond (EW4)
2.351	30	Woods, Good, HSG A (EW2, EW3)
0.001	98	pavement (EW1)
<b>3.335</b>	<b>46</b>	<b>TOTAL AREA</b>

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### Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.585	HSG A	EW1, EW2, EW3, EW4
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.750	Other	EW1, EW2, EW3, EW4
<b>3.335</b>		<b>TOTAL AREA</b>

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### Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.031	0.031		EW2
0.037	0.000	0.000	0.000	0.000	0.037	50-75% Grass cover, Fair	EW1, EW2
0.197	0.000	0.000	0.000	0.000	0.197	>75% Grass cover, Good	EW3, EW4
0.000	0.000	0.000	0.000	0.601	0.601	Pavement/House	EW3, EW4
0.000	0.000	0.000	0.000	0.117	0.117	Pond	EW4
2.351	0.000	0.000	0.000	0.000	2.351	Woods, Good	EW2, EW3
0.000	0.000	0.000	0.000	0.001	0.001	pavement	EW1
<b>2.585</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>0.750</b>	<b>3.335</b>	<b>TOTAL AREA</b>	

## 100-152 Existing HydroCAD

Type II 24-hr 100-Yr Rainfall=7.68"

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Page 5

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**SubcatchmentEW1: EW-1** Runoff Area=939 sf 4.15% Impervious Runoff Depth>2.15"  
Flow Length=51' Slope=0.0544 '/' Tc=6.0 min CN=51 Runoff=0.08 cfs 0.004 af

**SubcatchmentEW2: EW-2** Runoff Area=67,472 sf 2.03% Impervious Runoff Depth>0.47"  
Flow Length=615' Tc=11.1 min CN=32 Runoff=0.30 cfs 0.061 af

**SubcatchmentEW3: EW-3** Runoff Area=45,878 sf 13.04% Impervious Runoff Depth>1.02"  
Flow Length=353' Tc=6.0 min CN=39 Runoff=1.47 cfs 0.090 af

**SubcatchmentEW4: EW4** Runoff Area=30,979 sf 81.61% Impervious Runoff Depth>6.13"  
Tc=6.0 min CN=87 Runoff=6.98 cfs 0.363 af

**Pond 3P: Pond** Peak Elev=77.11' Storage=3,222 cf Inflow=6.98 cfs 0.363 af  
Discarded=0.40 cfs 0.271 af Primary=8.26 cfs 0.092 af Outflow=8.66 cfs 0.363 af

**Pond DP1: DP-1** Inflow=0.08 cfs 0.004 af  
Primary=0.08 cfs 0.004 af

**Pond DP2: DP-2** Inflow=8.28 cfs 0.153 af  
Primary=8.28 cfs 0.153 af

**Pond DP3: DP-3** Inflow=1.47 cfs 0.090 af  
Primary=1.47 cfs 0.090 af

**Total Runoff Area = 3.335 ac Runoff Volume = 0.518 af Average Runoff Depth = 1.87"**  
**77.51% Pervious = 2.585 ac 22.49% Impervious = 0.750 ac**

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Page 6

## Summary for Subcatchment EW1: EW-1

Runoff = 0.08 cfs @ 11.98 hrs, Volume= 0.004 af, Depth> 2.15"

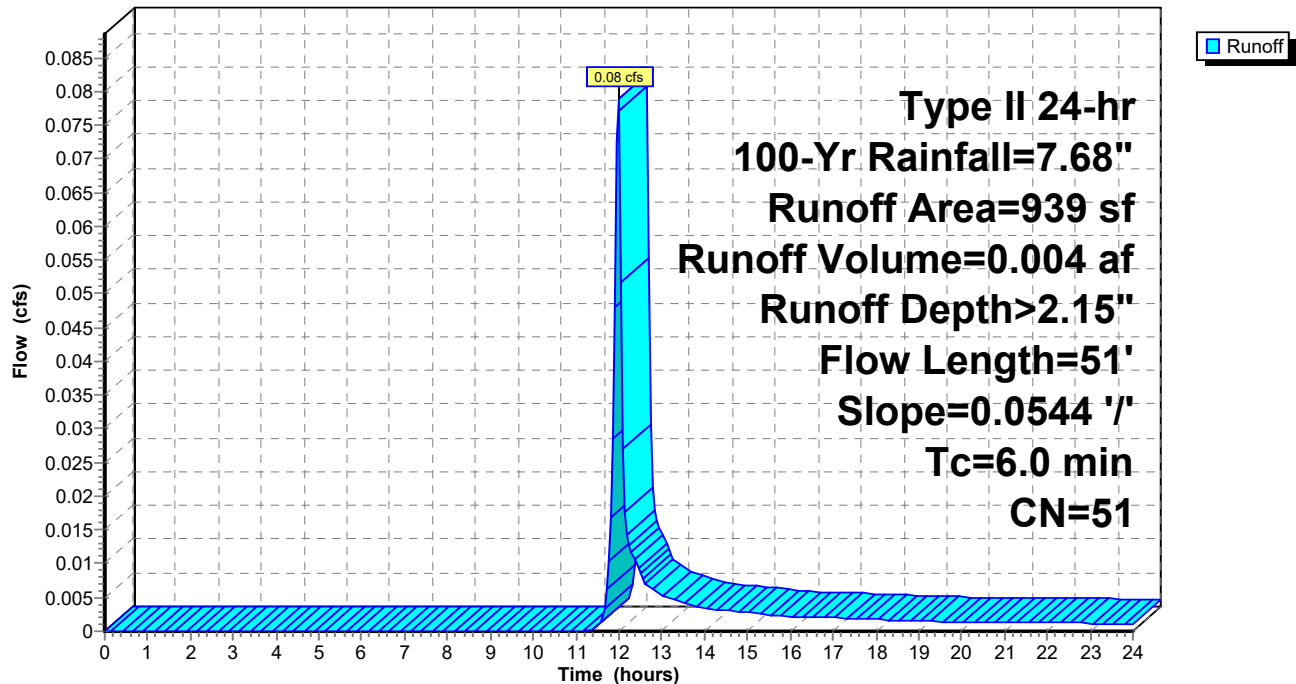
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-Yr Rainfall=7.68"

Area (sf)	CN	Description
900	49	50-75% Grass cover, Fair, HSG A
* 39	98	pavement
939	51	Weighted Average
900		95.85% Pervious Area
39		4.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	51	0.0544	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.39"
2.3					Direct Entry,
6.0	51	Total			

## Subcatchment EW1: EW-1

Hydrograph





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Type II 24-hr 100-Yr Rainfall=7.68"

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Page 7

### Summary for Subcatchment EW2: EW-2

Runoff = 0.30 cfs @ 12.11 hrs, Volume= 0.061 af, Depth> 0.47"

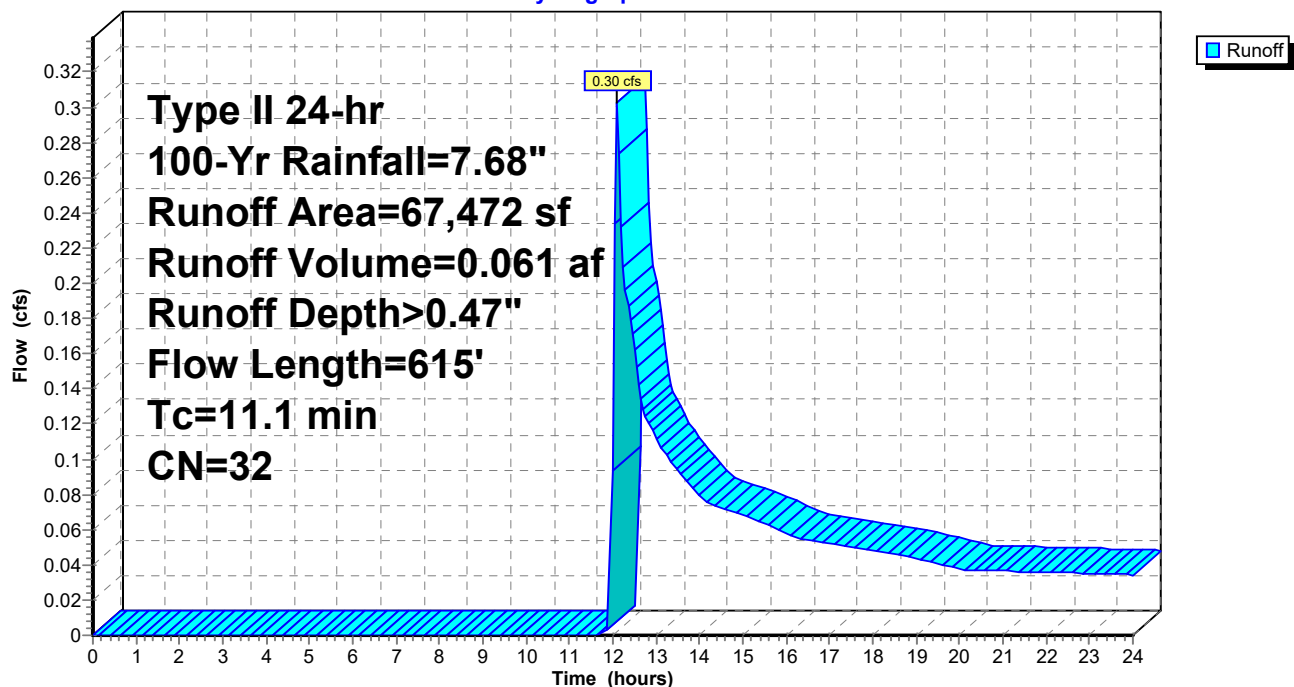
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-Yr Rainfall=7.68"

	Area (sf)	CN	Description
*	1,369	98	
	705	49	50-75% Grass cover, Fair, HSG A
	65,398	30	Woods, Good, HSG A
	67,472	32	Weighted Average
	66,103		97.97% Pervious Area
	1,369		2.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		<b>Sheet Flow, A-B</b>
					Smooth surfaces n= 0.011 P2= 3.39"
10.4	565	0.0327	0.90		<b>Shallow Concentrated Flow, B-C</b>
					Woodland Kv= 5.0 fps
11.1	615	Total			

### Subcatchment EW2: EW-2

Hydrograph





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Page 8

## Summary for Subcatchment EW3: EW-3

Runoff = 1.47 cfs @ 12.00 hrs, Volume= 0.090 af, Depth> 1.02"

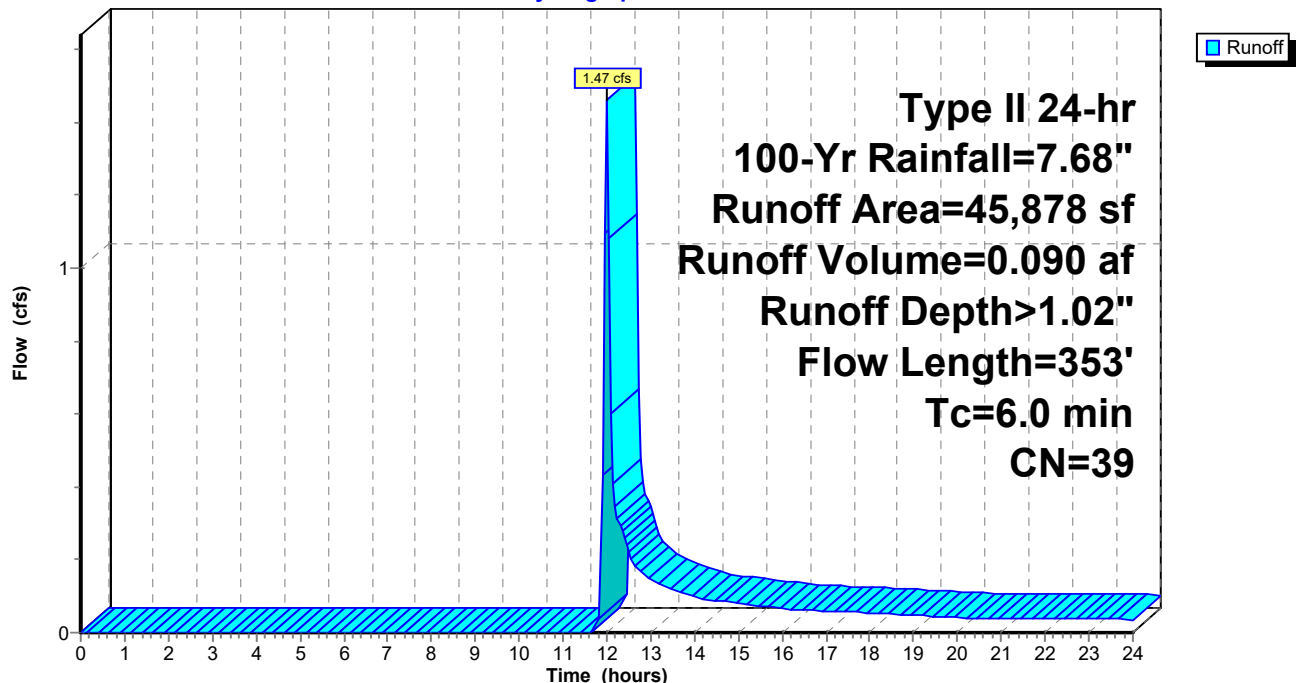
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-Yr Rainfall=7.68"

	Area (sf)	CN	Description
*	5,982	98	Pavement/House
	2,883	39	>75% Grass cover, Good, HSG A
	37,013	30	Woods, Good, HSG A
	45,878	39	Weighted Average
	39,896		86.96% Pervious Area
	5,982		13.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.39"
0.3	97	0.0620	5.05		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
2.3	206	0.0898	1.50		<b>Shallow Concentrated Flow,</b> Woodland Kv= 5.0 fps
2.7					<b>Direct Entry,</b>
6.0	353	Total			

## Subcatchment EW3: EW-3

Hydrograph



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Type II 24-hr 100-Yr Rainfall=7.68"

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Page 9

### Summary for Subcatchment EW4: EW4

Runoff = 6.98 cfs @ 11.96 hrs, Volume= 0.363 af, Depth> 6.13"

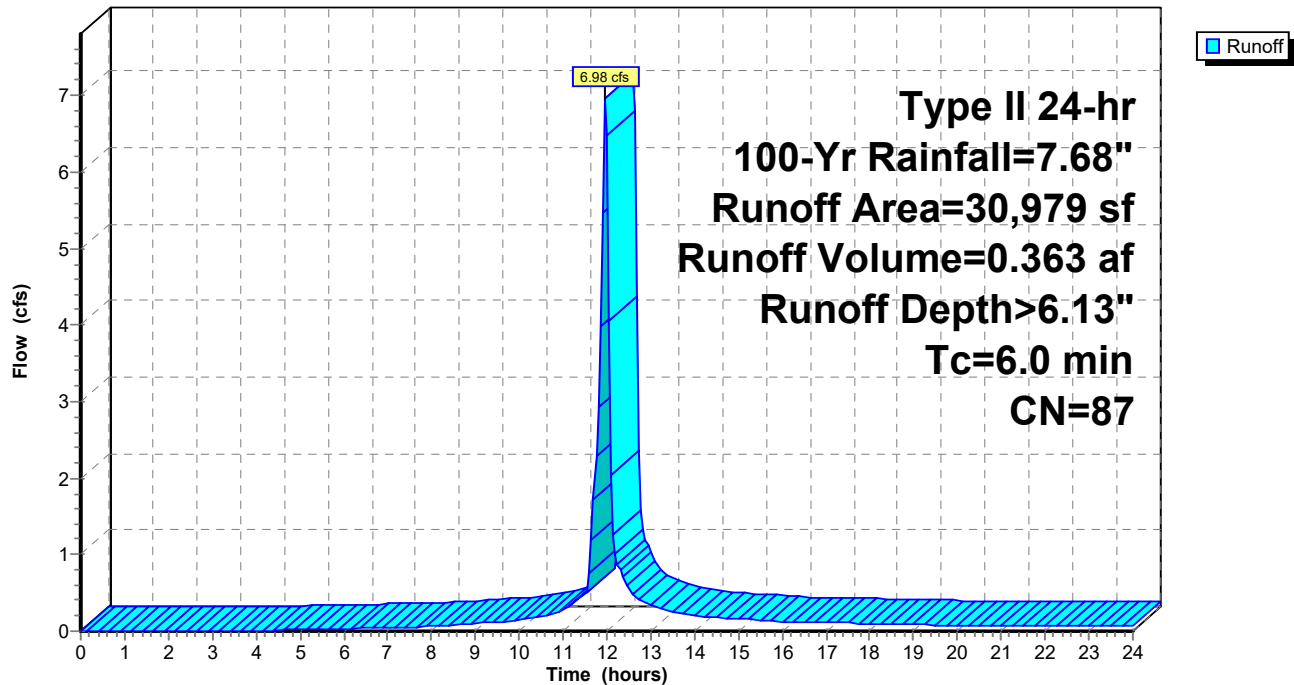
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-Yr Rainfall=7.68"

	Area (sf)	CN	Description
*	20,183	98	Pavement/House
*	5,100	98	Pond
	5,696	39	>75% Grass cover, Good, HSG A
	30,979	87	Weighted Average
	5,696		18.39% Pervious Area
	25,283		81.61% Impervious Area

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

### Subcatchment EW4: EW4

Hydrograph



**100-152 Existing HydroCAD**

Type II 24-hr 100-Yr Rainfall=7.68"

