DRAINAGE NARRATIVE AND ASSESSMENT
FOR
PROPOSED COMMERCIAL
CONTRACTOR UNITS
PLAT MAP 10 LOT 42
71 HARKNEY HILL RD. COVENTRY, RI
March 2025

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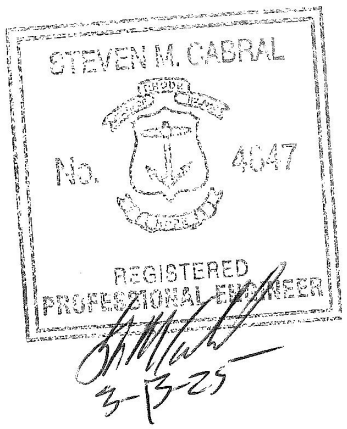

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Project Narrative

This Drainage Narrative and Assessment has been prepared for the proposed commercial contractor units at 71 Harkney Hill Road, Coventry, Rhode Island. The parcel is identified on Plat Mat 10 as Lot 42. The site is 2.2 acres and is relatively flat with two low areas. Runoff from the site ultimately flows toward the southerly property line. The site is within the Maple Root Pond Watershed (Waterbody ID RI0006013L-12).

According to the Rhode Island Department of Environmental Management (RIDEM) Environmental Resource Map, this site is classified under groundwater class GAA, is not located within 200 feet of wetlands, or in a wellhead protection area or critical resource area. The site is not within a 100-yr flood zone but is within a RIDEM Natural Heritage Area (Id128).

The proposed development will be completed in two phases. Phase 1 includes the construction of an 8,000-square-foot metal frame building, with parking areas, landscaping and new utilities. Phase 2 will include two 6,000-sf metal frame buildings with additional parking and landscaping. The stormwater management system is proposed to accept and treat runoff from both phases, and will be constructed under phase 1. This stormwater management system includes an infiltration basin, with catch basins and pipe for collection and conveyance. This design will meet the Town of Coventry stormwater regulations and also the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM) guidelines. Water quality, water quality pretreatment, recharge and peak flow attenuation are provided by above ground infiltration basin. Provided in the following table is a watershed summary.

Table 1 Watershed Area Summary (square foot)

	Existing		Post Development	
Watershed	Impervious Area	Pervious Area	Impervious Area	Pervious Area
EA1	2,627 sf (off-site)	23,018 sf	---	---
EA2	2,509 sf (off-site)	33,674 sf	---	---
EA3	---	48,508 sf	---	---
PA1	---	---	8,767 SF	---
PA2	---	---	13,517 sf	5,292 sf
PA3	---	---	8,000 sf	---
PA4	---	---	6,000 sf	---
PA5	---	---	2,502 sf (off-site) 14,919 sf (on-site)	20,883 sf
PA6	---	---	---	16,538 sf
PA7	---	---	6,000 sf	---
PA8	---	---	225 sf (off-site) 2,634 sf (on-site)	5,059 sf
Total	5,136 sf	105,200 sf	62,564 sf	47,772 sf

Minimum Standard 2: Groundwater Recharge

Stormwater must be recharged within the same watershed to maintain baseflow at pre-development recharge levels to the maximum extent practicable. The objective of the groundwater recharge standard is to protect water table levels, stream baseflow, wetlands, and soil moisture levels. The groundwater recharge volume calculations are provided below:

Required Recharge Volume (RRv):

RRv = 1" x F x I /12

Where: RRv = Required Recharge Volume
F = Recharge Factor (Rhode Island Stormwater Design and Installation Standards Manual) Note: The Rhode Island Soil Survey identifies existing soils within the area as Merrimac (MmA) and Hinkley (HkA) soil groups which consist of sands and gravel, and are in the Hydrologic Group A. The Hydrologic Soil Group A recharge coefficient is F= 0.60
I = Impervious Treatment Area (on-site) = 57,428 sf (1.32 acres)

RRv = 1" x 0.60 x (57,428 sf)/12 = 2,872 cubic feet

Provided Recharge Volume (PRv):

The recharge volume for the site is provided within the infiltration basin. All impervious runoff from the site flows into the infiltration basin, and the storage volume within the basin, below the outlet is the recharge volume provided. Storage volumes are provided in the stage-storage-volume tables in the Stormwater Runoff Calculations (HydroCAD) section of the Appendix.

BMP PRv = 19,684 cf (below the outlet weir elevation 256.5)

Drawdown within 48 hours:

Water within the proposed drainage facilities will infiltrate (drawdown) into the soils below the system. Soil evaluations have been conducted within the footprint of the proposed infiltration systems to determine the appropriate infiltration design rates using the soil textures. The subsoil beneath the proposed infiltration system used for the design infiltration rate of 8.27 in/hr, which is consistent with the soil mapping and soil evaluation data obtained for this site. The drawdown calculations are provided below.

T_D = PRv / (K x A)
Where: T_D = Drawdown Time
PRv = Provided Recharge Volume
K = Infiltration Rate
A = Bottom Surface Area of Infiltration BMP
BMP = 1,246 sf

BMP : T_D = 19,684 cf / [(8.27 in/hr) x (1'/12") x (1,256 sf)] =23 hours

Minimum Standard 3: Water Quality Improvements

Stormwater runoff from impervious surfaces must be treated before discharge. The amount of runoff that must be treated is referred to as the required Water Quality Volume. The proposed basins have been sized and designed to provide a Water Quality Volume greater than the minimum required to satisfy this standard. Refer to the calculations and tables below for the water quality requirements and provisions for the site.

Required Water Quality Volume (RWQv):

RWQv = 1" x I /12

Where: RWQv = Required Water Quality Volume
I = Impervious Treatment Area (on-site) = 57,428 sf (1.32 acres)

RWQv = 1" x (57,428 sf)/12 = 4,786 cubic feet

Provided Water Quality Volume (PWQv):

The provided water quality volume represents the storage volume within the infiltration basin below the outlet weir elevation. Impervious area on site flows into the infiltration basin, and the storage volume within the basin, below the outlet is the water quality volume provided. Storage volumes are provided in the stage-storage-volume tables in the Stormwater Runoff Calculations (HydroCAD) section of the Appendix.

PWQv = 19,684 cf (below the outlet weir elevation (256.5)

Pretreatment

Prior to entering the proposed water quality facilities, stormwater runoff requires pretreatment. The pretreatment required provided for the site is 25% of the water quality volume required. Provided below are the pretreatment calculations

Required pretreatment volume is 25% of the required WQ_V = 4,786 cf x 25% = 1,197 cf

Provided pretreatment volume = 1,230 cf (volume below the top of overflow curb (elev 255.00')
Calculation:
(Bottom area + Top area) / 2 x Height = Volume
(1,016 sf + 1,443 sf)/2 x 2 ft = 1,230 cf

Minimum Standard 4: Conveyance and Natural Channel Protection (CP_v)

The channel protection volume (CP_v) is the 24-hour extended detention of the post-development runoff volume from the 1 year, 24-hour, Type III storm event. This minimum standard is met because all runoff from post development impervious areas is fully infiltrated on site for the 1-100 year storm event.

Minimum Standard 5: Overbank Flood Protection (Runoff Calculations)

Reducing the peak flow rates for the 10-year and 100- year storm events is required to demonstrate compliance with the Overbank Flood Protection standard. The purpose of this criterion is to protect downstream structures and properties from increased runoff flows and velocities from upstream development. The proposed drainage systems have been designed to reduce peak flows for all storm events up to the 100-year storm event.

Hydrograph Methodology

Existing and post-development hydrographs have been analyzed to compare runoff for existing and post development conditions. Runoff from the existing and post development hydrographs has been computed utilizing "HydroCAD" Version 10.0 software. Generally, the methodology encompasses the Soil Conservation Service's unit hydrograph method used in TR-20, which provided a basis for TR-55. The hydrologic data is the same information required for TR-55 and includes watershed areas, SCS runoff curve numbers, and the travel length from the most remote watershed point. With this data, complete SCS hydrographs can be developed for a 24-hour Type III storm. The watershed time of concentration is computed internally using the velocity method shown in SCS/NCRS Methodologies. The velocity method assumes that time of concentration is the sum of travel times for segments along the hydraulically most distant flow path.

The hydraulically most distant point is the point with the longest time to the watershed outlet and not necessarily the point with the longest flow distance to the outlet. The site is analyzed by modeling stage/storage/discharge relationships within the "HydroCAD" program.

The "HydroCAD" program automatically routes hydrographs through BMP to determine the resulting outflow and also can combine hydrographs to determine cumulative sub watershed flows. The HydroCAD stormwater runoff calculations are provided in Appendix.

Watershed A – Existing Conditions vs. Post-Development Peak Flow Rate (CFS) Comparisons

Watershed	1.2"	1-YR	10-YR	25-YR	100-YR
Ex WSD	0.00	0.00	0.00	0.00	0.05
Pr WSD	0.00	0.00	0.00	0.00	0.05
Change	-0.00	-0.00	-0.00	-0.00	-0.05

The above tables demonstrates that there is a reduction in peak flow for all storm events.

Minimum Standard 6: Redevelopment and Infill Projects

This project is not considered a redevelopment or infill site

Minimum Standard 7: Pollution Prevention

The proposed stormwater pollution prevention practices to be implemented during construction are described and outlined in the accompanying site plans and the Soil Erosion and Sediment Control Plan (SESCP).

Minimum Standard 8: Land Uses with Higher Potential Pollutant Loads

The proposed improvements are not considered LUHPPL.

Minimum Standard 9: Illicit Discharges

This Minimum Standard is not applicable to the project.

