Stormwater Report

35 Village Road
Middleton, Massachusetts 01949

35 Village Road

December 19, 2025

JOB NO: ENG25-0131

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Project Narrative:

Ferncroft Apartments, LLC, (the "Applicant") seeks to construct two (2) multi-family residential structures to create 200 multifamily rental dwelling units on a portion of the land at 35 Village Road in Middleton, MA (Assessor's Map 21, Parcel 5) and depicted on the Figure 1, below, with a scaled portion of the USGS map provided as Attachment A to this report.

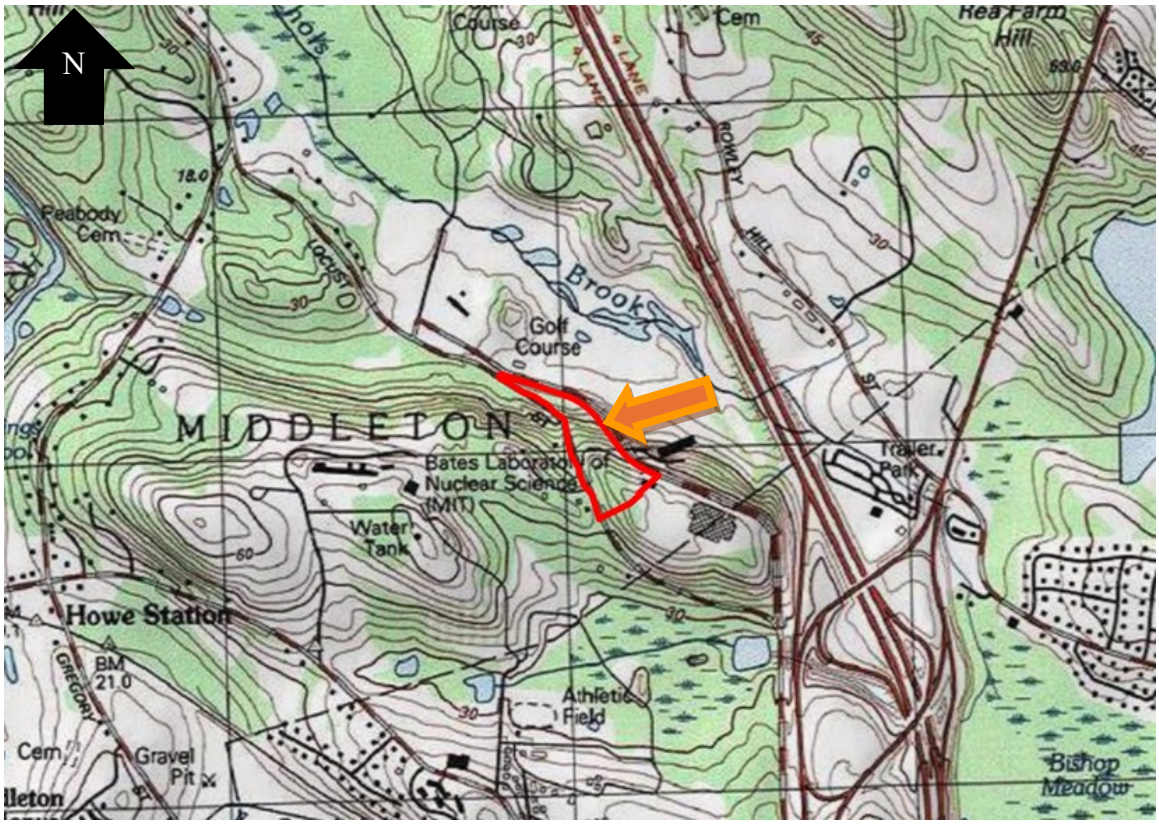


Figure 1-USGS Vicinity Map

A portion of this parcel is currently improved by Ferncroft Corporate Center consisting of commercial site amenities including parking, driveway access, open space, an existing 8-story, 234,556 square-foot office building and an adjacent, existing six level parking garage (2-stories above ground) having a 69,100 square-foot footprint with a paved surface parking lot along the eastern side of the Site. The Site is served by municipal water and wastewater (via the Town of Danvers) and has an existing on-site structured drainage system that discharges to an existing concrete swale along the southerly side of Village Road, a public right-of-way.

The Applicant seeks to construct the Ferncroft Apartments (or "the Project") consisting of 200 units, to be located on an underutilized portion of a 12.57+/- acre

site. As part of the project the parcel is proposed to be divided into two separate lots to separate the area of the existing commercial use to include the existing office building, existing parking garage, and related improvements (Lot A), and a second lot proposed for the new residential Project which is the subject of this Application encompassing the two new multifamily residential buildings and appurtenant areas as the area of the Chapter 40B Project (Lot B).

Proposed site work will include, but is not limited to, grading, retaining walls, drainage, utilities, paving and landscaping associated with the residential buildings.

Pre-Development (Existing) Uses & Site Conditions:

The Site is currently underutilized with development clustered to the southerly portion of the property with several areas of impervious coverage associated with the existing office building, vehicular access, parking structure and surface parking areas. Vegetated areas exist in landscape onsite and trees along all property boundaries. The existing building onsite is currently occupied with various businesses.

There is no evidence of exposed bedrock, streams, rivers, or wetlands onsite, nor are there any buffer zones associated with any wetlands on the property. The Site is not within the vicinity of any Priority or Estimated Habitat protected under Mass Wildlife's Natural Heritage & Endangered Species Program.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Essex County, Massachusetts, Map Number 25009C0401G, City of Middleton Community Number 250094, Panel Number 0401G, having an effective date of July 8, 2025, the Site is not located within any FEMA floodplain or floodway. A portion of this panel is provided in Attachment B to this report.

Natural Resources Conservation Service (NRCS) soil mapping describes the site as being a mixture of Udorthents-Urban (Map Unit Symbol 651) and varying slopes of Paxton fine sandy loam (Map Unit Symbol 305B, 305C, and 305D). Web soil survey mapping information can be found in Attachment B.

Weston and Sampson conducted confirmatory soil testing on November 19th, 2025, to verify soil type and depth to estimated seasonal high-water table. The subsurface exploration test pit logs can be found in Attachment C of this report.

Pre-Development Condition Hydrology:

The parcel currently slopes from Locust Street toward Village Road where surficial runoff is collected by a concrete swale and conveyed to the drainage system within Village Road. The site's topography includes a ridge adjacent to the roadway along Locust Street southwestern of the proposed development. This stormwater analysis

generally defined watershed areas through surficial topography. In the developed, southeast portion of the site, there are several onsite catch basins that collect runoff and drain to a 12-inch storm drain which discharge into an existing detention pond onsite. This detention pond discharges onto the slope and ultimately flows run overland to the above referenced concrete swale. An existing 30-inch storm drain runs parallel to Locust Street in a northwesterly direction before turning north and bisecting the site. The existing 30-inch storm drain also connects to the structured drainage system within Village Road. Offsite flows tributary to an existing 30" culvert crossing the site were assumed to remain constant and excluded from the analysis.

A single point of analysis (POA) was defined at the downstream catch basin inlet within the existing concrete drainage swale in Village Road, identified as POA-1. This POA is also at the confluence of the above-mentioned 30-inch culvert. Figure 1 of Attachment D is the pre-development drainage area map, which displays the limits of the pre-development drainage areas, time of concentration flow paths, and existing land coverages. Figure 1 also identifies the POA for the hydrologic analysis which remains consistent from pre- to post-development. The drainage areas in pre-development conditions are described below:

- Drainage Area E1 – Central portion draining to existing 12-inch storm drain.
- Drainage Area E2 – Northwestern portion of property draining to existing detention pond.
- Drainage Area E3 – Northeast corner draining toward Drainage Area E4.
- Drainage Area E4 – Central northeast portion draining to Drainage Area E6.
- Drainage Area E5 – Northwestern corner draining toward Drainage Area E6.
- Drainage Area E6 – Northwestern portion draining toward Drainage Area E7.
- Drainage Area E7 – Northwestern corner draining to POA-1.

Post-Development (Proposed) Uses & Site Conditions:

The Applicant seeks to construct 200 residential apartment units within two (2) buildings to be constructed at the site while maintaining most of the existing commercial improvements at the site. Building A is proposed to be constructed at the existing, elevated parking lot to the east of the existing, multi-story parking garage. Building B is proposed in the general vicinity of the existing detention basin within the wooded portion of the lot to the north of the existing, multi-story parking garage. The residential and commercial uses propose to share parking to the extent practicable to minimize the creation of unnecessary impervious surfaces. Through the shared parking and reuse of the existing parking deck the proposed Project, exclusive of roof top surfaces, results in a net increase of 297-square feet

(SF) of paved, impervious surfaces when compared to the pre-development conditions.

Post-Development Condition Hydrology:

The post-development conditions analysis evaluates the land coverage changes and stormwater features associated with the proposed project. The post-development conditions are designed to maintain the site's natural drainage paths to the maximum extent practicable while mitigating any potential negative impacts from site development. The project seeks to redevelop portions of the site and minimize increases in impervious surfaces to the extent practicable.

The proposed stormwater management system consists of an sub-surface infiltration system for roof runoff along with catch basins, underground storm pipes, water quality units, and three stormwater basins for treating and conveying surficial runoff.

The POA and their associated drainage areas generally remain consistent from pre- to post-development conditions. Each stormwater best management practice (BMP) has its corresponding drainage area(s) and time of concentration path. Figure 2 of Attachment D is the post-development drainage area map, which displays the limits of the post-development drainage areas, time of concentration flow paths, and proposed land coverages. The drainage areas in post-development conditions are described below:

- Drainage Area P1 – Proposed Building B drains to underground stormwater storage area 1P.
- Drainage Area P2 – Proposed Building A drains to underground stormwater storage area 1P.
- Drainage Area P3 – Northeastern bottom portion of site follows existing drainage pattern and drains to POA-1.
- Drainage Area P4 – Central portion of site that drains to stormwater basin 2P.
- Drainage Area P5 – Southwest portion of site that drains to stormwater basin 3P.
- Drainage Area P6 – Western corner of site that drains to stormwater basin 4P.
- Drainage Area P7 – Southwest corner of site that connects to the existing 30-inch storm drain at the site.

Methodology:

Runoff calculations were performed in accordance with the the NRCS Soil Conservation Service (SCS) method as defined in Technical Release 55 (TR-55) and Technical Release 20 (TR-20) which are the basis for they HydroCAD® hydrologic model. Cover conditions and times of concentrations were used to generate runoff hydrographs for each of the sub-catchments for the each of the Type III design storms with precipitation rates identified in NOAA Atlas 14, as identified in Table 1.

Table 1 - Design Storms – NOAA Atlas 14

DESIGN STORM (RETURN FREQUENCY)	RAINFALL (INCHES/24-HOURS)
2-year	3.25
10-year	4.91
100-year	8.86

Compliance with Storm Water Management Standards:

Although the proposed subdivision is not located within areas under jurisdiction of the Massachusetts Department of Environmental Protection's (MaDEPs) Wetlands Protection Act (WPA), the proposed storm water management system has been designed to comply with the ten (10) standards of the MaDEP Storm Water Management Policy to the maximum extent practicable. Each of the standards and the extent of Project compliance are summarized below.

Standard 1: No New Untreated Discharges

No new storm water conveyances (e.g. outfalls) may discharge untreated storm water directly to or cause erosion in wetlands or waters of the Commonwealth.

The proposed project does not create any new untreated discharges. Total impervious area will be increased in comparison with existing conditions by approximately 43,560-SF. As described above 43,263-SF of this increase is attributed to impervious surfaces associated with the rooftop areas from the proposed residential buildings. The Massachusetts Stormwater Handbook recognizes runoff from rooftops as being "clean" not requiring treatment prior to infiltration, as such the net increase in impervious surfaces requiring treatment at

the project site is 297-SF. New impervious areas will now undergo treatment via street sweeping, deep sump hooded catch basins, hydrodynamic separators, and/or subsurface infiltration and extended detention basins. As such, existing stormwater discharges will meet Standard 1.

Standard 2: Peak Rate Attenuation

Storm water management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Storm water management controls to mitigate peak rates of runoff from the Project were developed for the 2, 10, and 100-year, 24-hour, Type III design storm events. As previously stated, runoff calculations were performed in accordance with the methodology outlined in the NRCS Soil Conservation Service (SCS) methods as defined in Technical Release 55 (TR-55) and Technical Release 20 (TR-20) which are the basis for they HydroCAD® hydrologic model. Calculations are provided as Attachment D to this report. Table 2, below summarized pre- and post-development peak rates of runoff to the design point.

Table 2 – Peak Rate of Runoff

	Peak Flow Rate in Cubic Feet Per Second (CFS)			
Point of Analysis	24-hour Storm Event	Pre-Development Peak Runoff (cfs)	Poste Development Peak Runoff (cfs)	Difference in Peak Runoff (cfs)
POA1	2	8.8	8.7	-0.1
	10	20.0	18.6	-1.4
	100	37.7	32.4	-5.3

The Project, as designed, will decrease peak flow rate of runoff to the Point of Analysis in each of the analyzed design storm events when compared to the existing site conditions.

Standard 3: Recharge

Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration ... 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 storm water management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Storm Water Handbook.

The Project approximates the annual recharge to groundwater through the use of structural and non-structural best management practices (BMPs) including a proposed subsurface infiltration system that infiltrates clean roof runoff, as well as through implementation of the proposed long-term operations and maintenance plan.

In accordance with the Massachusetts Storm Water Handbook the required recharge volume (Rv) for the Project equals a depth of runoff corresponding to the soil type time the impervious areas covering that soil type at the post-development site.

As previously stated and documented in Appendix A, soils on-site vary and include Groups A, B, C and D. The target depth factor (F) identified by hydrologic soil type is identified in Table 2.3.2: Recharge Depth by Hydrologic Soil Group of the Massachusetts Storm Water Handbook (and included as Table 3, below).

Table 3 - Recharge Target Depth by Hydrologic Soil Group

NRCS HYDROLOGIC SOIL TYPE	APPROX. SOIL TEXTURE	TARGET DEPTH FACTOR (F)
A	sand	0.6-inch
B	loam	0.35-inch
C	silty loam	0.25-inch
D	clay	0.1-inch

As previously described, a portion of the site was previously developed and as such qualifies as a redevelopment project (see Standard 7 below). Standard 3 isl met through structural best management practices (BMPs) including one (1) subsurface infiltration basin and three (3) extended detention basins to provide recharge on site. The BMPs are designed to capture and infiltrate the required recharge volume for the increase in impervious areas being proposed. Supporting calculations can be found in Attachment E of this report.

Compliance with Standard 3 and compliance with draw-down standards are summarized in the tables below.

Table 4 – Recharge and Drawdown Calculations Pond SSIS1

SSIS1					
Hydrologic Soil Group	A	B	C	D	Total
Total Proposed Increase Impervious Area (acres)	0.00	0.00	0.99	0.00	0.99
Target Factor (inches)	0.60	0.35	0.25	0.10	-
Required Recharge Volume (cubic feet)	0	0	901	0	901
Recharge Volume Below Lowest Outlet (cubic feet)					3764
Drawdown Time					
Saturated Hydraulic Conductivity (Rawls Rate in/hr)					0.27
Area of Bottom of Basin (square feet)					2502
Drawdown Time (hours)					66.9

Table 5 – Recharge and Drawdown Calculations Pond 2P

2P (Upper Pond Building B) - Note credit for 42,328 sf in Existing Impervious Results in no net increase.					
Hydrologic Soil Group	A	B	C	D	Total
Total Proposed Increase Impervious Area (acres)	0.00	0.00	0.00	0.00	0.00
Target Factor (inches)	0.60	0.35	0.25	0.10	-
Required Recharge Volume (cubic feet)	0	0	0	0	0
Recharge Volume Below Lowest Outlet (cubic feet)					0
Drawdown Time					
Saturated Hydraulic Conductivity (Rawls Rate in/hr)					0.27
Area of Bottom of Basin (square feet)					300
Drawdown Time (hours)					0.0

Table 6 – Recharge and Drawdown Calculations Pond 3P

3P (Lower Pond Building B) - Note credit for 4,342 sf in Existing Impervious Results in no net increase.					
Hydrologic Soil Group	A	B	C	D	Total
Total Proposed Increase Impervious Area (acres)	0.00	0.00	0.00	0.00	0.00
Target Factor (inches)	0.60	0.35	0.25	0.10	-
Required Recharge Volume (cubic feet)	0	0	0	0	0
Recharge Volume Below Lowest Outlet (cubic feet)					0
Drawdown Time					
Saturated Hydraulic Conductivity (Rawls Rate in/hr)					0.27
Area of Bottom of Basin (square feet)					175
Drawdown Time (hours)					0.0

Table 7 – Recharge and Drawdown Calculations Pond 4P

4P (Pond West of Building B) - Note credit for 7,287 sf in Existing Impervious results in 243 sf. increase					
Hydrologic Soil Group	A	B	C	D	Total
Total Proposed Increase Impervious Area (acres)	0.00	0.00	0.01	0.00	0.01
Target Factor (inches)	0.60	0.35	0.25	0.10	-
Required Recharge Volume (cubic feet)	0	0	5	0	5
Recharge Volume Below Lowest Outlet (cubic feet)					75
Drawdown Time					
Saturated Hydraulic Conductivity (Rawls Rate in/hr)					0.27
Area of Bottom of Basin (square feet)					400
Drawdown Time (hours)					8.3

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 standard is met with pollution prevention plans, storm water best management practices sized to capture the required water quality volume, and pretreatment measures.

Stormwater from impervious parking and driveway areas on the site will undergo treatment to provide a minimum of 80% TSS removal. Stormwater will undergo pre-treatment from deep sump catch basins, hydrodynamic separators prior to discharging into extended detention basins. Clean rooftop runoff will be recharged via a subsurface infiltration system. Although qualifying as a partial redevelopment project (see Standard 7, below) the project has been designed to all impervious surfaces on-site tributary to the POA. Supporting calculations can be found in Attachment E of this report and summarized in Table 8.

B	C	D	E	F
BMP Type	TSS Removal Rate	Starting TSS Load	Amount Removed (C x D)	Remaining Load (D - E)
Street Sweeping	0.05	1.00	0.05	0.95
Deep Sump & Hooded Catch Basins	0.25	0.75	0.19	0.54
Swirl Particle Separator	0.50	0.54	0.27	0.27
Extended Dry Detention Basin	0.50	0.27	0.14	0.13
			Total TSS Removal = 87%	

During project construction, appropriate BMPs will be used to minimize sedimentation and soil erosion as further described in Standard 8, below.

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

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Storm Water Handbook to eliminate or reduce the discharge of storm water runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and storm water runoff, the proponent shall use the specific structural storm water BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Storm Water Handbook. Storm water discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean

Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Standard 5 is not applicable to the Project. The Project is not associated with uses that will subject the site to higher potential pollutant loads as defined in the MaDEP Wetlands and Water Quality regulations.

Land Uses with Higher Potential Pollutant Loads (LUHPPLs) are identified in 310 CMR 22.20B(2) and C(2) a through k and m and in 310 CMR 22.21(2)(a) 1 through 8 and (b) 1 through 6; areas within a site that are the location of activities that are subject to an individual National Pollutant Discharge Elimination System (NPDES) permit or the NPRDE Multi-Sector General Permit; automotive fueling facilities, exterior fleet storage areas, exterior vehicle service and equipment cleaning areas; marinas and boatyards; parking lots with high-intensity use; confined disposal facilities and disposal sites.

Standard 6: Critical Areas

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

The Project is not located within nor discharges to a Critical Area.

Standard 7: Redevelopments and Other Projects Subject to the Standards Only to the Maximum Extent Practicable

A redevelopment project is required to meet the following Storm Water 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 storm water discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Storm Water Management Standards and improve existing conditions.

Portions of the site are considered redevelopment and comply to the applicable standards to the maximum extent practicable.

Standard 8: Construction Period Pollution Prevention and Erosion and Sediment 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), must be developed and implemented.

A detailed Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in Attachment H. To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction. To ensure that the work incorporates the performance standards recommended in the DEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction, as depicted on the site plans.

Standard 9: Operation and Maintenance Plan

A long-term operation and maintenance plan must be developed and implemented to ensure that storm water management systems function as designed.

An operations and maintenance plan is included in Attachment G.

Standard 10: Prohibition of Illicit Discharges

All illicit discharges to the storm water management system are prohibited.

Illicit discharges to the storm water management system are discharges that are not entirely comprised of storm water. Discharges to the storm water management system from the following activities or facilities are permissible:

- Firefighting
- Water Main Flushing
- Landscape Irrigation
- Uncontaminated Groundwater
- Potable Water Sources
- Foundation Drains
- Air Conditioning Condensation
- Footing Drains
- Individual Resident Car Washing
- Flows from Riparian Habitats and Wetlands
- Dechlorinated Water from Swimming Pools
- Water Used for Street Sweeping
- Water Used to Clean Residential Buildings (without detergents)

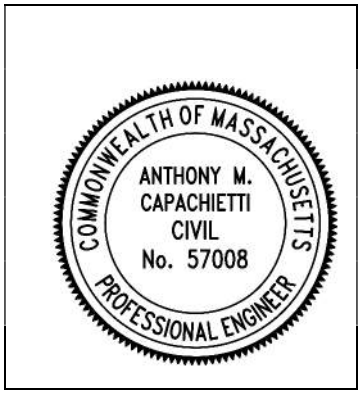
All other illicit discharges to the storm water management system are prohibited. There are no known illicit discharges anticipated through the completion of this project.

An illicit discharge compliance statement has been included in Attachment I.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including any relevant soil evaluations, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan, the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement 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



12/19/25

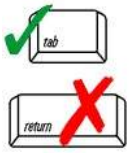
Signature and Date

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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.[1] 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[2]
- 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.

[1] 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.

[2] 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.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

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

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

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

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[1]

☒ 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.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

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

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.