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Page 10

**Summary for Pond 3P: Pond**

Inflow Area = 0.711 ac, 81.61% Impervious, Inflow Depth > 6.13" for 100-Yr event  
 Inflow = 6.98 cfs @ 11.96 hrs, Volume= 0.363 af  
 Outflow = 8.66 cfs @ 11.96 hrs, Volume= 0.363 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.40 cfs @ 11.95 hrs, Volume= 0.271 af  
 Primary = 8.26 cfs @ 11.96 hrs, Volume= 0.092 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 77.11' @ 11.95 hrs Surf.Area= 2,084 sf Storage= 3,222 cf

Plug-Flow detention time= 49.0 min calculated for 0.363 af (100% of inflow)  
 Center-of-Mass det. time= 48.6 min ( 831.0 - 782.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	3,222 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	991	0	0
76.00	1,684	1,338	1,338
77.00	2,084	1,884	3,222

Device	Routing	Invert	Outlet Devices
#1	Discarded	75.00'	<b>8.270 in/hr Exfiltration over Surface area</b>
#2	Primary	77.00'	<b>89.0' long x 4.0' breadth Broad-Crested Rectangular Weir</b>
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
			2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66
			2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

**Discarded OutFlow** Max=0.40 cfs @ 11.95 hrs HW=77.11' (Free Discharge)  
 ↑ **1=Exfiltration** (Exfiltration Controls 0.40 cfs)

**Primary OutFlow** Max=7.28 cfs @ 11.96 hrs HW=77.11' (Free Discharge)  
 ↑ **2=Broad-Crested Rectangular Weir** (Weir Controls 7.28 cfs @ 0.77 fps)

# 100-152 Existing HydroCAD

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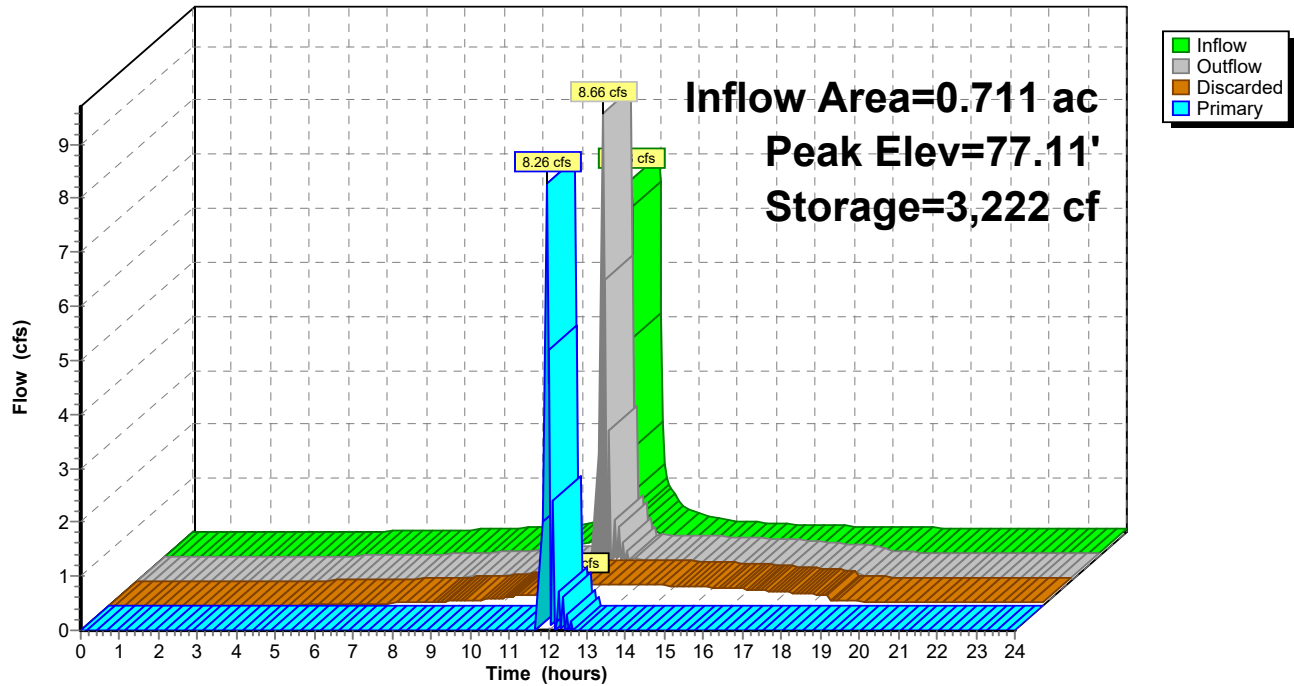
Type II 24-hr 100-Yr Rainfall=7.68"

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Page 11

## Pond 3P: Pond

Hydrograph



**100-152 Existing HydroCAD***Type II 24-hr 100-Yr Rainfall=7.68"*

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Page 12

**Stage-Area-Storage for Pond 3P: Pond**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
75.00	991	0
75.05	1,026	50
75.10	1,060	103
75.15	1,095	156
75.20	1,130	212
75.25	1,164	269
75.30	1,199	328
75.35	1,234	389
75.40	1,268	452
75.45	1,303	516
75.50	1,338	582
75.55	1,372	650
75.60	1,407	719
75.65	1,441	791
75.70	1,476	863
75.75	1,511	938
75.80	1,545	1,015
75.85	1,580	1,093
75.90	1,615	1,173
75.95	1,649	1,254
76.00	1,684	1,338
76.05	1,704	1,422
76.10	1,724	1,508
76.15	1,744	1,595
76.20	1,764	1,682
76.25	1,784	1,771
76.30	1,804	1,861
76.35	1,824	1,951
76.40	1,844	2,043
76.45	1,864	2,136
76.50	1,884	2,230
76.55	1,904	2,324
76.60	1,924	2,420
76.65	1,944	2,517
76.70	1,964	2,614
76.75	1,984	2,713
76.80	2,004	2,813
76.85	2,024	2,913
76.90	2,044	3,015
76.95	2,064	3,118
77.00	<b>2,084</b>	<b>3,222</b>
77.05	2,084	3,222
77.10	2,084	3,222

## 100-152 Existing HydroCAD

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Page 13

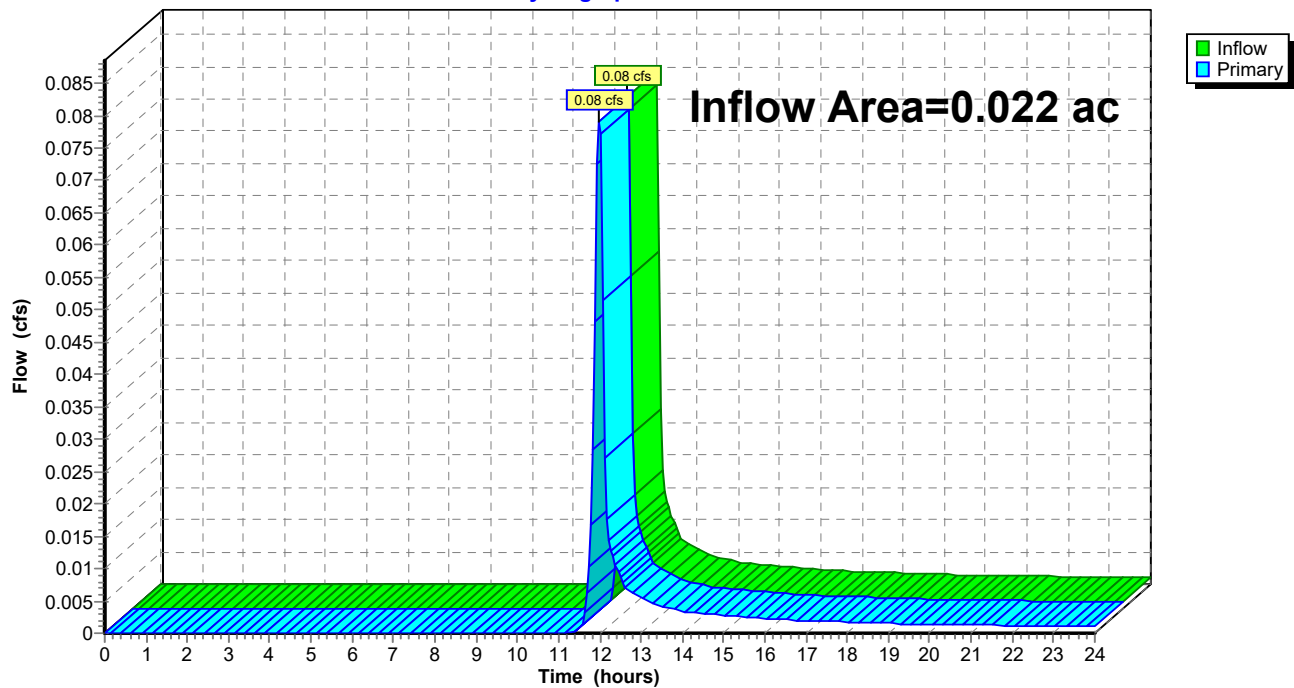
### Summary for Pond DP1: DP-1

Inflow Area = 0.022 ac, 4.15% Impervious, Inflow Depth > 2.15" for 100-Yr event  
Inflow = 0.08 cfs @ 11.98 hrs, Volume= 0.004 af  
Primary = 0.08 cfs @ 11.98 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

### Pond DP1: DP-1

Hydrograph



## 100-152 Existing HydroCAD

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Page 14

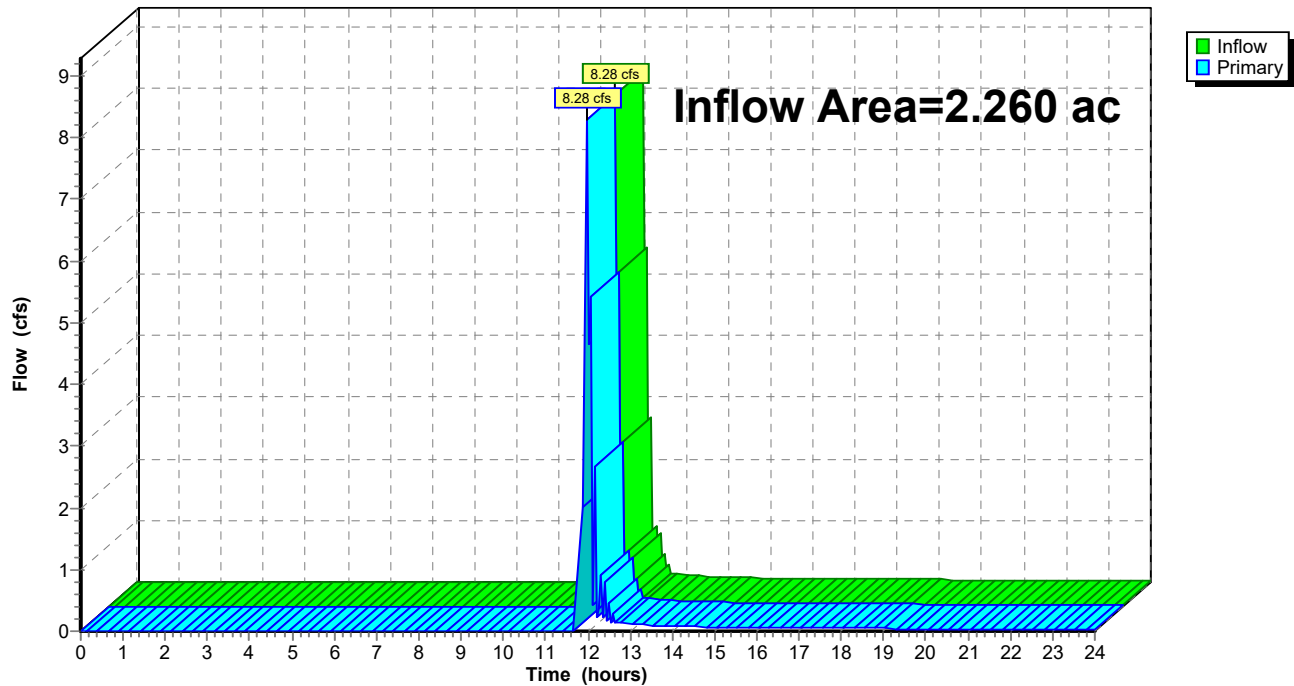
### Summary for Pond DP2: DP-2

Inflow Area = 2.260 ac, 27.07% Impervious, Inflow Depth > 0.81" for 100-Yr event  
Inflow = 8.28 cfs @ 11.96 hrs, Volume= 0.153 af  
Primary = 8.28 cfs @ 11.96 hrs, Volume= 0.153 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

### Pond DP2: DP-2

Hydrograph



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Page 15

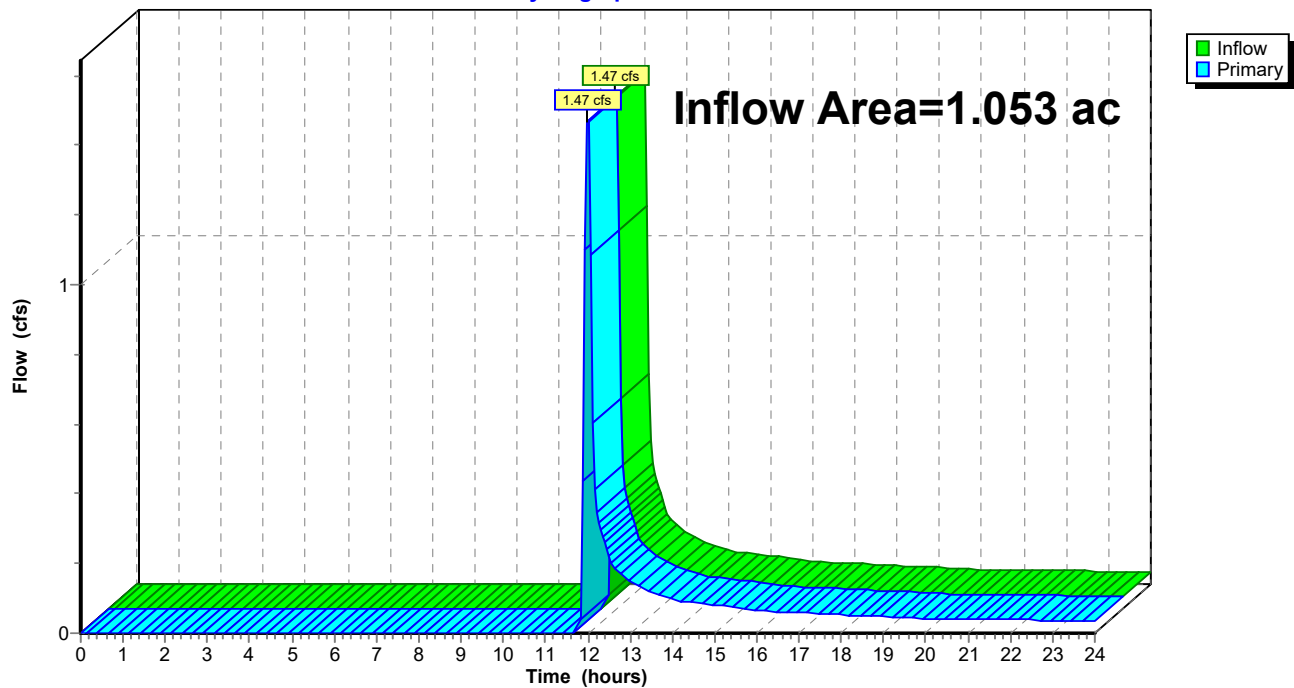
### Summary for Pond DP3: DP-3

Inflow Area = 1.053 ac, 13.04% Impervious, Inflow Depth > 1.02" for 100-Yr event  
Inflow = 1.47 cfs @ 12.00 hrs, Volume= 0.090 af  
Primary = 1.47 cfs @ 12.00 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min