Minimum Standard 10: Construction Erosion and Sediment Control

The proposed vegetative and structural practices to be implemented during construction are described and outlined in the accompanying site plans and the standalone Soil Erosion and Sediment Control Plan document. In addition, the operator should initiate appropriate permanent stabilization practices on all disturbed areas as soon as possible but not more than fourteen (14) days after the construction activity in that area has temporarily or permanently ceased, unless the activity is to resume within twenty-one (21) days. If construction cannot begin within twenty-one (21) days of completing site preparation activities, all disturbed areas shall be stabilized with loam and seeding.

Additional Controls

- Install perimeter erosion controls, install a crushed stone construction entrance will be located at the site's only access point.
- Review SESC Plan and site plans soil erosion control notes
- The Contractor is required to notify local authorities and the Rhode Island Department of Environmental Management, Office of Waste Management, of any hazardous material spill.
- The Contractor is required to maintain the site in an orderly and clean state. All construction waste shall be stored in appropriate containers prior to removal and contact with precipitation shall be kept to a minimum.
- General Maintenance procedures are outlined in the accompanying Site Plans. In addition, the Operator and Contractor are required to inspect all erosion controls on the site at least once every seven (7) calendar days and within twenty-four (24) hours after a rain event, which generates 0.25 inches of rain in a twenty-four (24) hour period and/or after a significant amount of runoff.

Minimum Standard 11: Stormwater Management System – Maintenance Operation

The proposed stormwater management system maintenance and inspection requirements shall be implemented by the owner after construction is described and outlined in the accompanying Long-Term Operation and Maintenance Plan.

Appendix

Appendix A - RISDISM Appendix A: Stormwater Management Checklist

Appendix B- Stormwater Runoff Calculations (HydroCAD)

Appendix C – Soil Evaluations

Appendix D – Soil Survey Map

Appendix E – FEMA Flood Map

Appendix F – Groundwater Mounding Calculations

Appendix G – Watershed Maps

Appendix A - RISDISM Appendix A: Stormwater Management Checklist

APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST AND LID PLANNING REPORT – STORMWATER DESIGN SUMMARY

PROJECT NAME **Proposed Commercial Contractor Units**	**(RIDEM USE ONLY)**
TOWN **Coventry, RI**	**STW/WQC File #:**
The proposed project is to install 3 commercial contractor buildings on a site located at 71 Harkney Hill Road, Coventry, Rhode Island. The parcel is identified on Plat Mat 10 as Lot 42. The site is 2.2 acres and is relatively flat with two low areas. Runoff from the site ultimately flows toward the southerly property line. The site is within the Maple Root Pond Watershed (Waterbody ID RI0006013L-12). The proposed development will be completed in two phases. Phase 1 includes the construction of an 8,000-square-foot metal frame building, with parking areas, landscaping and new utilities. Phase 2 will include two 6,000-sf metal frame buildings with additional parking and landscaping. The stormwater management system is proposed to accept and treat runoff from both phases, and will be constructed under phase 1. This stormwater management system includes an infiltration basin, with catch basins and pipe for collection and conveyance. This design will meet the Town of Coventry stormwater regulations and also the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM) guidelines. Water quality, water quality pretreatment, recharge and peak flow attenuation are provided by above ground infiltration basin. Provided in the following table is a watershed summary.	**Date Received:**

Stormwater Management Plan (SMP) Elements – Minimum Standards

When submitting a SMP,[1] submit four separately bound documents: Appendix A Checklist; Stormwater Site Planning, Analysis and Design Report with Plan Set/Drawings; Soil Erosion and Sediment Control (SESC) Plan, and Post Construction Operations and Maintenance (O&M) Plan. Please refer to Suggestions to Promote Brevity**.**

Note**: All stormwater construction projects must create a Stormwater Management Plan (SMP). However, not every element listed below is required per the RIDEM Stormwater Rules and the RIPDES Construction General Permit (CGP). This checklist will help identify the required elements to be submitted with an Application for Stormwater Construction Permit & Water Quality Certification.**

PART 1. PROJECT AND SITE INFORMATION

PROJECT TYPE (Check all that apply)

☐ Residential	☒ Commercial	☐ Federal	☐ Retrofit	☐ Restoration
☐ Road	☐ Utility	☐ Fill	☐ Dredge	☐ Mine
☐ Other (specify):				

SITE INFORMATION

☒ Vicinity Map

INITIAL DISCHARGE LOCATION(S): The WQv discharges to: (You may choose more than one answer if several discharge points are associated with the project.)

☐ **Groundwater**	☐ **Surface Water**	☐ **MS4**
☒ GAA	☐ Isolated Wetland	☐ RIDOT

[1] Applications for a Construction General Permit that do not require any other permits from RIDEM and will disturb less than 5 acres over the entire course of the project do not need to submit a SMP. The Appendix A checklist must still be submitted.

☐ GA	☒ Named Waterbody	☐ RIDOT Alteration Permit is Approved
☐ GB	☐ Unnamed Waterbody Connected to Named Waterbody	☐ Town
		☒ Other (specify): N/A

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQ_v and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.			
☐ Groundwater or Disconnected Wetland	☐ SRWP		
☒ Waterbody Name: Maple Root Pond	☐ Coldwater	☐ Warmwater	☒ Unassessed
☒ Waterbody ID: RI0006013L-12	☐ 4th order stream of pond 50 acres or more		
☐ TMDL for:	☐ Watershed of flood prone river (e.g., Pocasset River)		
☐ Contributes to a priority outfall listed in the TMDL	☐ Contributes stormwater to a public beach		
☒ 303(d) list – Impairment(s) for: NON-NATIVE AQUATIC PLANTS	☐ Contributes to shellfishing grounds		

PROJECT HISTORY		
☐ RIDEM Pre- Application Meeting	Meeting Date:	☐ Minutes Attached
☐ Municipal Master Plan Approval	Approval Date:	☐ Minutes Attached
☐ Subdivision Suitability Required	Approval #:	
☐ Previous Enforcement Action has been taken on the property	Enforcement #:	

FLOODPLAIN & FLOODWAY See Guidance Pertaining to Floodplain and Floodways	
☒ Riverine 100-year floodplain: **FEMA FLOODPLAIN FIRMETTE** has been reviewed and the 100-year floodplain is on site	
☒ Delineated from FEMA Maps	
NOTE: Per Rule 250-RICR-150-10-8-1.1(B)(5)(d)(3), provide volumetric floodplain compensation calculations for cut and fill/displacement calculated by qualified professional	
☐ Calculated by Professional Engineer	
☐ Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY): Amount of Cut (CY):
☐ Restrictions or modifications are proposed to the flow path or velocities in a floodway	
☐ Floodplain storage capacity is impacted	
☒ Project area is not within 100-year floodplain as defined by RIDEM	

CRMC JURISDICTION
☐ CRMC Assent required
☐ Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP:
☐ Sea level rise mitigation has been designed into this project

LUHPPL IDENTIFICATION - MINIMUM STANDARD 8:
1. OFFICE OF Land Revitalization and Sustainable Materials Management (OLRSMM)

	☐ Known or suspected releases of HAZARDOUS MATERIAL are present at the site (Hazardous Material is defined in Rule 1.4(A)(33) of 250-140-30-1 of the RIDEM Rules and Regulations for Investigation and Remediation of Hazardous Materials (the Remediation Regulations))	**RIDEM CONTACT:**
	☐ Known or suspected releases of PETROLEUM PRODUCT are present at the site (Petroleum Product as defined in Rule 1.5(A)(84) of 250-140-25-1 of the RIDEM Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials)	
	☐ This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities	**SITE ID#**:
	☐ CERCLIS/Superfund (NPL)	
	☐ State Hazardous Waste Site (SHWS)	
	☐ Environmental Land Usage Restriction (ELUR)	
	☐ Leaking Underground Storage Tank (LUST)	
	☐ Closed Landfill	
Note:	If any boxes in 1 above are checked, the applicant must contact the RIDEM OLRSMM Project Manager associated with the Site to determine if subsurface infiltration of stormwater is allowable for the project. Indicate if the infiltration corresponds to "Red," "Yellow" or "Green" as described in Section 3.2.8 of the RISDISM Guidance (Subsurface Contamination Guidance). Also, note and reference approval in PART 3, Minimum Standard 2: Groundwater Recharge/Infiltration**.**	
2.	**PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 "LUHPPLS," THE SITE IS/HAS:**	
	☐ Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php	
	☐ Auto Fueling Facility (e.g., gas station)	
	☐ Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area	
	☐ Road Salt Storage and Loading Areas (exposed to rainwater)	
	☐ Outdoor Storage and Loading/Unloading of Hazardous Substances	
3.	**STORMWATER INDUSTRIAL PERMITTING**	
	☐ The site is associated with existing or proposed activities that are considered Land Uses with Higher Potential Pollutant Loads (LUHPPLS) (see RICR 8.14.C)	Activities: Sector:
	☐ Construction is proposed on a site that is subject to THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.	MSGP permit #
	☐ Additional stormwater treatment is required by the MSGP Explain:	

REDEVELOPMENT STANDARD – MINIMUM STANDARD 6		
☐ Pre Construction Impervious Area		
	☐ Total Pre-Construction Impervious Area (**TIA**) 0.00	
	☒ Total Site Area (**TSA**) 2.2 Acres	
	☐ Jurisdictional Wetlands (**JW**) 0.00	
	☐ Conservation Land (**CL**) 0.00	
☒ Calculate the Site Size (defined as contiguous properties under same ownership)		
	☒ Site Size (**SS**) = (**TSA**) – (**JW**) – (**CL**)= 2.2-0.00-0.00 = 2.2 acres	
	☒ (**TIA**) / (**SS**) = 0/2.2=0	☐ (**TIA**) / (**SS**) >**0.4**?
☐ YES, Redevelopment		

PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1

(NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS)

This section may be deleted if not required.