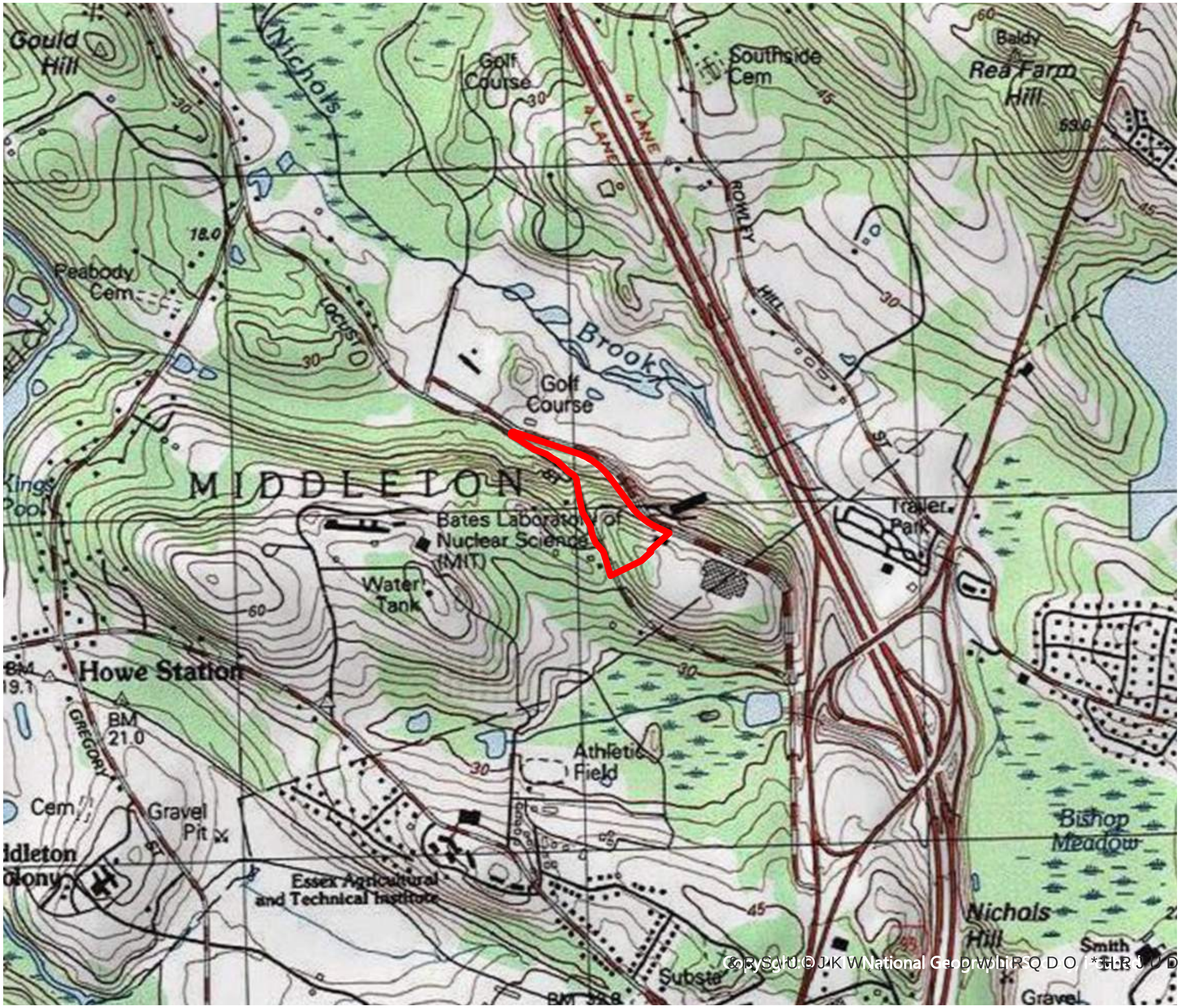
Standard 10: Prohibition of Illicit Discharges

☐ 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.

Attachment A - Locus Map



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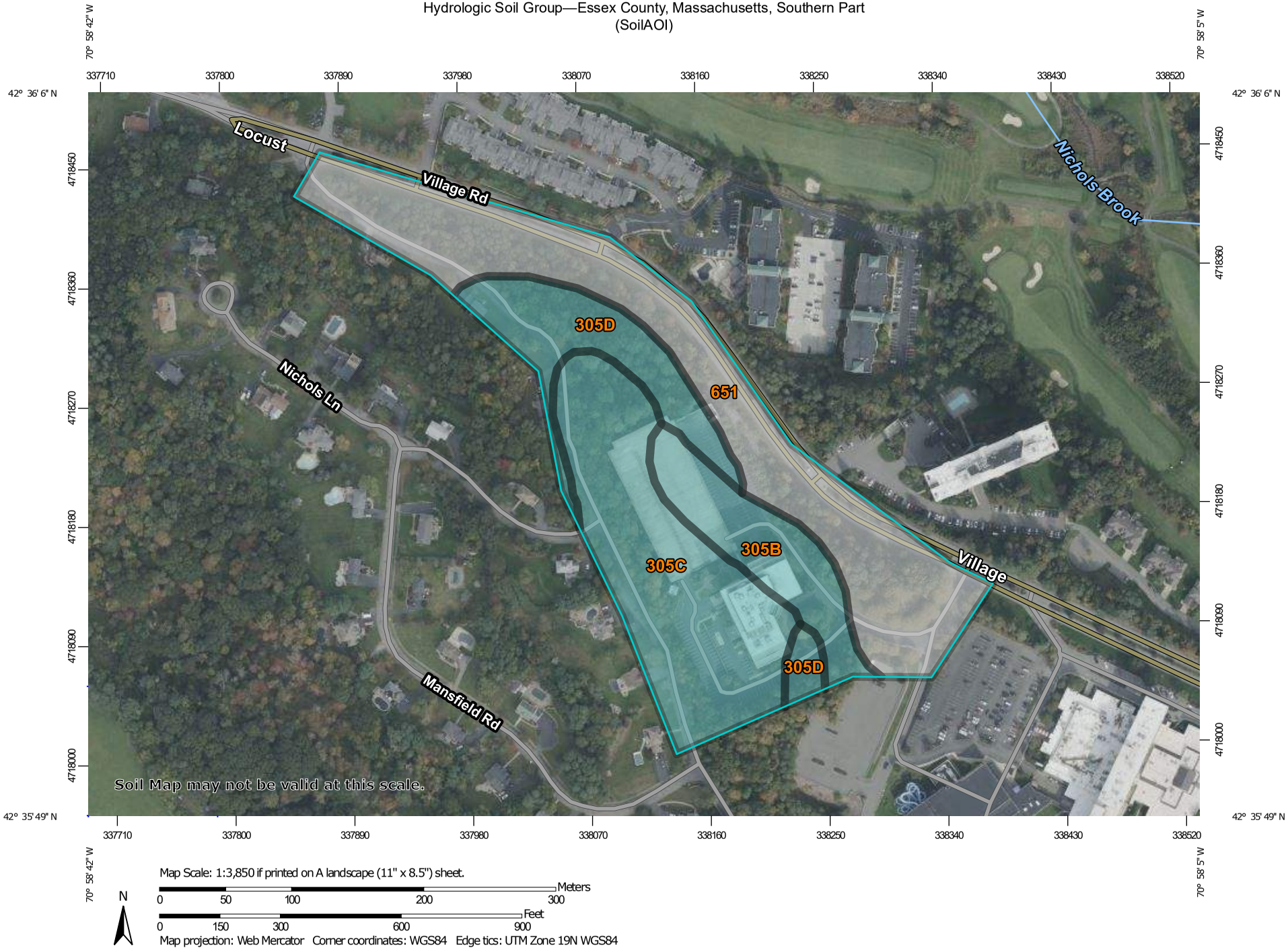
Weston & Sampson

Attachment B - NRCS Web Soil Survey Maps & Reports:
Hydrologic Soils Group, Depth to Bedrock, Depth to Water Table
FEMA FIRM,
NOAA Atlas 14 Rainfall Data

Hydrologic Soil Group—Essex County, Massachusetts, Southern Part
(SoilAOI)



Map Scale: 1:3,850 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 150 300 600 900

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

MAP LEGEND

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

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:15,800.

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: Essex County, Massachusetts, Southern Part
Survey Area Data: Version 22, Sep 8, 2025

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	2.5	12.4%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	C	6.3	31.6%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	C	3.0	14.8%
651	Udorthents, smoothed		8.3	41.2%
Totals for Area of Interest			**20.1**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

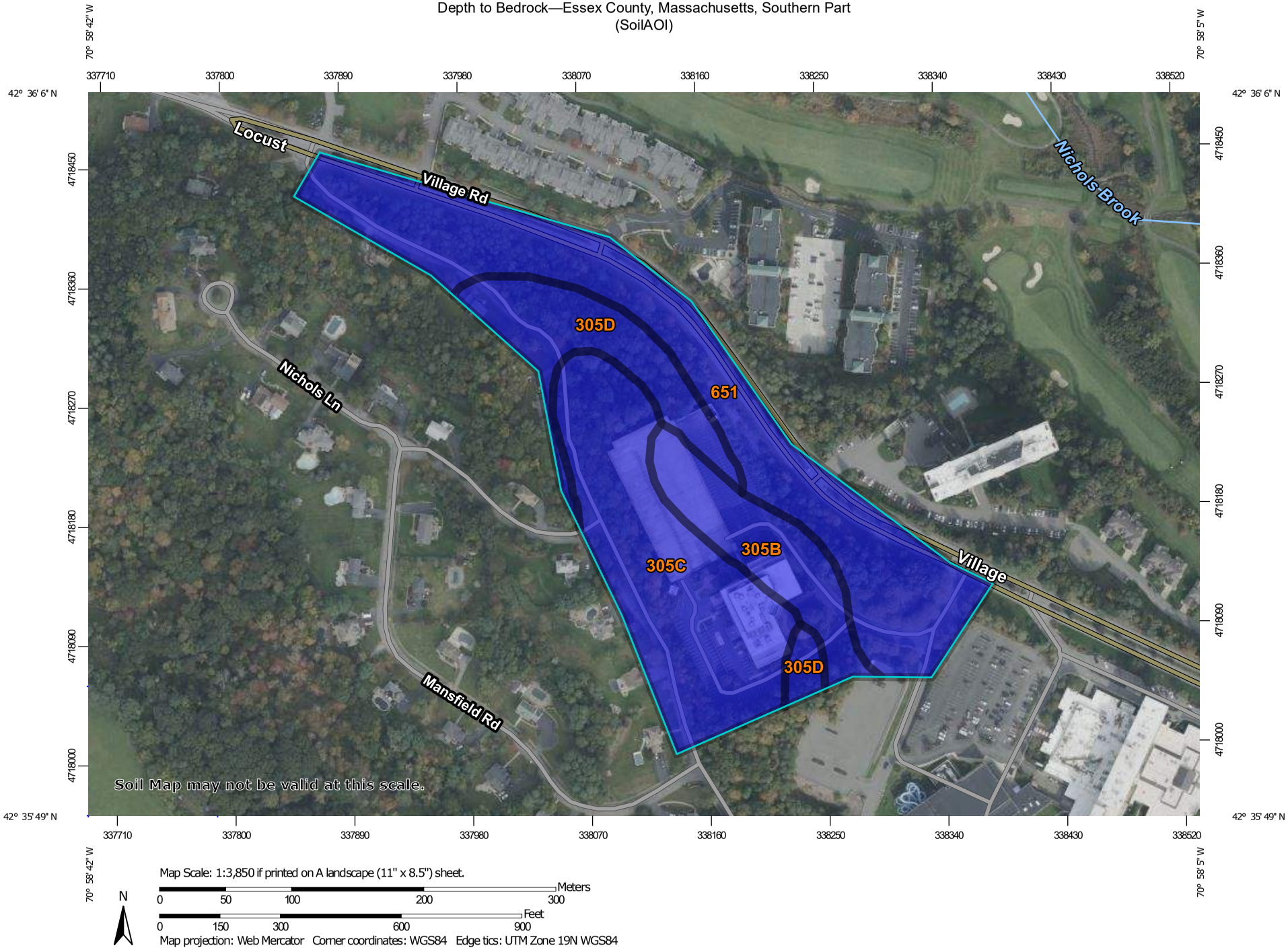
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Depth to Bedrock—Essex County, Massachusetts, Southern Part
(SoilAOI)



Map Scale: 1:3,850 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

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 1:15,800.

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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)

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Survey Area Data: Version 22, Sep 8, 2025

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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.

Depth to Bedrock

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
305B	Paxton fine sandy loam, 3 to 8 percent slopes	>200	2.5	12.4%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	>200	6.3	31.6%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	>200	3.0	14.8%
651	Udorthents, smoothed	>200	8.3	41.2%
Totals for Area of Interest			**20.1**	**100.0%**

Description

The term bedrock in soil survey refers to a continuous root and water restrictive layer of rock that occurs within the soil profile.

There are many types of restrictions that can occur within the soil profile but this theme only includes the three restrictions that use the term bedrock. These are:

1) Lithic Bedrock

2) Paralithic Bedrock

3) Densic Bedrock

Lithic bedrock and paralithic bedrock are comprised of igneous, metamorphic, and sedimentary rocks, which are coherent and consolidated into rock through pressure, heat, cementation, or fusion. Lithic bedrock represents the hardest type of bedrock, with a hardness of strongly coherent to indurated. Paralithic bedrock has a hardness of extremely weakly coherent to moderately coherent. It can occur as a thin layer of weathered bedrock above harder lithic bedrock. Paralithic bedrock can also be much thicker, extending well below the soil profile.

Densic bedrock represents a unique kind of bedrock recognized within the soil survey. It is non-coherent and consolidated, dense root restrictive material, formed by pressure, heat, and dewatering of earth materials or sediments. Densic bedrock differs from densic materials, which formed under the compaction of glaciers, mudflows, and or human-caused compaction.

If more than one type of bedrock is described for an individual soil type, the depth to the shallowest one is given. If no bedrock is described in a map unit, it is represented by the "greater than 200" depth class.

Depth to bedrock is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

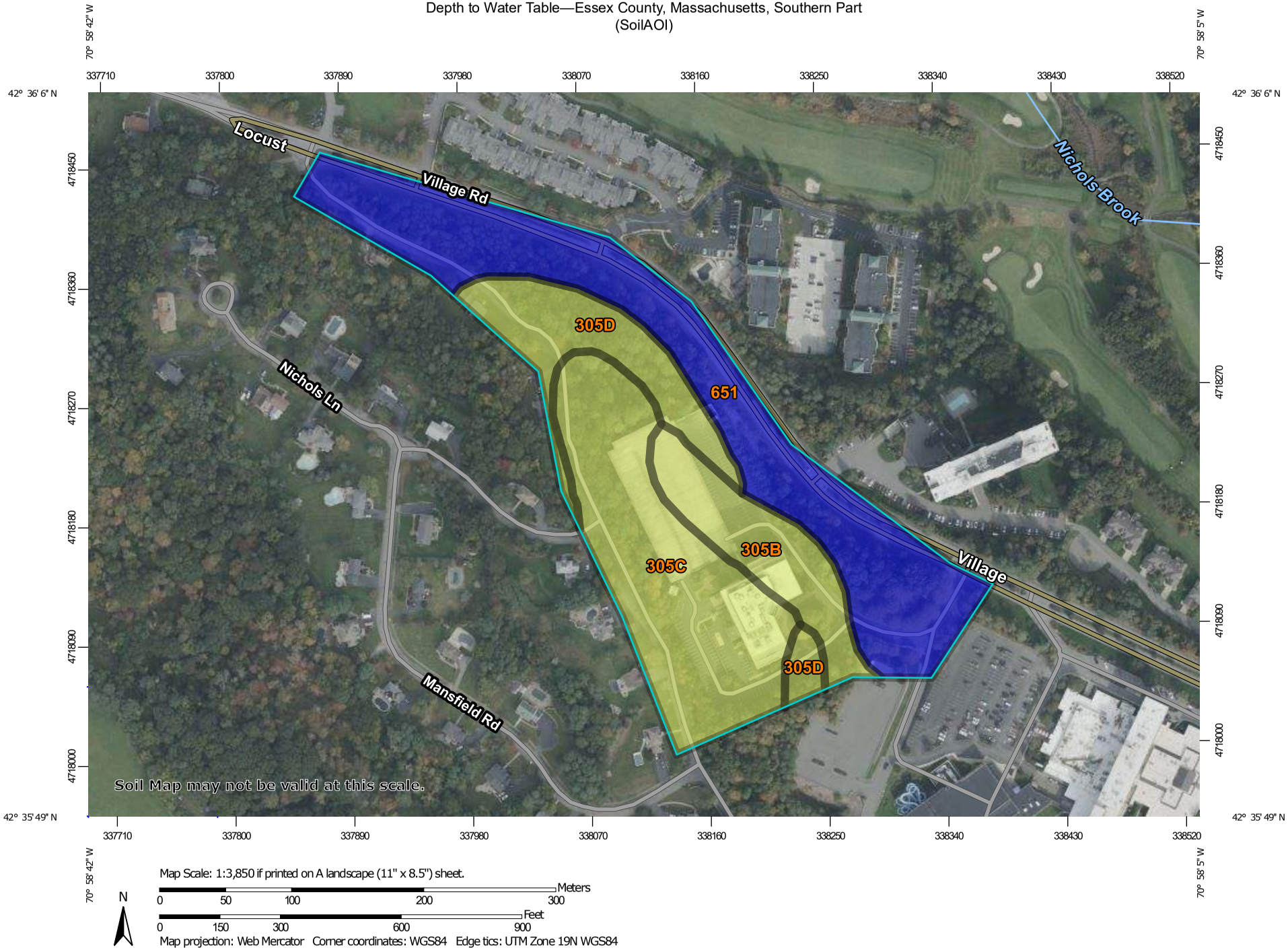
Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Depth to Water Table—Essex County, Massachusetts, Southern Part
(SoilAOI)



Map Scale: 1:3,850 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points

- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 22, Sep 8, 2025

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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.

Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
305B	Paxton fine sandy loam, 3 to 8 percent slopes	61	2.5	12.4%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	61	6.3	31.6%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	61	3.0	14.8%
651	Udorthents, smoothed	>200	8.3	41.2%
Totals for Area of Interest			**20.1**	**100.0%**

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

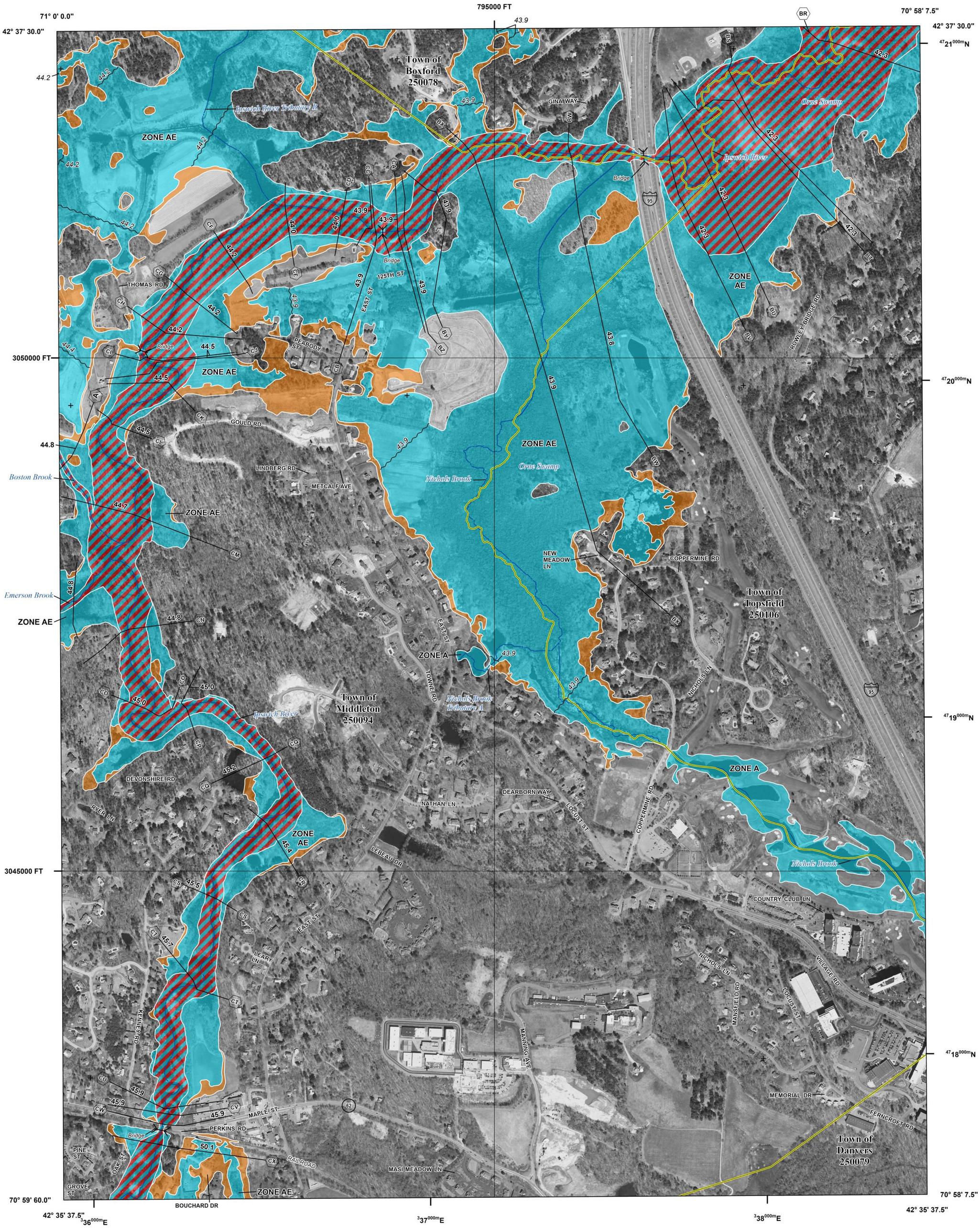
Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- E (18.2 / 17.5) — Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 — Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Mapping and Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study Report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on the FIRM uses imagery from 2019 provided by the U.S. Geological Survey at a resolution of 0.15 meter and 2016 transportation data provided by the U.S. Census Bureau with an undefined scale, and political boundaries from 2017 provided by MassGIS at a scale of 1:5,000.