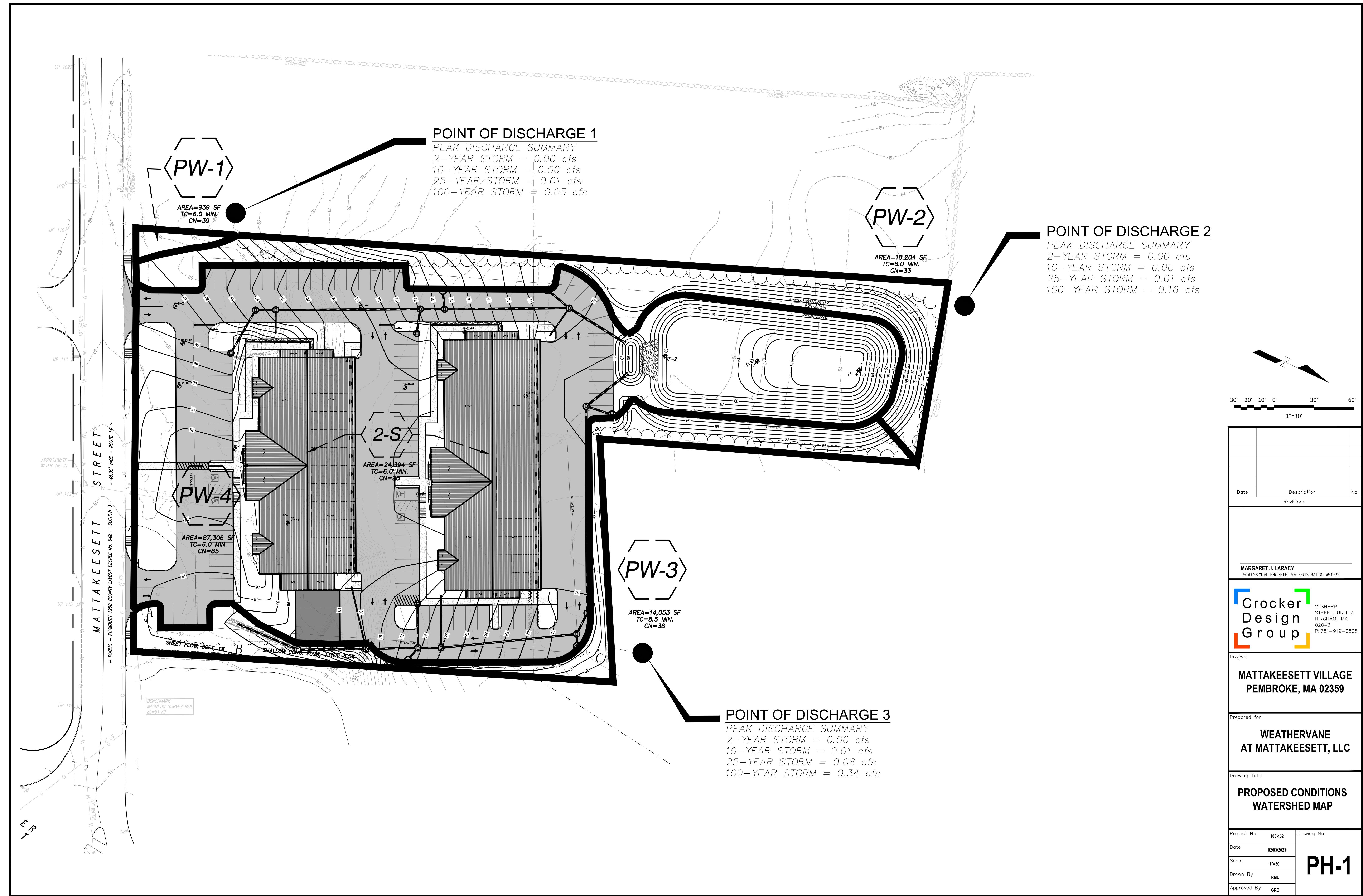
Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

### Pond DP3: DP-3

Hydrograph







**POINT OF DISCHARGE 1**

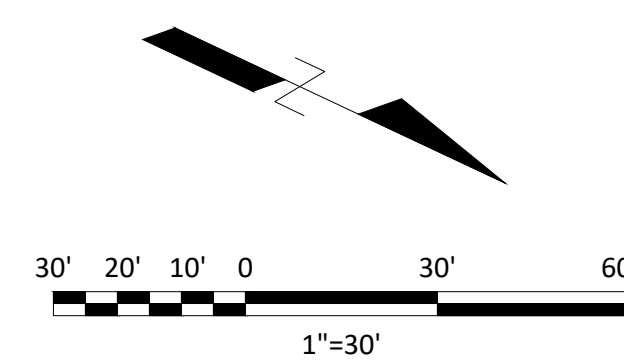
PEAK DISCHARGE SUMMARY  
2-YEAR STORM = 0.00 cfs  
10-YEAR STORM = 0.00 cfs  
25-YEAR STORM = 0.01 cfs  
100-YEAR STORM = 0.03 cfs

**POINT OF DISCHARGE 2**

PEAK DISCHARGE SUMMARY  
2-YEAR STORM = 0.00 cfs  
10-YEAR STORM = 0.00 cfs  
25-YEAR STORM = 0.01 cfs  
100-YEAR STORM = 0.16 cfs

**POINT OF DISCHARGE 3**

PEAK DISCHARGE SUMMARY  
2-YEAR STORM = 0.00 cfs  
10-YEAR STORM = 0.01 cfs  
25-YEAR STORM = 0.08 cfs  
100-YEAR STORM = 0.34 cfs



Date	Description	No.
Revisions		

MARGARET J. LARACY

PROFESSIONAL ENGINEER, MA REGISTRATION #54932

Crocker  
Design  
Group

2 SHARP  
STREET, UNIT A  
HINGHAM, MA  
02043  
P: 781-919-0808

Project  
**MATTAKEESETT VILLAGE  
PEMBROKE, MA 02359**

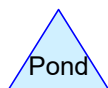
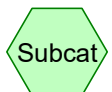
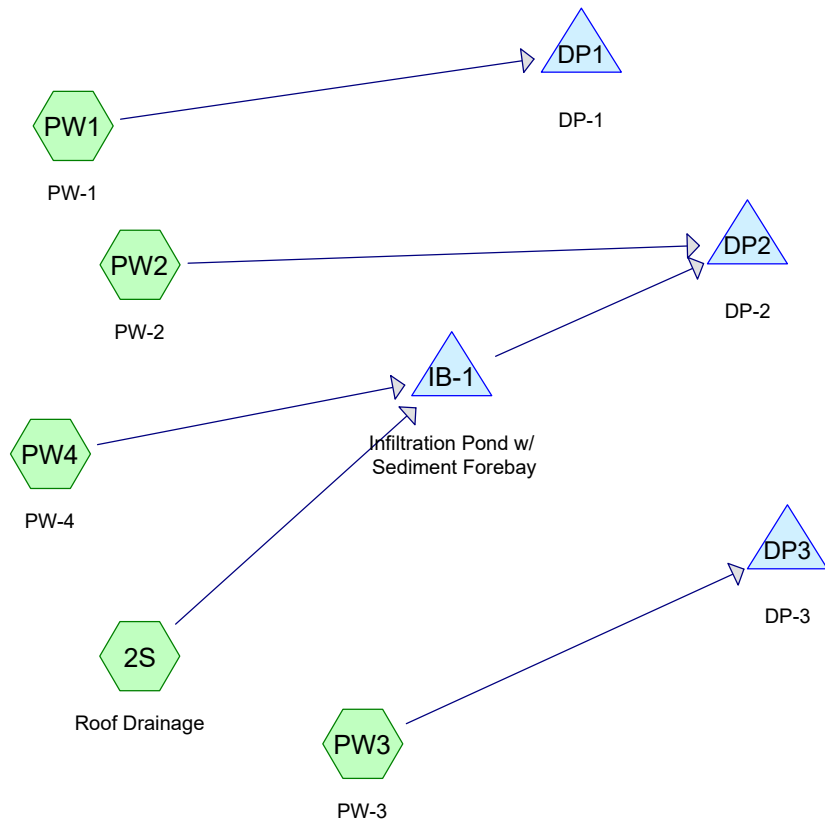
Prepared for  
**WEATHERVANE  
AT MATTAKEESETT, LLC**

Drawing Title  
**PROPOSED CONDITIONS  
WATERSHED MAP**

Project No.	100-152	Drawing No.	<b>PH-1</b>
Date	02/03/2023		
Scale	1"=30'		
Drawn By	RML		
Approved By	GRC		



Sediment Forebay



**Routing Diagram for 100-152 Proposed HydroCAD**

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## 100-152 Proposed HydroCAD

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Page 2

### Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.889	39	>75% Grass cover, Good, HSG A (PW1, PW2, PW3, PW4)
0.560	98	Buildings (2S)
1.250	98	Pavement (PW4)
0.319	30	Woods, Good, HSG A (PW2, PW3)
0.312	98	basin (PW4)
<b>3.330</b>	<b>76</b>	<b>TOTAL AREA</b>

## 100-152 Proposed HydroCAD

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Page 3

### Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.208	HSG A	PW1, PW2, PW3, PW4
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
2.122	Other	2S, PW4
<b>3.330</b>		<b>TOTAL AREA</b>

## 100-152 Proposed HydroCAD

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### Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.889	0.000	0.000	0.000	0.000	0.889	>75% Grass cover, Good	PW1, PW2, PW3, PW4
0.000	0.000	0.000	0.000	0.560	0.560	Buildings	2S
0.000	0.000	0.000	0.000	1.250	1.250	Pavement	PW4
0.319	0.000	0.000	0.000	0.000	0.319	Woods, Good	PW2, PW3
0.000	0.000	0.000	0.000	0.312	0.312	basin	PW4
<b>1.208</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>2.122</b>	<b>3.330</b>	<b>TOTAL AREA</b>	

# 100-152 Proposed HydroCAD

Type II 24-hr 100-YR Rainfall=7.68"

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Page 5

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

## Subcatchment2S: Roof Drainage

Runoff Area=0.560 ac 100.00% Impervious Runoff Depth>7.44"  
Tc=0.0 min CN=98 Runoff=6.90 cfs 0.347 af

## SubcatchmentPW1: PW-1

Runoff Area=1,030 sf 0.00% Impervious Runoff Depth>1.02"  
Flow Length=51' Slope=0.0544 '/' Tc=6.0 min CN=39 Runoff=0.03 cfs 0.002 af

## SubcatchmentPW2: PW-2

Runoff Area=18,204 sf 0.00% Impervious Runoff Depth>0.55"  
Flow Length=86' Tc=6.0 min CN=33 Runoff=0.16 cfs 0.019 af

## SubcatchmentPW3: PW-3

Runoff Area=14,109 sf 0.00% Impervious Runoff Depth>0.94"  
Flow Length=381' Tc=8.5 min CN=38 Runoff=0.34 cfs 0.025 af

## SubcatchmentPW4: PW-4

Runoff Area=87,306 sf 77.91% Impervious Runoff Depth>5.90"  
Tc=6.0 min CN=85 Runoff=19.16 cfs 0.985 af

## Pond 1P: Sediment Forebay

Peak Elev=0.00' Storage=0 cf

## Pond DP1: DP-1

Inflow=0.03 cfs 0.002 af  
Primary=0.03 cfs 0.002 af

## Pond DP2: DP-2

Inflow=0.16 cfs 0.019 af  
Primary=0.16 cfs 0.019 af

## Pond DP3: DP-3

Inflow=0.34 cfs 0.025 af  
Primary=0.34 cfs 0.025 af

## Pond IB-1: Infiltration Pond w/ Sediment

Peak Elev=67.11' Storage=36,828 cf Inflow=23.22 cfs 1.333 af  
Discarded=0.65 cfs 0.712 af Primary=0.00 cfs 0.000 af Outflow=0.65 cfs 0.712 af

**Total Runoff Area = 3.330 ac Runoff Volume = 1.379 af Average Runoff Depth = 4.97"**  
**36.28% Pervious = 1.208 ac 63.72% Impervious = 2.122 ac**



# 100-152 Proposed HydroCAD

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Type II 24-hr 100-YR Rainfall=7.68"

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Page 6

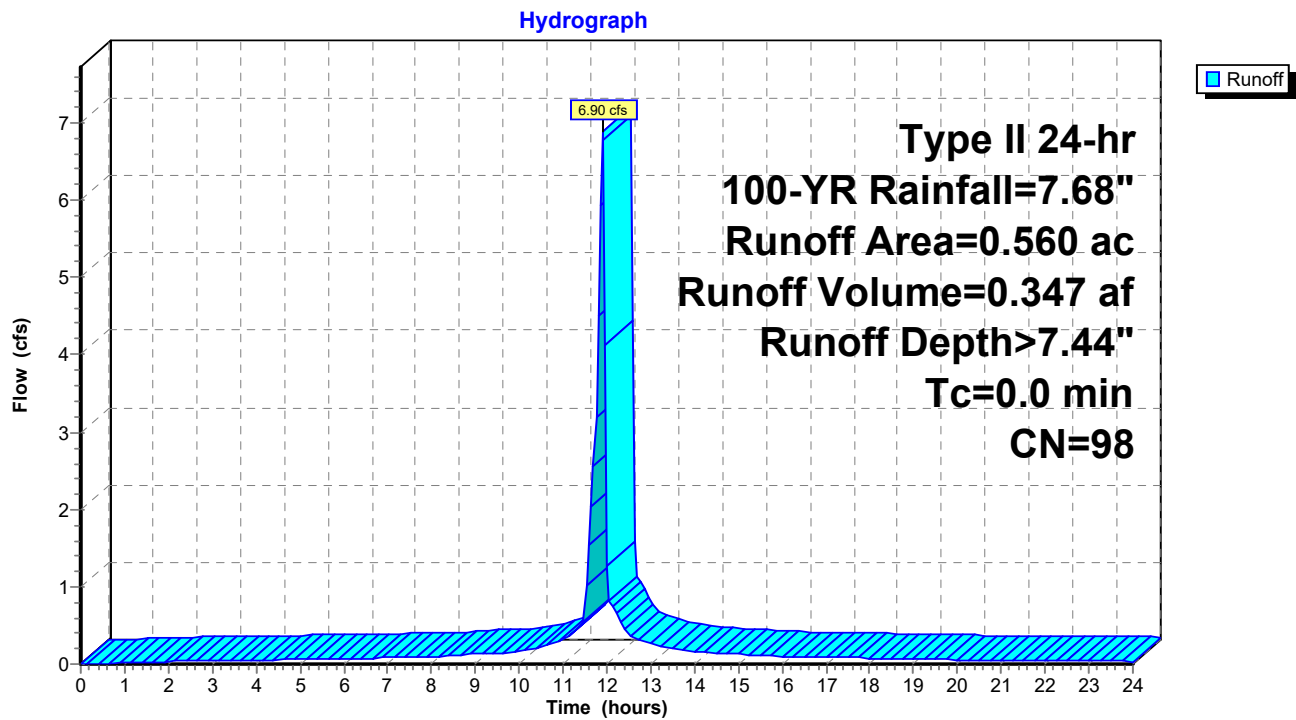
## Summary for Subcatchment 2S: Roof Drainage

Runoff = 6.90 cfs @ 11.89 hrs, Volume= 0.347 af, Depth> 7.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-YR Rainfall=7.68"

	Area (ac)	CN	Description
*	0.560	98	Buildings
	0.560		100.00% Impervious Area

## Subcatchment 2S: Roof Drainage



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Page 7

## Summary for Subcatchment PW1: PW-1

Runoff = 0.03 cfs @ 12.00 hrs, Volume= 0.002 af, Depth> 1.02"

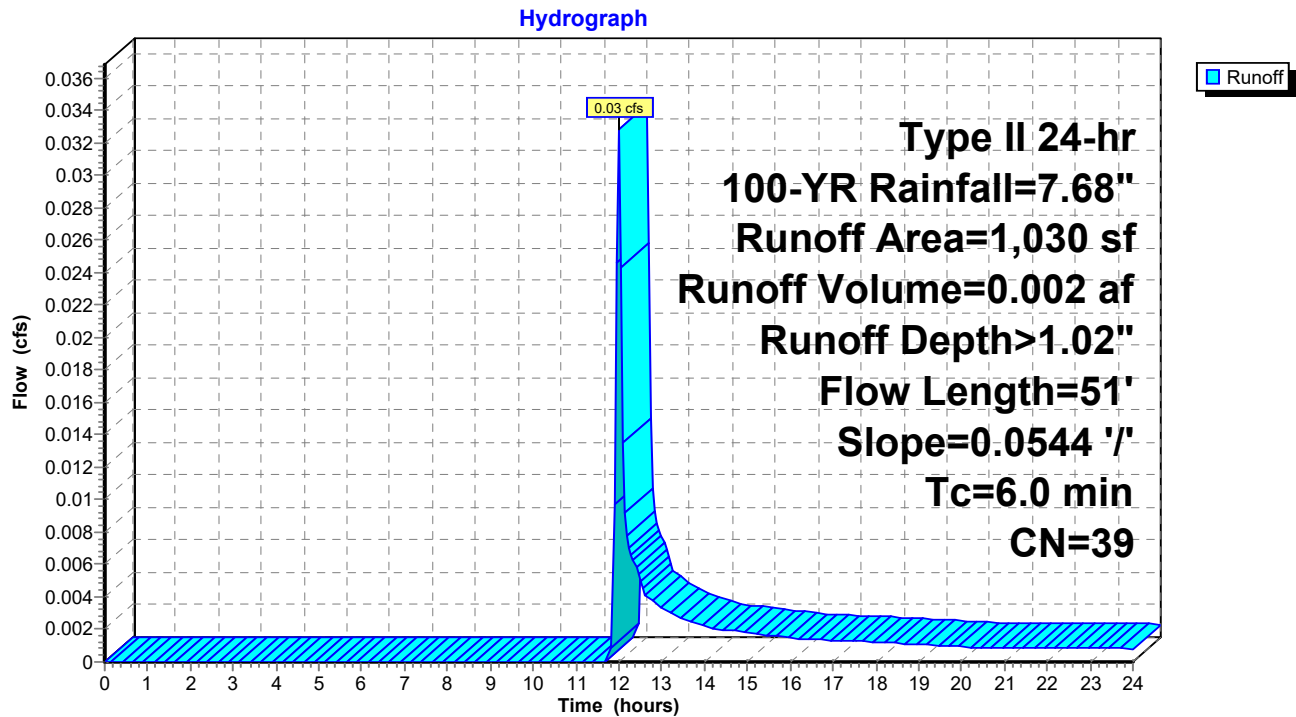
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-YR Rainfall=7.68"

Area (sf)	CN	Description
1,030	39	>75% Grass cover, Good, HSG A
1,030		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	51	0.0544	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.39"
2.3					Direct Entry,
6.0	51	Total			