Note: A written description must be provided specifying why each method is not being used or is not applicable at the Site. Appropriate answers may include:

- Town requires … (state the specific local requirement)
- Meets Town's dimensional requirement of …
- Not practical for site because …
- Applying for waiver/variance to achieve this (pending/approved/denied)
- Applying for wavier/variance to seek relief from this (pending/approved/denied)

A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS ☒ Sensitive resource areas and site constraints are identified (required) ☒ Local development regulations have been reviewed (required) ☒ All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction ☐ Conservation Development or another site design technique has been incorporated to protect open space and pre-development hydrology. **Note:** If Conservation Development has been used, check box and skip to Subpart C ☒ As much natural vegetation and pre-development hydrology as possible has been maintained	**IF NOT IMPLEMENTED, EXPLAIN HERE** Not practical for this site because proposed improvements are necessary to meet the project needs
B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS ☒ Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies ☒ Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B) ☐ Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA's) ☒ Development sites and building envelopes have been positioned outside of floodplains ☒ Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features ☒ Development sites and building envelopes have been located to minimize impacts to steep slopes (≥15%) ☐ Other (describe):	Not practical for this site because proposed improvements are necessary to meet the project needs
C) MINIMIZE CLEARING AND GRADING ☒ Site clearing has been restricted to <u>minimum area needed</u> for building footprints, development activities, construction access, and safety. ☒ Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities) ☒ Protection for stands of trees and individual trees and their root zones to be preserved has been specified, and such protection extends at least to the tree canopy drip line(s) ☒ Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent	No trees existing to protect Landscaping proposed
D) REDUCE IMPERVIOUS COVER ☐ Reduced roadway widths (≤22 feet for ADT ≤ 400; ≤ 26 feet for ADT 400 - 2,000) ☐ Reduced driveway areas (length minimized via reduced ROW width (≤ 45 ft.) and/or reduced (or absolute minimum) front yard setback; width minimized to ≤ 9 ft. wide one lane; ≤ 18 ft. wide two lanes; shared driveways; pervious surface) ☐ Reduced building footprint: Explain approach: ☐ Reduced sidewalk area (≤ 4 ft. wide; one side of the street; unpaved path; pervious surface) ☐ Reduced cul-de-sacs (radius < 45 ft; vegetated island; alternative turn-around) ☐ Reduced parking lot area: Explain approach ☐ Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc. ☒ Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance) ☐ Other (describe):	Not practical for this site because proposed improvements are necessary to meet the project needs
E) DISCONNECT IMPERVIOUS AREA ☐ Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible ☐ Residential street edges allow side-of-the-road drainage into vegetated open swales ☐ Parking lot landscaping breaks up impervious expanse AND accepts runoff ☐ Other (describe):	Not practical for this site because proposed improvements are necessary to meet the project needs

F) MITIGATE RUNOFF AT THE POINT OF GENERATION ☒ Small-scale BMPs have been designated to treat runoff as close as possible to the source	
G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION ☒ Low-maintenance landscaping has been proposed using native species and cultivars ☒ Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan ☐ Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots	N/A
H) RESTORE STREAMS/WETLANDS ☐ Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands ☐ Removal of invasive species ☐ Other	N/A

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2		
YES	**NO**	
☒	☐	The project has been designed to meet the groundwater recharge standard.
☐	☐	If "No," the justification for groundwater recharge criterion waiver has been explained in the Narrative (e.g., threat of groundwater contamination or physical limitation), if applicable (see RICR 8.8.D);
☐	☐	Your waiver request has been explained in the Narrative, if applicable.
☐	☒	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
☐	☐	If "Yes," has approval for infiltration by the OLRSMM Site Project Manager, per Part 1, Minimum Standard 8, been requested?

TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2)
(Add or Subtract Rows as Necessary) *N/A*

Design Point	**Impervious Area Treated (sq ft)**	**Total Re_v Required (cu ft)**	**LID Stormwater Credits (see RISDISM Section 4.6.1)** **Portion of Re_v directed to a QPA (cu ft)**	**Recharge Required by Remaining BMPs (cu ft)**	**Recharge Provided by BMPs (cu ft)**
DP-1: B (Basin)	57,428	2,872		2,872	19,684
TOTALS:	57,428	2,872		2,872	19,684

Notes:
1. Only BMPs listed in RISDISM Table 3-5 "List of BMPs Acceptable for Recharge" may be used to meet the recharge requirement.
2. Recharge requirement must be satisfied for each waterbody ID.

☒ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.): Drainage Narrative and Assessment, Minimum Standard 2

WATER QUALITY – MINIMUM STANDARD 3		
YES	**NO**	
☒	☐	Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
☒	☐	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
☒	☐	If "Yes," either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
☐	☐	If "Yes," either TR-55 or TR-20 was used to calculate WQv; and,
☐	☐	If "No," the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
☐	☐	Not Applicable
☒	☐	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
☒	☐	Does this project propose an increase of impervious cover to a receiving water body with impairments? If "Yes," please indicate below the method that was used to address the water quality requirements of no further degradation to a low-quality water.
☐	☒	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed
☒	☐	The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
☐	☒	BMPs are proposed that are on the approved technology list . If "Yes," please provide all required worksheets from the manufacturer.
☐	☒	Additional pollutant-specific requirements and/or pollutant removal efficiencies are applicable to the site as the result of a TMDL, SAMP, or other watershed-specific requirements. If "Yes," please describe:

TABLE 3-1: Summary of Water Quality (see RICR 8.9)

Design Point and WB ID	Impervious area treated (sq ft)	Total WQ_v Required (cu ft)	LID Stormwater Credits (see RICR 8.18) WQv directed to a QPA (cu ft)	Water Quality Treatment Remaining (cu ft)	Water Quality Provided by BMPs (cu ft)
BMP	57,428	4,786		4,786	19,684
TOTALS:	57,428	4,786		4,786	19,684

Notes:
1. Only BMPs listed in RICR 8.20 and 8.25 or the Approved Technologies List of BMPs is Acceptable for Water Quality treatment.
2. For each Design Point, the Water Quality Volume Standard must be met for each Waterbody ID.

☒ YES ☐ NO	This project has met the setback requirements for each BMP. If "No," please explain:

☐ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.): Drainage Narrative and Assessment, Minimum Standard 3

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4		
YES	**NO**	
☐	☒	Is this standard waived? If "Yes," please indicate one or more of the reasons below:
		☐ The project directs discharge to a large river (i.e., 4th-order stream or larger. See RISDISM Appendix I for State-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters. ☐ The project is a small facility with impervious cover of less than or equal to 1 acre. ☐ The project has a post-development peak discharge rate from the facility that is less than 2 cfs for the 1-year, 24-hour Type III design storm event (prior to any attenuation). (Note: LID design strategies can greatly reduce the peak discharge rate).
☒	☐	Conveyance and natural channel protection for the site have been met. If "No,' explain why:

TABLE 4-1: Summary of Channel Protection Volumes (see RICR 8.10)					
Design Point	**Receiving Water Body Name**	**Coldwater Fishery? (Y/N)**	**Total CPv Required (cu ft)**	**Total CPv Provided (cu ft)**	**Average Release Rate Modeled in the 1-yr storm (cfs)**
DP-1:					
DP-2:					
DP-3:					
DP-4:					
TOTALS:					
Note: The Channel Protection Volume Standard must be met in each waterbody ID.					
☐ YES ☐ NO	The CPv is released at roughly a uniform rate over a 24-hour duration (see examples of sizing calculations in Appendix D of the RISDISM).				
☐ YES ☐ NO	Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If "Yes," please indicate restrictions and solutions below.				
☐ Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).					

OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5			
YES	**NO**		
☐	☒	Is this standard waived? If yes, please indicate one or more of the reasons below:	
		☐	The project directs discharge to a large river (i.e., 4th-order stream or larger. See Appendix I for state-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
		☐	A Downstream Analysis (see RICR 8.11.D and E) indicates that peak discharge control would not be beneficial or would exacerbate peak flows in a downstream tributary of a particular site (e.g., through coincident peaks).
☐	☒	Does the project flow to an MS4 system or subject to other stormwater requirements? If "Yes," indicate as follows:	
		☐	RIDOT
		☐	Other (specify):
Note: The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT's regulations indicate that post-volumes must be **less** than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.			
		Indicate below which model was used for your analysis. ☐ TR-55 ☐ TR-20 ☒ HydroCAD ☐ Bentley/Haestad ☐ Intellisolve ☐ Other (Specify):	
YES	**NO**		
☒	☐	Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If "No," please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):	
☒	☐	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"	
☒	☐	Are the areas modeled as "present condition" for both pre- and post-development analysis?	
☒	☐	Are the off-site areas shown on the subwatershed maps?	
☒	☐	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?	
☐	☒	Is a Downstream Analysis required (see RICR 8.11.E.1)?	
☒	☐	Calculate the following:	
		☒	Area of disturbance within the sub-watershed (areas) 2.5 Acres
		☒	Impervious cover (%) 52%
☐	☒	Is a dam breach analysis required (earthen embankments over six (6) feet in height, or a capacity of 15 acre-feet or more, and contributes to a significant or high hazard dam)?	
☒	☐	Does this project meet the overbank flood protection standard?	

Table 5-1 Hydraulic Analysis Summary								
Subwatershed (Design Point)	**1.2" Peak Flow** (cfs)		**1-yr Peak Flow** (cfs)		**10-yr Peak Flow** (cfs)		**100-yr Peak Flow** (cfs)	
	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
South low spot	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05
TOTALS:	0.00	0.00	0.00	0.00	0.00	0.0	0.05	0.05

** Utilize modified curve number method or split pervious /impervious method in HydroCAD.

Note: The hydraulic analysis must demonstrate no impact to each individual subwatershed DP unless each DP discharges to the same wetland or water resource.