SCALE

N

Map Projection:
NAD 1983 State Plane, Massachusetts Mainland, FIPS 2001, Feet;
Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 feet

0 125 250 500 meters

PANEL LOCATOR

* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM
FLOOD INSURANCE RATE MAP

ESSEX COUNTY, MASSACHUSETTS
(All Jurisdictions)

PANEL 0401 OF 0600

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOXFORD, TOWN OF	250078	0401	G
DANVERS, TOWN OF	250079	0401	G
MIDDLETON, TOWN OF	250094	0401	G
TOPSFIELD, TOWN OF	250106	0401	G

VERSION NUMBER
2.6.3.6

MAP NUMBER
25009C0401G

MAP REVISED
July 8, 2025

NOAA Atlas 14, Volume 10, Version 3
Location name: Middleton, Massachusetts, USA*
Latitude: 42.5989°, Longitude: -70.9728°
Elevation: 172 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.311** (0.241-0.392)	**0.374** (0.289-0.471)	**0.477** (0.367-0.602)	**0.562** (0.430-0.713)	**0.679** (0.505-0.900)	**0.767** (0.560-1.04)	**0.860** (0.610-1.21)	**0.965** (0.649-1.38)	**1.12** (0.724-1.66)	**1.24** (0.787-1.88)
10-min	**0.441** (0.341-0.555)	**0.530** (0.410-0.667)	**0.675** (0.520-0.854)	**0.796** (0.610-1.01)	**0.962** (0.715-1.28)	**1.09** (0.792-1.47)	**1.22** (0.864-1.71)	**1.37** (0.919-1.96)	**1.58** (1.02-2.34)	**1.76** (1.11-2.66)
15-min	**0.519** (0.402-0.653)	**0.624** (0.482-0.785)	**0.795** (0.612-1.00)	**0.937** (0.718-1.19)	**1.13** (0.841-1.50)	**1.28** (0.933-1.73)	**1.43** (1.02-2.01)	**1.61** (1.08-2.30)	**1.86** (1.21-2.76)	**2.07** (1.31-3.13)
30-min	**0.715** (0.553-0.899)	**0.858** (0.663-1.08)	**1.09** (0.841-1.38)	**1.29** (0.985-1.63)	**1.55** (1.16-2.06)	**1.75** (1.28-2.37)	**1.96** (1.40-2.76)	**2.21** (1.48-3.16)	**2.56** (1.66-3.78)	**2.85** (1.80-4.30)
60-min	**0.911** (0.705-1.15)	**1.09** (0.845-1.38)	**1.39** (1.07-1.76)	**1.64** (1.25-2.08)	**1.98** (1.47-2.62)	**2.23** (1.63-3.02)	**2.50** (1.77-3.51)	**2.80** (1.88-4.02)	**3.25** (2.11-4.82)	**3.62** (2.29-5.47)
2-hr	**1.17** (0.916-1.47)	**1.43** (1.11-1.78)	**1.84** (1.43-2.31)	**2.18** (1.68-2.75)	**2.65** (1.99-3.51)	**3.00** (2.21-4.06)	**3.38** (2.43-4.76)	**3.84** (2.59-5.46)	**4.54** (2.95-6.68)	**5.14** (3.26-7.70)
3-hr	**1.36** (1.07-1.69)	**1.66** (1.30-2.07)	**2.16** (1.68-2.69)	**2.56** (1.99-3.22)	**3.13** (2.36-4.13)	**3.54** (2.62-4.78)	**3.99** (2.89-5.63)	**4.55** (3.08-6.46)	**5.42** (3.52-7.95)	**6.17** (3.92-9.21)
6-hr	**1.75** (1.38-2.16)	**2.14** (1.69-2.65)	**2.79** (2.19-3.46)	**3.32** (2.60-4.15)	**4.06** (3.08-5.32)	**4.60** (3.43-6.18)	**5.19** (3.78-7.28)	**5.93** (4.03-8.36)	**7.08** (4.62-10.3)	**8.08** (5.15-12.0)
12-hr	**2.22** (1.77-2.72)	**2.72** (2.16-3.34)	**3.53** (2.80-4.36)	**4.21** (3.32-5.22)	**5.14** (3.93-6.70)	**5.83** (4.38-7.78)	**6.58** (4.82-9.15)	**7.51** (5.12-10.5)	**8.94** (5.85-12.9)	**10.2** (6.51-15.0)
24-hr	**2.66** (2.13-3.24)	**3.29** (2.64-4.02)	**4.33** (3.46-5.31)	**5.20** (4.13-6.41)	**6.39** (4.92-8.28)	**7.26** (5.49-9.64)	**8.22** (6.06-11.4)	**9.42** (6.45-13.1)	**11.3** (7.43-16.2)	**12.9** (8.30-18.9)
2-day	**3.03** (2.45-3.67)	**3.82** (3.09-4.64)	**5.13** (4.13-6.24)	**6.21** (4.97-7.60)	**7.70** (5.99-9.95)	**8.78** (6.71-11.6)	**9.99** (7.46-13.9)	**11.6** (7.94-16.0)	**14.1** (9.29-20.1)	**16.3** (10.5-23.7)
3-day	**3.32** (2.70-4.02)	**4.18** (3.40-5.06)	**5.58** (4.52-6.78)	**6.75** (5.43-8.23)	**8.35** (6.52-10.8)	**9.52** (7.30-12.6)	**10.8** (8.11-15.0)	**12.5** (8.63-17.3)	**15.3** (10.1-21.8)	**17.7** (11.4-25.7)
4-day	**3.60** (2.94-4.34)	**4.49** (3.66-5.41)	**5.93** (4.82-7.18)	**7.13** (5.76-8.68)	**8.78** (6.88-11.3)	**9.98** (7.68-13.1)	**11.3** (8.51-15.6)	**13.1** (9.03-18.0)	**15.9** (10.5-22.6)	**18.5** (11.9-26.7)
7-day	**4.38** (3.60-5.24)	**5.29** (4.34-6.34)	**6.78** (5.55-8.16)	**8.03** (6.52-9.71)	**9.73** (7.67-12.4)	**11.0** (8.48-14.3)	**12.4** (9.31-16.9)	**14.2** (9.82-19.4)	**17.1** (11.3-24.1)	**19.7** (12.7-28.3)
10-day	**5.07** (4.18-6.05)	**6.00** (4.95-7.18)	**7.54** (6.20-9.04)	**8.81** (7.19-10.6)	**10.6** (8.34-13.4)	**11.8** (9.16-15.4)	**13.3** (9.98-18.0)	**15.1** (10.5-20.5)	**17.9** (11.9-25.2)	**20.5** (13.3-29.3)
20-day	**7.01** (5.84-8.32)	**8.04** (6.69-9.54)	**9.72** (8.06-11.6)	**11.1** (9.15-13.3)	**13.0** (10.3-16.3)	**14.5** (11.2-18.4)	**16.0** (11.9-21.1)	**17.7** (12.4-23.9)	**20.3** (13.6-28.3)	**22.5** (14.6-31.9)
30-day	**8.62** (7.22-10.2)	**9.72** (8.13-11.5)	**11.5** (9.60-13.7)	**13.0** (10.8-15.5)	**15.1** (12.0-18.6)	**16.6** (12.9-21.0)	**18.2** (13.6-23.8)	**19.9** (14.0-26.7)	**22.3** (15.0-30.9)	**24.2** (15.8-34.2)
45-day	**10.7** (8.97-12.5)	**11.8** (9.95-13.9)	**13.8** (11.5-16.3)	**15.4** (12.8-18.3)	**17.6** (14.0-21.6)	**19.3** (14.9-24.1)	**21.0** (15.6-27.0)	**22.6** (16.0-30.2)	**24.8** (16.7-34.2)	**26.4** (17.3-37.3)
60-day	**12.4** (10.5-14.6)	**13.6** (11.5-16.0)	**15.7** (13.2-18.5)	**17.3** (14.5-20.6)	**19.7** (15.7-24.0)	**21.5** (16.7-26.7)	**23.2** (17.2-29.7)	**24.9** (17.6-33.1)	**27.0** (18.2-37.1)	**28.4** (18.6-39.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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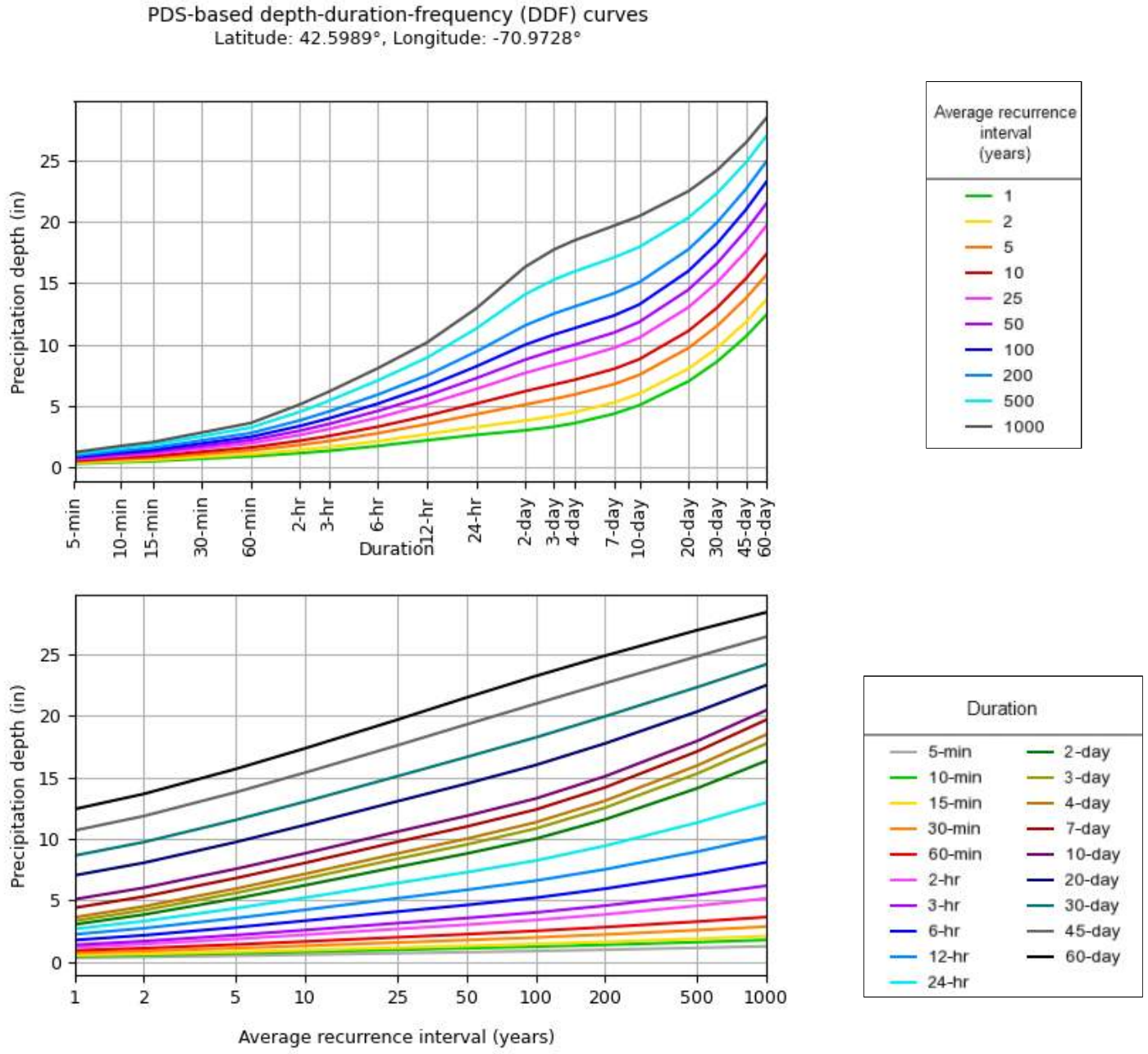
PF graphical



NOAA Atlas 14, Volume 10, Version 3

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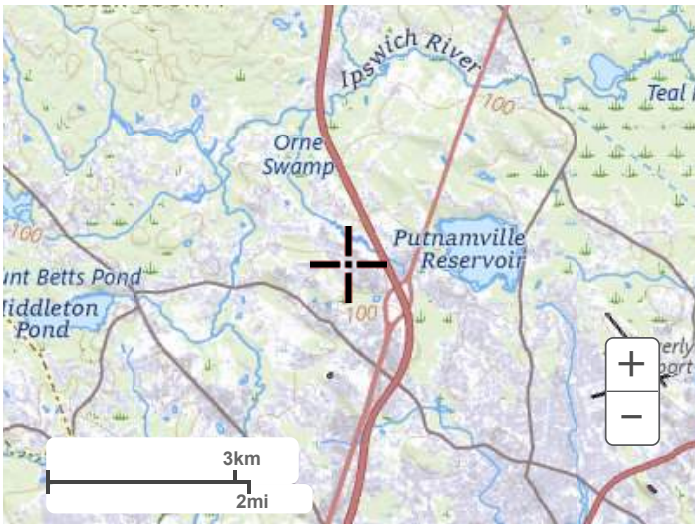
Maps & aerials

Small scale terrain



Large scale terrain

Large scale map

Large scale aerial

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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Attachment C - Site Exploration, Test Pits, and Soil Boring Logs

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: DOH1 (Hole #) | 11/19/2025 (Date) | 08:35 (Time) | 5 42°F (Weather) | ____ (Latitude) | ____ (Longitude)

1. Land Use: Wooded (e.g., woodland, agricultural field, vacant lot, etc.) | Mix of Evergreen and Deciduous (Vegetation) | Stonewalls Present (Surface Stones (e.g., cobbles, stones, boulders, etc.) | ____ (Slope (%))

Description of Location: ____

2. Soil Parent Material: Glacial Till | Drumlin (Landform) | Top Slope (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ____ feet | Drainage Way ____ feet | Wetlands ____ feet | Property Line ____ feet | Drinking Water Well ____ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☒ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	Ap	Fsg	10 YR 3/2		Cnc : Dpl:		0				
9-22	Bw	Fsg	2.5Y 6/6		Cnc : Dpl:		0				
22-72"	C	Fsl	2.5Y 7/3	40"	Cnc : 10YR 5/8 Dpl: 2.5Y 7/1	>15%	5		m Fr		roots to 36"
					Cnc : Dpl:	soil	tightens mfr @ 48"	15%			
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: ____

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: DOH 2 (Hole #) | 11/19/2025 (Date) | 09:15 (Time) | _____ (Weather) | _____ (Latitude) | _____ (Longitude)

1. Land Use: Wooded (e.g., woodland, agricultural field, vacant lot, etc.) | Mix of Evergreen and Deciduous (Vegetation) | Stonewalls Present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | _____ (Slope (%))

Description of Location: _____

2. Soil Parent Material: Glacial Till | Drumlin (Landform) | MID SLOPE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body _____ feet | Drainage Way _____ feet | Wetlands _____ feet | Property Line _____ feet | Drinking Water Well _____ feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No surface learning If yes: _____ Depth to Weeping in Hole _____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-4"	O	organic	2.5Y 2.5/1		Cnc : Dpl:						
4"-9"	A	fl s	2.5Y 6/6		Cnc : Dpl:						
9"-72"	C	fl s	2.5Y 7/3	26"	Cnc : 10YR 5/6 Dpl: 2.5Y 7/1	15%	10	5	m fr	wet g.pond	
					Cnc : Dpl:						
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes: surface water in organic layer / perched from bkgd

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: ____ (Hole #) 11/19/2025 (Date) ____ (Time) ____ (Weather) ____ (Latitude) ____ (Longitude)

1. Land Use: Wooded (e.g., woodland, agricultural field, vacant lot, etc.) | Mix of Evergreen and Deciduous (Vegetation) | Stonewalls Present (Surface Stones (e.g., cobbles, stones, boulders, etc.) | ____ (Slope (%))

Description of Location: ____

2. Soil Parent Material: Glacial Till | Drumlin (Landform) | Mid Slope (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body ____ feet | Drainage Way ____ feet | Wetlands ____ feet | Property Line ____ feet | Drinking Water Well ____ feet | Other ____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No If yes: ____ Depth to Weeping in Hole ____ Depth to Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-7	A	FLS	10YR 4/3		Cnc : Dpl:					0	
7-16	B	FLS	10YR 5/4		Cnc : Dpl:						
16-24	A_b	FLS	10YR 4/1		Cnc : Dpl:						
24-28	B	FLS	10YR 5/6		Cnc : Dpl:						Roots to 28
28-40	C_1	FS	10YR 7/4	50"	Cnc : 10YR 5/8 Dpl: NO	<5%	10	10			
40-84	C_2	FS	10YR 7/4	72"	Cnc : 10YR 5/8 Dpl: NO	<5%		30	mfi		

Additional Notes: DRY, SANDY, BOULDERS, ROUNDED COBBLES

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: DOH 4 (Hole #) | 11/19/2025 (Date) | 10:00a (Time) | SUN 42° (Weather) | _____ (Latitude) | _____ (Longitude)

1. Land Use: Wooded (e.g., woodland, agricultural field, vacant lot, etc.) | Mix of Evergreen and Deciduous (Vegetation) | Stonewalls Present (Surface Stones (e.g., cobbles, stones, boulders, etc.)) | _____ (Slope (%))

   Description of Location: _____

2. Soil Parent Material: Glacial Till | Drumlin (Landform) | MID SLOPE @ BASE (Position on Landscape (SU, SH, BS, FS, TS, Plain))

3. Distances from: Open Water Body _____ feet | Drainage Way _____ feet | Wetlands _____ feet | Property Line _____ feet | Drinking Water Well _____ feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☐ No If yes: _____ Depth to Weeping in Hole _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	Ap	FLS	10YR 4/3		Cnc : Dpl:					O	
9-25	Bw	FLS	10YR 5/6		Cnc : Dpl:					O	
25-42	C1	MS	10YR 7/4		Cnc : Dpl:		10			O	BLASTS @ 38
42-84	C2	VFS	10YR 7/4	42"	Cnc : 10YR 5/6 Dpl: 2.5Y 7/4		10	15	mFi	O	
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
POSSIBLY PERCHED @ 42" VERY FIRM @ TRANSITION AS COBBLES & STONES INCREASE

Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review *(minimum of two holes required at every proposed primary and reserve disposal area)*

Deep Observation Hole Number: DOH 5 (Hole #) | 11/19/2025 (Date) | 10:30 a (Time) | SUN 42 (Weather) | _____ (Latitude) | _____ (Longitude)

1. Land Use: Wooded (e.g., woodland, agricultural field, vacant lot, etc.) | Mix of Evergreen and Deciduous (Vegetation) | Stonewalls Present (Surface Stones (e.g., cobbles, stones, boulders, etc.) | _____ (Slope (%))

   Description of Location: ABOUT 50' DOWN SLOPE FROM DOH 4 IN FRONT OF RANCH TO SOUTH

2. Soil Parent Material: Glacial Till | Landform: Drumlin | Position on Landscape (SU, SH, BS, FS, TS, Plain): _____

3. Distances from: Open Water Body _____ feet | Drainage Way _____ feet | Wetlands _____ feet | Property Line _____ feet | Drinking Water Well _____ feet | Other _____ feet

4. Unsuitable Materials Present: ☐ Yes ☐ No If Yes: ☐ Disturbed Soil/Fill Material ☐ Weathered/Fractured Rock ☐ Bedrock

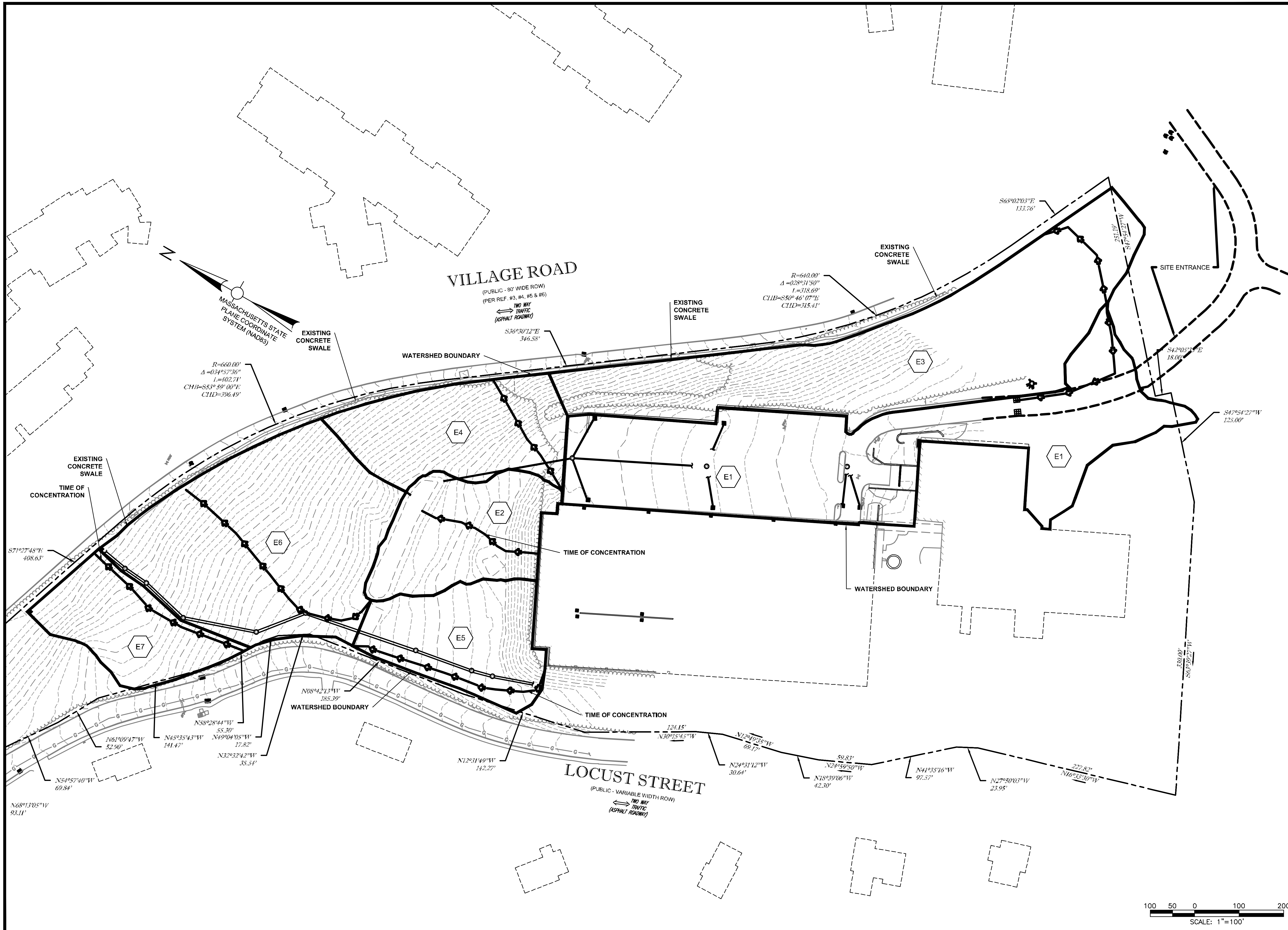
5. Groundwater Observed: ☐ Yes ☐ No If yes: _____ Depth to Weeping in Hole _____ Depth Standing Water in Hole