## Subcatchment PW1: PW-1





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Page 8

## Summary for Subcatchment PW2: PW-2

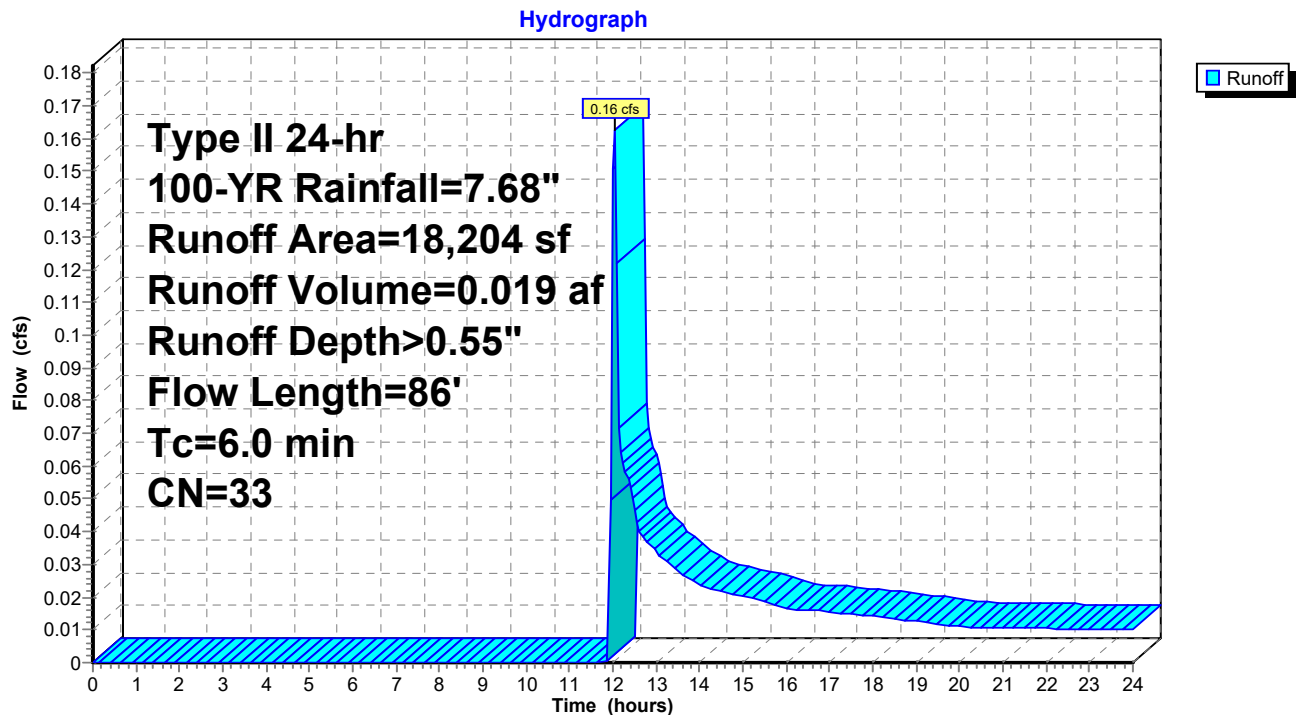
Runoff = 0.16 cfs @ 12.02 hrs, Volume= 0.019 af, Depth> 0.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-YR Rainfall=7.68"

Area (sf)	CN	Description
6,473	39	>75% Grass cover, Good, HSG A
11,731	30	Woods, Good, HSG A
18,204	33	Weighted Average
18,204		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.1	50	0.0400	0.20		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.39"
0.2	36	0.0474	3.51		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
1.7					<b>Direct Entry, Direct</b>
6.0	86	Total			

## Subcatchment PW2: PW-2



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Page 9

## Summary for Subcatchment PW3: PW-3

Runoff = 0.34 cfs @ 12.04 hrs, Volume= 0.025 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-YR Rainfall=7.68"

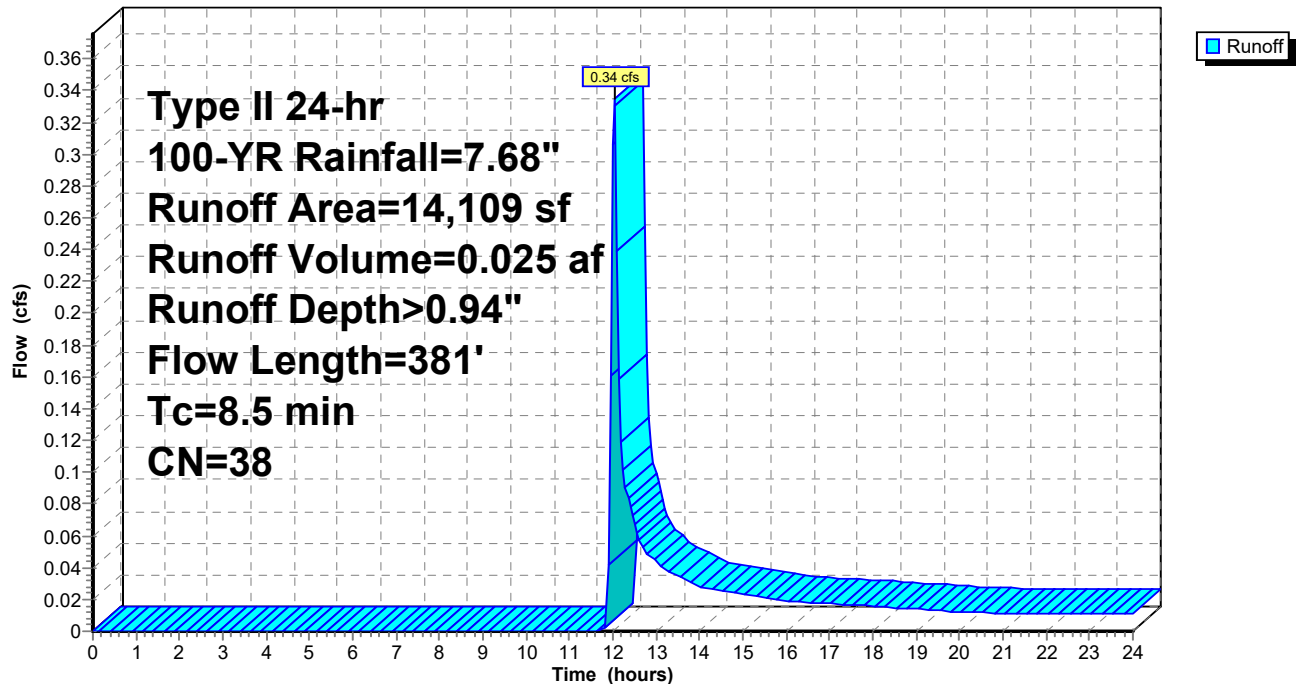
Area (sf)	CN	Description
2,156	30	Woods, Good, HSG A
11,953	39	>75% Grass cover, Good, HSG A
14,109	38	Weighted Average
14,109		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2	50	0.0100	0.12		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.39"
1.3	331	0.0650	4.10		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
8.5	381	Total			

## Subcatchment PW3: PW-3

Hydrograph



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Page 10

## Summary for Subcatchment PW4: PW-4

Runoff = 19.16 cfs @ 11.96 hrs, Volume= 0.985 af, Depth> 5.90"

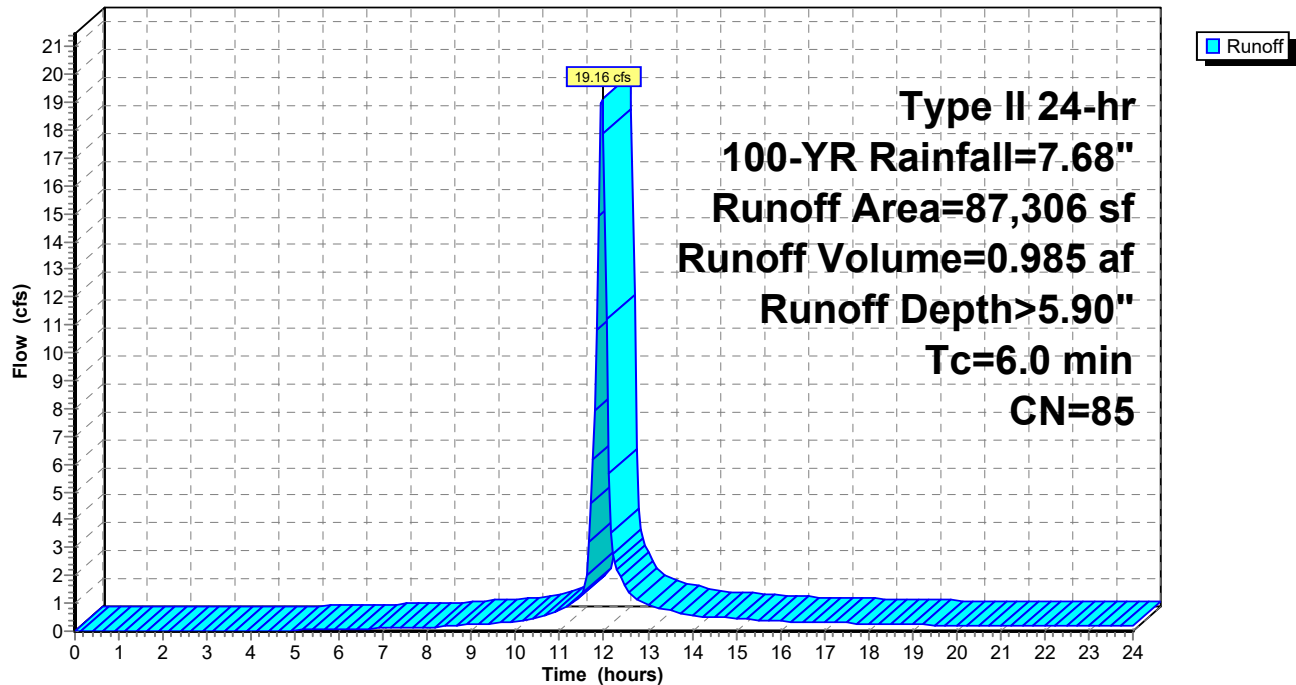
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
Type II 24-hr 100-YR Rainfall=7.68"

	Area (sf)	CN	Description
*	54,450	98	Pavement
*	13,571	98	basin
	19,285	39	>75% Grass cover, Good, HSG A
	87,306	85	Weighted Average
	19,285		22.09% Pervious Area
	68,021		77.91% Impervious Area

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

## Subcatchment PW4: PW-4

Hydrograph



**100-152 Proposed HydroCAD***Type II 24-hr 100-YR Rainfall=7.68"*

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Page 11

**Summary for Pond 1P: Sediment Forebay**

Volume	Invert	Avail.Storage	Storage Description
#1	65.00'	1,556 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
65.00	59	0	0
66.00	190	125	125
67.00	360	275	400
68.00	568	464	864
69.00	817	693	1,556

**100-152 Proposed HydroCAD***Type II 24-hr 100-YR Rainfall=7.68"*

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**Stage-Area-Storage for Pond 1P: Sediment Forebay**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
65.00	59	0	67.60	485	653
65.05	66	3	67.65	495	677
65.10	72	7	67.70	506	702
65.15	79	10	67.75	516	728
65.20	85	14	67.80	526	754
65.25	92	19	67.85	537	781
65.30	98	24	67.90	547	808
65.35	105	29	67.95	558	835
65.40	111	34	68.00	568	864
65.45	118	40	68.05	580	892
65.50	125	46	68.10	593	922
65.55	131	52	68.15	605	952
65.60	138	59	68.20	618	982
65.65	144	66	68.25	630	1,013
65.70	151	73	68.30	643	1,045
65.75	157	81	68.35	655	1,078
65.80	164	89	68.40	668	1,111
65.85	170	97	68.45	680	1,144
65.90	177	106	68.50	693	1,179
65.95	183	115	68.55	705	1,214
66.00	190	125	68.60	717	1,249
66.05	198	134	68.65	730	1,285
66.10	207	144	68.70	742	1,322
66.15	216	155	68.75	755	1,360
66.20	224	166	68.80	767	1,398
66.25	233	177	68.85	780	1,436
66.30	241	189	68.90	792	1,476
66.35	249	201	68.95	805	1,515
66.40	258	214	69.00	<b>817</b>	<b>1,556</b>
66.45	267	227			
66.50	275	241			
66.55	283	255			
66.60	292	269			
66.65	301	284			
66.70	309	299			
66.75	318	315			
66.80	326	331			
66.85	334	347			
66.90	343	364			
66.95	352	382			
67.00	360	400			
67.05	370	418			
67.10	381	437			
67.15	391	456			
67.20	402	476			
67.25	412	496			
67.30	422	517			
67.35	433	538			
67.40	443	560			
67.45	454	583			
67.50	464	606			
67.55	474	629			

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Page 13

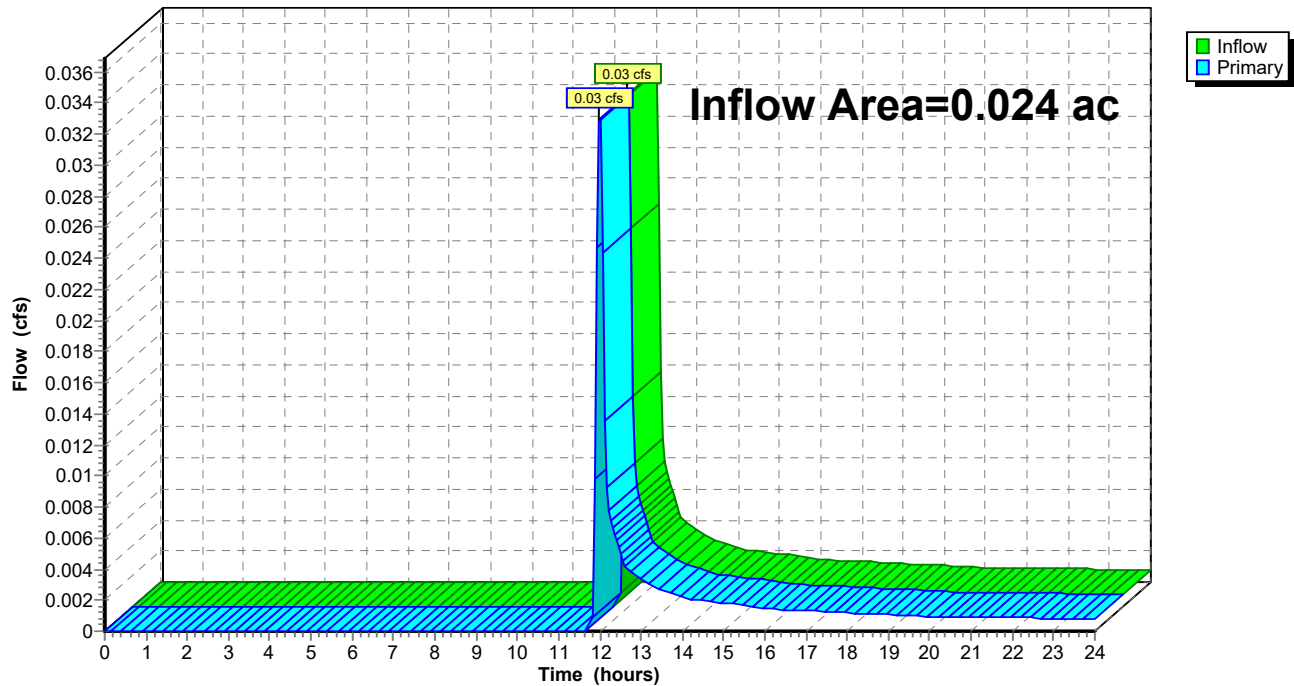
## Summary for Pond DP1: DP-1

Inflow Area = 0.024 ac, 0.00% Impervious, Inflow Depth > 1.02" for 100-YR event  
Inflow = 0.03 cfs @ 12.00 hrs, Volume= 0.002 af  
Primary = 0.03 cfs @ 12.00 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

### Pond DP1: DP-1

Hydrograph



## 100-152 Proposed HydroCAD

Prepared by {enter your company name here}

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Type II 24-hr 100-YR Rainfall=7.68"