Indicate as follows where the pertinent calculations and/or information for the items above are provided	**Name of report/document, page numbers, appendices, etc.**
Existing conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, and water surface elevations showing methodologies used and supporting calculations.	Drainage Narrative and Assessment Appendix B
Proposed conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, water surface elevations, and routing showing the methodologies used and supporting calculations.	Drainage Narrative and Assessment Appendix B
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	Drainage Narrative and Assessment Appendix B
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	Drainage Narrative and Assessment Appendix B

Table 5-2 Summary of Best Management Practices											
BMP ID	**DP #**	**BMP Type** (e.g., bioretention, tree filter)	**BMP Functions**					**Bypass Type**	**Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4**		
			Pre-Treatment (Y/N/ NA)	Re_v	WQ_v	CP_v (Y/N/ NA)	Overbank Flood Reduction (Y/N/NA)	External (E) Internal (I) or NA	Yes/ No	Technical Justification (Design Report page number)	Distance Provided
BMP 1a	A	Sediment Forebay No.	Y	N	Y	NA	N	NA	Y	Property Line	10 ft
BMP 1b	A	Infiltration Basin	Y	Y	Y	Y	Y	NA	Y	Property Line	10 ft

Table 5.3 Summary of Soils to Evaluate Each BMP				
DP #	**BMP**	**BMP Type**	**Soils Analysis for Each BMP**	

	ID	(e.g., bioretention, tree filter)	Test Pit ID# and Ground Elevation		SHWT Elevation (ft)	Bottom of Practice Elevation* (ft)	Separation Distance Provided (ft)	Hydrologic Soil Group (A, B, C, D)	Exfiltration Rate Applied (in/hr)
			Primary	Secondary					
P	BMP	Sediment Forebay	TP#4 258	TP#5 258	249.5	252.5	3.0’	A	8.27
P	BMP	Infiltration Basin	TP#5 258	TP#4 258	249.5	252.5	3.0’	A	8.27

LAND USES WITH HIGHER POTENTIAL POLLUTANTS LOADS (LUHPPLs) – MINIMUM STANDARD 8			
YES	**NO**	**N/A**	
☐	☐	☒	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.
☐	☐	☒	Are these activities already covered under an MSGP? If “No,” please explain if you have applied for an MSGP or intend to do so?
☐	☐	☒	List the specific BMPs that are proposed for this project that receive stormwater from LUHPPL drainage areas. These BMP types must be listed in RISDISM Table 3-3, “Acceptable BMPs for Use at LUHPPLs.” Please list BMPs:
☐	☐	☒	Additional BMPs, or additional pretreatment BMP’s if any, that meet RIPDES MSGP requirements; Please list BMPs:
			Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).

ILLICIT DISCHARGES – MINIMUM STANDARD 9			
Illicit discharges are defined as unpermitted discharges to Waters of the State that do not consist entirely of stormwater or uncontaminated groundwater, except for certain discharges identified in the RIPDES Phase II Stormwater General Permit.			
YES	**NO**	**N/A**	
☒	☐	☐	Have you checked for illicit discharges?
☐	☒	☐	Have any been found and/or corrected? If “Yes,” please identify.
☒	☐	☐	Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10			
YES	**NO**	**N/A**	

☒	☐	☐	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?	
☒	☐	☐	Have you provided a **separately-bound** document based upon the SESC Template? If yes, proceed to Minimum Standard 11 (the following items can be assumed to be addressed).	
			If "No," include a document with your submittal that addresses the following elements of an SESC Plan:	
			☒	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
			☒	Provide Natural Buffers and Maintain Existing Vegetation
			☒	Minimize Area of Disturbance
			☒	Minimize the Disturbance of Steep Slopes
			☒	Preserve Topsoil
			☒	Stabilize Soils
			☒	Protect Storm Drain Inlets
			☒	Protect Storm Drain Outlets
			☒	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
			☒	Establish Perimeter Controls and Sediment Barriers
			☒	Divert or Manage Run-On from Up-Gradient Areas
			☒	Properly Design Constructed Stormwater Conveyance Channels
			☒	Retain Sediment On-Site
			☒	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
			☒	Apply Construction Activity Pollution Prevention Control Measures
			☒	Install, Inspect, and Maintain Control Measures and Take Corrective Actions
			☒	Qualified SESC Plan Preparer's Information and Certification
			☒	Operator's Information and Certification; if not known at the time of application, the Operator must certify the SESC Plan upon selection and prior to initiating site activities
			☒	Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required

STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9		
Operation and Maintenance Section		
YES	**NO**	
☒	☐	Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?
☒	☐	Have you provided a **separately-bound** Operation and Maintenance Plan for the site and for all of the BMPs, and does it address each element of RICR 8.17 and RISDISM Appendix C and E?
☒	☐	Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If "No," why not?
☒	☐	Is the property owner or homeowner's association responsible for the stormwater maintenance of all BMP's? If "No," you must provide a legally binding and enforceable maintenance agreement (see RISDISM Appendix E, page 26) that identifies the entity that will be responsible for maintenance of the stormwater. Indicate where this agreement can be found in your report (i.e., name of report/document, page numbers, appendices, etc.).
☒	☐	Do you anticipate that you will need legal agreements related to the stormwater structures? (e.g. off-site easements, deed restrictions, covenants, or ELUR per the Remediation Regulations). If "Yes," have you obtained them? Or please explain your plan to obtain them:
☐	☒	Is stormwater being directed from public areas to private property? If "Yes," note the following: Note: This is not allowed unless a funding mechanism is in place to provide the finances for the long-term maintenance of the BMP and drainage, or a funding mechanism is demonstrated that can guarantee the long-

		term maintenance of a stormwater BMP by an individual homeowner.
Pollution Prevention Section		
☒	☐	Designated snow stockpile locations?
☒	☐	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
☒	☐	Asphalt-only based sealants?
☐	☒	Pet waste stations? (Note: If a receiving water has a bacterial impairment, and the project involves housing units, then this could be an important part of your pollution prevention plan).
☒	☐	Regular sweeping? Please describe:
☒	☐	De-icing specifications, in accordance with RISDISM Appendix G. (NOTE: If the groundwater is GAA, or this area contributes to a drinking water supply, then this could be an important part of your pollution prevention plan).
☐	☒	A prohibition of phosphate-based fertilizers? (Note: If the site discharges to a phosphorus impaired waterbody, then this could be an important part of your pollution prevention plan).

PART 4. SUBWATERSHED MAPPING AND SITE-PLAN DETAILS

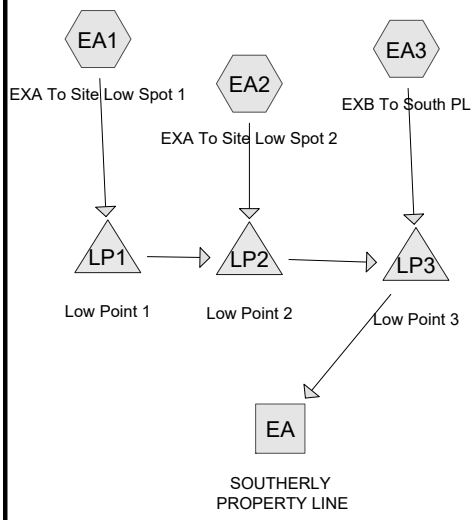
Existing and Proposed Subwatershed Mapping (REQUIRED)			
YES	**NO**		
☒	☐		Existing and proposed drainage area delineations
☒	☐		Locations of all streams and drainage swales
☒	☐		Drainage flow paths, mapped according to the DEM *Guidance for Preparation of Drainage Area Maps* (included in RISDISM Appendix K)
☒	☐		Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
☒	☐		Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
☒	☐		Mapped seasonal high-water-table test pit locations
☒	☐		Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs
☒	☐		Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans
☐	☒		Mapped bedrock outcrops adjacent to any infiltration BMP
☒	☐		Soils were logged by a:
		☒	DEM-licensed Class IV soil evaluator Name: Brian King D4010
		☐	RI-registered P.E. Name:

Subwatershed and Impervious Area Summary				
Subwatershed (area to each design point)	**First Receiving Water ID or MS4**	**Area Disturbed (Acres)**	**Existing Impervious (Acres)**	**Proposed Impervious (Acres)**
Maple Root Pond	RI0006013L-12	2.5	0	1.32
TOTALS:		2.5	0	1.32