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-9	A_p	Fls	10YR 4/3		Cnc : Dpl:						
9-28	B_w	Fls	10YR 5/8		Cnc : Dpl:						
28-42	C_1	fs	10YR 7/4	40	Cnc : 10YR 5/8 Dpl: 2.5Y 7/1	>15%	0	0			
42-72	C_2	Fls	10YR 7/3		Cnc : Dpl:		10	25	WM FIP		
					Cnc : Dpl:						
					Cnc : Dpl:						

Additional Notes:
BOULDERY/TIGHT @ 42

Attachment D - Hydrologic Maps & HydroCAD Reports



Project:
FERNCROFT APARTMENTS
RESIDENTIAL COMMUNITY
35 VILLAGE ROAD
MIDDLETON, MA 01949

TOWN OF MIDDLETON, MASSACHUSETTS FOUNDED IN 1728

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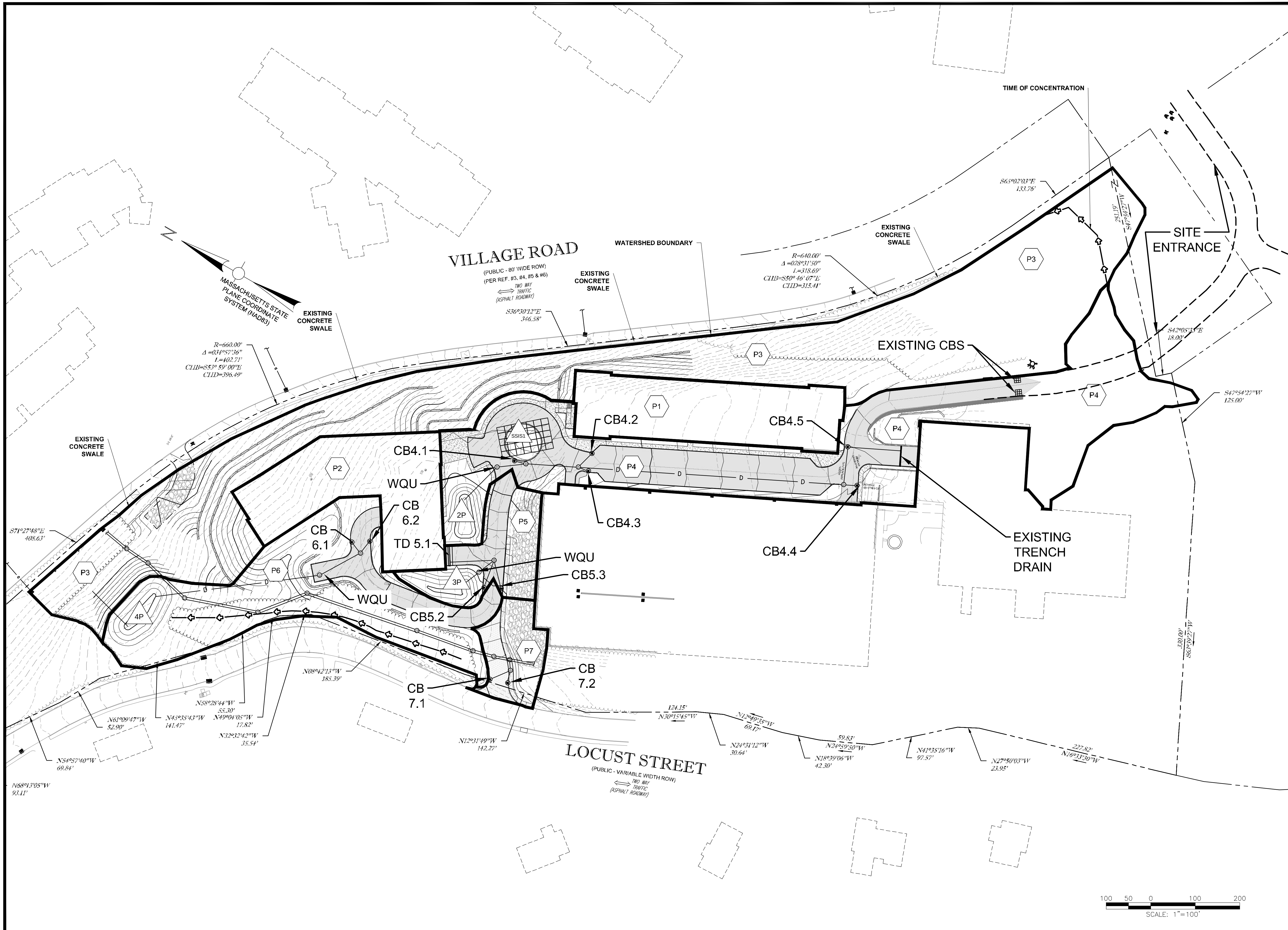
Date: 12/19/2025
Drawn By:
Reviewed By:
Approved By:
W&S Project No.: ENG25-0131
W&S File No.:

Drawing Title:
WATERSHED MAP - EXISTING CONDITIONS

Sheet Number:
C201



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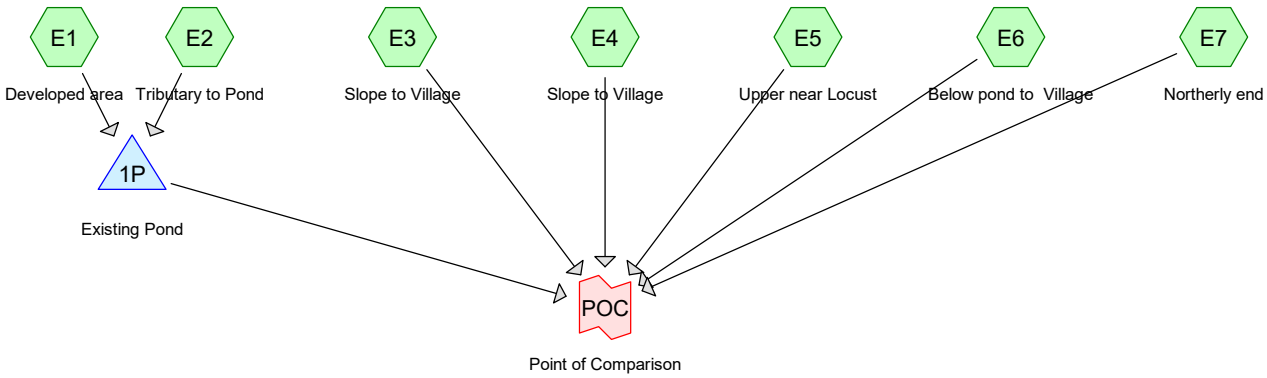
Scale:
Date: 12/19/2025
Drawn By:
Reviewed By:
Approved By:
W&S Project No.: ENG25-0131
W&S File No.:

Drawing Title:
WATERSHED MAP - PROPOSED CONDITIONS

Sheet Number:
C202



Subcat Reach Pond Link

Routing Diagram for Village Rd - Middleton - PRE

Prepared by Weston & Sampson Engineers, Inc, Printed 12/17/2025

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: Developed area Runoff Area=69,753 sf 77.35% Impervious Runoff Depth=2.44"
Tc=6.0 min CN=92 Runoff=4.36 cfs 14,161 cf

Subcatchment E2: Tributary to Pond Runoff Area=22,244 sf 0.00% Impervious Runoff Depth=1.16"
Flow Length=140' Tc=6.7 min CN=75 Runoff=0.64 cfs 2,142 cf

Subcatchment E3: Slope to Village Runoff Area=64,085 sf 0.00% Impervious Runoff Depth=1.10"
Flow Length=100' Tc=9.4 min CN=74 Runoff=1.58 cfs 5,860 cf

Subcatchment E4: Slope to Village Runoff Area=24,966 sf 0.00% Impervious Runoff Depth=1.10"
Tc=6.0 min CN=74 Runoff=0.69 cfs 2,283 cf

Subcatchment E5: Upper near Locust Runoff Area=21,357 sf 0.00% Impervious Runoff Depth=1.16"
Flow Length=240' Tc=5.5 min CN=75 Runoff=0.64 cfs 2,056 cf

Subcatchment E6: Below pond to Village Runoff Area=53,678 sf 0.00% Impervious Runoff Depth=0.88"
Flow Length=275' Tc=6.5 min CN=70 Runoff=1.12 cfs 3,941 cf

Subcatchment E7: Northerly end Runoff Area=17,675 sf 0.00% Impervious Runoff Depth=0.88"
Flow Length=210' Tc=5.2 min CN=70 Runoff=0.38 cfs 1,298 cf

Pond 1P: Existing Pond Peak Elev=120.47' Storage=4,887 cf Inflow=4.99 cfs 16,303 cf
Outflow=4.66 cfs 13,847 cf

Link POC: Point of Comparison Inflow=8.77 cfs 29,284 cf
Primary=8.77 cfs 29,284 cf

Total Runoff Area = 273,758 sf Runoff Volume = 31,740 cf Average Runoff Depth = 1.39"
80.29% Pervious = 219,801 sf 19.71% Impervious = 53,957 sf

Summary for Subcatchment E1: Developed area

Runoff = 4.36 cfs @ 12.09 hrs, Volume= 14,161 cf, Depth= 2.44"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

Area (sf)	CN	Description
53,957	98	Paved parking, HSG C
12,329	74	>75% Grass cover, Good, HSG C
3,467	70	Woods, Good, HSG C
69,753	92	Weighted Average
15,796		22.65% Pervious Area
53,957		77.35% Impervious Area

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

Summary for Subcatchment E2: Tributary to Pond

Runoff = 0.64 cfs @ 12.11 hrs, Volume= 2,142 cf, Depth= 1.16"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

Area (sf)	CN	Description
17,458	70	Woods, Good, HSG C
4,786	91	Fallow, bare soil, HSG C
22,244	75	Weighted Average
22,244		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.4000	0.13		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.2	90	0.2100	7.38		**Shallow Concentrated Flow, Shallow** Unpaved Kv= 16.1 fps
6.7	140	Total			

Summary for Subcatchment E3: Slope to Village

Runoff = 1.58 cfs @ 12.15 hrs, Volume= 5,860 cf, Depth= 1.10"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

Area (sf)	CN	Description
51,988	70	Woods, Good, HSG C
12,097	91	Fallow, bare soil, HSG C
64,085	74	Weighted Average
64,085		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	50	0.2000	7.20		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
9.4	100	Total			

Summary for Subcatchment E4: Slope to Village

Runoff = 0.69 cfs @ 12.10 hrs, Volume= 2,283 cf, Depth= 1.10"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

Area (sf)	CN	Description
20,756	70	Woods, Good, HSG C
4,210	91	Fallow, bare soil, HSG C
24,966	74	Weighted Average
24,966		100.00% Pervious Area

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

Summary for Subcatchment E5: Upper near Locust

Runoff = 0.64 cfs @ 12.09 hrs, Volume= 2,056 cf, Depth= 1.16"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

Area (sf)	CN	Description
16,520	70	Woods, Good, HSG C
4,837	91	Fallow, bare soil, HSG C
21,357	75	Weighted Average
21,357		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	25	0.6400	0.24		**Sheet Flow, Sheet 1** Woods: Light underbrush n= 0.400 P2= 3.20"
3.1	25	0.1600	0.14		**Sheet Flow, Sheet2** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	190	0.1100	5.34		**Shallow Concentrated Flow, Shallow** Unpaved Kv= 16.1 fps
5.5	240	Total			

Summary for Subcatchment E6: Below pond to Village

Runoff = 1.12 cfs @ 12.11 hrs, Volume= 3,941 cf, Depth= 0.88"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

Area (sf)	CN	Description
53,678	70	Woods, Good, HSG C
53,678		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1200	0.14		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	225	0.2100	7.38		**Shallow Concentrated Flow, Shallow1** Unpaved Kv= 16.1 fps
6.5	275	Total			

Summary for Subcatchment E7: Northerly end

Runoff = 0.38 cfs @ 12.09 hrs, Volume= 1,298 cf, Depth= 0.88"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

Area (sf)	CN	Description
17,675	70	Woods, Good, HSG C
17,675		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.2000	0.17		**Sheet Flow, Shallow** Woods: Light underbrush n= 0.400 P2= 3.20"
0.3	160	0.2300	7.72		**Shallow Concentrated Flow, Shallow1** Unpaved Kv= 16.1 fps
5.2	210	Total			

Summary for Pond 1P: Existing Pond

Inflow Area = 91,997 sf, 58.65% Impervious, Inflow Depth = 2.13" for 2 year event
Inflow = 4.99 cfs @ 12.09 hrs, Volume= 16,303 cf
Outflow = 4.66 cfs @ 12.14 hrs, Volume= 13,847 cf, Atten= 7%, Lag= 2.9 min
Primary = 4.66 cfs @ 12.14 hrs, Volume= 13,847 cf
Routed to Link POC : Point of Comparison

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 120.47' @ 12.14 hrs Surf.Area= 3,336 sf Storage= 4,887 cf

Plug-Flow detention time= 137.8 min calculated for 13,847 cf (85% of inflow)
Center-of-Mass det. time= 72.9 min (877.7 - 804.8)

Volume	Invert	Avail.Storage	Storage Description
#1	118.00'	4,988 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
118.00	500	0	0
119.00	1,781	1,141	1,141
120.00	2,820	2,301	3,441
120.50	3,369	1,547	4,988

Device	Routing	Invert	Outlet Devices
#1	Primary	119.62'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.62' / 119.42' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Primary	120.40'	**50.0' long (Profile 6) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 3.12 3.41 3.59

Primary OutFlow Max=4.48 cfs @ 12.14 hrs HW=120.47' (Free Discharge)
1=Culvert (Inlet Controls 1.76 cfs @ 2.47 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 2.72 cfs @ 0.81 fps)

Summary for Link POC: Point of Comparison

Inflow Area = 273,758 sf, 19.71% Impervious, Inflow Depth = 1.28" for 2 year event
Inflow = 8.77 cfs @ 12.13 hrs, Volume= 29,284 cf
Primary = 8.77 cfs @ 12.13 hrs, Volume= 29,284 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: Developed area Runoff Area=69,753 sf 77.35% Impervious Runoff Depth=4.28"
Tc=6.0 min CN=92 Runoff=7.44 cfs 24,906 cf

Subcatchment E2: Tributary to Pond Runoff Area=22,244 sf 0.00% Impervious Runoff Depth=2.61"
Flow Length=140' Tc=6.7 min CN=75 Runoff=1.50 cfs 4,843 cf

Subcatchment E3: Slope to Village Runoff Area=64,085 sf 0.00% Impervious Runoff Depth=2.52"
Flow Length=100' Tc=9.4 min CN=74 Runoff=3.80 cfs 13,483 cf

Subcatchment E4: Slope to Village Runoff Area=24,966 sf 0.00% Impervious Runoff Depth=2.52"
Tc=6.0 min CN=74 Runoff=1.66 cfs 5,253 cf

Subcatchment E5: Upper near Locust Runoff Area=21,357 sf 0.00% Impervious Runoff Depth=2.61"
Flow Length=240' Tc=5.5 min CN=75 Runoff=1.49 cfs 4,649 cf

Subcatchment E6: Below pond to Village Runoff Area=53,678 sf 0.00% Impervious Runoff Depth=2.19"
Flow Length=275' Tc=6.5 min CN=70 Runoff=3.02 cfs 9,777 cf

Subcatchment E7: Northerly end Runoff Area=17,675 sf 0.00% Impervious Runoff Depth=2.19"
Flow Length=210' Tc=5.2 min CN=70 Runoff=1.02 cfs 3,220 cf

Pond 1P: Existing Pond Peak Elev=120.53' Storage=4,988 cf Inflow=8.93 cfs 29,749 cf
Outflow=9.28 cfs 27,293 cf

Link POC: Point of Comparison Inflow=20.00 cfs 63,676 cf
Primary=20.00 cfs 63,676 cf

Total Runoff Area = 273,758 sf Runoff Volume = 66,132 cf Average Runoff Depth = 2.90"
80.29% Pervious = 219,801 sf 19.71% Impervious = 53,957 sf

Summary for Subcatchment E1: Developed area

Runoff = 7.44 cfs @ 12.09 hrs, Volume= 24,906 cf, Depth= 4.28"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

Area (sf)	CN	Description
53,957	98	Paved parking, HSG C
12,329	74	>75% Grass cover, Good, HSG C
3,467	70	Woods, Good, HSG C
69,753	92	Weighted Average
15,796		22.65% Pervious Area
53,957		77.35% Impervious Area

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

Summary for Subcatchment E2: Tributary to Pond

Runoff = 1.50 cfs @ 12.10 hrs, Volume= 4,843 cf, Depth= 2.61"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

Area (sf)	CN	Description
17,458	70	Woods, Good, HSG C
4,786	91	Fallow, bare soil, HSG C
22,244	75	Weighted Average
22,244		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.4000	0.13		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.2	90	0.2100	7.38		**Shallow Concentrated Flow, Shallow** Unpaved Kv= 16.1 fps
6.7	140	Total			

Summary for Subcatchment E3: Slope to Village

Runoff = 3.80 cfs @ 12.14 hrs, Volume= 13,483 cf, Depth= 2.52"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

Area (sf)	CN	Description
51,988	70	Woods, Good, HSG C
12,097	91	Fallow, bare soil, HSG C
64,085	74	Weighted Average
64,085		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	50	0.2000	7.20		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
9.4	100	Total			

Summary for Subcatchment E4: Slope to Village

Runoff = 1.66 cfs @ 12.09 hrs, Volume= 5,253 cf, Depth= 2.52"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

Area (sf)	CN	Description
20,756	70	Woods, Good, HSG C
4,210	91	Fallow, bare soil, HSG C
24,966	74	Weighted Average
24,966		100.00% Pervious Area

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

Summary for Subcatchment E5: Upper near Locust

Runoff = 1.49 cfs @ 12.09 hrs, Volume= 4,649 cf, Depth= 2.61"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

Area (sf)	CN	Description
16,520	70	Woods, Good, HSG C
4,837	91	Fallow, bare soil, HSG C
21,357	75	Weighted Average
21,357		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	25	0.6400	0.24		**Sheet Flow, Sheet 1** Woods: Light underbrush n= 0.400 P2= 3.20"
3.1	25	0.1600	0.14		**Sheet Flow, Sheet2** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	190	0.1100	5.34		**Shallow Concentrated Flow, Shallow** Unpaved Kv= 16.1 fps
5.5	240	Total			

Summary for Subcatchment E6: Below pond to Village

Runoff = 3.02 cfs @ 12.10 hrs, Volume= 9,777 cf, Depth= 2.19"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

Area (sf)	CN	Description
53,678	70	Woods, Good, HSG C
53,678		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1200	0.14		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	225	0.2100	7.38		**Shallow Concentrated Flow, Shallow1** Unpaved Kv= 16.1 fps
6.5	275	Total			

Summary for Subcatchment E7: Northerly end

Runoff = 1.02 cfs @ 12.09 hrs, Volume= 3,220 cf, Depth= 2.19"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

Area (sf)	CN	Description
17,675	70	Woods, Good, HSG C
17,675		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.2000	0.17		**Sheet Flow, Shallow** Woods: Light underbrush n= 0.400 P2= 3.20"
0.3	160	0.2300	7.72		**Shallow Concentrated Flow, Shallow1** Unpaved Kv= 16.1 fps
5.2	210	Total			

Summary for Pond 1P: Existing Pond

Inflow Area = 91,997 sf, 58.65% Impervious, Inflow Depth = 3.88" for 10 year event
Inflow = 8.93 cfs @ 12.09 hrs, Volume= 29,749 cf
Outflow = 9.28 cfs @ 12.09 hrs, Volume= 27,293 cf, Atten= 0%, Lag= 0.2 min
Primary = 9.28 cfs @ 12.09 hrs, Volume= 27,293 cf
Routed to Link POC : Point of Comparison

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 120.53' @ 12.09 hrs Surf.Area= 3,369 sf Storage= 4,988 cf

Plug-Flow detention time= 94.6 min calculated for 27,265 cf (92% of inflow)
Center-of-Mass det. time= 53.4 min (843.4 - 790.0)

Volume	Invert	Avail.Storage	Storage Description
#1	118.00'	4,988 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
118.00	500	0	0
119.00	1,781	1,141	1,141
120.00	2,820	2,301	3,441
120.50	3,369	1,547	4,988

Device	Routing	Invert	Outlet Devices
#1	Primary	119.62'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.62' / 119.42' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Primary	120.40'	**50.0' long (Profile 6) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 3.12 3.41 3.59

Primary OutFlow Max=9.04 cfs @ 12.09 hrs HW=120.53' (Free Discharge)
1=Culvert (Inlet Controls 1.92 cfs @ 2.56 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 7.12 cfs @ 1.11 fps)

Summary for Link POC: Point of Comparison

Inflow Area = 273,758 sf, 19.71% Impervious, Inflow Depth = 2.79" for 10 year event
Inflow = 20.00 cfs @ 12.10 hrs, Volume= 63,676 cf
Primary = 20.00 cfs @ 12.10 hrs, Volume= 63,676 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: Developed area Runoff Area=69,753 sf 77.35% Impervious Runoff Depth=7.26"
Tc=6.0 min CN=92 Runoff=12.23 cfs 42,208 cf