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Page 14

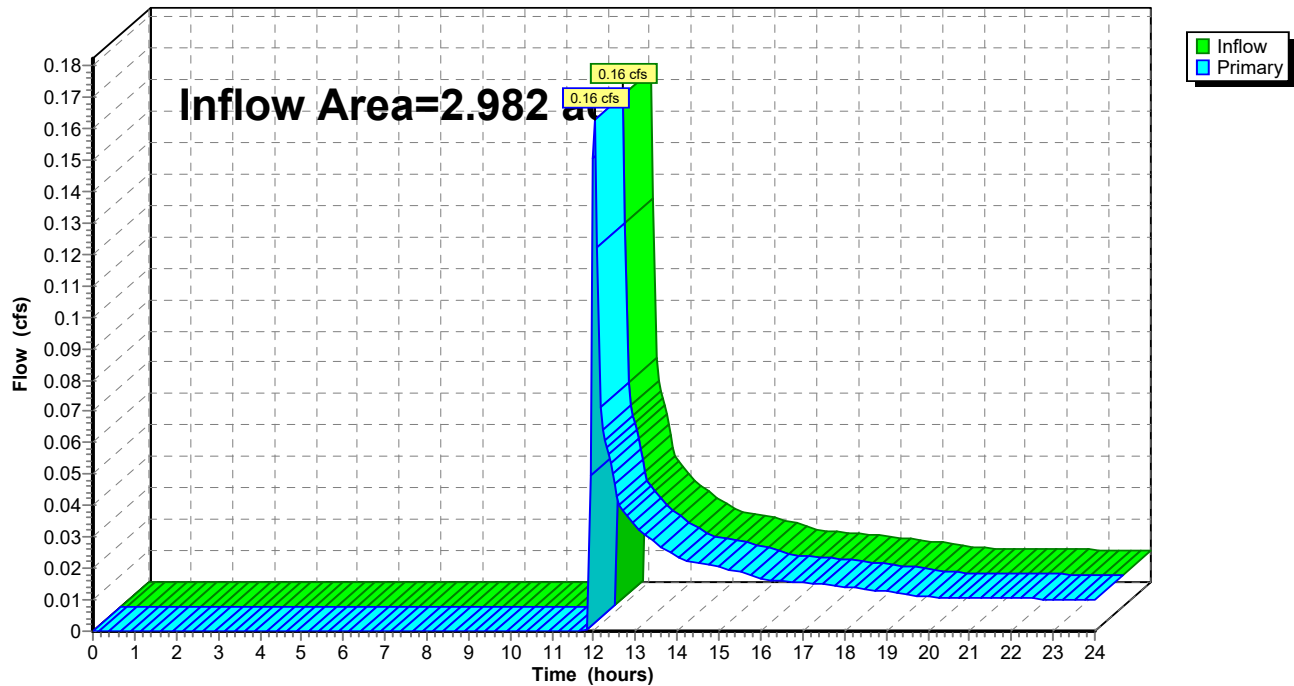
### Summary for Pond DP2: DP-2

Inflow Area = 2.982 ac, 71.14% Impervious, Inflow Depth > 0.08" for 100-YR event  
Inflow = 0.16 cfs @ 12.02 hrs, Volume= 0.019 af  
Primary = 0.16 cfs @ 12.02 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

### Pond DP2: DP-2

Hydrograph



# 100-152 Proposed HydroCAD

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Type II 24-hr 100-YR Rainfall=7.68"

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Page 15

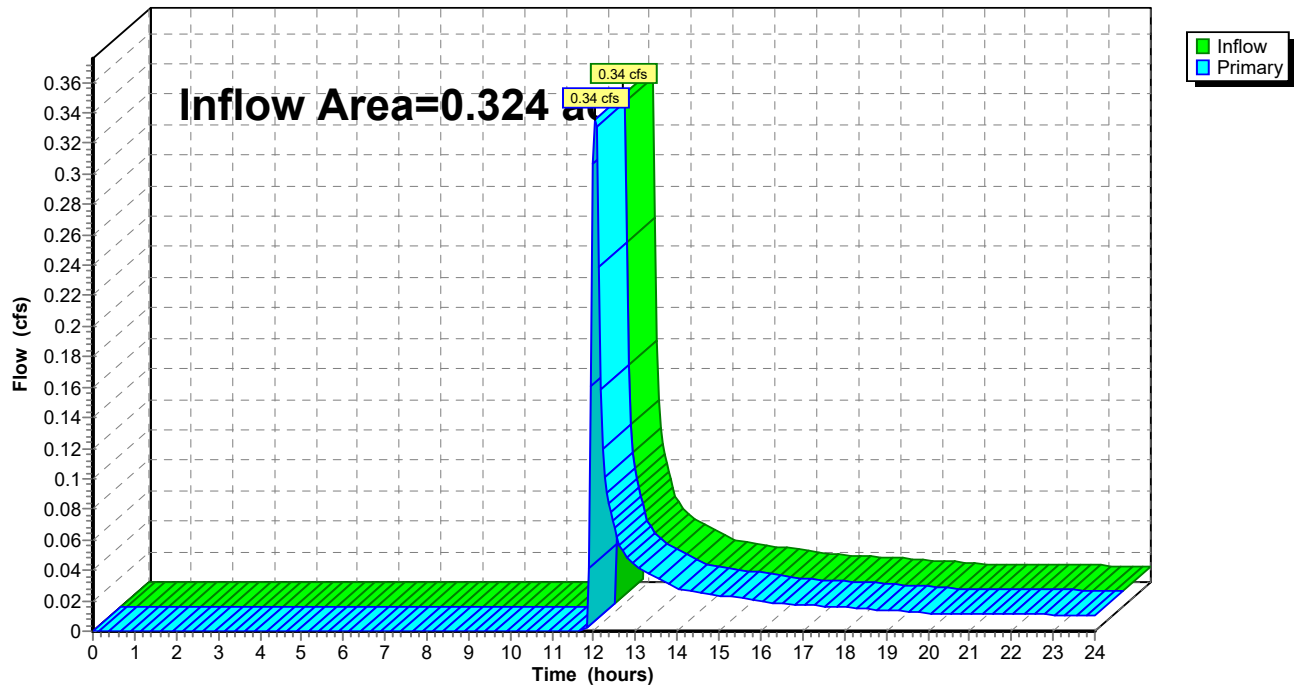
## Summary for Pond DP3: DP-3

Inflow Area = 0.324 ac, 0.00% Impervious, Inflow Depth > 0.94" for 100-YR event  
Inflow = 0.34 cfs @ 12.04 hrs, Volume= 0.025 af  
Primary = 0.34 cfs @ 12.04 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

### Pond DP3: DP-3

Hydrograph





**100-152 Proposed HydroCAD**

Type II 24-hr 100-YR Rainfall=7.68"

Prepared by {enter your company name here}

Printed 2/6/2023

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Page 16

**Summary for Pond IB-1: Infiltration Pond w/ Sediment Forebay**

Inflow Area = 2.564 ac, 82.73% Impervious, Inflow Depth > 6.24" for 100-YR event  
 Inflow = 23.22 cfs @ 11.94 hrs, Volume= 1.333 af  
 Outflow = 0.65 cfs @ 14.51 hrs, Volume= 0.712 af, Atten= 97%, Lag= 154.4 min  
 Discarded = 0.65 cfs @ 14.51 hrs, Volume= 0.712 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs  
 Peak Elev= 67.11' @ 14.51 hrs Surf.Area= 11,594 sf Storage= 36,828 cf

Plug-Flow detention time= 339.6 min calculated for 0.712 af (53% of inflow)  
 Center-of-Mass det. time= 225.3 min ( 998.8 - 773.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	61.00'	61,016 cf	<b>Infiltration Basin/Sediment Forebay (Prismatic)</b> listed below (Recalc) 61,773 cf Overall - 756 cf Embedded = 61,016 cf
#2	66.20'	454 cf	<b>10.00'W x 36.00'L x 1.80'H Stone Check Dam Z=0.7</b> Inside #1 756 cf Overall x 60.0% Voids
		61,470 cf	Total Available Storage

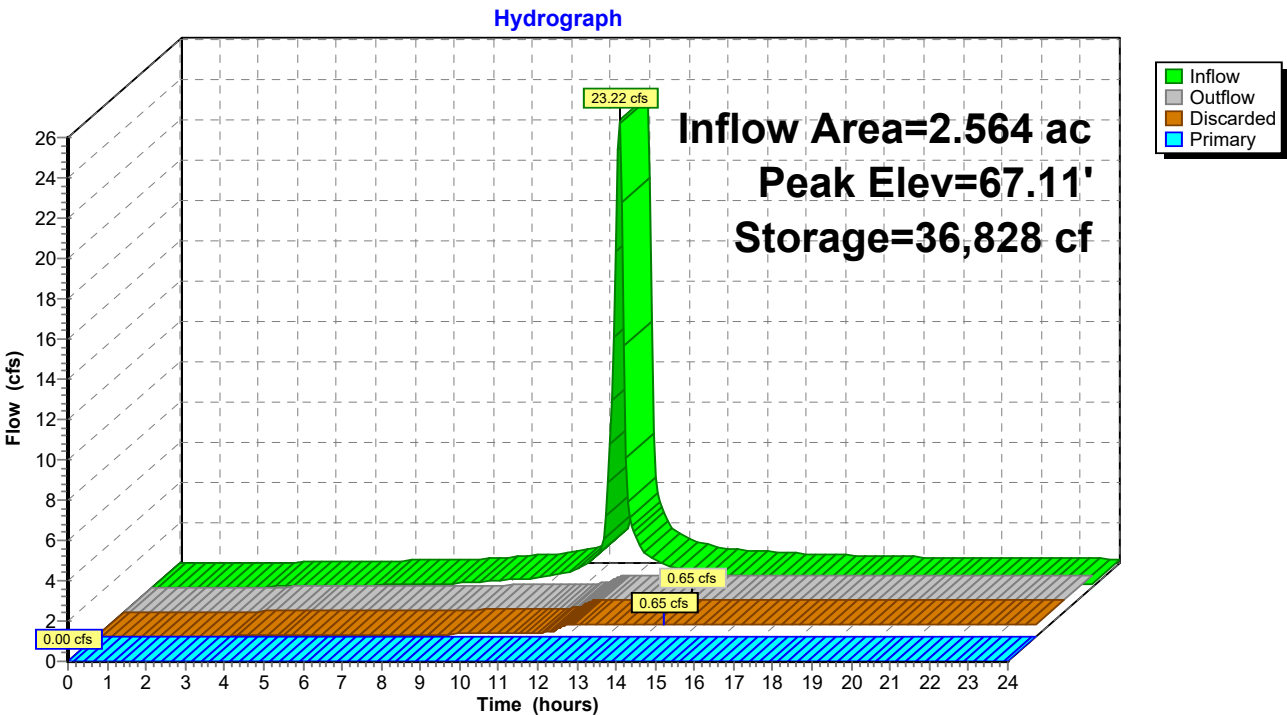
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
61.00	1,470	0	0
62.00	2,580	2,025	2,025
63.00	3,527	3,054	5,079
64.00	4,620	4,074	9,152
65.00	8,607	6,614	15,766
66.00	9,971	9,289	25,055
67.00	11,430	10,701	35,755
68.00	12,985	12,208	47,963
69.00	14,635	13,810	61,773

Device	Routing	Invert	Outlet Devices
#1	Discarded	61.00'	<b>2.410 in/hr Exfiltration over Surface area</b>
#2	Primary	68.90'	<b>69.0' long Sharp-Crested Vee/Trap Weir</b> Cv= 2.62 (C= 3.28)

**Discarded OutFlow** Max=0.65 cfs @ 14.51 hrs HW=67.11' (Free Discharge)  
 ↑ **1=Exfiltration** (Exfiltration Controls 0.65 cfs)

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=61.00' (Free Discharge)  
 ↑ **2=Sharp-Crested Vee/Trap Weir** ( Controls 0.00 cfs)

Pond IB-1: Infiltration Pond w/ Sediment Forebay



**100-152 Proposed HydroCAD***Type II 24-hr 100-YR Rainfall=7.68"*

Prepared by {enter your company name here}

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Page 18

**Stage-Area-Storage for Pond IB-1: Infiltration Pond w/ Sediment Forebay**

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
61.00	1,470	0	66.20	10,263	27,078
61.10	1,581	153	66.30	10,409	28,097
61.20	1,692	316	66.40	10,555	29,130
61.30	1,803	491	66.50	10,701	30,178
61.40	1,914	677	66.60	10,846	31,240
61.50	2,025	874	66.70	10,992	32,316
61.60	2,136	1,082	66.80	11,138	33,407
61.70	2,247	1,301	66.90	11,284	34,512
61.80	2,358	1,531	67.00	11,430	35,631
61.90	2,469	1,773	67.10	11,585	36,766
62.00	2,580	2,025	67.20	11,741	37,915
62.10	2,675	2,288	67.30	11,896	39,080
62.20	2,769	2,560	67.40	12,052	40,260
62.30	2,864	2,842	67.50	12,208	41,455
62.40	2,959	3,133	67.60	12,363	42,665
62.50	3,054	3,433	67.70	12,519	43,891
62.60	3,148	3,743	67.80	12,674	45,132
62.70	3,243	4,063	67.90	12,830	46,388
62.80	3,338	4,392	68.00	12,985	47,660
62.90	3,432	4,731	68.10	13,150	48,967
63.00	3,527	5,079	68.20	13,315	50,290
63.10	3,636	5,437	68.30	13,480	51,630
63.20	3,746	5,806	68.40	13,645	52,986
63.30	3,855	6,186	68.50	13,810	54,359
63.40	3,964	6,577	68.60	13,975	55,748
63.50	4,074	6,979	68.70	14,140	57,154
63.60	4,183	7,391	68.80	14,305	58,576
63.70	4,292	7,815	68.90	14,470	60,015
63.80	4,401	8,250	69.00	<b>14,635</b>	<b>61,470</b>
63.90	4,511	8,695			
64.00	4,620	9,152			
64.10	5,019	9,634			
64.20	5,417	10,156			
64.30	5,816	10,717			
64.40	6,215	11,319			
64.50	6,614	11,960			
64.60	7,012	12,642			
64.70	7,411	13,363			
64.80	7,810	14,124			
64.90	8,208	14,925			
65.00	8,607	15,766			
65.10	8,743	16,633			
65.20	8,880	17,514			
65.30	9,016	18,409			
65.40	9,153	19,317			
65.50	9,289	20,240			
65.60	9,425	21,175			
65.70	9,562	22,125			
65.80	9,698	23,088			
65.90	9,835	24,064			
66.00	9,971	25,055			
66.10	10,117	26,059			

## **SECTION 4 – STORMWATER MANAGEMENT CALCS**

## 4.1 STANDARD 3: RECHARGE CALCULATIONS

The Required Recharge Volume is computed using the equation provided in the 2008 Massachusetts Stormwater Handbook. The volume is computed as an equivalent depth of rainfall over the proposed impervious areas in accordance with a Target Depth Factor based on the soil classifications. The Calculations is as follows:

$$Rv = (F) \times (\text{Impervious Area})$$

*(Equation 1) Volume 3, Ch 1, page 15*

- Rv = Required Recharge Volume, expressed in cubic feet, cubic yards, or acre-feet
- F = Target Depth Factor associated with each Hydrologic Soil Group (HSG)
- Impervious Area = new pavement and new rooftop area
- The Target Depth Factor “F” per Table 2.3.2, Volume 3, Chapter 1 for each soil classification is as follows:
  - A soils = 0.60 inches
  - B soils = 0.35 inches
  - C soils = 0.25 inches
  - D soils = 0.10 inches

The existing impervious area within limit of work is 27,573 SF and the total proposed impervious area within limit of work is 78,844 SF. There is an increase in impervious area of 51,271 SF. Based on the above formula, the required recharge volume for the site is as follows:

Per Section 1.3, the onsite soils are considered “B” soils:

- F (A soils) = 0.60 inches
- Impervious Area (New Impervious) = 51,271 SF

$$Rv = (F) \times (\text{Impervious Area})$$

$$Rv = (0.60 \text{ inches}) \times (1\text{in}/12 \text{ ft}) \times 51,271 \text{ SF} = 2,564 \text{ CF}$$

**TOTAL RECHARGE VOLUME REQUIRED (Rv)= 2,564 CF**

Infiltration BMP	Infiltration Rate (in/hr) k	Storage (Recharge) Volume (CF) Rv	Required Recharge Volume (CF)
Infiltration Basin	2.41	61,773	2,564
<b>Totals</b>		<b>61,773 CF</b>	<b>2,564 CF</b>
<i>k = saturated hydraulic conductivity (in/hr)</i> <i>Rv = storage volume (CF)</i> <i>Bottom Area (SF)</i> <i>Volume 3, Chapter 1 of the MA Stormwater Handbook</i>			

### Conclusion:

The recharge provided by the proposed underground system exceeds the required recharge. The project satisfies Standard 3 of the Massachusetts DEP Stormwater.



## 4.2 DRAWDOWN TIME

Below are the drawdown time calculations for the infiltration systems proposed on the site. The calculation uses estimated hydraulic conductivity values “K” in accordance with the Rawls Rates table. The formula below utilized the recommended formula per the MA Stormwater Handbook as follows:

$$\text{Drawdown Time} = [Rv / (K * \text{Bottom Area})] * (12\text{IN}/1\text{FT})$$

- Rv = Storage Volume (CF)
- K = Saturated Hydraulic Conductivity per Rawls Rate Table (IN/HR)
- Bottom Area = Area of Bottom of Proposed Recharge Structure (SF)

Below is a summary table of the drawdown calculations:

Underground Chambers Drawdown Calculations				
Infiltration BMP	Infiltration Rate (IN/HR) k	Storage (Recharge) Volume Provided (CF) Rv	Bottom Area (SF)	Draw Down Time (HR)
Infiltration Basin	2.41	61,773	8,607	35.74
<b>Totals</b>		<b>61,733</b>		<b>35.74</b>
<i>k = saturated hydraulic conductivity (IN/HR)</i> <i>Rv = storage volume (CF)</i> <i>Bottom Area (SF)</i> <i>Volume 3, Chapter 1 of the MA Stormwater Handbook</i>				

### Conclusion:

The calculations show that the infiltration BMP draws down in less than 72 hours, as required.



### 4.3 STANDARD 4: WATER QUALITY

The applicant is proposing to treat stormwater runoff from the pavement through a series of deep sump catch basins piped to a sediment forebay, that spills flows into an infiltration basin. The sediment forebay was sized to treat 0.1in per impervious acre, as required per the Massachusetts Stormwater Standards.