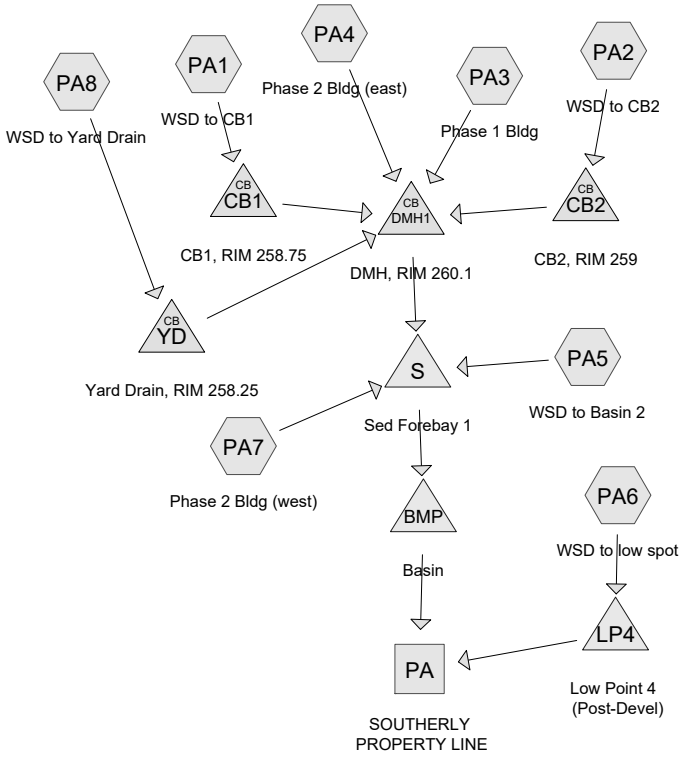
Site Construction Plans (Indicate that the following applicable specifications are provided)		
YES	**NO**	
☒	☐	Existing and proposed plans (scale not greater than 1" = 40') with North arrow
☒	☐	Existing and proposed site topography (with 1 or 2-foot contours); 10-foot contours accepted for off-site areas
☒	☐	Boundaries of existing predominant vegetation and proposed limits of clearing
☒	☐	Site Location clarification
☒	☐	Location and field-verified boundaries of resource protection areas such as: ► freshwater and coastal wetlands, including lakes and ponds ► coastal shoreline features Perennial and intermittent streams, in addition to Areas Subject to Storm Flowage (ASSFs)
☒	☐	All required setbacks (e.g., buffers, water-supply wells, septic systems)
☒	☐	Representative cross-section and profile drawings, and notes and details of structural stormwater management practices and conveyances (i.e., storm drains, open channels, swales, etc.), which include: ► Location and size of the stormwater treatment practices (type of practice, depth, area). Stormwater treatment practices (BMPs) must have labels that correspond to RISDISM Table 5-2; ► Design water surface elevations (applicable storms); ► Structural details of outlet structures, embankments, spillways, stilling basins, grade-control structures, conveyance channels, etc.; ► Existing and proposed structural elevations (e.g., inverts of pipes, manholes, etc.); ► Location of floodplain and, if applicable, floodway limits and relationship of site to upstream and downstream properties or drainage that could be affected by work in the floodplain; ► Planting plans for structural stormwater BMPs, including species, size, planting methods, and maintenance requirements of proposed planting
☒	☐	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report and corresponding water tables
☐	☒	Mapping of any OLRSMM-approved remedial actions/systems (including ELURs)
☒	☐	Location of existing and proposed roads, buildings, and other structures including limits of disturbance; ► Existing and proposed utilities (e.g., water, sewer, gas, electric) and easements; ► Location of existing and proposed conveyance systems, such as grass channels, swales, and storm drains, and location(s) of final discharge point(s) (wetland, waterbody, etc.); ► Cross sections of roadways, with edge details such as curbs and sidewalks; ► Location and dimensions of channel modifications, such as bridge or culvert crossings
☐	☒	Locations, cross sections, and profiles of all stream or wetland crossings and their method of stabilization

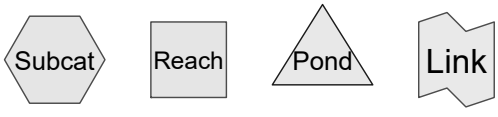
Appendix B- Stormwater Runoff Calculations (HydroCAD)

EX CONDITIONS



Post Devel CONDITIONS





Routing Diagram for 2872-March 2025
Prepared by {enter your company name here}, Printed 3/14/2025

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EA1: EXA To Site Low Spot Runoff Area=25,645 sf 10.24% Impervious Runoff Depth>0.10"
Tc=5.0 min CN=30/98 Runoff=0.07 cfs 0.005 af

Subcatchment EA2: EXA To Site Low Spot 2 Runoff Area=36,183 sf 6.93% Impervious Runoff Depth>0.07"
Tc=5.0 min CN=30/98 Runoff=0.07 cfs 0.005 af

Subcatchment EA3: EXB To South PL Runoff Area=48,508 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=222' Tc=11.2 min CN=31/0 Runoff=0.00 cfs 0.000 af

Subcatchment PA1: WSD to CB1 Runoff Area=8,767 sf 100.00% Impervious Runoff Depth>0.98"
Tc=5.0 min CN=0/98 Runoff=0.23 cfs 0.017 af

Subcatchment PA2: WSD to CB2 Runoff Area=18,809 sf 71.86% Impervious Runoff Depth>0.71"
Tc=5.0 min CN=39/98 Runoff=0.35 cfs 0.025 af

Subcatchment PA3: Phase 1 Bldg Runoff Area=8,000 sf 100.00% Impervious Runoff Depth>0.98"
Tc=5.0 min CN=0/98 Runoff=0.21 cfs 0.015 af

Subcatchment PA4: Phase 2 Bldg (east) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>0.98"
Tc=5.0 min CN=0/98 Runoff=0.16 cfs 0.011 af

Subcatchment PA5: WSD to Basin 2 Runoff Area=38,304 sf 45.48% Impervious Runoff Depth>0.45"
Tc=5.0 min CN=39/98 Runoff=0.45 cfs 0.033 af

Subcatchment PA6: WSD to low spot Runoff Area=16,538 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39/0 Runoff=0.00 cfs 0.000 af

Subcatchment PA7: Phase 2 Bldg (west) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>0.98"
Tc=5.0 min CN=0/98 Runoff=0.16 cfs 0.011 af

Subcatchment PA8: WSD to Yard Drain Runoff Area=7,918 sf 36.11% Impervious Runoff Depth>0.36"
Tc=5.0 min CN=39/98 Runoff=0.07 cfs 0.005 af

Reach EA: SOUTHERLY PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach PA: SOUTHERLY PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond BMP: Basin Peak Elev=253.06' Storage=1,003 cf Inflow=1.77 cfs 0.090 af
Discarded=0.50 cfs 0.090 af Primary=0.00 cfs 0.000 af Outflow=0.50 cfs 0.090 af

Pond CB1: CB1, RIM 258.75 Peak Elev=255.58' Inflow=0.23 cfs 0.017 af
18.0" Round Culvert n=0.013 L=75.0' S=0.0000 '/' Outflow=0.23 cfs 0.017 af

Pond CB2: CB2, RIM 259 Peak Elev=255.61' Inflow=0.35 cfs 0.025 af
18.0" Round Culvert n=0.013 L=124.3' S=0.0000 '/' Outflow=0.35 cfs 0.025 af

Pond DMH1: DMH, RIM 260.1 Peak Elev=255.56' Inflow=1.02 cfs 0.074 af
18.0" Round Culvert n=0.013 L=108.0' S=0.0093 '/' Outflow=1.02 cfs 0.074 af

Pond LP1: Low Point 1 Peak Elev=257.14' Storage=216 cf Inflow=0.07 cfs 0.005 af
Outflow=0.00 cfs 0.000 af

Pond LP2: Low Point 2 Peak Elev=257.09' Storage=206 cf Inflow=0.07 cfs 0.005 af
Outflow=0.00 cfs 0.000 af

Pond LP3: Low Point 3 Peak Elev=257.10' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond LP4: Low Point 4 (Post-Devel) Peak Elev=257.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond S: Sed Forebay 1 Peak Elev=255.03' Storage=1,230 cf Inflow=1.63 cfs 0.118 af
Outflow=1.77 cfs 0.090 af

Pond YD: Yard Drain, RIM 258.25 Peak Elev=256.23' Inflow=0.07 cfs 0.005 af
10.0" Round Culvert n=0.013 L=222.0' S=0.0011 '/' Outflow=0.07 cfs 0.005 af

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EA1: EXA To Site Low Spot Runoff Area=25,645 sf 10.24% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=37 Runoff=0.00 cfs 0.000 af

Subcatchment EA2: EXA To Site Low Spot 2 Runoff Area=36,183 sf 6.93% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=35 Runoff=0.00 cfs 0.000 af

Subcatchment EA3: EXB To South PL Runoff Area=48,508 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=222' Tc=11.2 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment PA1: WSD to CB1 Runoff Area=8,767 sf 100.00% Impervious Runoff Depth>2.47"
Tc=5.0 min CN=98 Runoff=0.54 cfs 0.041 af

Subcatchment PA2: WSD to CB2 Runoff Area=18,809 sf 71.86% Impervious Runoff Depth>1.09"
Tc=5.0 min CN=81 Runoff=0.56 cfs 0.039 af

Subcatchment PA3: Phase 1 Bldg Runoff Area=8,000 sf 100.00% Impervious Runoff Depth>2.47"
Tc=5.0 min CN=98 Runoff=0.50 cfs 0.038 af

Subcatchment PA4: Phase 2 Bldg (east) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>2.47"
Tc=5.0 min CN=98 Runoff=0.37 cfs 0.028 af

Subcatchment PA5: WSD to Basin 2 Runoff Area=38,304 sf 45.48% Impervious Runoff Depth>0.41"
Tc=5.0 min CN=66 Runoff=0.30 cfs 0.030 af

Subcatchment PA6: WSD to low spot Runoff Area=16,538 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment PA7: Phase 2 Bldg (west) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>2.47"
Tc=5.0 min CN=98 Runoff=0.37 cfs 0.028 af

Subcatchment PA8: WSD to Yard Drain Runoff Area=7,918 sf 36.11% Impervious Runoff Depth>0.23"
Tc=5.0 min CN=60 Runoff=0.02 cfs 0.004 af

Reach EA: SOUTHERLY PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach PA: SOUTHERLY PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond BMP: Basin Peak Elev=253.50' Storage=2,103 cf Inflow=2.70 cfs 0.180 af
Discarded=0.65 cfs 0.180 af Primary=0.00 cfs 0.000 af Outflow=0.65 cfs 0.180 af

Pond CB1: CB1, RIM 258.75 Peak Elev=255.80' Inflow=0.54 cfs 0.041 af
18.0" Round Culvert n=0.013 L=75.0' S=0.0000 '/' Outflow=0.54 cfs 0.041 af

Pond CB2: CB2, RIM 259 Peak Elev=255.81' Inflow=0.56 cfs 0.039 af
18.0" Round Culvert n=0.013 L=124.3' S=0.0000 '/' Outflow=0.56 cfs 0.039 af

Pond DMH1: DMH, RIM 260.1 Peak Elev=255.76' Inflow=1.98 cfs 0.150 af
18.0" Round Culvert n=0.013 L=108.0' S=0.0093 '/' Outflow=1.98 cfs 0.150 af