Subcatchment E2: Tributary to Pond Runoff Area=22,244 sf 0.00% Impervious Runoff Depth=5.24"
Flow Length=140' Tc=6.7 min CN=75 Runoff=3.00 cfs 9,714 cf

Subcatchment E3: Slope to Village Runoff Area=64,085 sf 0.00% Impervious Runoff Depth=5.12"
Flow Length=100' Tc=9.4 min CN=74 Runoff=7.72 cfs 27,358 cf

Subcatchment E4: Slope to Village Runoff Area=24,966 sf 0.00% Impervious Runoff Depth=5.12"
Tc=6.0 min CN=74 Runoff=3.36 cfs 10,658 cf

Subcatchment E5: Upper near Locust Runoff Area=21,357 sf 0.00% Impervious Runoff Depth=5.24"
Flow Length=240' Tc=5.5 min CN=75 Runoff=2.97 cfs 9,327 cf

Subcatchment E6: Below pond to Village Runoff Area=53,678 sf 0.00% Impervious Runoff Depth=4.65"
Flow Length=275' Tc=6.5 min CN=70 Runoff=6.51 cfs 20,818 cf

Subcatchment E7: Northerly end Runoff Area=17,675 sf 0.00% Impervious Runoff Depth=4.65"
Flow Length=210' Tc=5.2 min CN=70 Runoff=2.21 cfs 6,855 cf

Pond 1P: Existing Pond Peak Elev=120.59' Storage=4,988 cf Inflow=15.21 cfs 51,923 cf
Outflow=15.41 cfs 49,467 cf

Link POC: Point of Comparison Inflow=37.68 cfs 124,483 cf
Primary=37.68 cfs 124,483 cf

Total Runoff Area = 273,758 sf Runoff Volume = 126,939 cf Average Runoff Depth = 5.56"
80.29% Pervious = 219,801 sf 19.71% Impervious = 53,957 sf

Summary for Subcatchment E1: Developed area

Runoff = 12.23 cfs @ 12.09 hrs, Volume= 42,208 cf, Depth= 7.26"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

Area (sf)	CN	Description
53,957	98	Paved parking, HSG C
12,329	74	>75% Grass cover, Good, HSG C
3,467	70	Woods, Good, HSG C
69,753	92	Weighted Average
15,796		22.65% Pervious Area
53,957		77.35% Impervious Area

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

Summary for Subcatchment E2: Tributary to Pond

Runoff = 3.00 cfs @ 12.10 hrs, Volume= 9,714 cf, Depth= 5.24"
Routed to Pond 1P : Existing Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

Area (sf)	CN	Description
17,458	70	Woods, Good, HSG C
4,786	91	Fallow, bare soil, HSG C
22,244	75	Weighted Average
22,244		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.4000	0.13		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.2	90	0.2100	7.38		**Shallow Concentrated Flow, Shallow** Unpaved Kv= 16.1 fps
6.7	140	Total			

Summary for Subcatchment E3: Slope to Village

Runoff = 7.72 cfs @ 12.13 hrs, Volume= 27,358 cf, Depth= 5.12"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

Area (sf)	CN	Description
51,988	70	Woods, Good, HSG C
12,097	91	Fallow, bare soil, HSG C
64,085	74	Weighted Average
64,085		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	50	0.2000	7.20		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
9.4	100	Total			

Summary for Subcatchment E4: Slope to Village

Runoff = 3.36 cfs @ 12.09 hrs, Volume= 10,658 cf, Depth= 5.12"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

Area (sf)	CN	Description
20,756	70	Woods, Good, HSG C
4,210	91	Fallow, bare soil, HSG C
24,966	74	Weighted Average
24,966		100.00% Pervious Area

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

Summary for Subcatchment E5: Upper near Locust

Runoff = 2.97 cfs @ 12.08 hrs, Volume= 9,327 cf, Depth= 5.24"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

Area (sf)	CN	Description
16,520	70	Woods, Good, HSG C
4,837	91	Fallow, bare soil, HSG C
21,357	75	Weighted Average
21,357		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.8	25	0.6400	0.24		**Sheet Flow, Sheet 1** Woods: Light underbrush n= 0.400 P2= 3.20"
3.1	25	0.1600	0.14		**Sheet Flow, Sheet2** Woods: Light underbrush n= 0.400 P2= 3.20"
0.6	190	0.1100	5.34		**Shallow Concentrated Flow, Shallow** Unpaved Kv= 16.1 fps
5.5	240	Total			

Summary for Subcatchment E6: Below pond to Village

Runoff = 6.51 cfs @ 12.10 hrs, Volume= 20,818 cf, Depth= 4.65"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

Area (sf)	CN	Description
53,678	70	Woods, Good, HSG C
53,678		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.1200	0.14		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.5	225	0.2100	7.38		**Shallow Concentrated Flow, Shallow1** Unpaved Kv= 16.1 fps
6.5	275	Total			

Summary for Subcatchment E7: Northerly end

Runoff = 2.21 cfs @ 12.08 hrs, Volume= 6,855 cf, Depth= 4.65"
Routed to Link POC : Point of Comparison

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

Area (sf)	CN	Description
17,675	70	Woods, Good, HSG C
17,675		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.2000	0.17		**Sheet Flow, Shallow** Woods: Light underbrush n= 0.400 P2= 3.20"
0.3	160	0.2300	7.72		**Shallow Concentrated Flow, Shallow1** Unpaved Kv= 16.1 fps
5.2	210	Total			

Summary for Pond 1P: Existing Pond

Inflow Area = 91,997 sf, 58.65% Impervious, Inflow Depth = 6.77" for 100 year event
Inflow = 15.21 cfs @ 12.09 hrs, Volume= 51,923 cf
Outflow = 15.41 cfs @ 12.09 hrs, Volume= 49,467 cf, Atten= 0%, Lag= 0.1 min
Primary = 15.41 cfs @ 12.09 hrs, Volume= 49,467 cf
Routed to Link POC : Point of Comparison

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 120.59' @ 12.09 hrs Surf.Area= 3,369 sf Storage= 4,988 cf

Plug-Flow detention time= 67.0 min calculated for 49,415 cf (95% of inflow)
Center-of-Mass det. time= 40.8 min (817.6 - 776.8)

Volume	Invert	Avail.Storage	Storage Description
#1	118.00'	4,988 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
118.00	500	0	0
119.00	1,781	1,141	1,141
120.00	2,820	2,301	3,441
120.50	3,369	1,547	4,988

Device	Routing	Invert	Outlet Devices
#1	Primary	119.62'	**12.0" Round Culvert** L= 20.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 119.62' / 119.42' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Primary	120.40'	**50.0' long (Profile 6) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 3.12 3.41 3.59

Primary OutFlow Max=15.03 cfs @ 12.09 hrs HW=120.59' (Free Discharge)
1=Culvert (Inlet Controls 2.06 cfs @ 2.65 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 12.97 cfs @ 1.36 fps)

Summary for Link POC: Point of Comparison

Inflow Area = 273,758 sf, 19.71% Impervious, Inflow Depth = 5.46" for 100 year event
Inflow = 37.68 cfs @ 12.10 hrs, Volume= 124,483 cf
Primary = 37.68 cfs @ 12.10 hrs, Volume= 124,483 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Events for Subcatchment E1: Developed area

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	4.36	14,161	2.44
10 year	5.20	7.44	24,906	4.28
100 year	**8.22**	**12.23**	**42,208**	**7.26**

Events for Subcatchment E2: Tributary to Pond

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	0.64	2,142	1.16
10 year	5.20	1.50	4,843	2.61
100 year	**8.22**	**3.00**	**9,714**	**5.24**

Events for Subcatchment E3: Slope to Village

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	1.58	5,860	1.10
10 year	5.20	3.80	13,483	2.52
100 year	**8.22**	**7.72**	**27,358**	**5.12**

Events for Subcatchment E4: Slope to Village

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	0.69	2,283	1.10
10 year	5.20	1.66	5,253	2.52
100 year	**8.22**	**3.36**	**10,658**	**5.12**

Events for Subcatchment E5: Upper near Locust

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	0.64	2,056	1.16
10 year	5.20	1.49	4,649	2.61
100 year	**8.22**	**2.97**	**9,327**	**5.24**

Events for Subcatchment E6: Below pond to Village

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	1.12	3,941	0.88
10 year	5.20	3.02	9,777	2.19
100 year	**8.22**	**6.51**	**20,818**	**4.65**

Events for Subcatchment E7: Northerly end

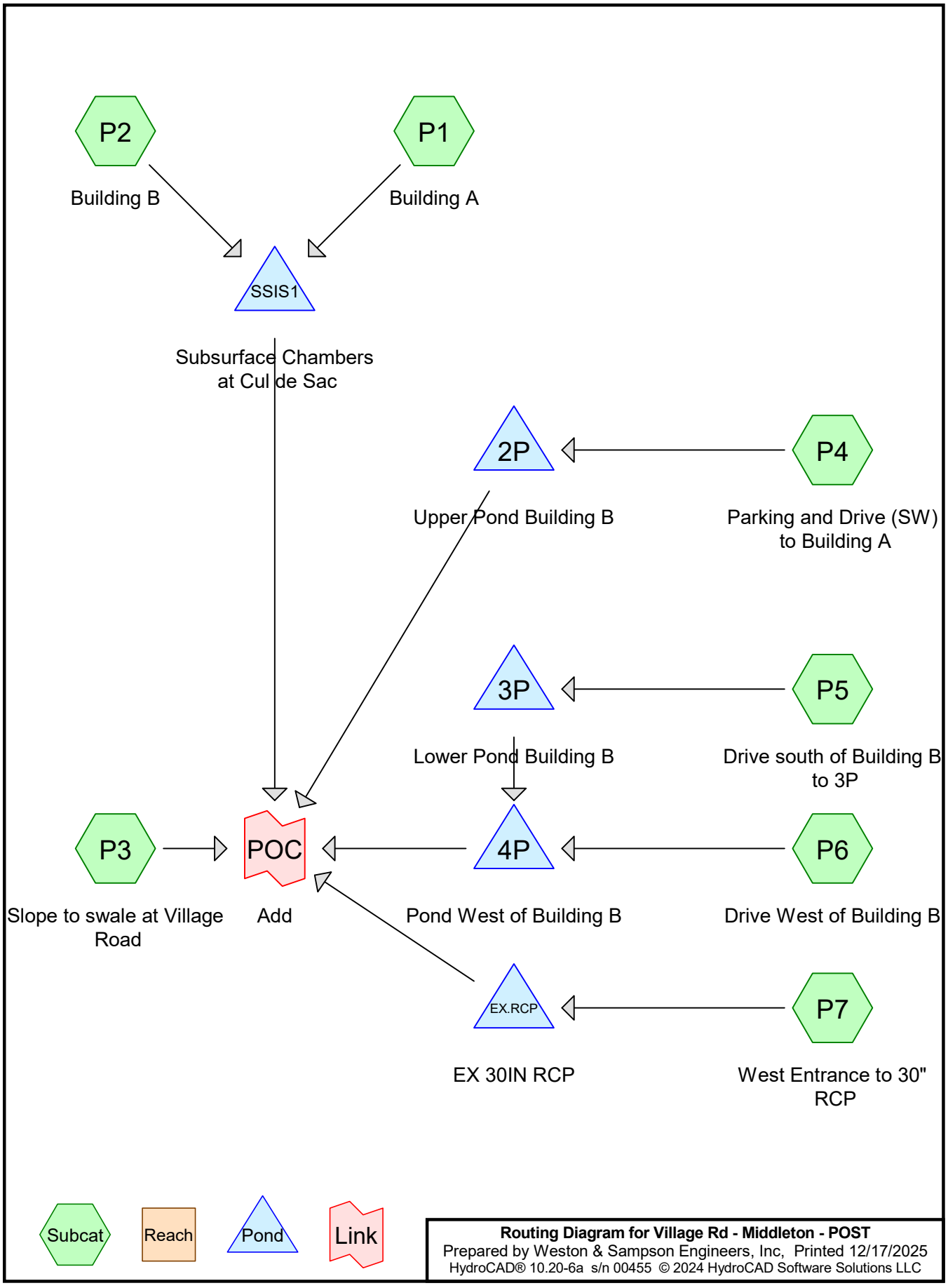
Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	0.38	1,298	0.88
10 year	5.20	1.02	3,220	2.19
100 year	**8.22**	**2.21**	**6,855**	**4.65**

Events for Pond 1P: Existing Pond

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 year	4.99	4.66	120.47	4,887
10 year	8.93	9.28	120.53	**4,988**
100 year	**15.21**	**15.41**	**120.59**	4,988

Events for Link POC: Point of Comparison

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2 year	8.77	8.77	**0.00**
10 year	20.00	20.00	0.00
100 year	**37.68**	**37.68**	0.00



Routing Diagram for Village Rd - Middleton - POST

Prepared by Weston & Sampson Engineers, Inc, Printed 12/17/2025

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P1: Building A Runoff Area=21,113 sf 100.00% Impervious Runoff Depth=3.06"
Tc=6.0 min CN=98 Runoff=1.51 cfs 5,379 cf

Subcatchment P2: Building B Runoff Area=22,150 sf 100.00% Impervious Runoff Depth=3.06"
Tc=6.0 min CN=98 Runoff=1.59 cfs 5,643 cf

Subcatchment P3: Slope to swale at Runoff Area=103,778 sf 0.00% Impervious Runoff Depth=0.99"
Flow Length=100' Tc=9.4 min CN=72 Runoff=2.25 cfs 8,527 cf

Subcatchment P4: Parking and Drive (SW) Runoff Area=69,708 sf 60.72% Impervious Runoff Depth=2.16"
Tc=6.0 min CN=89 Runoff=3.94 cfs 12,570 cf

Subcatchment P5: Drive south of Building Runoff Area=11,925 sf 36.41% Impervious Runoff Depth=1.99"
Tc=6.0 min CN=87 Runoff=0.63 cfs 1,982 cf

Subcatchment P6: Drive West of Building Runoff Area=39,041 sf 19.29% Impervious Runoff Depth=1.34"
Flow Length=295' Tc=11.1 min CN=78 Runoff=1.16 cfs 4,359 cf

Subcatchment P7: West Entrance to 30" RCP Runoff Area=7,027 sf 0.00% Impervious Runoff Depth=1.16"
Tc=6.0 min CN=75 Runoff=0.21 cfs 677 cf

Pond 2P: Upper Pond Building B Peak Elev=140.44' Storage=370 cf Inflow=3.94 cfs 12,570 cf
Discarded=0.00 cfs 84 cf Primary=3.84 cfs 12,486 cf Outflow=3.85 cfs 12,570 cf

Pond 3P: Lower Pond Building B Peak Elev=130.38' Storage=99 cf Inflow=0.63 cfs 1,982 cf
Discarded=0.00 cfs 75 cf Primary=0.58 cfs 1,907 cf Outflow=0.58 cfs 1,982 cf

Pond 4P: Pond West of Building B Peak Elev=76.68' Storage=437 cf Inflow=1.71 cfs 6,266 cf
Discarded=0.00 cfs 236 cf Primary=1.58 cfs 6,029 cf Outflow=1.59 cfs 6,266 cf

Pond EX.RCP: EX 30IN RCP Inflow=0.21 cfs 677 cf
Primary=0.21 cfs 677 cf

Pond SSIS1: Subsurface Chambers at Cul Peak Elev=144.86' Storage=5,080 cf Inflow=3.10 cfs 11,022 cf
Discarded=0.02 cfs 2,530 cf Primary=1.53 cfs 5,986 cf Outflow=1.54 cfs 8,516 cf

Link POC: Add Inflow=8.66 cfs 33,704 cf
Primary=8.66 cfs 33,704 cf

Total Runoff Area = 274,742 sf Runoff Volume = 39,136 cf Average Runoff Depth = 1.71"
64.53% Pervious = 177,279 sf 35.47% Impervious = 97,463 sf

Summary for Subcatchment P1: Building A

Runoff = 1.51 cfs @ 12.09 hrs, Volume= 5,379 cf, Depth= 3.06"
Routed to Pond SSIS1 : Subsurface Chambers at Cul de Sac

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

Area (sf)	CN	Description
21,113	98	Roofs, HSG C
21,113		100.00% Impervious Area

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

Summary for Subcatchment P2: Building B

Runoff = 1.59 cfs @ 12.09 hrs, Volume= 5,643 cf, Depth= 3.06"
Routed to Pond SSIS1 : Subsurface Chambers at Cul de Sac

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

Area (sf)	CN	Description
22,150	98	Roofs, HSG C
22,150		100.00% Impervious Area

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

Summary for Subcatchment P3: Slope to swale at Village Road

Runoff = 2.25 cfs @ 12.15 hrs, Volume= 8,527 cf, Depth= 0.99"
Routed to Link POC : Add

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

	Area (sf)	CN	Description
	53,920	74	>75% Grass cover, Good, HSG C
	48,296	70	Woods, Good, HSG C
*	1,562	91	Gravel Drive
	103,778	72	Weighted Average
	103,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	50	0.2000	7.20		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
9.4	100	Total			

Summary for Subcatchment P4: Parking and Drive (SW) to Building A

Runoff = 3.94 cfs @ 12.09 hrs, Volume= 12,570 cf, Depth= 2.16"
Routed to Pond 2P : Upper Pond Building B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

	Area (sf)	CN	Description
*	42,328	98	Paved parking, HSG C
*	27,380	74	>75% Grass cover, Good, HSG C
	69,708	89	Weighted Average
	27,380		39.28% Pervious Area
	42,328		60.72% Impervious Area

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

Summary for Subcatchment P5: Drive south of Building B to 3P

Runoff = 0.63 cfs @ 12.09 hrs, Volume= 1,982 cf, Depth= 1.99"
Routed to Pond 3P : Lower Pond Building B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

	Area (sf)	CN	Description
	3,405	91	Fallow, bare soil, HSG C
	4,342	98	Paved parking, HSG C
	3,873	74	>75% Grass cover, Good, HSG C
*	305	61	Porous Pavers, HSG C
	11,925	87	Weighted Average
	7,583		63.59% Pervious Area
	4,342		36.41% Impervious Area

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

Summary for Subcatchment P6: Drive West of Building B

Runoff = 1.16 cfs @ 12.16 hrs, Volume= 4,359 cf, Depth= 1.34"
Routed to Pond 4P : Pond West of Building B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

	Area (sf)	CN	Description
*	21,084	74	>75% Grass cover, Good, HSG C
*	10,427	70	Woods, Good, HSG C
*	7,530	98	Paved parking, HSG C
	39,041	78	Weighted Average
	31,511		80.71% Pervious Area
	7,530		19.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.1200	0.08		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.4	130	0.1200	5.58		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
0.2	115	0.2500	8.05		**Shallow Concentrated Flow, Shallow 2** Unpaved Kv= 16.1 fps
11.1	295	Total			

Summary for Subcatchment P7: West Entrance to 30" RCP

Runoff = 0.21 cfs @ 12.10 hrs, Volume= 677 cf, Depth= 1.16"
Routed to Pond EX.RCP : EX 30IN RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 year Rainfall=3.29", P2=3.20"

	Area (sf)	CN	Description
*	2,590	91	Fallow, bare soil, HSG C
	1,447	74	>75% Grass cover, Good, HSG C
*	2,990	61	Porous Pavers, HSG C
	7,027	75	Weighted Average
	7,027		100.00% Pervious Area

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

Summary for Pond 2P: Upper Pond Building B

Inflow Area = 69,708 sf, 60.72% Impervious, Inflow Depth = 2.16" for 2 year event
Inflow = 3.94 cfs @ 12.09 hrs, Volume= 12,570 cf
Outflow = 3.85 cfs @ 12.11 hrs, Volume= 12,570 cf, Atten= 2%, Lag= 1.2 min
Discarded = 0.00 cfs @ 12.11 hrs, Volume= 84 cf
Primary = 3.84 cfs @ 12.11 hrs, Volume= 12,486 cf
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 140.44' @ 12.11 hrs Surf.Area= 488 sf Storage= 370 cf

Plug-Flow detention time= 4.5 min calculated for 12,570 cf (100% of inflow)
Center-of-Mass det. time= 4.2 min (814.2 - 810.0)

Volume	Invert	Avail.Storage	Storage Description
#1	139.50'	1,850 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.50	300	0	0
140.00	400	175	175
142.00	800	1,200	1,375
142.50	1,100	475	1,850

Device	Routing	Invert	Outlet Devices
#1	Primary	139.50'	**18.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 139.50' / 138.62' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	139.50'	**0.170 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.11 hrs HW=140.43' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=3.76 cfs @ 12.11 hrs HW=140.43' (Free Discharge)
1=Culvert (Inlet Controls 3.76 cfs @ 3.28 fps)

Summary for Pond 3P: Lower Pond Building B

Inflow Area = 11,925 sf, 36.41% Impervious, Inflow Depth = 1.99" for 2 year event
Inflow = 0.63 cfs @ 12.09 hrs, Volume= 1,982 cf
Outflow = 0.58 cfs @ 12.12 hrs, Volume= 1,982 cf, Atten= 7%, Lag= 1.9 min
Discarded = 0.00 cfs @ 12.12 hrs, Volume= 75 cf
Primary = 0.58 cfs @ 12.12 hrs, Volume= 1,907 cf
Routed to Pond 4P : Pond West of Building B

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 130.38' @ 12.12 hrs Surf.Area= 342 sf Storage= 99 cf

Plug-Flow detention time= 7.0 min calculated for 1,982 cf (100% of inflow)
Center-of-Mass det. time= 6.7 min (824.4 - 817.7)

Volume	Invert	Avail.Storage	Storage Description
#1	130.00'	1,838 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
130.00	175	0	0
132.00	1,050	1,225	1,225
132.50	1,400	613	1,838

Device	Routing	Invert	Outlet Devices
#1	Primary	130.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 130.00' / 123.50' S= 0.0650 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Discarded	130.00'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.12 hrs HW=130.38' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.56 cfs @ 12.12 hrs HW=130.38' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.56 cfs @ 2.09 fps)