	<b>Tributary Impervious Area (SF)</b>	<b>Tributary Impervious Area (AC)</b>	<b>Amount of Treatment/ 1 AC Impervious (IN)</b>	<b>Required Forebay Volume (CF)</b>	<b>Provided Forebay Volume</b>
<b>Sediment Forebay</b>	54,644	1.25	0.1	454	693

**Required Water Quality Volume:**

$V_{wq} = (D_{wq}/12\text{in}/1\text{ft}) * (A_{\text{imp-pavement}})$

$V_{wq} = (1\text{in}/12\text{in}/1\text{ft}) * (54,450\text{SF})$

$V_{wq} = 4,537 \text{ CF}$

<b>Water Quality BMP</b>	<b>WQV Treatment Provided (CF)</b>	<b>Required WQV (CF)</b>
Sediment Forebay	693	<b>4,537</b>
Infiltration Basin	61,773	
<b>Total</b>	<b>62,466</b>	

## **4.4 TSS REMOVAL**

The project has been designed to comply with the required 80% TSS (minimum) removal per the Massachusetts Stormwater Regulations. Various combinations of stormwater BMPs including deep sump hooded catch basins, proprietary water quality units and subsurface infiltration basins are utilized.

Please refer to the attached TSS calculation sheets that follow:

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: **Infiltration Basin (via CB, Sediment Forebay)**

**TSS Removal  
Calculation Worksheet**

A BMP <sup>1</sup>	B TSS Removal Rate <sup>1</sup>	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Sediment Forebay/Infiltration Basin	0.80	0.75	0.60	0.15
	0.00	0.00	0.00	0.00
	0.00	0.04	0.00	0.00
	0.00	0.40	0.00	0.00

**Total TSS Removal =**

**85%**

**Separate Form Needs to  
be Completed for Each  
Outlet or BMP Train**

Project: **Mattakeesett Village**  
 Prepared By: **MJL**  
 Date: **1/31/2023**

\*Equals remaining load from previous BMP (E)  
 which enters the BMP

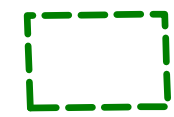



## **SECTION 5 – LONG TERM OPERATION & MAINTENANCE**

# OPERATION AND MAINTENANCE BMP MAP

February 3, 2023

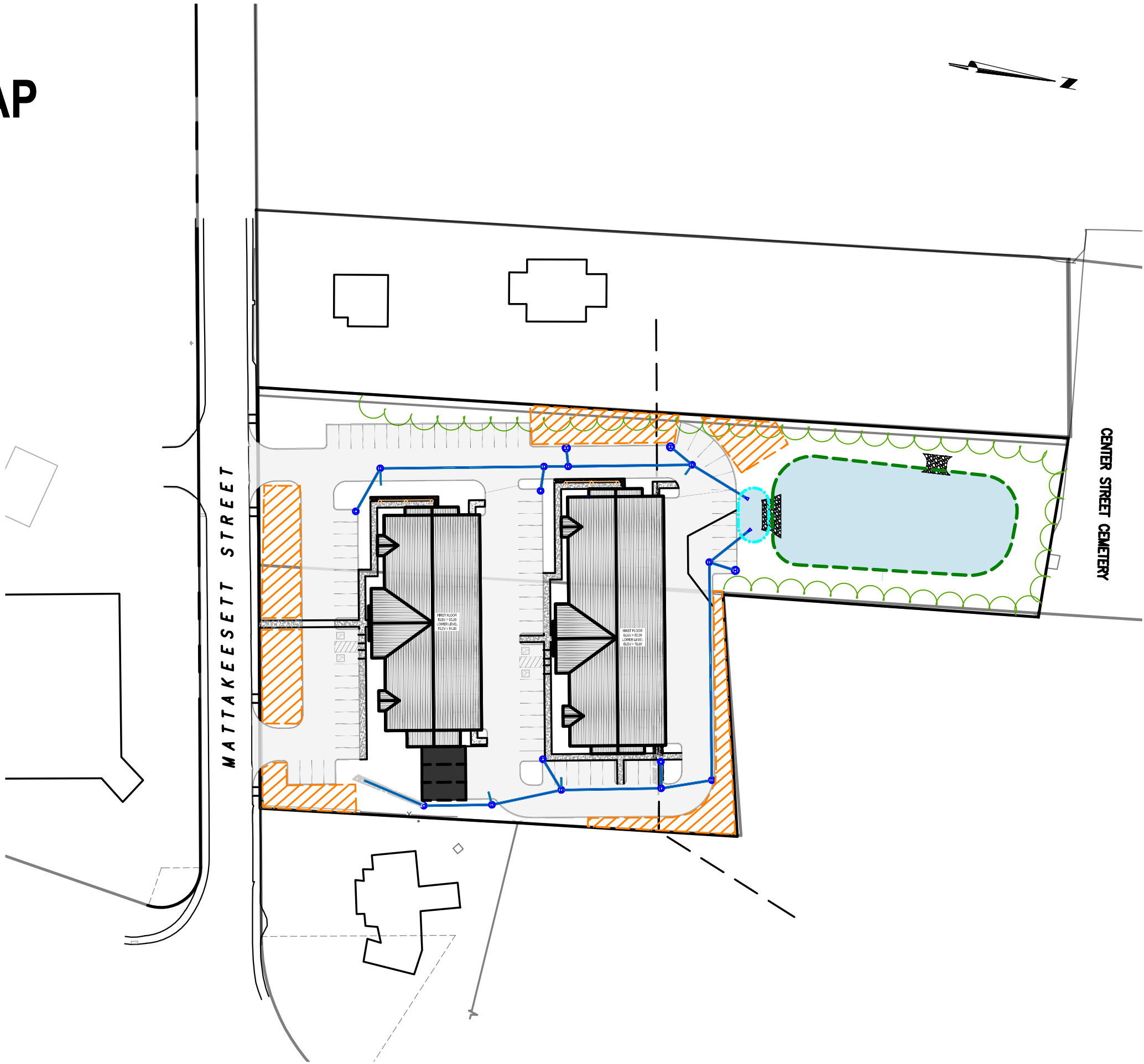
Mattakeesett Village

7 & 15 MATTAKEESETT ST.  
PEMBROKE, MASSACHUSETTS 02359

-  INFILTRATION + BASIN
-  SEDIMENT FOREBAY
-  DRAINAGE SYSTEM
-  SNOW STORAGE

**SNOW STORAGE:**

1. DRIVE AISLE TO BE PLOWED TO EACH EDGE OF PAVEMENT  
MAINTAINING MIN 20' WIDE ACCESS AT ALL TIMES.
2. SNOW STORAGE SHALL NOT OCCUR OVER CATCH BASINS.



# **LONG-TERM STORMWATER OPERATION & MAINTENANCE PLAN**

**Mattakeesett Village**  
7 & 15 Mattakeesett Street  
Pembroke, MA 02359

## **PROJECT OVERVIEW:**

The proposed project is two (2) multi-family buildings consisting of 66-units on Mattakeesett St. in Pembroke, Massachusetts. The project will consist of 17 affordable units and 49 market rate units, and will be age restricted as a 55 and over product. The project includes the construction of site and garage parking which provides for a total of 109 spaces. Stormwater management consists of a series of deep sump catch basins which collect stormwater from throughout the site and pipe it to a sediment forebay and infiltration basin. The project has been designed to comply with the Massachusetts Stormwater Management Regulations.

Appended to this document is a sample maintenance form and a chart describing the anticipated frequency of tasks.

## **OWNER AND RESPONSIBLE PARTY:**

### ***Current Land Owners:***

1317 Washington Re Holdings, LLC.  
190 Old Derby Street, Suite 311  
Hingham, MA 02043

### ***Proposed Site Contractor:***

To Be Determined

### ***Proposed Owner (Once project is approved):***

1317 Washington Re Holdings, LLC.  
190 Old Derby Street, Suite 311  
Hingham, MA 02043

## **CONSTRUCTION MANAGEMENT:**

A construction manager with adequate knowledge and experience on projects of similar size and scope shall be employed to oversee all site work related construction. The contractor shall incorporate the appropriate techniques to control sediment and erosion pollution during

construction in accordance with the *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas* and any conditions of approval from the Planning Board.

Care should be taken when constructing stormwater control structures. Light earth-moving equipment shall be used to excavate in the vicinity of the infiltration areas. Use of heavy-equipment causes excessive compaction of the soils beneath the basin resulting in reduced infiltration capacity. At no time shall temporary infiltration areas or settling basins be constructed in the vicinity of the proposed infiltration basins in order to prevent the soils from becoming clogged with sediment.

### **ON-GOING MAINTENANCE CONTRACT**

The non-structural and structural approaches recommended below, as well as the required BMP maintenance, will be completed by the selected contractor. In Adequate personnel with appropriate training and access to proper equipment will be available to complete the tasks. Future responsible parties must be notified of their responsibility to operate and maintain the system in perpetuity.

### **MAINTENANCE LOG**

The Responsible Party shall develop and maintain a log of inspections, maintenance, repairs, and disposal (including location of disposal) during the life of the project. Records will be maintained for at least 3 years and be made available to the Massachusetts Department of Environmental Protection or the Town of Hingham in accordance with the provisions of the Massachusetts Stormwater Handbook. A sample of such a maintenance log is provided.

### **STORMWATER BMP MAINTENANCE**

The proposed stormwater management system has been designed with appropriate BMPs aimed at reducing the pollutants discharge based upon the intended use of the property. All BMPs require regular maintenance to function as intended. Some management measures have simple maintenance requirements; others are more involved. The Responsible Party must have all BMPs regularly inspected to ensure they are operating properly on an as needed basis, including during runoff events exceeding 0.5 inches of rainfall.

A description of the non-structural and structural approaches to be incorporated is indicated below. The following best management practices are proposed to be incorporated into the stormwater management design to reduce source runoff and improve stormwater runoff discharge quality. The Responsible Party will regularly inspect all BMPs to ensure they are operating properly. If any deficiencies are identified during these inspections, action to resolve it will be initiated and documented on the maintenance log.



## **STRUCTURAL BMPs**

### Deep Sump Hooded Catch Basins and Area/Yard Drains

On a regular basis the inlet pipe and outlet pipe shall be checked for debris and removed as necessary to ensure unobstructed flow of water. Inspections shall occur at least four times per year, and at the end of the foliage and snow removal seasons. Inspections shall verify the tees are secure and free flowing. Sediments must also be removed four times per year or whenever the depth of deposits is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. Because these catch basins will be discharging near a critical area, more frequent cleaning may be necessary. Basins shall be cleaned using a vacuum pump. All liquid shall be pumped from the sump of each basin at least once per year. All sediments and hydrocarbons should be properly handled and disposed of in accordance with local, state and federal guidelines and regulations.

### Sediment Forebay

Frequently remove accumulated sediment. At a minimum, inspect forebay monthly and clean them out at least four times a year. Stabilize the floor and sidewalls of the forebay before making it operational. Grass height shall be no higher than 6-inches, and no lower than 3-inches. Check for signs of riling and gullying and repair as needed.

### Infiltration Basin

Accumulated debris and sediment shall be removed on an annual basis unless or more frequently if deemed necessary. Sediment shall be transported off site and disposed of in accordance with applicable local, state, and federal guidelines and regulations. Vegetated surfaces shall be repaired to ensure stable surfaces exist. Any debris or landscape growth extending within the identified maintenance access paths shall be trimmed/removed accordingly to maintain a clear and open pathway. Inspection should occur twice annually, once in the fall and then in the spring after the snow melts. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections and manufacturer's requirements.

### Stone Trench

Inspect and clean every six months and after every major storm event (2-year return frequency). Check inlet/outlet pipes to determine if they are clogged. Inspect trench after the first several rainfall events, after all major storms, and on regularly scheduled dates every 6-months. Remove accumulated sediment trash, debris, leaves, and grass dipping's.

## **NON-STRUCTURAL BMPs**

### Pavement Sweeping

As street sweeping is a BMP under DEP guidelines, this non-structural BMP is an effective removal of Total Suspended Solids (TSS) in a comprehensive stormwater management program. Litter and debris is to be regularly picked up and removed from the pavement and porous pavers. Paved areas are to be swept a minimum of quarterly per year.

### Pervious Areas and Slopes

Runoff from pervious areas and slopes shall be directed over vegetated areas to promote settlement of suspended solids before entering a wetland or resource area. Steep pervious slopes will be permanently vegetated to dissipate energy and reduce potential erosion. No constructed vegetated slopes should exceed 2H:1V. Slopes exceeding 2:1 shall be stabilized with rip-rap, jute netting or other similar measures to minimize the potential for future erosion.

### Drainage Control Structures, Flared End Sections, Trash Racks, Riprap Pads, Swales, and Level Spreader Splash Pads

Basin control structures, flared end sections, trash racks, riprap pads and level spreader splash pads shall be inspected and any debris or growth surrounding or within these structures shall be removed. Any/all debris or vegetation encroaching on the control structures or outfall components shall be removed or appropriately trimmed back to maintain the designed control elevation and flow patterns/cross section without impediment. Inspection should occur twice annually, once in the fall and then in the spring after the snow melts. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections and manufacturer's requirements.

### Pest and Insect Control

- As a first-line defense against pests/insects and weeds (the "First-Line Defense"), the party responsible for maintenance shall avoid the use of non-organic pesticides, herbicides, fungicides and insecticides unless spot treatment is required for a specific control application. The owner shall not be required to undertake extraordinary measures or incur unreasonable cost to locate, purchase or apply non-organic products.
- If the First-Line Defense fails, as determined by the owner or party responsible for maintenance, in its sole but reasonable discretion, non-

organic approaches to pest/insect control may be used, the same to be applied by a professional licensed in the Commonwealth of Massachusetts, where required.

#### Waste Management

Solid waste and recycling will be contained in dumpsters for routine and regular trash pickup.

#### Snow Removal

Snow that is plowed from the paved driveway surfaces shall be plowed to the edges of the pavement. When capacity of these areas is exceeded, accumulated snow shall be removed. Refer to the enclosed O&M Map which identifies location of BMPs and provides additional Snow Removal information.

#### Hazardous Waste and Spill Control Containment

In the event of a discharge or spill of oil or another hazardous material, outlets to stormwater management facilities immediately downstream of the spill shall be plugged so that hazardous materials do not enter the system. In the event of a discharge of oil or other hazardous material, responsible facility personnel shall notify the appropriate state agencies, the Town of Hingham DPW and the EPA National Response Center 1-800-424-8802 shall be notified. All hazardous waste materials will be disposed of in a manner specified by local, state and/or federal regulations and by the manufacturer of such products.

## Stormwater BMP Inspection and Maintenance Log

Facility Name
Address
Begin Date <span style="float: right;">End Date</span>

Date	BMP ID#	BMP Description	Inspected by:	Cause for Inspection	Exceptions Noted	Comments and Actions Taken

**Instructions:** Record all inspections and maintenance for all treatment BMPs on this form. Use additional log sheets and/or attach extended comments or documentation as necessary. Submit a copy of the completed log with the annual independent inspectors' report to the municipality and start a new log at that time.

BMP ID# — Always use ID# from the Operation and Maintenance Manual.

Inspected by — Note all inspections and maintenance on this form, including the required independent annual inspection.

Cause for inspection — Note if the inspection is routine, pre-rainy-season, post-storm, annual, or in response to a noted problem or complaint.

Exceptions noted — Note any condition that requires correction or indicates a need for maintenance.

Comments and actions taken — Describe any maintenance done and need for follow-up.