Pond LP1: Low Point 1 Peak Elev=257.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond LP2: Low Point 2 Peak Elev=257.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond LP3: Low Point 3 Peak Elev=257.10' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond LP4: Low Point 4 (Post-Devel) Peak Elev=257.00' Storage=0 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond S: Sed Forebay 1 Peak Elev=255.04' Storage=1,230 cf Inflow=2.62 cfs 0.208 af
Outflow=2.70 cfs 0.180 af

Pond YD: Yard Drain, RIM 258.25 Peak Elev=256.12' Inflow=0.02 cfs 0.004 af
10.0" Round Culvert n=0.013 L=222.0' S=0.0011 '/' Outflow=0.02 cfs 0.004 af

Summary for Subcatchment EA1: EXA To Site Low Spot 1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

	Area (sf)	CN	Description
	910	39	>75% Grass cover, Good, HSG A
	22,108	30	Woods, Good, HSG A
*	2,627	98	Paved parking, HSG A (off-site)
	25,645	37	Weighted Average
	23,018	30	89.76% Pervious Area
	2,627	98	10.24% Impervious Area

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

Summary for Subcatchment EA2: EXA To Site Low Spot 2

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

	Area (sf)	CN	Description
	33,674	30	Woods, Good, HSG A
*	2,509	98	Paved parking, HSG A (off-site)
	36,183	35	Weighted Average
	33,674	30	93.07% Pervious Area
	2,509	98	6.93% Impervious Area

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

Summary for Subcatchment EA3: EXB To South PL

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

Area (sf)	CN	Description
45,558	30	Woods, Good, HSG A
2,950	39	>75% Grass cover, Good, HSG A
48,508	31	Weighted Average
48,508	31	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	32	0.0780	0.11		**Sheet Flow, A** Woods: Light underbrush n= 0.400 P2= 3.30"
6.3	190	0.0100	0.50		**Shallow Concentrated Flow, B** Woodland Kv= 5.0 fps
11.2	222	Total			

Summary for Subcatchment PA1: WSD to CB1

Runoff = 0.54 cfs @ 12.07 hrs, Volume= 0.041 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

Area (sf)	CN	Description
8,767	98	Paved parking, HSG A
8,767	98	100.00% Impervious Area

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

Summary for Subcatchment PA2: WSD to CB2

Runoff = 0.56 cfs @ 12.08 hrs, Volume= 0.039 af, Depth> 1.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

Area (sf)	CN	Description
13,517	98	Paved parking, HSG A
5,292	39	>75% Grass cover, Good, HSG A
18,809	81	Weighted Average
5,292	39	28.14% Pervious Area
13,517	98	71.86% Impervious Area

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

Summary for Subcatchment PA3: Phase 1 Bldg

Runoff = 0.50 cfs @ 12.07 hrs, Volume= 0.038 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

Area (sf)	CN	Description
8,000	98	Roofs, HSG A
8,000	98	100.00% Impervious Area

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

Summary for Subcatchment PA4: Phase 2 Bldg (east)

Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.028 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

Area (sf)	CN	Description
6,000	98	Roofs, HSG A
6,000	98	100.00% Impervious Area

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

Summary for Subcatchment PA5: WSD to Basin 2

Runoff = 0.30 cfs @ 12.10 hrs, Volume= 0.030 af, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

	Area (sf)	CN	Description
	8,713	98	Paved parking, HSG A
	20,883	39	>75% Grass cover, Good, HSG A
*	6,206	98	Bituminous Grindings (compacted)
*	2,502	98	Harkney Hill Rd pavement, HSG A
	38,304	66	Weighted Average
	20,883	39	54.52% Pervious Area
	17,421	98	45.48% Impervious Area

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

Summary for Subcatchment PA6: WSD to low spot

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

Area (sf)	CN	Description
16,538	39	>75% Grass cover, Good, HSG A
16,538	39	100.00% Pervious Area

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

Summary for Subcatchment PA7: Phase 2 Bldg (west)

Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.028 af, Depth> 2.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

Area (sf)	CN	Description
6,000	98	Roofs, HSG A
6,000	98	100.00% Impervious Area

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

Summary for Subcatchment PA8: WSD to Yard Drain

Runoff = 0.02 cfs @ 12.30 hrs, Volume= 0.004 af, Depth> 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 Year Rainfall=2.70"

	Area (sf)	CN	Description
*	2,634	98	Roadway (off-site
*	225	98	Driveway (off-site)
	5,059	39	>75% Grass cover, Good, HSG A
	7,918	60	Weighted Average
	5,059	39	63.89% Pervious Area
	2,859	98	36.11% Impervious Area

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

Summary for Reach EA: SOUTHERLY PROPERTY LINE

Inflow Area = 2.533 ac, 4.65% Impervious, Inflow Depth = 0.00" for 1 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Summary for Reach PA: SOUTHERLY PROPERTY LINE

Inflow Area = 2.533 ac, 56.70% Impervious, Inflow Depth = 0.00" for 1 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2

Summary for Pond BMP: Basin

Inflow Area = 2.153 ac, 66.70% Impervious, Inflow Depth > 1.00" for 1 Year event
Inflow = 2.70 cfs @ 12.07 hrs, Volume= 0.180 af
Outflow = 0.65 cfs @ 12.48 hrs, Volume= 0.180 af, Atten= 76%, Lag= 24.4 min
Discarded = 0.65 cfs @ 12.48 hrs, Volume= 0.180 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 253.50' @ 12.48 hrs Surf.Area= 2,749 sf Storage= 2,103 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 24.4 min (866.6 - 842.2)

Volume	Invert	Avail.Storage	Storage Description
#1	252.50'	24,278 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
252.50	1,256	0	0
253.00	2,218	869	869
254.00	3,287	2,753	3,621
255.00	6,290	4,789	8,410
256.00	7,918	7,104	15,514
257.00	9,610	8,764	24,278

Device	Routing	Invert	Outlet Devices
#1	Primary	256.50'	**15.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88
#2	Discarded	252.50'	**8.270 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 249.50'

Discarded OutFlow Max=0.65 cfs @ 12.48 hrs HW=253.50' (Free Discharge)
↑└**2=Exfiltration** (Controls 0.65 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=252.50' TW=0.00' (Dynamic Tailwater)
↑└**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond CB1: CB1, RIM 258.75

Inflow Area = 0.201 ac,100.00% Impervious, Inflow Depth > 2.47" for 1 Year event
Inflow = 0.54 cfs @ 12.07 hrs, Volume= 0.041 af
Outflow = 0.54 cfs @ 12.07 hrs, Volume= 0.041 af, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.07 hrs, Volume= 0.041 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 255.80' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	255.00'	**18.0" Round Culvert** L= 75.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 255.00' / 255.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.54 cfs @ 12.07 hrs HW=255.79' TW=255.76' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.54 cfs @ 0.83 fps)

Summary for Pond CB2: CB2, RIM 259

Inflow Area = 0.432 ac, 71.86% Impervious, Inflow Depth > 1.09" for 1 Year event
Inflow = 0.56 cfs @ 12.08 hrs, Volume= 0.039 af
Outflow = 0.56 cfs @ 12.08 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min
Primary = 0.56 cfs @ 12.08 hrs, Volume= 0.039 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 255.81' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	255.00'	**18.0" Round Culvert** L= 124.3' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 255.00' / 255.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=0.56 cfs @ 12.08 hrs HW=255.81' TW=255.76' (Dynamic Tailwater)
1=Culvert (Outlet Controls 0.56 cfs @ 0.84 fps)

Summary for Pond DMH1: DMH, RIM 260.1

Inflow Area = 1.136 ac, 79.09% Impervious, Inflow Depth > 1.59" for 1 Year event
Inflow = 1.98 cfs @ 12.07 hrs, Volume= 0.150 af
Outflow = 1.98 cfs @ 12.07 hrs, Volume= 0.150 af, Atten= 0%, Lag= 0.0 min
Primary = 1.98 cfs @ 12.07 hrs, Volume= 0.150 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 255.76' @ 12.07 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	255.00'	**18.0" Round Culvert** L= 108.0' CPP, projecting, no headwall, Ke= 0.900

Inlet / Outlet Invert= 255.00' / 254.00' S= 0.0093 '/' Cc= 0.900
n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=1.97 cfs @ 12.07 hrs HW=255.76' TW=255.04' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.97 cfs @ 3.22 fps)

Summary for Pond LP1: Low Point 1

Inflow Area = 0.589 ac, 10.24% Impervious, Inflow Depth = 0.00" for 1 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 257.00' @ 0.00 hrs Surf.Area= 845 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	257.00'	7,902 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
257.00	845	0	0
258.20	12,325	7,902	7,902

Device	Routing	Invert	Outlet Devices
#1	Primary	258.10'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.20 Width (feet) 15.00 60.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=257.00' TW=257.00' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Summary for Pond LP2: Low Point 2

Inflow Area = 1.419 ac, 8.31% Impervious, Inflow Depth = 0.00" for 1 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 257.00' @ 0.00 hrs Surf.Area= 1,445 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	257.00'	10,322 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
257.00	1,445	0	0
257.90	21,492	10,322	10,322

Device	Routing	Invert	Outlet Devices
#1	Primary	257.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.90 Width (feet) 15.00 60.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=257.00' TW=257.10' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Summary for Pond LP3: Low Point 3

Inflow Area = 2.533 ac, 4.65% Impervious, Inflow Depth = 0.00" for 1 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 257.10' @ 0.00 hrs Surf.Area= 1,432 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	257.10'	2,735 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
257.10	1,432	0	0
257.40	16,803	2,735	2,735

Device	Routing	Invert	Outlet Devices
#1	Primary	257.40'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.10 Width (feet) 300.00 325.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=257.10' TW=0.00' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Summary for Pond LP4: Low Point 4 (Post-Devel)