Summary for Pond 4P: Pond West of Building B

Inflow Area = 50,966 sf, 23.29% Impervious, Inflow Depth = 1.48" for 2 year event
Inflow = 1.71 cfs @ 12.15 hrs, Volume= 6,266 cf
Outflow = 1.59 cfs @ 12.20 hrs, Volume= 6,266 cf, Atten= 7%, Lag= 3.0 min
Discarded = 0.00 cfs @ 12.20 hrs, Volume= 236 cf
Primary = 1.58 cfs @ 12.20 hrs, Volume= 6,029 cf
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 76.68' @ 12.20 hrs Surf.Area= 670 sf Storage= 437 cf

Plug-Flow detention time= 23.1 min calculated for 6,266 cf (100% of inflow)
Center-of-Mass det. time= 22.9 min (865.1 - 842.1)

Volume	Invert	Avail.Storage	Storage Description
#1	75.75'	12,475 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.75	200	0	0
76.00	400	75	75
78.00	1,200	1,600	1,675
80.00	2,200	3,400	5,075
82.00	3,400	5,600	10,675
82.50	3,800	1,800	12,475

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 76.00' / 74.00' S= 0.0400 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Primary	82.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#3	Discarded	75.75'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.20 hrs HW=76.68' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.58 cfs @ 12.20 hrs HW=76.68' (Free Discharge)
├**1=Culvert** (Inlet Controls 1.58 cfs @ 2.80 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond EX.RCP: EX 30IN RCP

Inflow Area = 7,027 sf, 0.00% Impervious, Inflow Depth = 1.16" for 2 year event
Inflow = 0.21 cfs @ 12.10 hrs, Volume= 677 cf
Primary = 0.21 cfs @ 12.10 hrs, Volume= 677 cf, Atten= 0%, Lag= 0.0 min
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond SSIS1: Subsurface Chambers at Cul de Sac

Inflow Area = 43,263 sf,100.00% Impervious, Inflow Depth = 3.06" for 2 year event
Inflow = 3.10 cfs @ 12.09 hrs, Volume= 11,022 cf
Outflow = 1.54 cfs @ 12.24 hrs, Volume= 8,516 cf, Atten= 50%, Lag= 9.3 min
Discarded = 0.02 cfs @ 4.25 hrs, Volume= 2,530 cf
Primary = 1.53 cfs @ 12.24 hrs, Volume= 5,986 cf
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 144.86' @ 12.24 hrs Surf.Area= 2,502 sf Storage= 5,080 cf

Plug-Flow detention time= 378.9 min calculated for 8,507 cf (77% of inflow)

Center-of-Mass det. time= 298.7 min (1,054.6 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	142.00'	4,134 cf	**46.67'W x 53.61'L x 6.75'H Field A** 16,887 cf Overall - 6,551 cf Embedded = 10,336 cf x 40.0% Voids
#2A	142.75'	6,551 cf	**ADS_StormTech MC-7200 +Cap** x 35 Inside #1 Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap 35 Chambers in 5 Rows Cap Storage= 39.5 cf x 2 x 5 rows = 395.0 cf
		10,685 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	144.20'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.20' / 141.56' S= 0.0600 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	142.00'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 4.25 hrs HW=142.07' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=1.52 cfs @ 12.24 hrs HW=144.86' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 1.52 cfs @ 2.77 fps)

Summary for Link POC: Add

Inflow Area = 274,742 sf, 35.47% Impervious, Inflow Depth = 1.47" for 2 year event
Inflow = 8.66 cfs @ 12.15 hrs, Volume= 33,704 cf
Primary = 8.66 cfs @ 12.15 hrs, Volume= 33,704 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P1: Building A Runoff Area=21,113 sf 100.00% Impervious Runoff Depth=4.96"
Tc=6.0 min CN=98 Runoff=2.41 cfs 8,732 cf

Subcatchment P2: Building B Runoff Area=22,150 sf 100.00% Impervious Runoff Depth=4.96"
Tc=6.0 min CN=98 Runoff=2.53 cfs 9,161 cf

Subcatchment P3: Slope to swale at Runoff Area=103,778 sf 0.00% Impervious Runoff Depth=2.35"
Flow Length=100' Tc=9.4 min CN=72 Runoff=5.71 cfs 20,349 cf

Subcatchment P4: Parking and Drive (SW) Runoff Area=69,708 sf 60.72% Impervious Runoff Depth=3.96"
Tc=6.0 min CN=89 Runoff=7.04 cfs 23,025 cf

Subcatchment P5: Drive south of Building Runoff Area=11,925 sf 36.41% Impervious Runoff Depth=3.76"
Tc=6.0 min CN=87 Runoff=1.16 cfs 3,733 cf

Subcatchment P6: Drive West of Building Runoff Area=39,041 sf 19.29% Impervious Runoff Depth=2.88"
Flow Length=295' Tc=11.1 min CN=78 Runoff=2.54 cfs 9,377 cf

Subcatchment P7: West Entrance to 30" RCP Runoff Area=7,027 sf 0.00% Impervious Runoff Depth=2.61"
Tc=6.0 min CN=75 Runoff=0.48 cfs 1,530 cf

Pond 2P: Upper Pond Building B Peak Elev=140.88' Storage=602 cf Inflow=7.04 cfs 23,025 cf
Discarded=0.00 cfs 96 cf Primary=6.78 cfs 22,929 cf Outflow=6.78 cfs 23,025 cf

Pond 3P: Lower Pond Building B Peak Elev=130.54' Storage=158 cf Inflow=1.16 cfs 3,733 cf
Discarded=0.00 cfs 88 cf Primary=1.08 cfs 3,644 cf Outflow=1.09 cfs 3,733 cf

Pond 4P: Pond West of Building B Peak Elev=77.17' Storage=820 cf Inflow=3.57 cfs 13,021 cf
Discarded=0.01 cfs 264 cf Primary=3.11 cfs 12,757 cf Outflow=3.11 cfs 13,021 cf

Pond EX.RCP: EX 30IN RCP Inflow=0.48 cfs 1,530 cf
Primary=0.48 cfs 1,530 cf

Pond SSIS1: Subsurface Chambers at Cul Peak Elev=145.44' Storage=6,185 cf Inflow=4.94 cfs 17,892 cf
Discarded=0.02 cfs 2,594 cf Primary=3.26 cfs 12,770 cf Outflow=3.27 cfs 15,364 cf

Link POC: Add Inflow=18.64 cfs 70,335 cf
Primary=18.64 cfs 70,335 cf

Total Runoff Area = 274,742 sf Runoff Volume = 75,906 cf Average Runoff Depth = 3.32"
64.53% Pervious = 177,279 sf 35.47% Impervious = 97,463 sf

Summary for Subcatchment P1: Building A

Runoff = 2.41 cfs @ 12.09 hrs, Volume= 8,732 cf, Depth= 4.96"
Routed to Pond SSIS1 : Subsurface Chambers at Cul de Sac

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

Area (sf)	CN	Description
21,113	98	Roofs, HSG C
21,113		100.00% Impervious Area

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

Summary for Subcatchment P2: Building B

Runoff = 2.53 cfs @ 12.09 hrs, Volume= 9,161 cf, Depth= 4.96"
Routed to Pond SSIS1 : Subsurface Chambers at Cul de Sac

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

Area (sf)	CN	Description
22,150	98	Roofs, HSG C
22,150		100.00% Impervious Area

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

Summary for Subcatchment P3: Slope to swale at Village Road

Runoff = 5.71 cfs @ 12.14 hrs, Volume= 20,349 cf, Depth= 2.35"
Routed to Link POC : Add

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

	Area (sf)	CN	Description
	53,920	74	>75% Grass cover, Good, HSG C
	48,296	70	Woods, Good, HSG C
*	1,562	91	Gravel Drive
	103,778	72	Weighted Average
	103,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	50	0.2000	7.20		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
9.4	100	Total			

Summary for Subcatchment P4: Parking and Drive (SW) to Building A

Runoff = 7.04 cfs @ 12.09 hrs, Volume= 23,025 cf, Depth= 3.96"
Routed to Pond 2P : Upper Pond Building B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

	Area (sf)	CN	Description
*	42,328	98	Paved parking, HSG C
*	27,380	74	>75% Grass cover, Good, HSG C
	69,708	89	Weighted Average
	27,380		39.28% Pervious Area
	42,328		60.72% Impervious Area

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

Summary for Subcatchment P5: Drive south of Building B to 3P

Runoff = 1.16 cfs @ 12.09 hrs, Volume= 3,733 cf, Depth= 3.76"
Routed to Pond 3P : Lower Pond Building B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

	Area (sf)	CN	Description
	3,405	91	Fallow, bare soil, HSG C
	4,342	98	Paved parking, HSG C
	3,873	74	>75% Grass cover, Good, HSG C
*	305	61	Porous Pavers, HSG C
	11,925	87	Weighted Average
	7,583		63.59% Pervious Area
	4,342		36.41% Impervious Area

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

Summary for Subcatchment P6: Drive West of Building B

Runoff = 2.54 cfs @ 12.16 hrs, Volume= 9,377 cf, Depth= 2.88"
Routed to Pond 4P : Pond West of Building B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

	Area (sf)	CN	Description
*	21,084	74	>75% Grass cover, Good, HSG C
*	10,427	70	Woods, Good, HSG C
*	7,530	98	Paved parking, HSG C
	39,041	78	Weighted Average
	31,511		80.71% Pervious Area
	7,530		19.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.1200	0.08		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.4	130	0.1200	5.58		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
0.2	115	0.2500	8.05		**Shallow Concentrated Flow, Shallow 2** Unpaved Kv= 16.1 fps
11.1	295	Total			

Summary for Subcatchment P7: West Entrance to 30" RCP

Runoff = 0.48 cfs @ 12.09 hrs, Volume= 1,530 cf, Depth= 2.61"
Routed to Pond EX.RCP : EX 30IN RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=5.20", P2=3.20"

	Area (sf)	CN	Description
*	2,590	91	Fallow, bare soil, HSG C
	1,447	74	>75% Grass cover, Good, HSG C
*	2,990	61	Porous Pavers, HSG C
	7,027	75	Weighted Average
	7,027		100.00% Pervious Area

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

Summary for Pond 2P: Upper Pond Building B

Inflow Area = 69,708 sf, 60.72% Impervious, Inflow Depth = 3.96" for 10 year event
Inflow = 7.04 cfs @ 12.09 hrs, Volume= 23,025 cf
Outflow = 6.78 cfs @ 12.11 hrs, Volume= 23,025 cf, Atten= 4%, Lag= 1.3 min
Discarded = 0.00 cfs @ 12.11 hrs, Volume= 96 cf
Primary = 6.78 cfs @ 12.11 hrs, Volume= 22,929 cf
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 140.88' @ 12.11 hrs Surf.Area= 575 sf Storage= 602 cf

Plug-Flow detention time= 3.7 min calculated for 23,025 cf (100% of inflow)
Center-of-Mass det. time= 3.4 min (796.4 - 793.0)

Volume	Invert	Avail.Storage	Storage Description
#1	139.50'	1,850 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.50	300	0	0
140.00	400	175	175
142.00	800	1,200	1,375
142.50	1,100	475	1,850

Device	Routing	Invert	Outlet Devices
#1	Primary	139.50'	**18.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 139.50' / 138.62' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	139.50'	**0.170 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.11 hrs HW=140.85' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=6.65 cfs @ 12.11 hrs HW=140.85' (Free Discharge)
1=Culvert (Inlet Controls 6.65 cfs @ 3.96 fps)

Summary for Pond 3P: Lower Pond Building B

Inflow Area = 11,925 sf, 36.41% Impervious, Inflow Depth = 3.76" for 10 year event
Inflow = 1.16 cfs @ 12.09 hrs, Volume= 3,733 cf
Outflow = 1.09 cfs @ 12.12 hrs, Volume= 3,733 cf, Atten= 6%, Lag= 1.8 min
Discarded = 0.00 cfs @ 12.12 hrs, Volume= 88 cf
Primary = 1.08 cfs @ 12.12 hrs, Volume= 3,644 cf
Routed to Pond 4P : Pond West of Building B

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 130.54' @ 12.12 hrs Surf.Area= 411 sf Storage= 158 cf

Plug-Flow detention time= 5.4 min calculated for 3,729 cf (100% of inflow)
Center-of-Mass det. time= 5.5 min (805.3 - 799.8)

Volume	Invert	Avail.Storage	Storage Description
#1	130.00'	1,838 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
130.00	175	0	0
132.00	1,050	1,225	1,225
132.50	1,400	613	1,838

Device	Routing	Invert	Outlet Devices
#1	Primary	130.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 130.00' / 123.50' S= 0.0650 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Discarded	130.00'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.12 hrs HW=130.53' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.05 cfs @ 12.12 hrs HW=130.53' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 1.05 cfs @ 2.48 fps)

Summary for Pond 4P: Pond West of Building B

Inflow Area = 50,966 sf, 23.29% Impervious, Inflow Depth = 3.07" for 10 year event
Inflow = 3.57 cfs @ 12.15 hrs, Volume= 13,021 cf
Outflow = 3.11 cfs @ 12.21 hrs, Volume= 13,021 cf, Atten= 13%, Lag= 3.9 min
Discarded = 0.01 cfs @ 12.21 hrs, Volume= 264 cf
Primary = 3.11 cfs @ 12.21 hrs, Volume= 12,757 cf
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 77.17' @ 12.21 hrs Surf.Area= 870 sf Storage= 820 cf

Plug-Flow detention time= 14.5 min calculated for 13,021 cf (100% of inflow)
Center-of-Mass det. time= 14.3 min (836.7 - 822.4)

Volume	Invert	Avail.Storage	Storage Description
#1	75.75'	12,475 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.75	200	0	0
76.00	400	75	75
78.00	1,200	1,600	1,675
80.00	2,200	3,400	5,075
82.00	3,400	5,600	10,675
82.50	3,800	1,800	12,475

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 76.00' / 74.00' S= 0.0400 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Primary	82.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#3	Discarded	75.75'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.21 hrs HW=77.16' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=3.08 cfs @ 12.21 hrs HW=77.16' (Free Discharge)
├**1=Culvert** (Inlet Controls 3.08 cfs @ 3.92 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond EX.RCP: EX 30IN RCP

Inflow Area = 7,027 sf, 0.00% Impervious, Inflow Depth = 2.61" for 10 year event
Inflow = 0.48 cfs @ 12.09 hrs, Volume= 1,530 cf
Primary = 0.48 cfs @ 12.09 hrs, Volume= 1,530 cf, Atten= 0%, Lag= 0.0 min
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond SSIS1: Subsurface Chambers at Cul de Sac

Inflow Area = 43,263 sf,100.00% Impervious, Inflow Depth = 4.96" for 10 year event
Inflow = 4.94 cfs @ 12.09 hrs, Volume= 17,892 cf
Outflow = 3.27 cfs @ 12.18 hrs, Volume= 15,364 cf, Atten= 34%, Lag= 5.7 min
Discarded = 0.02 cfs @ 2.70 hrs, Volume= 2,594 cf
Primary = 3.26 cfs @ 12.18 hrs, Volume= 12,770 cf
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 145.44' @ 12.18 hrs Surf.Area= 2,502 sf Storage= 6,185 cf

Plug-Flow detention time= 254.6 min calculated for 15,348 cf (86% of inflow)

Center-of-Mass det. time= 193.5 min (940.9 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	142.00'	4,134 cf	**46.67'W x 53.61'L x 6.75'H Field A** 16,887 cf Overall - 6,551 cf Embedded = 10,336 cf x 40.0% Voids
#2A	142.75'	6,551 cf	**ADS_StormTech MC-7200 +Cap** x 35 Inside #1 Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap 35 Chambers in 5 Rows Cap Storage= 39.5 cf x 2 x 5 rows = 395.0 cf
		10,685 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	144.20'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.20' / 141.56' S= 0.0600 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	142.00'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 2.70 hrs HW=142.07' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=3.24 cfs @ 12.18 hrs HW=145.43' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 3.24 cfs @ 4.12 fps)

Summary for Link POC: Add

Inflow Area = 274,742 sf, 35.47% Impervious, Inflow Depth = 3.07" for 10 year event
Inflow = 18.64 cfs @ 12.13 hrs, Volume= 70,335 cf
Primary = 18.64 cfs @ 12.13 hrs, Volume= 70,335 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P1: Building A Runoff Area=21,113 sf 100.00% Impervious Runoff Depth=7.98"
Tc=6.0 min CN=98 Runoff=3.82 cfs 14,040 cf

Subcatchment P2: Building B Runoff Area=22,150 sf 100.00% Impervious Runoff Depth=7.98"
Tc=6.0 min CN=98 Runoff=4.01 cfs 14,730 cf

Subcatchment P3: Slope to swale at Runoff Area=103,778 sf 0.00% Impervious Runoff Depth=4.89"
Flow Length=100' Tc=9.4 min CN=72 Runoff=11.95 cfs 42,272 cf

Subcatchment P4: Parking and Drive (SW) Runoff Area=69,708 sf 60.72% Impervious Runoff Depth=6.90"
Tc=6.0 min CN=89 Runoff=11.89 cfs 40,098 cf

Subcatchment P5: Drive south of Building Runoff Area=11,925 sf 36.41% Impervious Runoff Depth=6.66"
Tc=6.0 min CN=87 Runoff=1.99 cfs 6,622 cf

Subcatchment P6: Drive West of Building Runoff Area=39,041 sf 19.29% Impervious Runoff Depth=5.59"
Flow Length=295' Tc=11.1 min CN=78 Runoff=4.88 cfs 18,202 cf

Subcatchment P7: West Entrance to 30" RCP Runoff Area=7,027 sf 0.00% Impervious Runoff Depth=5.24"
Tc=6.0 min CN=75 Runoff=0.97 cfs 3,069 cf

Pond 2P: Upper Pond Building B Peak Elev=141.82' Storage=1,237 cf Inflow=11.89 cfs 40,098 cf
Discarded=0.00 cfs 107 cf Primary=10.69 cfs 39,991 cf Outflow=10.69 cfs 40,098 cf

Pond 3P: Lower Pond Building B Peak Elev=130.75' Storage=253 cf Inflow=1.99 cfs 6,622 cf
Discarded=0.00 cfs 103 cf Primary=1.86 cfs 6,520 cf Outflow=1.86 cfs 6,622 cf

Pond 4P: Pond West of Building B Peak Elev=78.24' Storage=1,976 cf Inflow=6.66 cfs 24,722 cf
Discarded=0.01 cfs 299 cf Primary=4.99 cfs 24,423 cf Outflow=4.99 cfs 24,722 cf

Pond EX.RCP: EX 30IN RCP Inflow=0.97 cfs 3,069 cf
Primary=0.97 cfs 3,069 cf

Pond SSIS1: Subsurface Chambers at Cul Peak Elev=146.27' Storage=7,651 cf Inflow=7.83 cfs 28,770 cf
Discarded=0.02 cfs 2,635 cf Primary=4.73 cfs 23,591 cf Outflow=4.75 cfs 26,226 cf

Link POC: Add Inflow=32.42 cfs 133,346 cf
Primary=32.42 cfs 133,346 cf

Total Runoff Area = 274,742 sf Runoff Volume = 139,034 cf Average Runoff Depth = 6.07"
64.53% Pervious = 177,279 sf 35.47% Impervious = 97,463 sf

Summary for Subcatchment P1: Building A

Runoff = 3.82 cfs @ 12.09 hrs, Volume= 14,040 cf, Depth= 7.98"
Routed to Pond SSIS1 : Subsurface Chambers at Cul de Sac

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

Area (sf)	CN	Description
21,113	98	Roofs, HSG C
21,113		100.00% Impervious Area

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

Summary for Subcatchment P2: Building B

Runoff = 4.01 cfs @ 12.09 hrs, Volume= 14,730 cf, Depth= 7.98"
Routed to Pond SSIS1 : Subsurface Chambers at Cul de Sac

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

Area (sf)	CN	Description
22,150	98	Roofs, HSG C
22,150		100.00% Impervious Area

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

Summary for Subcatchment P3: Slope to swale at Village Road

Runoff = 11.95 cfs @ 12.14 hrs, Volume= 42,272 cf, Depth= 4.89"
Routed to Link POC : Add

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

	Area (sf)	CN	Description
	53,920	74	>75% Grass cover, Good, HSG C
	48,296	70	Woods, Good, HSG C
*	1,562	91	Gravel Drive
	103,778	72	Weighted Average
	103,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	50	0.0400	0.09		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.20"
0.1	50	0.2000	7.20		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
9.4	100	Total			

Summary for Subcatchment P4: Parking and Drive (SW) to Building A

Runoff = 11.89 cfs @ 12.09 hrs, Volume= 40,098 cf, Depth= 6.90"
Routed to Pond 2P : Upper Pond Building B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

	Area (sf)	CN	Description
*	42,328	98	Paved parking, HSG C
*	27,380	74	>75% Grass cover, Good, HSG C
	69,708	89	Weighted Average
	27,380		39.28% Pervious Area
	42,328		60.72% Impervious Area

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

Summary for Subcatchment P5: Drive south of Building B to 3P

Runoff = 1.99 cfs @ 12.09 hrs, Volume= 6,622 cf, Depth= 6.66"
Routed to Pond 3P : Lower Pond Building B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

	Area (sf)	CN	Description
	3,405	91	Fallow, bare soil, HSG C
	4,342	98	Paved parking, HSG C
	3,873	74	>75% Grass cover, Good, HSG C
*	305	61	Porous Pavers, HSG C
	11,925	87	Weighted Average
	7,583		63.59% Pervious Area
	4,342		36.41% Impervious Area

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

Summary for Subcatchment P6: Drive West of Building B

Runoff = 4.88 cfs @ 12.15 hrs, Volume= 18,202 cf, Depth= 5.59"
Routed to Pond 4P : Pond West of Building B

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

	Area (sf)	CN	Description
*	21,084	74	>75% Grass cover, Good, HSG C
*	10,427	70	Woods, Good, HSG C
*	7,530	98	Paved parking, HSG C
	39,041	78	Weighted Average
	31,511		80.71% Pervious Area
	7,530		19.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.5	50	0.1200	0.08		**Sheet Flow, Sheet** Woods: Dense underbrush n= 0.800 P2= 3.20"
0.4	130	0.1200	5.58		**Shallow Concentrated Flow, Shallow 1** Unpaved Kv= 16.1 fps
0.2	115	0.2500	8.05		**Shallow Concentrated Flow, Shallow 2** Unpaved Kv= 16.1 fps
11.1	295	Total			