## Stormwater BMP Inspection Matrix

Conventional & LID Best Management Practices	Inspection & Maint. Frequency	Erosion& Scour	Obstructions	Trash & Debris	Sediment Build-Up Removal	Vegetation Cover	Remove/Reset Filter Fabric & Stone As Required	Vac Truck Sediment & Contaminants	Remove/Reset Riprap as Required
Catch Basins/Area & Yard Drains	Twice-Annually (Spring and Fall)								
Pavement Sweeping	Four times per year								
Stone Trench	Twice-Annually (Spring and Fall)								
Sediment Forebay	Twice-Annually (Spring and Fall)								
Infiltration Basin	Twice-Annually (Spring and Fall)								
Outlets (FES, Rip Rap Pad, Level Spreaders)	Twice-Annually (Spring and Fall)								

## **SECTION 6 – SOILS TESTING DATA**

Project No. 100-152

Date: 11/1/21  
Revision: \_\_\_\_\_

Commonwealth of Massachusetts  
Pembroke, Massachusetts  
***Soil Suitability Assessment for On-site Sewage Disposal***

Performed By: David Newhall Test Dates: 11/1/21  
Performed By: \_\_\_\_\_ Test Dates: \_\_\_\_\_  
Witnessed By: Lisa Cullity Testhole #: 21-01 to 21-04  
Witnessed By: \_\_\_\_\_ Testhole #: \_\_\_\_\_

**FACILITY INFORMATION**

Site Location: \_\_\_\_\_ Owner/ Applicant Information: \_\_\_\_\_  
Builder's lot #: \_\_\_\_\_ Name: 7-15 Mattakeesett Street LLC  
Street Address: 7-15 Mattakeesett Street Address: \_\_\_\_\_  
Town, State, Zip: Pembroke, MA Town, State, Zip: \_\_\_\_\_  
Assessor's Map: Map 123 Lot 78 Telephone no.: \_\_\_\_\_

**SITE INFORMATION**

Construction Type:

New Construction: ☒ Repair: ☐ Upgrade: ☐ Drainage: ☐

Published Soil Survey Available: No: ☐ Yes: ☒

Year Published: 2021 Publication Scale: Attached a. Soil Map Unit: 256A Drainage Class: MWD  
b. Soil Map Unit: 626B Drainage Class: SED

Soil Name: a. Deerfield loamy fine sand Soil Limitations: None  
b. Merrimac-Urban land complex

Surficial Geologic Report Available: No: ☐ Yes: ☒

Year Published: 2004 Publication Scale: 1:100,000

Geological Material/map unit: Qsd and Qt

Landform: Glacial Stratified Deposits and Till

Flood Insurance Rate Map:

Above 500 year flood boundary? No: ☐ Yes: ☒ Within a velocity zone? No: ☒ Yes: ☐

Within 500 year flood boundary? No: ☒ Yes: ☐ Within 100 year flood boundary? No: ☒ Yes: ☐

Wetland Area:

National Wetland Inventory Map: (map unit) n/a Name: \_\_\_\_\_

Wetlands Conservancy Program Map: (map unit) n/a Name: \_\_\_\_\_

Current Water Resource Conditions (USGS): (Month/year) December-2018

Range: Above Normal: ☒ Normal: ☐ Below Normal: ☐

Other References Reviewed: \_\_\_\_\_

Comments: \_\_\_\_\_



Project No.: 100-152

Date: 11/1/21  
Revised: \_\_\_\_\_

\*Deep Hole # 21-01 to 21-04

Street Address: 7-15 Mattakeesett Street  
Town: Pembroke, MA  
Assessor's Map: Map 123 Lot 78

### DETERMINATION OF HIGH GROUNDWATER ELEVATION

Method Used:

- ☐ Depth observed standing in observation hole: A: \_\_\_\_\_ inches B: \_\_\_\_\_ inches
- ☐ Depth weeping from side of observation hole: A: \_\_\_\_\_ inches B: \_\_\_\_\_ inches
- ☐ Depth to soil mottles: \_\_\_\_\_ inches
- ☒ Ground water adjustment: 132 inches

Index Well Number: MA-D4W 79 Duxbury Reading Date: 10/22/21 Index well level: Above

Adjustment factor: None Adjustment groundwater level:   

### DEPTH OF PERVIOUS MATERIAL

Depth of Naturally Occurring Pervious Material

Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? Yes: ☒ No: ☐

If yes, at what depth was it observed? Upper Boundary (inches): see logs  
Lower Boundary (inches): see logs

### CERTIFICATION

I certify that I have passed the soil evaluator examination approved by the Department of Environmental Protection and that the above analysis was performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017.

Signature of Soil Evaluator: \_\_\_\_\_ Date: \_\_\_\_\_  
Typed or Printed Name of Soil Evaluator: David Newhall  
Date of Soil Evaluator Exam: May 2018

Name of Board of Health Witness: Lisa Cullity  
Board of Health: Pembroke

\*If applicable, only deep hole with shallowest ESHGW listed.

## ON-SITE REVIEW

DEEP HOLE #: 21-01 DATE: 11/1/21 TIME: 8:30 AM WEATHER: Clear 55°  
SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA  
OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152  
LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Wooded LANDFORM: Glacial Stratified Deposits and Till

### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency, % Gravels, Stones, Boulders)
0-8"	A	Loamy Sand	10 YR 3/3		
8"-24"	B	Loamy Sand	10 YR 5/6	5YR 5/6 at 18"	
24"-96"	C <sub>1</sub>	Sand	2.5 Y 5/3	Weeping at 75"	

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes: \_\_\_\_\_

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater: \_\_\_\_\_

Standing in Hole: 77" Weeping from Face: 75" Saturating the Face: \_\_\_\_\_ Mottling: 16"

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

### PERCOLATION TEST

Percolation Hole #:	<u>21-01</u>	Percolation Hole #:	_____
Test Date:	<u>11/1/21</u>	Test Date:	_____
Depth of Perc:	<u>36"-54"</u>	Depth of Perc:	_____
Start of Presoak:	<u>9:03 AM</u>	Start of Presoak:	_____
End of Presoak:	<u>9:18 AM</u>	End of Presoak:	_____
Time @ 12":	<u>9:18 AM</u>	Time @ 12":	_____
Time @ 9":	<u>9:24 AM</u>	Time @ 9":	_____
Time Elapse:(12"-9")	<u>6 min</u>	Time Elapse:(12"-9")	_____
Time AT 6":	<u>9:33 AM</u>	Time AT 6":	_____
Time Elapse: (9"-6"):	<u>9 min</u>	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	<u>3 min/in</u>	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/ Add. Test Req'd:	<u>Passed</u>	Test Passed/ Failed/ Discon/ Add. Testing Req'd:	_____

Performed By: David Newhall Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price  
Comments: \_\_\_\_\_

*An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.*

*An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.*

# ON-SITE REVIEW

DEEP HOLE #: 21-02 DATE: 11/1/21 TIME: 10:00 AM WEATHER: Clear 55°  
SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA  
OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152  
LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Wooded LANDFORM: Glacial Stratified Deposits and Till

## DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft  
DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

## DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-18"	A	Loamy Sand	10 YR 3/3		Granular, Friable
18"-44"	B	Loamy Sand	10 YR 5/6	at 40"	Massive, Friable
44"-108"	C <sub>1</sub>	Sand	2.5 Y 5/3	5YR 5/6 at 36"	Single Grain, 10% Gravel

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes: \_\_\_\_\_  
Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater: \_\_\_\_\_  
Standing in Hole: 80" Weeping from Face: 76" Saturating the Face: \_\_\_\_\_ Mottling: 36"

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

## PERCOLATION TEST

Percolation Hole #:	<u>21-02</u>	Percolation Hole #:	_____
Test Date:	<u>11/1/21</u>	Test Date:	_____
Depth of Perc:	<u>48"-66"</u>	Depth of Perc:	_____
Start of Presoak:	<u>10:48 AM</u>	Start of Presoak:	_____
End of Presoak:	<u>11:03 AM</u>	End of Presoak:	_____
Time @ 12":	<u>11:03 AM</u>	Time @ 12":	_____
Time @ 9":	<u>11:16 AM</u>	Time @ 9":	_____
Time Elapse:(12"-9")	<u>13 min</u>	Time Elapse:(12"-9")	_____
Time AT 6":	<u>11:33 AM</u>	Time AT 6":	_____
Time Elapse: (9"-6"):	<u>17 min</u>	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	<u>6 min/in</u>	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/ Add. Test Req'd:	<u>Passed</u>	Test Passed/ Failed/ Discon/ Add. Testing Req'd:	_____

Performed By: David Newhall Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price  
Comments: Some finer material within sand layer, coarser at bottom.

*An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title5 and applicable local bylaws, will in fact be feasible on this site.*

*An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.*

## ON-SITE REVIEW

DEEP HOLE #: **21-03** DATE: 11/1/21 TIME: 10:30 AM WEATHER: Clear 55°

SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA

OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152

LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Wooded LANDFORM: Glacial Stratified Deposits and Till

### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-12"	A	Loamy Sand	10 YR 3/3		Granular, Friable
12"-36"	B	Loamy Sand	10 YR 5/6	at 22"	Massive, Friable
36"-96"	C <sub>1</sub>	Sand	2.5 Y 5/3	5YR 5/6	Single Grain, 10% Gravel

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater:

Standing in Hole: 52" Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: 22"

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/	_____	Test Passed/ Failed/ Discon/	_____
Discon/ Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: David Newhall Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price

Comments: \_\_\_\_\_

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*An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.*

### ON-SITE REVIEW

DEEP HOLE #: 21-04 DATE: 11/1/21 TIME: 11:30 AM WEATHER: Clear 55°  
SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA  
OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152  
LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Wooded LANDFORM: Glacial Stratified Deposits and Till

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft  
DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency, % Gravels, Stones, Boulders)
0-12"	A	Loamy Sand	10 YR 3/3		Granular, Friable
12"-28"	B	Loamy Sand	10 YR 5/6		Massive, Friable
28"-96"	C <sub>1</sub>	Sand	2.5 Y 5/3	5YR 5/6 at 26"	Single Grain, Loose, 5% Gravel

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes: \_\_\_\_\_  
Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater: \_\_\_\_\_  
Standing in Hole: 52" Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: 22"

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/ Add. Test Req'd:	<u>Passed</u>	Test Passed/ Failed/ Discon/ Add. Testing Req'd:	_____

Performed By: David Newhall Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price  
Comments: \_\_\_\_\_

*An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.*

*An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.*

## ON-SITE REVIEW

DEEP HOLE #: 21-05 DATE: 12/14/21 TIME: 9:00 AM WEATHER: Partly Cloudy  
SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA  
OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152  
LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Pavement LANDFORM: Glacial Stratified Deposits and Till

### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft  
DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency, % Gravels, Stones, Boulders)
0-112"	Fill	Fill			
112"-126"	A <sub>B</sub>	Loamy Sand	2.5 Y 6/2		Sinlge Grain, Loose
126"-186"	C <sub>1</sub>	Sand	2.5 Y 5/3		Sinlge Grain, Loose

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:  
Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☐ No: ☒ If Yes: What is the depth of Groundwater:  
Standing in Hole: \_\_\_\_\_ Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: David Newhall Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price  
Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

### ON-SITE REVIEW

DEEP HOLE #: 21-06 DATE: 12/14/21 TIME: 9:00 AM WEATHER: Partly Cloudy

SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA

OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152

LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Pavement LANDFORM: Glacial Stratified Deposits and Till

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-82"	Fill	Fill	-	-	-
112"-126"	C <sub>1</sub>	Sand	2.5 Y 5/3		Sinlge Grain, Loose

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☐ No: ☒ If Yes: What is the depth of Groundwater:

Standing in Hole: \_\_\_\_\_ Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: David Newhall Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price

Comments: Pockets

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

### ON-SITE REVIEW

DEEP HOLE #: 21-07 DATE: 12/14/21 TIME: 9:00 AM WEATHER: Partly Cloudy

SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA

OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152

LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Pavement LANDFORM: Glacial Stratified Deposits and Till

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-102"	Fill	Fill	-	-	-
112"-174"	C <sub>1</sub>	Sand	2.5 Y 5/3		Single Grain, Loose

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☐ No: ☒ If Yes: What is the depth of Groundwater:

Standing in Hole: \_\_\_\_\_ Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: David Newhall Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price

Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.



### ON-SITE REVIEW

DEEP HOLE #: 21-06 DATE: 12/14/21 TIME: 9:00 AM WEATHER: Partly Cloudy

SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA

OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152

LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Pavement LANDFORM: Glacial Stratified Deposits and Till

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-110"	Fill	Fill	-	-	-
110"-180"	C <sub>1</sub>	Sand	2.5 Y 5/3		Sinlge Grain, Loose

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☐ No: ☒ If Yes: What is the depth of Groundwater:

Standing in Hole: \_\_\_\_\_ Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: David Newhall Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price

Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

### ON-SITE REVIEW

DEEP HOLE #: TP-1 DATE: 8/17/22 TIME: 10:50 AM WEATHER: Sunny 72°F

SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA

OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152

LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Pavement LANDFORM: Glacial Stratified Deposits and Till

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-127"	Fill	Fill	-	-	-

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☐ No: ☒ If Yes: What is the depth of Groundwater:

Standing in Hole: \_\_\_\_\_ Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: Maggie Laracy Witnessed By: \_\_\_\_\_ Mach./Oper.: J.F. Price

Comments: There were some pockets of what appeared to be ash, but the test pit was completely comprised of fill materials.

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

### ON-SITE REVIEW

DEEP HOLE #: TP-2 DATE: 8/17/22 TIME: 10:15 AM WEATHER: Sunny 72°F

SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA

OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152

LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Woods LANDFORM: Glacial Stratified Deposits and Till

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-13"	Ap		-	-	-
13-25"	B	Loamy Sand	10YR 5/5		massive, friable
25-95"	C <sub>1</sub>	Loamy Sand	2.5Y 5/4	5YR 5/6 at 40"	massive, friable

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☐ No: ☒ If Yes: What is the depth of Groundwater:

Standing in Hole: \_\_\_\_\_ Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: 40"

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: Maggie Laracy Witnessed By: \_\_\_\_\_ Mach./Oper.: J.F. Price

Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

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### ON-SITE REVIEW

DEEP HOLE #: TP-3 DATE: 8/17/22 TIME: 10:00 AM WEATHER: Sunny 72°F

SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA

OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152

LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Woods ~ 100ft from property line/cemetery LANDFORM: Glacial Stratified Deposits and Till

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: >10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-11"	Ap		-	-	-
11-25"	B	Loamy Sand	-		massive, friable
25-75"	C <sub>1</sub>	Loamy Sand	10YR 5/6		5%gravel & cobbles, massive, friable
75-105"	C <sub>2</sub>	Sand	10YR 4/4	5YR 5/6 at 81"	Sinlge Grain, Loose

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater: 105"

Standing in Hole: 105" Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: at 81"

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: Maggie Laracy Witnessed By: \_\_\_\_\_ Mach./Oper.: J.F. Price

Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

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### ON-SITE REVIEW

DEEP HOLE #: TP-4 DATE: 8/17/22 TIME: 9:40 AM WEATHER: Overcast 66°F

SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA

OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152

LOCATION (Identify on Plan): ~ 30' from PL/cemetery GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☐ No: ☒ SLOPE (%): 0-3%

VEGETATION: Woods LANDFORM: Glacial Stratified Deposits and Till

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: ~30 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >50 ft

DRINKING WATER WELL: >200 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-12"	Ap		-	-	-
12-27"	B	Loamy Sand	-		massive, friable
27-97+"	C <sub>1</sub>	Loamy Sand	10YR 5/4	7.5YR 5/8, 15% at 60"	massive, friable

PARENT MATERIAL: Sandy outwash / Loamy glaciofluvial deposit Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☐ No: ☒ If Yes: What is the depth of Groundwater:

Standing in Hole: \_\_\_\_\_ Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: at 60"

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	_____	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: Maggie Laracy Witnessed By: \_\_\_\_\_ Mach./Oper.: J.F. Price

Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

### ON-SITE REVIEW

DEEP HOLE #: 23-01 DATE: 1/14/23 TIME: 8:30 AM WEATHER: Cloudy 35°F

SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA

OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152

LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☒ No: ☐ stonewall SLOPE (%): 3-5%

VEGETATION: Woods - mixed LANDFORM: Moraine

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: ~70 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >100 ft

DRINKING WATER WELL: >100 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-8"	Ap	Loamy Sand	10YR 3/2	-	massive, friable
8-30"	B	Loamy Sand	10YR 5/4		massive, friable
30-120"	C <sub>1</sub>	Med. Sand	10YR 6/3		single grain loose, 2% gravel

PARENT MATERIAL: Outwash Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:

Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater:

Standing in Hole: 110 Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	<u>Not performed</u>	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: Josh Green Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price

Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.

### ON-SITE REVIEW

DEEP HOLE #: 23-02 DATE: 1/14/23 TIME: 9:00 AM WEATHER: Cloudy 35°F  
SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA  
OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152  
LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☒ No: ☐ stonewall SLOPE (%): 3-5%

VEGETATION: Woods - mixed LANDFORM: Moraine

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: ~25 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: >100 ft  
DRINKING WATER WELL: >100 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-8"	Ap	Loamy Sand	10YR 3/2	-	massive, friable
8-24"	B	Loamy Sand	10YR 5/6		massive, friable
24-120"	C <sub>1</sub>	Med. Sand	2.5Y 6/3	none	single grain loose, 2% gravel

PARENT MATERIAL: Outwash Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:  
Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☒ No: ☐ If Yes: What is the depth of Groundwater:  
Standing in Hole: 108 Weeping from Face: \_\_\_\_\_ Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	<u>23-02</u>	Percolation Hole #:	_____
Test Date:	<u>1/19/23</u>	Test Date:	_____
Depth of Perc:	<u>34-52</u>	Depth of Perc:	_____
Start of Presoak:	<u>9:26 AM</u>	Start of Presoak:	_____
End of Presoak:	<u>9:41 AM</u>	End of Presoak:	_____
Time @ 12":	<u>9:41 AM</u>	Time @ 12":	_____
Time @ 9":	<u>9:46 AM</u>	Time @ 9":	_____
Time Elapse:(12"-9")	<u>5 min</u>	Time Elapse:(12"-9")	_____
Time AT 6":	<u>9:52 AM</u>	Time AT 6":	_____
Time Elapse: (9"-6"):	<u>6 min</u>	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	<u>2min/in</u>	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: Josh Green Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price  
Comments: Dense layer at 45-65", loose in hand, same material as below

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

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### ON-SITE REVIEW

DEEP HOLE #: 23-03 DATE: 1/14/23 TIME: 10:00 AM WEATHER: Cloudy 35°F  
SITE ADDRESS or MAP/LOT #: 7 & 15 Mattakeesett st, Pembroke, MA  
OWNER: 7-15 Mattakeesett Street LLC JOB NO.: 100-152  
LOCATION (Identify on Plan): See Plan GROUND ELEVATION AT SURFACE OF HOLE: See Plan

LAND USE: Commercial SURFACE STONES: Yes: ☒ No: ☐ stonewall SLOPE (%): 3-5%

VEGETATION: Woods - mixed LANDFORM: Moraine

#### DISTANCES FROM:

OPEN WATER BODY: >100 ft PROPERTY LINE: ~10 ft POSSIBLE WET AREA: >100 ft DRAINAGEWAY: 20 ft

DRINKING WATER WELL: >100 ft OTHER: \_\_\_\_\_

#### DEEP OBSERVATION HOLE LOG

Depth (inches)	Soil Hor./ Layer	Soil Texture (USDA)	Soil Color (Munsell)	Redoximorphic Features	Other (Structure, Consistency,% Gravels, Stones, Boulders)
0-12"	Ap	Loamy Sand	10YR 3/2	-	massive, friable
12-34"	B	Loamy Sand	10YR 5/4		massive, friable
34-108"	C <sub>1</sub>	Med. Sand	2.5Y 6/3	none	single grain loose, 5% gravel

PARENT MATERIAL: Outwash Unsuitable Material Present? Yes: ☐ No: ☒ If Yes:  
Disturbed Soil: ☐ Fill Mat'l: ☐ Impervious Layer(s): ☐ Weathered/Fractured Rock: ☐ Bedrock: ☐

GROUNDWATER OBSERVED: Yes: ☐ No: ☒ If Yes: What is the depth of Groundwater:  
Standing in Hole: \_\_\_\_\_ Weeping from Face: 108 Saturating the Face: \_\_\_\_\_ Mottling: \_\_\_\_\_

Estimated Depth to Seasonal High Ground Water : \_\_\_\_\_

#### PERCOLATION TEST

Percolation Hole #:	<u>Not performed</u>	Percolation Hole #:	_____
Test Date:	_____	Test Date:	_____
Depth of Perc:	_____	Depth of Perc:	_____
Start of Presoak:	_____	Start of Presoak:	_____
End of Presoak:	_____	End of Presoak:	_____
Time @ 12":	_____	Time @ 12":	_____
Time @ 9":	_____	Time @ 9":	_____
Time Elapse:(12"-9")	_____	Time Elapse:(12"-9")	_____
Time AT 6":	_____	Time AT 6":	_____
Time Elapse: (9"-6"):	_____	Time Elapse: (9"-6"):	_____
Rate: (min/in.):	_____	Rate: (min/in.):	_____
Test Passed/ Failed/ Discon/	_____	Test Passed/ Failed/ Discon/	_____
Add. Test Req'd:	_____	Add. Testing Req'd:	_____

Performed By: Josh Green Witnessed By: Lisa Cullity Mach./Oper.: J.F. Price  
Comments: \_\_\_\_\_

An indication that the "site passed" indicates only that the basic criteria for a soil evaluation and percolation test under Title 5 have been met in the area tested. Further soil evaluations and design work are necessary to determine whether a septic system for a particular use, meeting the requirements of Title 5 and applicable local bylaws, will in fact be feasible on this site.