Inflow Area = 0.380 ac, 0.00% Impervious, Inflow Depth = 0.00" for 1 Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 257.00' @ 0.00 hrs Surf.Area= 732 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	257.00'	1,302 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
257.00	732	0	0
257.50	4,475	1,302	1,302

Device	Routing	Invert	Outlet Devices
#1	Primary	257.50'	**Custom Weir/Orifice, Cv= 2.62 (C= 3.28)** Head (feet) 0.00 0.10 Width (feet) 300.00 325.00

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=257.00' TW=0.00' (Dynamic Tailwater)
↑—**1=Custom Weir/Orifice** (Controls 0.00 cfs)

Summary for Pond S: Sed Forebay 1

Inflow Area = 2.153 ac, 66.70% Impervious, Inflow Depth > 1.16" for 1 Year event
Inflow = 2.62 cfs @ 12.08 hrs, Volume= 0.208 af
Outflow = 2.70 cfs @ 12.07 hrs, Volume= 0.180 af, Atten= 0%, Lag= 0.0 min
Primary = 2.70 cfs @ 12.07 hrs, Volume= 0.180 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 255.04' @ 12.07 hrs Surf.Area= 1,443 sf Storage= 1,230 cf

Plug-Flow detention time= 105.7 min calculated for 0.180 af (86% of inflow)
Center-of-Mass det. time= 42.5 min (842.2 - 799.7)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	1,230 cf	**.75 (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	1,016	0	0
254.00	1,443	1,230	1,230

Device	Routing	Invert	Outlet Devices
#1	Primary	255.00'	**135.0' long x 0.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.68 cfs @ 12.07 hrs HW=255.04' TW=253.07' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 2.68 cfs @ 0.54 fps)

Summary for Pond YD: Yard Drain, RIM 258.25

Inflow Area = 0.182 ac, 36.11% Impervious, Inflow Depth > 0.23" for 1 Year event
Inflow = 0.02 cfs @ 12.30 hrs, Volume= 0.004 af
Outflow = 0.02 cfs @ 12.30 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min
Primary = 0.02 cfs @ 12.30 hrs, Volume= 0.004 af

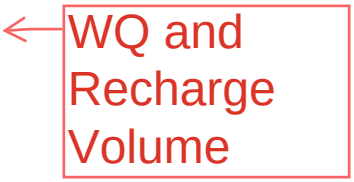
Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 256.12' @ 12.30 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	256.00'	**10.0" Round Culvert** L= 222.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 256.00' / 255.75' S= 0.0011 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.55 sf

Primary OutFlow Max=0.02 cfs @ 12.30 hrs HW=256.12' TW=255.50' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.02 cfs @ 0.59 fps)

Stage-Area-Storage for Pond BMP: Basin

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
252.50	1,256	0
252.55	1,352	65
252.60	1,448	135
252.65	1,545	210
252.70	1,641	290
252.75	1,737	374
252.80	1,833	463
252.85	1,929	557
252.90	2,026	656
252.95	2,122	760
253.00	2,218	869
253.05	2,271	981
253.10	2,325	1,096
253.15	2,378	1,213
253.20	2,432	1,333
253.25	2,485	1,456
253.30	2,539	1,582
253.35	2,592	1,710
253.40	2,646	1,841
253.45	2,699	1,975
253.50	2,753	2,111
253.55	2,806	2,250
253.60	2,859	2,392
253.65	2,913	2,536
253.70	2,966	2,683
253.75	3,020	2,833
253.80	3,073	2,985
253.85	3,127	3,140
253.90	3,180	3,298
253.95	3,234	3,458
254.00	3,287	3,621
254.05	3,437	3,789
254.10	3,587	3,965
254.15	3,737	4,148
254.20	3,888	4,338
254.25	4,038	4,537
254.30	4,188	4,742
254.35	4,338	4,955
254.40	4,488	5,176
254.45	4,638	5,404
254.50	4,789	5,640
254.55	4,939	5,883
254.60	5,089	6,134
254.65	5,239	6,392
254.70	5,389	6,658
254.75	5,539	6,931
254.80	5,689	7,212
254.85	5,840	7,500
254.90	5,990	7,796
254.95	6,140	8,099
255.00	6,290	8,410
255.05	6,371	8,726
255.10	6,453	9,047
255.15	6,534	9,371
255.20	6,616	9,700
255.25	6,697	10,033
255.30	6,778	10,370
255.35	6,860	10,711
255.40	6,941	11,056
255.45	7,023	11,405
255.50	7,104	11,758
255.55	7,185	12,115
255.60	7,267	12,477
255.65	7,348	12,842
255.70	7,430	13,211
255.75	7,511	13,585
255.80	7,592	13,962
255.85	7,674	14,344
255.90	7,755	14,730
255.95	7,837	15,120
256.00	7,918	15,514
256.05	8,003	15,912
256.10	8,087	16,314
256.15	8,172	16,720
256.20	8,256	17,131
256.25	8,341	17,546
256.30	8,426	17,965
256.35	8,510	18,388
256.40	8,595	18,816
256.45	8,679	19,248
256.50	8,764	19,684
256.55	8,849	20,124
256.60	8,933	20,569
256.65	9,018	21,018
256.70	9,102	21,471
256.75	9,187	21,928
256.80	9,272	22,389
256.85	9,356	22,855
256.90	9,441	23,325
256.95	9,525	23,799
257.00	**9,610**	**24,278**



Stage-Area-Storage for Pond LP1: Low Point 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
257.00	845	0
257.02	1,036	19
257.04	1,228	41
257.06	1,419	68
257.08	1,610	98
257.10	1,802	132
257.12	1,993	170
257.14	2,184	212
257.16	2,376	258
257.18	2,567	307
257.20	2,758	360
257.22	2,950	417
257.24	3,141	478
257.26	3,332	543
257.28	3,524	612
257.30	3,715	684
257.32	3,906	760
257.34	4,098	840
257.36	4,289	924
257.38	4,480	1,012
257.40	4,672	1,103
257.42	4,863	1,199
257.44	5,054	1,298
257.46	5,246	1,401
257.48	5,437	1,508
257.50	5,628	1,618
257.52	5,820	1,733
257.54	6,011	1,851
257.56	6,202	1,973
257.58	6,394	2,099
257.60	6,585	2,229
257.62	6,776	2,363
257.64	6,968	2,500
257.66	7,159	2,641
257.68	7,350	2,786
257.70	7,542	2,935
257.72	7,733	3,088
257.74	7,924	3,245
257.76	8,116	3,405
257.78	8,307	3,569
257.80	8,498	3,737
257.82	8,690	3,909
257.84	8,881	4,085
257.86	9,072	4,264
257.88	9,264	4,448
257.90	9,455	4,635
257.92	9,646	4,826
257.94	9,838	5,021
257.96	10,029	5,220
257.98	10,220	5,422
258.00	10,412	5,628
258.02	10,603	5,838
258.04	10,794	6,052
258.06	10,986	6,270
258.08	11,177	6,492
258.10	11,368	6,717
258.12	11,560	6,947
258.14	11,751	7,180
258.16	11,942	7,417
258.18	12,134	7,657
258.20	**12,325**	**7,902**
258.22	12,325	7,902
258.24	12,325	7,902
258.26	12,325	7,902
258.28	12,325	7,902
258.30	12,325	7,902

Stage-Area-Storage for Pond LP2: Low Point 2

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
257.00	1,445	0
257.02	1,890	33
257.04	2,336	76
257.06	2,781	127
257.08	3,227	187
257.10	3,672	256
257.12	4,118	334
257.14	4,563	421
257.16	5,009	516
257.18	5,454	621
257.20	5,900	734
257.22	6,345	857
257.24	6,791	988
257.26	7,236	1,129
257.28	7,682	1,278
257.30	8,127	1,436
257.32	8,573	1,603
257.34	9,018	1,779
257.36	9,464	1,964
257.38	9,909	2,157
257.40	10,355	2,360
257.42	10,800	2,572
257.44	11,246	2,792
257.46	11,691	3,021
257.48	12,137	3,260
257.50	12,582	3,507
257.52	13,028	3,763
257.54	13,473	4,028
257.56	13,919	4,302
257.58	14,364	4,585
257.60	14,810	4,876
257.62	15,255	5,177
257.64	15,701	5,487
257.66	16,146	5,805
257.68	16,592	6,132
257.70	17,037	6,469
257.72	17,483	6,814
257.74	17,928	7,168
257.76	18,374	7,531
257.78	18,819	7,903
257.80	19,265	8,284
257.82	19,710	8,674
257.84	20,156	9,072
257.86	20,601	9,480
257.88	21,047	9,896
257.90	**21,492**	**10,322**
257.92	21,492	10,322
257.94	21,492	10,322
257.96	21,492	10,322
257.98	21,492	10,322
258.00	21,492	10,322
258.02	21,492	10,322
258.04	21,492	10,322
258.06	21,492	10,322
258.08	21,492	10,322
258.10	21,492	10,322
258.12	21,492	10,322
258.14	21,492	10,322
258.16	21,492	10,322
258.18	21,492	10,322
258.20	21,492	10,322
258.22	21,492	10,322
258.24	21,492	10,322
258.26	21,492	10,322
258.28	21,492	10,322
258.30	21,492	10,322
258.32	21,492	10,322
258.34	21,492	10,322
258.36	21,492	10,322
258.38	21,492	10,322
258.40	21,492	10,322