Summary for Subcatchment P7: West Entrance to 30" RCP

Runoff = 0.97 cfs @ 12.09 hrs, Volume= 3,069 cf, Depth= 5.24"
Routed to Pond EX.RCP : EX 30IN RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=8.22", P2=3.20"

	Area (sf)	CN	Description
*	2,590	91	Fallow, bare soil, HSG C
	1,447	74	>75% Grass cover, Good, HSG C
*	2,990	61	Porous Pavers, HSG C
	7,027	75	Weighted Average
	7,027		100.00% Pervious Area

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

Summary for Pond 2P: Upper Pond Building B

Inflow Area = 69,708 sf, 60.72% Impervious, Inflow Depth = 6.90" for 100 year event
Inflow = 11.89 cfs @ 12.09 hrs, Volume= 40,098 cf
Outflow = 10.69 cfs @ 12.13 hrs, Volume= 40,098 cf, Atten= 10%, Lag= 2.4 min
Discarded = 0.00 cfs @ 12.13 hrs, Volume= 107 cf
Primary = 10.69 cfs @ 12.13 hrs, Volume= 39,991 cf
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 141.82' @ 12.13 hrs Surf.Area= 765 sf Storage= 1,237 cf

Plug-Flow detention time= 2.9 min calculated for 40,056 cf (100% of inflow)
Center-of-Mass det. time= 2.9 min (781.1 - 778.2)

Volume	Invert	Avail.Storage	Storage Description
#1	139.50'	1,850 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.50	300	0	0
140.00	400	175	175
142.00	800	1,200	1,375
142.50	1,100	475	1,850

Device	Routing	Invert	Outlet Devices
#1	Primary	139.50'	**18.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 139.50' / 138.62' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf
#2	Discarded	139.50'	**0.170 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.13 hrs HW=141.77' (Free Discharge)
2=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=10.49 cfs @ 12.13 hrs HW=141.77' (Free Discharge)
1=Culvert (Inlet Controls 10.49 cfs @ 5.94 fps)

Summary for Pond 3P: Lower Pond Building B

Inflow Area = 11,925 sf, 36.41% Impervious, Inflow Depth = 6.66" for 100 year event
Inflow = 1.99 cfs @ 12.09 hrs, Volume= 6,622 cf
Outflow = 1.86 cfs @ 12.12 hrs, Volume= 6,622 cf, Atten= 7%, Lag= 1.8 min
Discarded = 0.00 cfs @ 12.12 hrs, Volume= 103 cf
Primary = 1.86 cfs @ 12.12 hrs, Volume= 6,520 cf
Routed to Pond 4P : Pond West of Building B

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 130.75' @ 12.12 hrs Surf.Area= 502 sf Storage= 253 cf

Plug-Flow detention time= 4.5 min calculated for 6,615 cf (100% of inflow)
Center-of-Mass det. time= 4.6 min (788.7 - 784.1)

Volume	Invert	Avail.Storage	Storage Description
#1	130.00'	1,838 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
130.00	175	0	0
132.00	1,050	1,225	1,225
132.50	1,400	613	1,838

Device	Routing	Invert	Outlet Devices
#1	Primary	130.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 130.00' / 123.50' S= 0.0650 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Discarded	130.00'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.00 cfs @ 12.12 hrs HW=130.74' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.81 cfs @ 12.12 hrs HW=130.74' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 1.81 cfs @ 2.92 fps)

Summary for Pond 4P: Pond West of Building B

Inflow Area = 50,966 sf, 23.29% Impervious, Inflow Depth = 5.82" for 100 year event
Inflow = 6.66 cfs @ 12.14 hrs, Volume= 24,722 cf
Outflow = 4.99 cfs @ 12.25 hrs, Volume= 24,722 cf, Atten= 25%, Lag= 6.3 min
Discarded = 0.01 cfs @ 12.25 hrs, Volume= 299 cf
Primary = 4.99 cfs @ 12.25 hrs, Volume= 24,423 cf
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 78.24' @ 12.25 hrs Surf.Area= 1,319 sf Storage= 1,976 cf

Plug-Flow detention time= 10.8 min calculated for 24,722 cf (100% of inflow)
Center-of-Mass det. time= 10.6 min (815.5 - 804.9)

Volume	Invert	Avail.Storage	Storage Description
#1	75.75'	12,475 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.75	200	0	0
76.00	400	75	75
78.00	1,200	1,600	1,675
80.00	2,200	3,400	5,075
82.00	3,400	5,600	10,675
82.50	3,800	1,800	12,475

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	**12.0" Round Culvert** L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 76.00' / 74.00' S= 0.0400 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Primary	82.00'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
#3	Discarded	75.75'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 12.25 hrs HW=78.24' (Free Discharge)
└**3=Exfiltration** (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=4.99 cfs @ 12.25 hrs HW=78.24' (Free Discharge)
├**1=Culvert** (Inlet Controls 4.99 cfs @ 6.35 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond EX.RCP: EX 30IN RCP

Inflow Area = 7,027 sf, 0.00% Impervious, Inflow Depth = 5.24" for 100 year event
Inflow = 0.97 cfs @ 12.09 hrs, Volume= 3,069 cf
Primary = 0.97 cfs @ 12.09 hrs, Volume= 3,069 cf, Atten= 0%, Lag= 0.0 min
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Summary for Pond SSIS1: Subsurface Chambers at Cul de Sac

Inflow Area = 43,263 sf,100.00% Impervious, Inflow Depth = 7.98" for 100 year event
Inflow = 7.83 cfs @ 12.09 hrs, Volume= 28,770 cf
Outflow = 4.75 cfs @ 12.20 hrs, Volume= 26,226 cf, Atten= 39%, Lag= 6.8 min
Discarded = 0.02 cfs @ 1.65 hrs, Volume= 2,635 cf
Primary = 4.73 cfs @ 12.20 hrs, Volume= 23,591 cf
Routed to Link POC : Add

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 146.27' @ 12.20 hrs Surf.Area= 2,502 sf Storage= 7,651 cf

Plug-Flow detention time= 180.2 min calculated for 26,198 cf (91% of inflow)

Center-of-Mass det. time= 135.7 min (876.6 - 740.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	142.00'	4,134 cf	**46.67'W x 53.61'L x 6.75'H Field A** 16,887 cf Overall - 6,551 cf Embedded = 10,336 cf x 40.0% Voids
#2A	142.75'	6,551 cf	**ADS_StormTech MC-7200 +Cap** x 35 Inside #1 Effective Size= 91.2"W x 60.0"H => 26.68 sf x 6.59'L = 175.9 cf Overall Size= 100.0"W x 60.0"H x 6.95'L with 0.36' Overlap 35 Chambers in 5 Rows Cap Storage= 39.5 cf x 2 x 5 rows = 395.0 cf
		10,685 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	144.20'	**12.0" Round Culvert** L= 44.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 144.20' / 141.56' S= 0.0600 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Discarded	142.00'	**0.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 1.65 hrs HW=142.07' (Free Discharge)
↑—**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=4.73 cfs @ 12.20 hrs HW=146.27' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 4.73 cfs @ 6.02 fps)

Summary for Link POC: Add

Inflow Area = 274,742 sf, 35.47% Impervious, Inflow Depth = 5.82" for 100 year event
Inflow = 32.42 cfs @ 12.14 hrs, Volume= 133,346 cf
Primary = 32.42 cfs @ 12.14 hrs, Volume= 133,346 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Events for Subcatchment P1: Building A

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	1.51	5,379	3.06
10 year	5.20	2.41	8,732	4.96
100 year	**8.22**	**3.82**	**14,040**	**7.98**

Events for Subcatchment P2: Building B

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	1.59	5,643	3.06
10 year	5.20	2.53	9,161	4.96
100 year	**8.22**	**4.01**	**14,730**	**7.98**

Events for Subcatchment P3: Slope to swale at Village Road

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	2.25	8,527	0.99
10 year	5.20	5.71	20,349	2.35
100 year	**8.22**	**11.95**	**42,272**	**4.89**

Events for Subcatchment P4: Parking and Drive (SW) to Building A

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	3.94	12,570	2.16
10 year	5.20	7.04	23,025	3.96
100 year	**8.22**	**11.89**	**40,098**	**6.90**

Events for Subcatchment P5: Drive south of Building B to 3P

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	0.63	1,982	1.99
10 year	5.20	1.16	3,733	3.76
100 year	**8.22**	**1.99**	**6,622**	**6.66**

Events for Subcatchment P6: Drive West of Building B

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	1.16	4,359	1.34
10 year	5.20	2.54	9,377	2.88
100 year	**8.22**	**4.88**	**18,202**	**5.59**

Events for Subcatchment P7: West Entrance to 30" RCP

Event	Rainfall (inches)	Runoff (cfs)	Volume (cubic-feet)	Depth (inches)
2 year	3.29	0.21	677	1.16
10 year	5.20	0.48	1,530	2.61
100 year	**8.22**	**0.97**	**3,069**	**5.24**

Events for Pond 2P: Upper Pond Building B

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 year	3.94	3.85	0.00	3.84	140.44	370
10 year	7.04	6.78	0.00	6.78	140.88	602
100 year	**11.89**	**10.69**	**0.00**	**10.69**	**141.82**	**1,237**

Events for Pond 3P: Lower Pond Building B

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 year	0.63	0.58	0.00	0.58	130.38	99
10 year	1.16	1.09	0.00	1.08	130.54	158
100 year	**1.99**	**1.86**	**0.00**	**1.86**	**130.75**	**253**

Events for Pond 4P: Pond West of Building B

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 year	1.71	1.59	0.00	1.58	76.68	437
10 year	3.57	3.11	0.01	3.11	77.17	820
100 year	**6.66**	**4.99**	**0.01**	**4.99**	**78.24**	**1,976**

Events for Pond EX.RCP: EX 30IN RCP

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 year	0.21	0.21	**0.00**	**0**
10 year	0.48	0.48	0.00	0
100 year	**0.97**	**0.97**	0.00	0

Events for Pond SSIS1: Subsurface Chambers at Cul de Sac

Event	Inflow (cfs)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Storage (cubic-feet)
2 year	3.10	1.54	**0.02**	1.53	144.86	5,080
10 year	4.94	3.27	0.02	3.26	145.44	6,185
100 year	**7.83**	**4.75**	0.02	**4.73**	**146.27**	**7,651**

Events for Link POC: Add

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
2 year	8.66	8.66	**0.00**
10 year	18.64	18.64	0.00
100 year	**32.42**	**32.42**	0.00

Attachment E - Supporting Calculations

Ferncroft Apartments Residential Community - 35 Vilage Road, Middleton, MA

SSIS1					
Hydrologic Soil Group	A	B	C	D	Total
Total Proposed Increase Impervious Area (acres)	0.00	0.00	0.99	0.00	0.99
Target Factor (inches)	0.60	0.35	0.25	0.10	-
Required Recharge Volume (cubic feet)	0	0	901	0	901
Recharge Volume Below Lowest Outlet (cubic feet)					3764
Drawdown Time					
Saturated Hydraulic Conductivity (Rawls Rate in/hr)					0.27
Area of Bottom of Basin (square feet)					2502
Drawdown Time (hours)					66.9

2P (Upper Pond Building B) - Note credit for 42,328 sf in Existing Impervious Results in no net increase.					
Hydrologic Soil Group	A	B	C	D	Total
Total Proposed Increase Impervious Area (acres)	0.00	0.00	0.00	0.00	0.00
Target Factor (inches)	0.60	0.35	0.25	0.10	-
Required Recharge Volume (cubic feet)	0	0	0	0	0
Recharge Volume Below Lowest Outlet (cubic feet)					0
Drawdown Time					
Saturated Hydraulic Conductivity (Rawls Rate in/hr)					0.27
Area of Bottom of Basin (square feet)					300
Drawdown Time (hours)					0.0

3P (Lower Pond Building B) - Note credit for 4,342 sf in Existing Impervious Results in no net increase.					
Hydrologic Soil Group	A	B	C	D	Total
Total Proposed Increase Impervious Area (acres)	0.00	0.00	0.00	0.00	0.00
Target Factor (inches)	0.60	0.35	0.25	0.10	-
Required Recharge Volume (cubic feet)	0	0	0	0	0
Recharge Volume Below Lowest Outlet (cubic feet)					0
Drawdown Time					
Saturated Hydraulic Conductivity (Rawls Rate in/hr)					0.27
Area of Bottom of Basin (square feet)					175
Drawdown Time (hours)					0.0

4P (Pond West of Building B) - Note credit for 7,287 sf in Existing Impervious results in 243 sf. increase					
Hydrologic Soil Group	A	B	C	D	Total
Total Proposed Increase Impervious Area (acres)	0.00	0.00	0.01	0.00	0.01
Target Factor (inches)	0.60	0.35	0.25	0.10	-
Required Recharge Volume (cubic feet)	0	0	5	0	5
Recharge Volume Below Lowest Outlet (cubic feet)					75
Drawdown Time					
Saturated Hydraulic Conductivity (Rawls Rate in/hr)					0.27
Area of Bottom of Basin (square feet)					400
Drawdown Time (hours)					8.3

Ferncroft Apartments Residential Community - 35 Vilage Road, Middleton, MA

OFF-SITE SUMMARY	FLOW			
Point of Analysis	24-hour Storm Event	Existing Peak Runoff (cfs)	Proposed Peak Runoff (cfs)	Difference in Peak Runoff (cfs)
POC1	2	8.8	8.7	-0.1
	10	20.0	18.6	-1.4
	100	37.7	32.4	-5.3

35 Village Road

TSS Removal Calculations

B	C	D	E	F
BMP Type	TSS Removal Rate	Starting TSS Load	Amount Removed (C x D)	Remaining Load (D - E)
Street Sweeping	0.05	1.00	0.05	0.95
Deep Sump & Hooded Catch Basins	0.25	0.75	0.19	0.54
Swirl Particle Separator	0.50	0.54	0.27	0.27
Extended Dry Detention Basin	0.50	0.27	0.14	0.13

Total TSS Removal = 87%

Attachment F - Long Term Pollution Prevention Plan

Long Term Pollution Prevention Plan
35 Village Road
Middleton, MA

To meet the requirements of Standard 4 of the Massachusetts Stormwater Handbook, this Long-Term Pollution Prevention Plan is provided to identify the proper procedures of practices for source control and pollution prevention.

Storage and Handling of Oil and other Hazardous Materials

Any hazardous materials that will be used ancillary to the apartments will be stored inside, or off site.

Spill Prevention/Response

Spill kits will be kept on site, and spills shall be cleaned up immediately. Spills of any hazardous material over 10 gallons will be reported to the Massachusetts Department of Environmental Protection within 24 hours.

Operation and Maintenance of Stormwater Control Structures

Included in Attachment G of this appendix is the Operation and Maintenance plan for this site, which includes street sweeping of the paved areas as well as periodic cleaning of stormwater structures and infiltration practices. The owner will be responsible for the implementation of the plan.

Landscaping

The landscaped areas will be maintained by the owner. Use of fertilizers, herbicides, and pesticides shall be allowed for all vegetated areas on site. If kept on site, all chemicals shall be stored under cover. Any storage for fertilizers, herbicides and pesticides shall not be located within 100 feet of any wetland or within proximity to the stormwater management system where spills could enter the storm drain system.

Septic System

There will be no onsite septic facilities.

Vehicle Washing

Vehicle washing shall not be performed on site. Vehicles can be rinsed with a high volume of water at low pressure. This is considered dust water by the DEP and accounts for what may be rinsed off of the vehicle when it rains. Pre-treatment BMP’s downstream of these activities will include deep-sump hooded catch basins.

Non-Hazardous Waste Management/Good Housekeeping Practices

All non-hazardous waste shall be stored in designated trash or recycling containers onsite for periodic collection by the local trash collector. The Owner shall have maintenance staff who monitor the site for the accumulation of trash. Any trash that is seen onsite shall immediately be collected and placed into designated trash or recycling containers. The owner's maintenance staff shall inspect the site once per week at minimum.

Prohibition of Illicit Discharges

Illicit discharges to the onsite stormwater management system shall be strictly prohibited. Illicit discharges are defined as any direct or indirect non-stormwater discharge to the onsite stormwater system. Requirements related to Illicit Discharges are further detailed in the attached Illicit Discharge Compliance Statement.

De-icing & Snow Disposal

The operation will utilize salt and sand to treat the paved surfaces of the site during snow and ice events. Snow will be temporarily stored within peripheral areas of the site and allowed to melt and drain back to onsite stormwater systems. When needed, snow shall be removed from the site and disposed of in accordance with all local, state and federal regulations.

Winter Sand/Salt Use & Storage

Any sand and/or salt to be used for de-icing purposes shall be stored inside or under cover and stabilized to prevent the discharge into nearby wetlands or waterbodies.

Emergency Contact Information

Owner/Operator:
Ferncroft, LLC
747 Third Avenue, 37th Floor
New York, NY 10017

Engineer:
Anthony Capachietti, P.E.
Weston & Sampson, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978-532-1900

Attachment G - Stormwater Operation & Maintenance Plan

Operation & Maintenance Plan

35 Village Road
Middleton, Massachusetts 01949

Ferncroft, LLC

Note: Owner is responsible for maintenance of stormwater practices and shall complete maintenance checklist upon inspection.

JOB NO: ENG25-0131

Weston & Sampson
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
www.westonandsampson.com
Tel: 978-532-1900 Fax: 978-977-0100

1.0 Introduction

The following document has been written to comply with the stormwater guidelines set forth by the Massachusetts Department of Environmental Protection (MassDEP). The intent of these guidelines is to encourage Low Impact Development techniques to improve the quality of the stormwater runoff. These techniques, also known as Best Management Practices (BMPs) collect, store, and treat the runoff before discharging to adjacent environmental resources.

2.0 Purpose

This Operation and Maintenance Plan (O&M Plan) is intended to provide a mechanism for the consistent inspection and maintenance of each BMP installed on the project site. Included in this O&M Plan is a description of each BMP type and an inspection form for each BMP. Ferncroft, LLC is the owner and operator of the system and is responsible for its upkeep and maintenance. This work will be funded on an annual basis through the owner's operating budget.

In the event the Owner sells the property, it is the Owner's responsibility to transfer this plan as well as the past three years of operation and maintenance records to the new property owner.

3.0 Snow Management Procedures

Designated snow storage locations are displayed in the O&M Key Plan. During events where on-site snow storage capacity is exceeded, it is the Owner's responsibility to coordinate the transport of excess snow to an off-site location.

4.0 BMP Description and Locations

4.1 Street Sweeping

Street sweeping consists of using a high efficiency vacuum sweeper machine to clean impervious areas of accumulated sediment, debris, and trash at paved areas.

4.2 Deep Sump Catch Basins

Deep sump catch basins utilizing "SNOUT" catch basin hoods will be located throughout the site and used as pre-treatment before entering the infiltration systems. The deep sump catch basins are designed to remove trash, debris, hydrocarbons, and coarse sediment from the stormwater runoff.

4.3 Drain Manholes

Drain Manholes will be located throughout the site and used to convey and redirect stormwater collected from deep sump catch basins. They allow for access, connection points, and change-in-direction points in the underground drainage system.

4.4 Infiltration Systems

There is one subsurface chamber system in the facility that will receive stormwater. There are three extended detention systems in the facility that will receive stormwater. These structures provide for stormwater infiltration to mitigate peak runoff rates from the site. These structures also significantly mitigate TSS.

4.5 Outlet Control Structure

Outlet control structures are used to control discharges from captured stormwater. They release the water in a controlled manner to control peak discharges.

4.6 Hydrodynamic Separator

The hydrodynamic separator is designed to remove sediments, hydrocarbons and trash from stormwater flows for pretreatment/treatment purposes.

5.0 Inspection, Maintenance Checklist and Schedule

5.1 Street Sweeping

Street sweeping shall be performed on all impervious surfaces on a quarterly average, with sweeping performed primarily in the spring and fall. Street sweeping shall be performed using a high efficiency vacuum street sweeping machine or a regenerative air sweeper. A mechanical rotary broom sweeper may be used if sweeping is performed on a monthly basis.

In the event of contamination by a spill or other means, all street sweeping cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000 and handled as hazardous waste.

In the absence of evidence of contamination, street sweeping cleanings may be taken to a landfill or other facility permitted by MassDEP to accept Solid Waste without any prior approval by MassDEP. Please note that current MassDEP regulations prevent landfills from accepting materials that contain free-draining liquids.

5.2 Deep Sump Catch Basins and Outlet Control Structures

Inspect and/or clean catch basin and outlet control structures at least four times per year and at the end of foliage and snow removal seasons. Sediments must be removed 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. The structures should be cleaned a minimum of four times per year regardless of the amount of sediment in the basin. The site is considered a land use with a higher potential pollutant load, therefore if Catch Basins are found to be filled to capacity with sediment during a cleaning, the frequency of cleaning shall be increased. Catch basins and outlet control structures shall be cleaned with clamshell buckets or by hand tools where necessary. SNOUT hoods shall be inspected annually. Open and close the access hatch and flush or rod the anti-siphon device to ensure proper operation.

In the event of contamination by a spill or other means, all cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000 and handled as hazardous waste.

In the absence of evidence of contamination, catch basin cleanings may be taken to a landfill or other facility permitted by MassDEP to accept Solid Waste without any prior approval by MassDEP. Please note that current MassDEP regulations prevent landfills from accepting materials that contain free-draining liquids.

5.3 Drain Manholes

Inspect and/or clean drain manholes at least four times per year while inspecting the catch basins. Remove all accumulated sediments and debris, and dispose of in accordance with local, state, and federal regulations. Drain Manholes shall be cleaned with clamshell buckets or by hand tools where necessary.

In the event of contamination by a spill or other means, all cleanings must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.000 and handled as hazardous waste.

In the absence of evidence of contamination, manhole cleanings may be taken to a landfill or other facility permitted by MassDEP to accept Solid Waste without any prior approval by MassDEP. Please note that current MassDEP regulations prevent landfills from accepting materials that contain free-draining liquids.

5.4 Infiltration Systems

Subsurface chambers shall be inspected every three months for the first year, then timed thereafter based upon the depth of sediment build up witnessed in the previous inspections. Inspection ports shall be located strategically throughout the system. When sediment is observed, the depth shall be recorded with a stadia rod, and when that average depth across the row of chambers reaches 3-inches, the system shall be cleaned out.