An indication that the "site failed" indicates only that the area tested did not meet the minimum criteria (at the time of testing) for a successful soil evaluation and/or percolation test in the area tested. Additional testing at another depth or other areas may result in passing results.



# Soil Map—Plymouth County, Massachusetts



Natural Resources  
Conservation Service

Web Soil Survey  
National Cooperative Soil Survey

2/1/2023  
Page 1 of 3

## 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 1:12,000.

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: Plymouth County, Massachusetts

Survey Area Data: Version 15, Sep 9, 2022

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	3.5	80.2%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	0.9	19.8%
<b>Totals for Area of Interest</b>		<b>4.3</b>	<b>100.0%</b>

## Plymouth County, Massachusetts

### 256A—Deerfield loamy fine sand, 0 to 3 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2xfg8

*Elevation:* 0 to 1,100 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 145 to 240 days

*Farmland classification:* Farmland of statewide importance

#### Map Unit Composition

*Deerfield and similar soils:* 85 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Deerfield

##### Setting

*Landform:* Outwash terraces, outwash deltas, outwash plains, kame terraces

*Landform position (three-dimensional):* Tread

*Down-slope shape:* Concave, convex, linear

*Across-slope shape:* Convex, linear, concave

*Parent material:* Sandy outwash derived from granite, gneiss, and/or quartzite

##### Typical profile

*Ap - 0 to 9 inches:* loamy fine sand

*Bw - 9 to 25 inches:* loamy fine sand

*BC - 25 to 33 inches:* fine sand

*Cg - 33 to 60 inches:* sand

##### Properties and qualities

*Slope:* 0 to 3 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Moderately well drained

*Runoff class:* Negligible

*Capacity of the most limiting layer to transmit water*

*(Ksat):* Moderately high to very high (1.42 to 99.90 in/hr)

*Depth to water table:* About 15 to 37 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Maximum salinity:* Nonsaline (0.0 to 1.9 mmhos/cm)

*Sodium adsorption ratio, maximum:* 11.0

*Available water supply, 0 to 60 inches:* Moderate (about 6.5 inches)

##### Interpretive groups

*Land capability classification (irrigated):* None specified

*Land capability classification (nonirrigated):* 2w  
*Hydrologic Soil Group:* A  
*Ecological site:* F144AY027MA - Moist Sandy Outwash  
*Hydric soil rating:* No

### **Minor Components**

#### **Windsor**

*Percent of map unit:* 7 percent  
*Landform:* Outwash terraces, kame terraces, outwash deltas,  
outwash plains  
*Landform position (three-dimensional):* Tread  
*Down-slope shape:* Concave, convex, linear  
*Across-slope shape:* Convex, linear, concave  
*Hydric soil rating:* No

#### **Wareham**

*Percent of map unit:* 5 percent  
*Landform:* Drainageways, depressions  
*Down-slope shape:* Concave  
*Across-slope shape:* Concave  
*Hydric soil rating:* Yes

#### **Sudbury**

*Percent of map unit:* 2 percent  
*Landform:* Outwash plains, kame terraces, outwash deltas,  
outwash terraces  
*Landform position (three-dimensional):* Tread  
*Down-slope shape:* Concave, convex, linear  
*Across-slope shape:* Convex, linear, concave  
*Hydric soil rating:* No

#### **Ninigret**

*Percent of map unit:* 1 percent  
*Landform:* Outwash terraces, kame terraces, outwash plains  
*Landform position (three-dimensional):* Tread  
*Down-slope shape:* Linear, convex  
*Across-slope shape:* Concave, convex  
*Hydric soil rating:* No

## **Data Source Information**

Soil Survey Area: Plymouth County, Massachusetts  
Survey Area Data: Version 15, Sep 9, 2022



## Plymouth County, Massachusetts

### 626B—Merrimac-Urban land complex, 0 to 8 percent slopes

#### Map Unit Setting

*National map unit symbol:* 2tyr9

*Elevation:* 0 to 820 feet

*Mean annual precipitation:* 36 to 71 inches

*Mean annual air temperature:* 39 to 55 degrees F

*Frost-free period:* 140 to 250 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Merrimac and similar soils:* 45 percent

*Urban land:* 40 percent

*Minor components:* 15 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Merrimac

##### Setting

*Landform:* Outwash plains, outwash terraces, moraines, eskers, kames

*Landform position (two-dimensional):* Summit, shoulder, backslope, footslope

*Landform position (three-dimensional):* Side slope, crest, riser, tread

*Down-slope shape:* Convex

*Across-slope shape:* Convex

*Parent material:* Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

##### Typical profile

*Ap - 0 to 10 inches:* fine sandy loam

*Bw1 - 10 to 22 inches:* fine sandy loam

*Bw2 - 22 to 26 inches:* stratified gravel to gravelly loamy sand

*2C - 26 to 65 inches:* stratified gravel to very gravelly sand

##### Properties and qualities

*Slope:* 0 to 8 percent

*Depth to restrictive feature:* More than 80 inches

*Drainage class:* Somewhat excessively drained

*Runoff class:* Very low

*Capacity of the most limiting layer to transmit water*

*(Ksat):* Moderately high to very high (1.42 to 99.90 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum content:* 2 percent

*Maximum salinity:* Nonsaline (0.0 to 1.4 mmhos/cm)

*Sodium adsorption ratio, maximum:* 1.0  
*Available water supply, 0 to 60 inches:* Low (about 4.6 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 2e  
*Hydrologic Soil Group:* A  
*Ecological site:* F144AY022MA - Dry Outwash  
*Hydric soil rating:* No

**Description of Urban Land**

**Typical profile**

*M - 0 to 10 inches:* cemented material

**Properties and qualities**

*Slope:* 0 to 8 percent  
*Depth to restrictive feature:* 0 inches to manufactured layer  
*Runoff class:* Very high  
*Capacity of the most limiting layer to transmit water (Ksat):* Very low  
(0.00 to 0.00 in/hr)  
*Available water supply, 0 to 60 inches:* Very low (about 0.0 inches)

**Interpretive groups**

*Land capability classification (irrigated):* None specified  
*Land capability classification (nonirrigated):* 8  
*Hydrologic Soil Group:* D  
*Hydric soil rating:* Unranked

**Minor Components**

**Windsor**

*Percent of map unit:* 5 percent  
*Landform:* Outwash terraces, dunes, outwash plains, deltas  
*Landform position (three-dimensional):* Tread, riser  
*Down-slope shape:* Linear, convex  
*Across-slope shape:* Linear, convex  
*Hydric soil rating:* No

**Hinckley**

*Percent of map unit:* 5 percent  
*Landform:* Deltas, kames, eskers, outwash plains  
*Landform position (two-dimensional):* Summit, shoulder, backslope  
*Landform position (three-dimensional):* Head slope, nose slope, side slope, crest, rise  
*Down-slope shape:* Convex  
*Across-slope shape:* Convex, linear  
*Hydric soil rating:* No

**Sudbury**

*Percent of map unit:* 5 percent  
*Landform:* Deltas, terraces, outwash plains  
*Landform position (two-dimensional):* Footslope  
*Landform position (three-dimensional):* Tread, dip  
*Down-slope shape:* Concave

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

## Data Source Information

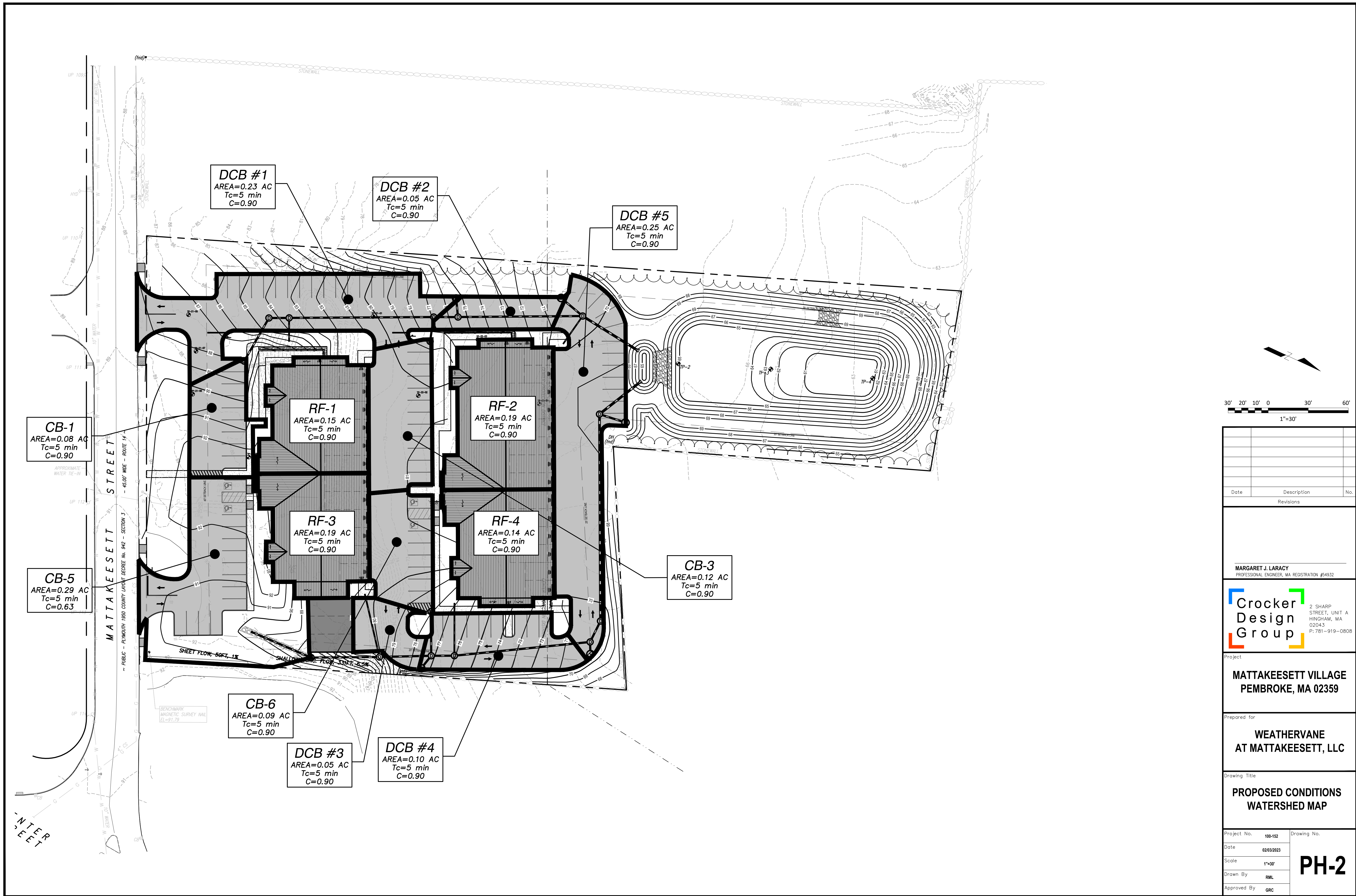
Soil Survey Area: Plymouth County, Massachusetts  
Survey Area Data: Version 15, Sep 9, 2022



## **SECTION 7 – HYDRAULIC PIPE SIZING**

[illegible]

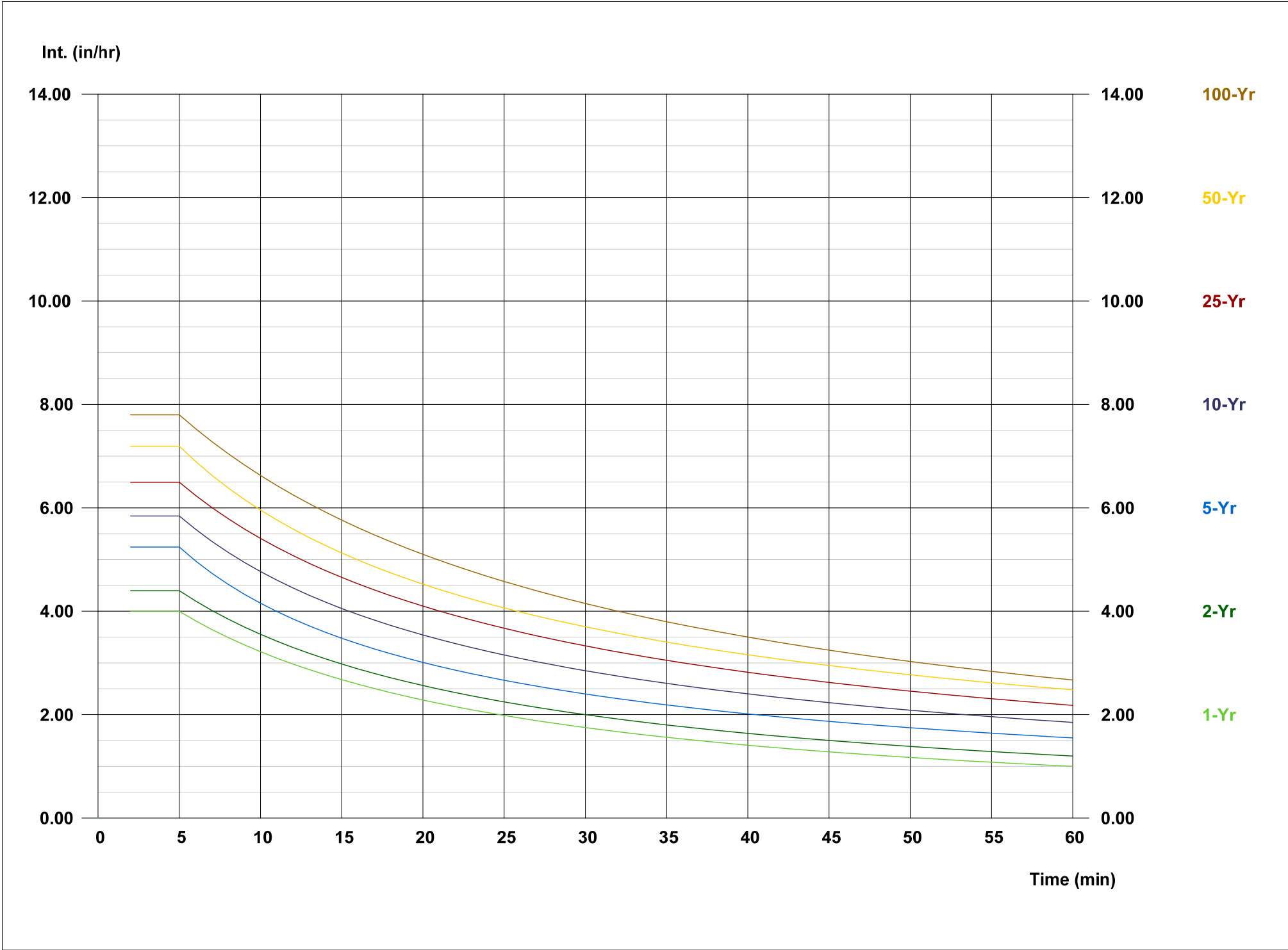
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# Storm Sewer IDF Curves

IDF file: quincy idf curve.IDF



## **SECTION 8-**

**SITE DEVELOPMENT PLANS – MATTAKEESETT VILLAGE 2/3/2023**