Cleaning is performed through the Jet-vac process whereby the chambers are washed with a high-pressure water system and the captured pollutants are then vacuumed out.

Refer to the attached maintenance documents for additional information.

5.5 Hydrodynamic Separator

The hydrodynamic separator units shall be inspected four times a year at a minimum. The maintenance cycle shall be determined by the depth of sediment buildup witnessed in previous inspections. The hydrodynamic separator units should be inspected and cleaned a minimum of four times per year regardless of the amount of sediment in the basins. See the Maintenance Guide following this O&M plan for additional information regarding maintenance intervals and procedures.

The interior of the CDS unit shall be visually inspected upon opening. Use a sediment probe and oil dipstick to check respected levels of sediment and hydrocarbons. When cleaning is necessary, use a vacuum truck to clean and remove pollutants. All pollutants shall be disposed of according to local, state and federal regulations.

5.6 Inspections and Record Keeping

- An inspection form should be filled out each and every time maintenance work is performed.

- A binder should be kept at the facility that contains all of the completed inspection forms and any other related materials.

- A review of all Operation & Maintenance actions should take place annually to ensure that these Stormwater BMPs are being taken care of in the manner illustrated in this Operation & Maintenance Plan.

- All operation and maintenance log forms for the last three years, at a minimum, shall be kept on site at the facility.

- Annual inspection logs shall be submitted to the DPW Engineering Division as required to maintain certification of compliance under Newton's NPDES MS4 Permit.

- The inspection and maintenance schedule may be refined in the future based on the findings and results of this operation and maintenance program or policy.

6.0 Public Safety Features

All proposed stormwater management practices on site are underground, thereby not presenting any harm to the public.

7.0 Stormwater Management System Owner/Responsible Party

The stormwater management system shall be owned and maintained by the following party or its future designee/assigns:

Ferncroft, LLC
747 Third Avenue, 37th Floor
New York, NY 10017

This operation and Maintenance Plan will be recorded with the registry of deeds so that current and future owners are aware of the requirement for proper operation and maintenance of the onsite stormwater system.

8.0 General Good Housekeeping Practices

All non-hazardous waste shall be stored in designated trash or recycling containers onsite for periodic collection by the local trash collector. The owner shall have maintenance staff who monitor the site for the accumulation of trash. Any trash that is seen onsite shall immediately be collected and placed into designated trash or recycling containers. The owner's staff shall make an inspection of the site once per week at minimum.

9.0 Estimated Operations and Maintenance Budget

The estimated budget for annual operations and maintenance of this stormwater system is $10,000 per year.

35 Village Road
December 19, 2025

Signed: _____

Printed: _____

Ferncroft Apartments, LLC

35 Village Road
Permanent BMP Inspection Checklist

☐ **Street Sweeping**

Frequency:	Quarterly average, primarily in the spring and fall if using a high efficiency vacuum sweeper or regenerative air sweeper. Monthly, if using a mechanical rotary broom sweeper.
Location:	Parking Areas, Driveways and Roadway
Inspected By:	_____ Date: _____
Observations:	_____ _____ _____
Actions Taken:	_____ _____ _____
Instructions:	Sweep all impervious areas, including parking lots, driveways, and roadways using high efficiency vacuum street sweeping machine, regenerative air sweeper, or mechanical rotary broom sweeper. All trash, debris, and sediments should be disposed of in accordance with local, state, and federal regulations.

☐ **Deep Sump Catch Basins & Outlet Control Structures**

Frequency: Inspect and clean deep sump catch basins, water quality units, and outlet control structures in March, June, September and December.

Structure Number: _____

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Clean units four times per year or whenever the depth of the deposits is greater than or equal to one half the depth from the bottom of the invert to the lowest pipe in the structure. Open and close SNOUT hood and check anti-siphon vent for clogging.

☐ **Drain Manholes**

Frequency: Inspect and clean drain manholes in March, June, September and December.

Structure Number: _____

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Clean units four times per year at a minimum, or whenever catch basins are inspected. Remove sediment and debris. All debris, and sediments should be disposed of in accordance with local, state, and federal regulations. Drain Manholes shall be cleaned with clamshell buckets or by hand tools where necessary.

☐ **Infiltration Systems**

Frequency: Inspect and clean chamber systems every six months for the first year, then timed thereafter based upon the depth of sediment build up witnessed in the previous inspections. Inspections shall occur annually at a minimum. More frequent inspections may be required based upon rate of sediment accumulation.

Structure No.: _____

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Clean the system whenever the depth of the deposits averages three inches in depth across the bottom of the chambers. Inspect chambers via manholes or inspection ports. Use reverse water jet to pull sediment back into manhole. Remove sediment, trash and debris as noted above.

☐ **Hydrodynamic Separator**

Frequency: Inspect and clean unit four times a year at a minimum.

Structure Number: _____

Inspected By: _____ Date: _____

Observations: _____
_____
_____

Actions Taken: _____
_____
_____

Instructions: Clean the system whenever the depth of the deposits is equal to 50% of the maximum storage volume. Visually inspect unit via manhole. Use vacuum truck to remove sediment, trash and hydrocarbons. The hydrodynamic separator units should be inspected and cleaned a minimum of four times per year regardless of the amount of sediment in the basins. See attached maintenance guide for additional information.

Attachment H - Construction Period Pollution and Erosion and Sedimentation Control Plan

Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan

SECTION 1: Introduction

The project applicant, Ferncroft LLC, proposes multi-family housing development project at 35 Village Road in Middleton. The Site is being divided into two separate lots to separate the area of the existing commercial use to include the existing office building, existing parking garage, and related improvements (Lot A), and a second lot proposed for the new residential Project which is the subject of this Application encompassing the two new multifamily residential buildings and appurtenant areas as the area of the Chapter 40B Project (Lot B, or the Property).

Site work will include, but is not limited to, grading, drainage, utilities, paving and landscaping.

As part of this project, this "Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan" has been created to ensure that onsite erosion is prevented and sediment is controlled to prevent it from leaving the site.

SECTION 2: Construction Period Pollution Prevention Measures

Best Management Practices (BMPs) will be utilized as Construction Period Pollution Prevention Measures to reduce potential pollutants and prevent any off-site discharge. The objectives of the BMPs for construction activities are to minimize the disturbed areas, stabilize any disturbed areas, control the site perimeter and retain sediment. Both erosion and sedimentation controls and non-stormwater best management measures will be used to minimize site disturbance and ensure compliance with the performance standards of the WPA and Stormwater Standards. Measures will be taken to minimize the area disturbed by construction activities to reduce the potential for soil erosion and stormwater pollution problems. All pollution prevention and erosion control measures which are required on the site plans and in the SWPPP shall be followed along with the guidance in this document. In addition, good housekeeping measures will be followed for the day-to-day operation of the construction site under the control of the contractor to minimize the impact of construction. This section describes the control practices that will be in place during construction activities. All recommended control practices will comply with the standards set in the MA DEP Stormwater Policy Handbook.

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

In order to minimize disturbed areas all work will be completed within well-defined work limits. These work limits are shown on the construction plans. The Contractor shall not disturb native vegetation in the undisturbed wooded area without prior approval from the Engineer. The Contractor will be responsible to

make sure that all workers know the proper work limits and do not extend their work into the undisturbed areas. The protective measures are described in more detail in the following sections.

2.2 Control Stormwater Flowing onto and through the project

A portion of the perimeter around the construction area a will be lined with compost filter tubes and silt fence. The tubes/fence will be inspected daily and accumulated silt will be removed as appropriate. In addition, any storage of material will require a second level of protection by surrounding the areas with another row of compost filter tubes.

2.3 Stabilize Soils

The Contractor shall limit the area of land which is exposed and free from vegetation during construction. In areas where the period of exposure will be greater than two (2) months, mulching, the use of erosion control mats, or other protective measures shall be provided as specified.

The Contractor shall take account of the conditions of the soil where erosion control seeding will take place to ensure that materials used for re-vegetation are adaptive to the sediment control.

Following the completion of construction, embankment areas will be finished with topsoil and seed. The overland areas of the proposed construction staging areas will also be re-seeded.

2.4 Proper storage and cover of any stockpiles

The location of the Contractor's storage areas for equipment and/or materials shall be upon cleared portions of the job site or areas to be cleared as a part of this project and shall require written approval of the Engineer.

Adequate measures for erosion and sediment control such as the placement of compost filter tubes around the downstream perimeter of stockpiles shall be employed to protect any downstream areas from siltation.

The Engineer may designate a particular area or areas where the Contractor may store materials used in his operations.

2.5 Perimeter Controls and Sediment Barriers

Erosion control lines as described in Section 5 will be utilized to ensure that no sedimentation occurs outside the perimeter of the work area.

2.6 Storm Drain Inlet Protection

Storm drain inlets will be protected from sediment.

2.7 Retain Sediment On-Site

The Contractor will be responsible to monitor all erosion control measures. Whenever necessary the Contractor will clear all sediment from the compost filter tubes that have been silted up during construction. Daily monitoring should be conducted using the attached Monitoring Form.

The following good housekeeping practices will be followed on-site during the construction project.

2.8 Material Handling and Waste Management

All materials stored on-site will be stored in a neat, orderly manner in appropriate containers. All materials will be kept in their original containers with the original manufacturer's label. Substances will not be mixed with one another unless recommended by the manufacturer.

All waste materials will be collected and stored in a securely lidded metal container from a licensed management company. The waste and any construction debris from the site will be hauled off-site daily and disposed of properly. The contractor will be responsible for all waste removal. Manufacturer's recommendations for proper use and disposal will be followed for all materials. Sanitary waste will be collected from the portable units a minimum of once a week, by a licensed sanitary waste management contractor.

2.9 Designated Washout Areas

The Contractor shall perform washout into contained areas designated for that purpose to prevent cement-laden water from leaving the site.

2.10 Proper Equipment/Vehicle Fueling and Maintenance Practices

On-site vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. To ensure that leaks on stored equipment do not contaminate the site, oil-absorbing mats will be placed under all equipment during storage. Regular fueling and service of the equipment may be performed using approved methods and with care taken to minimize chance of spills. Any petroleum products will be stored in tightly sealed containers that are clearly labeled.

2.11 Equipment/Vehicle Washing

The Contractor will be responsible to ensure that no equipment is washed on-site.

SECTION 3: Spill Prevention and Control Plan

The Contractor will be responsible for preventing spills in accordance with the project specifications and applicable federal, state and local regulations. The Contractor will identify a properly trained site employee, involved with the day-to-day site operations to be the spill prevention and cleanup coordinator. The name(s) of the responsible spill personnel will be posted on-site. Each employee will be instructed that all spills are to be reported to the spill prevention and cleanup coordinator.

3.1 Spill Control Equipment

Spill control/containment equipment will be kept in the Work Area. Materials and equipment necessary for spill cleanup will be kept either in the Work Area or in an otherwise accessible on-site location. Equipment and materials will include, but not be limited to, absorbent booms/mats, brooms, dust pans, mops, rags, gloves, goggles, sand, plastic and metal containers specifically for this purpose. It is the responsibility of the Contractor to ensure the inventory will be readily accessible and maintained.

3.2 Notification

All workers will be directed to inform the on-site supervisor of a spill event. The supervisor will assess the incident and initiate proper containment and response procedures immediately upon notification. Workers should avoid direct contact with spilled materials during the containment procedures. Primary notification of a spill should be made to the local Fire Department and Police Departments. Secondary Notification will be to the certified cleanup contractor if deemed necessary by Fire and/or Police personnel. The third level of notification is to the DEP. The specific cleanup contractor to be used will be identified by the Contractor prior to commencement of construction activities.

3.3 Spill Containment and Clean-Up Measures

Spills will be contained with granular sorbent material, sand, sorbent pads, booms or all of the above to prevent spreading. Certified cleanup contractors should complete spill cleanup. The material manufacturer's recommended methods for spill cleanup will be clearly posted and on-site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

3.4 Hazardous Materials Spill Report

The Contractor will report and record any spill. The spill report will present a description of the release, including the quantity and type of material, date of the spill, circumstances leading to the release, location of spill, response actions and personnel, documentation of notifications and corrective measures implemented to prevent reoccurrence.

This document does not relieve the Contractor of the Federal reporting requirements of 40 CFR Part 110, 40 CFR Part 117, 40 CFR Part 302 and the State requirements specified under the Massachusetts Contingency Plan (M.C.P) relating to spills or other releases of oils or hazardous substances. Where a release containing a hazardous substance or oil in an amount equal to or

in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302, occurs during a twenty-four (24) hour period, the Contractor is required to comply with the response requirements of the above mentioned regulations. Spills of oil or hazardous material in excess of the reportable quantity will be reported to the National Response Center (NRC).

SECTION 4: Contact Information/Responsible Parties

Owner/Operator:
Ferncroft, LLC
747 Third Avenue, 37th Floor
New York, NY 10017

Engineer:
Anthony Capachietti, P.E.
Weston & Sampson, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978-532-1900

Site Inspector:
TBD

Contractor:
TBD

SECTION 5: Erosion and Sedimentation Control

Erosion and Sedimentation Controls are shown on the project plans. A Stormwater Pollution Prevention Plan (SWPPP) will be required for this project in accordance with EPA regulations. The contractor shall refer to the SWPPP for additional requirements.

SECTION 6: Site Development Plans

A full set of site development plans are included with this submittal.

SECTION 7: Operation and Maintenance of Erosion Control

If there is a failure to the controls the Contractor, under the supervision of the Engineer, will be required to stop work until the failure is repaired.

Periodically throughout the work, whenever the Engineer deems it necessary, the sediment that has been deposited against the controls will be removed to ensure that the controls are working properly.

SECTION 8: Inspection Schedule

During construction the erosion and sedimentation controls will be inspected daily. Once the Contractor is selected, an on-site inspector will be selected to work closely with the Engineer to insure that all erosion and sedimentation controls are in place and working properly. An Inspection Form is included.

Inspection Form

Inspected By:_____ Date: _____Time:_____

YES	NO	DOES NOT APPLY	ITEM
			Do any erosion/siltation control measures require repair or clean out to maintain adequate function?
			Is there any evidence that sediment is leaving the site and entering the wetlands?
			Are any temporary soil stockpiles or construction materials located in non-approved areas?
			Are on-site construction traffic routes, parking, and storage of equipment and supplies located in areas not specifically designed for them?
			Is there any evidence that sediment is entering subsurface stormwater chamber systems?

Specific location, current weather conditions, and action to be taken:

_____

_____

_____

_____

_____

_____

Other Comments:

_____

_____

_____

Pending the actions noted above I certify that the site is in compliance with the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan.

Signature:_____Date: _____

Attachment I - Illicit Discharge Statement

Illicit Discharge Compliance Statement

Section I – Purpose/Intent

The purpose of this document is to provide for the health, safety, and general welfare of the citizens of Middleton, Massachusetts through the regulation of non-stormwater discharges into existing outstanding resource areas near the site to the maximum extent practicable, as required by federal and state law. This document establishes methods for controlling the introduction of pollutants into existing outstanding resource areas to comply with requirements of the National Pollutant Discharge Elimination System (NPDES) permit process.

Section II - Definitions

For the purposes of this statement, the following shall mean:

Best Management Practices (BMPs): Schedules of activities, prohibitions of practices, general good housekeeping practices, pollution prevention and educational practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants directly or indirectly to stormwater, receiving waters, or stormwater conveyance systems. BMPs also include treatment practices, operating procedures, and practices to control site runoff, spillage or leaks, sludge or water disposal, or drainage from raw materials storage.

Clean Water Act: The federal Water Pollution Control Act (33 U.S.C § 1251 et seq.), and any subsequent amendments thereto.

Construction Activity: Activities subject to the Massachusetts Erosion and Sedimentation Control Act or NPDES Construction Permits. Such activities include but are not limited to clearing and grubbing, grading, excavating, and demolition.

Hazardous Materials: Any material, including any substance, waste, or combination thereof, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, a substantial present or potential hazard to human health, safety, property, or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Illegal Connection: An illegal connection is defined as either of the following:

a. Any pipe, open channel, drain or conveyance, whether on the surface or subsurface, which allows an illicit discharge to enter the outstanding resource area including but not limited to any conveyances which allow any non-stormwater discharge including sewage, process wastewater, and wash water, regardless of whether said drain or connection has been previously allowed, permitted, or approved by an authorized enforcement agency; or

b. Any pipe, open channel, drain or conveyance connected to the Town of Weymouth storm water treatment system which has not been documented in plans, maps, or equivalent records and approved by an authorized enforcement agency.

Illicit Discharge: Any direct or indirect non-stormwater discharge to the Town of Weymouth stormwater treatment system, except as exempted in Section III of this ordinance.

Industrial Activity: Activities subject to NPDES Industrial Permits as defined in 40CFR, Section 122.26 (b) (14).

National Pollutant Discharge Elimination System (NPDES) Stormwater Discharge Permit: A permit issued by MassDEP under authority delegated pursuant to 33 USC § 1342 (b) that authorizes the discharge of pollutants to waters of the United States, whether the permit is applicable on an individual, group, or general area-wide basis.

Town of Weymouth Stormwater Treatment System: Any facility, owned or maintained by the Town, designed or used for collecting and/or conveying stormwater, including but not limited to roads with drainage systems, Town of Weymouth streets, curbs, gutters, inlets, catch basins, piped storm drains, pumping facilities, infiltration, retention and detention basins, natural and man-made or altered drainage channels, reservoirs, and other drainage structures.

Non-Stormwater Discharge: Any discharge to the storm drain system that is not composed entirely of stormwater.

Person: Any individual, association, organization, partnership, firm, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, Town, county or other political subdivision of the State, interstate body, or any other legal entity.

Pollutant: Anything which causes or contributes to pollution. Pollutants may include, but are not limited to: paints, varnishes, and solvents; petroleum hydrocarbons; automotive fluids; cooking grease; detergents (biodegradable or otherwise); degreasers; cleaning chemicals; non-hazardous liquid and solid wastes; refuse, rubbish, garbage, litter, or other discarded or abandoned objects and accumulations, so that same may cause or contribute to pollution; floatables; pesticides, herbicides, and fertilizers; liquid and solid wastes; sewage, fecal coliform and pathogens; dissolved and particulate metals; animal wastes; wastes and residues that result from constructing a building or structure; concrete and cement; and noxious or offensive matter of any kind.

Pollution: Contamination or other alteration of any water's physical, chemical, or biological properties by addition of any constituent including but not limited to a change in temperature, taste, color, turbidity, or odor of such waters, or the discharge of any liquid, gaseous, solid, radioactive, or other substance into any such waters as will or is

likely to create a nuisance or render such waters harmful, detrimental, or injurious to the public health, safety, welfare, or environment, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate beneficial uses, or to livestock, wild animals, birds, fish or other aquatic life.

Premises: Any building, lot, parcel of land, or portion of land whether improved or unimproved including adjacent sidewalks and parking strips.

Stormwater: Any surface flow, runoff, and drainage consisting entirely of water from any form of natural precipitation and resulting from such precipitation.

Wastewater: Any water or other liquid discharged from a facility, that has been used, as for washing, flushing, or in a manufacturing process, and so contains waste products.

Section III - Prohibitions

Prohibition of Illicit Discharges:

No person shall throw, drain, or otherwise discharge, cause or allow others under its control to throw, drain, or otherwise discharge into the Town of Weymouth stormwater treatment system or watercourses any materials, including but not limited to, any pollutants or waters containing any pollutants, other than stormwater. The commencement, conduct or continuance of any illicit discharge to the storm drain system is prohibited except as described as follows:

1. Water line flushing performed by a government agency, other potable water sources, landscape irrigation or lawn watering, diverted stream flows, rising ground water, ground water infiltration to storm drains, uncontaminated pumped ground water, foundation or footing drains (not including active groundwater dewatering systems), crawl space pumps, air conditioning condensation, springs, natural riparian habitat or wetland flows, and any other water source not containing pollutants;

2. Discharges or flows from firefighting, and other discharges specified in writing by the Town of Weymouth as being necessary to protect public health and safety;

3. Dye testing is an allowable discharge, but requires a verbal notification to the Town of Weymouth prior to the time of the test;

4. Any non-stormwater discharge permitted under an NPDES permit, waiver, or waste discharge order issued to the discharger and administered under the authority of the Federal Environmental Protection Agency, provided that the discharger is in full compliance with all requirements of the permit, waiver, or order and other applicable laws and regulations, and provided that written approval has been granted for a discharge to the Town of Weymouth stormwater treatment system.

Section IV - Industrial or Construction Activity Discharges

Any person subject to an industrial or construction activity NPDES stormwater discharge permit shall comply with all provisions of such permit. Proof of compliance with said permit may be required in a form acceptable to the Town of Weymouth Department of Public Works prior to allowing discharges to the Town of Weymouth stormwater treatment system.

Section V - Notification of Spills and Accidental Discharges

Notwithstanding other requirements of law, as soon as any person responsible for a facility, activity or operation, or responsible for emergency response for a facility, activity or operation has information of any known or suspected release of pollutants or non-stormwater discharges from that facility, activity, or operation which are resulting or may result in illicit discharges or pollutants discharging into stormwater, the Town of Weymouth stormwater treatment system, State Waters, or Waters of the U.S., said person shall take all necessary steps to ensure the discovery, containment, and cleanup of such release so as to minimize the effects of the discharge. In the event of such a release of hazardous materials, said person shall immediately notify emergency response agencies of the occurrence via emergency dispatch services. In the event of a release of non-hazardous materials, said person shall notify the Town of Weymouth Highway Department in person or by phone no later than the next business day, including the nature, quantity and time of occurrence of the discharge. Notifications in person or by phone shall be confirmed by written notice, via certified mail return receipt requested addressed to the Town of Weymouth Department of Public Works within three (3) business days of the initial notice. If the discharge of prohibited materials emanates from a commercial or industrial establishment, the owner or operator of such establishment shall also retain an on-site written record of the discharge and the actions taken to prevent its recurrence. Such records shall be retained for at least three years.

IN WITNESS WHEREOF the parties hereto have executed copies of this Agreement on the _____ day of **_____, _____.**

_____
Representative of Ferncroft Apartment, LLC