Stage-Area-Storage for Pond LP3: Low Point 3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
257.10	1,432	0
257.11	1,944	17
257.12	2,457	39
257.13	2,969	66
257.14	3,481	98
257.15	3,994	136
257.16	4,506	178
257.17	5,019	226
257.18	5,531	279
257.19	6,043	336
257.20	6,556	399
257.21	7,068	468
257.22	7,580	541
257.23	8,093	619
257.24	8,605	703
257.25	9,118	791
257.26	9,630	885
257.27	10,142	984
257.28	10,655	1,088
257.29	11,167	1,197
257.30	11,679	1,311
257.31	12,192	1,430
257.32	12,704	1,555
257.33	13,216	1,685
257.34	13,729	1,819
257.35	14,241	1,959
257.36	14,754	2,104
257.37	15,266	2,254
257.38	15,778	2,409
257.39	16,291	2,570
257.40	**16,803**	**2,735**
257.41	16,803	2,735
257.42	16,803	2,735
257.43	16,803	2,735
257.44	16,803	2,735
257.45	16,803	2,735
257.46	16,803	2,735
257.47	16,803	2,735
257.48	16,803	2,735
257.49	16,803	2,735
257.50	16,803	2,735

Stage-Area-Storage for Pond LP4: Low Point 4 (Post-Devel)

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
257.00	732	0
257.01	807	8
257.02	882	16
257.03	957	25
257.04	1,031	35
257.05	1,106	46
257.06	1,181	57
257.07	1,256	70
257.08	1,331	83
257.09	1,406	96
257.10	1,481	111
257.11	1,555	126
257.12	1,630	142
257.13	1,705	158
257.14	1,780	176
257.15	1,855	194
257.16	1,930	213
257.17	2,005	233
257.18	2,079	253
257.19	2,154	274
257.20	2,229	296
257.21	2,304	319
257.22	2,379	342
257.23	2,454	366
257.24	2,529	391
257.25	2,604	417
257.26	2,678	443
257.27	2,753	471
257.28	2,828	498
257.29	2,903	527
257.30	2,978	556
257.31	3,053	587
257.32	3,128	618
257.33	3,202	649
257.34	3,277	682
257.35	3,352	715
257.36	3,427	749
257.37	3,502	783
257.38	3,577	819
257.39	3,652	855
257.40	3,726	892
257.41	3,801	929
257.42	3,876	968
257.43	3,951	1,007
257.44	4,026	1,047
257.45	4,101	1,087
257.46	4,176	1,129
257.47	4,250	1,171
257.48	4,325	1,214
257.49	4,400	1,257
257.50	**4,475**	**1,302**
257.51	4,475	1,302
257.52	4,475	1,302
257.53	4,475	1,302
257.54	4,475	1,302
257.55	4,475	1,302
257.56	4,475	1,302
257.57	4,475	1,302
257.58	4,475	1,302
257.59	4,475	1,302
257.60	4,475	1,302

Stage-Area-Storage for Pond S: Sed Forebay 1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
253.00	1,016	0
253.02	1,025	20
253.04	1,033	41
253.06	1,042	62
253.08	1,050	83
253.10	1,059	104
253.12	1,067	125
253.14	1,076	146
253.16	1,084	168
253.18	1,093	190
253.20	1,101	212
253.22	1,110	234
253.24	1,118	256
253.26	1,127	279
253.28	1,136	301
253.30	1,144	324
253.32	1,153	347
253.34	1,161	370
253.36	1,170	393
253.38	1,178	417
253.40	1,187	441
253.42	1,195	464
253.44	1,204	488
253.46	1,212	513
253.48	1,221	537
253.50	1,230	561
253.52	1,238	586
253.54	1,247	611
253.56	1,255	636
253.58	1,264	661
253.60	1,272	686
253.62	1,281	712
253.64	1,289	738
253.66	1,298	764
253.68	1,306	790
253.70	1,315	816
253.72	1,323	842
253.74	1,332	869
253.76	1,341	895
253.78	1,349	922
253.80	1,358	949
253.82	1,366	977
253.84	1,375	1,004
253.86	1,383	1,032
253.88	1,392	1,059
253.90	1,400	1,087
253.92	1,409	1,115
253.94	1,417	1,144
253.96	1,426	1,172
253.98	1,434	1,201
254.00	**1,443**	**1,230**
254.02	1,443	1,230
254.04	1,443	1,230
254.06	1,443	1,230
254.08	1,443	1,230
254.10	1,443	1,230
254.12	1,443	1,230
254.14	1,443	1,230
254.16	1,443	1,230
254.18	1,443	1,230
254.20	1,443	1,230
254.22	1,443	1,230
254.24	1,443	1,230
254.26	1,443	1,230
254.28	1,443	1,230
254.30	1,443	1,230
254.32	1,443	1,230
254.34	1,443	1,230
254.36	1,443	1,230
254.38	1,443	1,230
254.40	1,443	1,230
254.42	1,443	1,230
254.44	1,443	1,230
254.46	1,443	1,230
254.48	1,443	1,230
254.50	1,443	1,230
254.52	1,443	1,230
254.54	1,443	1,230
254.56	1,443	1,230
254.58	1,443	1,230
254.60	1,443	1,230
254.62	1,443	1,230
254.64	1,443	1,230
254.66	1,443	1,230
254.68	1,443	1,230
254.70	1,443	1,230
254.72	1,443	1,230
254.74	1,443	1,230
254.76	1,443	1,230
254.78	1,443	1,230
254.80	1,443	1,230
254.82	1,443	1,230
254.84	1,443	1,230
254.86	1,443	1,230
254.88	1,443	1,230
254.90	1,443	1,230
254.92	1,443	1,230
254.94	1,443	1,230
254.96	1,443	1,230
254.98	1,443	1,230
255.00	1,443	1,230
255.02	1,443	1,230
255.04	1,443	1,230

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EA1: EXA To Site Low Spot Runoff Area=25,645 sf 10.24% Impervious Runoff Depth>0.11"
Tc=5.0 min CN=37 Runoff=0.01 cfs 0.005 af

Subcatchment EA2: EXA To Site Low Spot 2 Runoff Area=36,183 sf 6.93% Impervious Runoff Depth>0.06"
Tc=5.0 min CN=35 Runoff=0.01 cfs 0.004 af

Subcatchment EA3: EXB To South PL Runoff Area=48,508 sf 0.00% Impervious Runoff Depth>0.01"
Flow Length=222' Tc=11.2 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment PA1: WSD to CB1 Runoff Area=8,767 sf 100.00% Impervious Runoff Depth>4.56"
Tc=5.0 min CN=98 Runoff=0.98 cfs 0.076 af

Subcatchment PA2: WSD to CB2 Runoff Area=18,809 sf 71.86% Impervious Runoff Depth>2.81"
Tc=5.0 min CN=81 Runoff=1.47 cfs 0.101 af

Subcatchment PA3: Phase 1 Bldg Runoff Area=8,000 sf 100.00% Impervious Runoff Depth>4.56"
Tc=5.0 min CN=98 Runoff=0.89 cfs 0.070 af

Subcatchment PA4: Phase 2 Bldg (east) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>4.56"
Tc=5.0 min CN=98 Runoff=0.67 cfs 0.052 af

Subcatchment PA5: WSD to Basin 2 Runoff Area=38,304 sf 45.48% Impervious Runoff Depth>1.59"
Tc=5.0 min CN=66 Runoff=1.62 cfs 0.117 af

Subcatchment PA6: WSD to low spot Runoff Area=16,538 sf 0.00% Impervious Runoff Depth>0.16"
Tc=5.0 min CN=39 Runoff=0.01 cfs 0.005 af

Subcatchment PA7: Phase 2 Bldg (west) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>4.56"
Tc=5.0 min CN=98 Runoff=0.67 cfs 0.052 af

Subcatchment PA8: WSD to Yard Drain Runoff Area=7,918 sf 36.11% Impervious Runoff Depth>1.18"
Tc=5.0 min CN=60 Runoff=0.23 cfs 0.018 af

Reach EA: SOUTHERLY PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach PA: SOUTHERLY PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond BMP: Basin Peak Elev=254.65' Storage=6,413 cf Inflow=6.59 cfs 0.458 af
Discarded=1.37 cfs 0.458 af Primary=0.00 cfs 0.000 af Outflow=1.37 cfs 0.458 af

Pond CB1: CB1, RIM 258.75 Peak Elev=256.20' Inflow=0.98 cfs 0.076 af
18.0" Round Culvert n=0.013 L=75.0' S=0.0000 '/' Outflow=0.98 cfs 0.076 af

Pond CB2: CB2, RIM 259 Peak Elev=256.25' Inflow=1.47 cfs 0.101 af
18.0" Round Culvert n=0.013 L=124.3' S=0.0000 '/' Outflow=1.47 cfs 0.101 af

Pond DMH1: DMH, RIM 260.1 Peak Elev=256.16' Inflow=4.24 cfs 0.318 af
18.0" Round Culvert n=0.013 L=108.0' S=0.0093 '/' Outflow=4.24 cfs 0.318 af

Pond LP1: Low Point 1 Peak Elev=257.15' Storage=225 cf Inflow=0.01 cfs 0.005 af
Outflow=0.00 cfs 0.000 af

Pond LP2: Low Point 2 Peak Elev=257.08' Storage=180 cf Inflow=0.01 cfs 0.004 af
Outflow=0.00 cfs 0.000 af

Pond LP3: Low Point 3 Peak Elev=257.11' Storage=21 cf Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond LP4: Low Point 4 (Post-Devel) Peak Elev=257.16' Storage=222 cf Inflow=0.01 cfs 0.005 af
Outflow=0.00 cfs 0.000 af

Pond S: Sed Forebay 1 Peak Elev=255.07' Storage=1,230 cf Inflow=6.52 cfs 0.486 af
Outflow=6.59 cfs 0.458 af

Pond YD: Yard Drain, RIM 258.25 Peak Elev=256.43' Inflow=0.23 cfs 0.018 af
10.0" Round Culvert n=0.013 L=222.0' S=0.0011 '/' Outflow=0.23 cfs 0.018 af

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EA1: EXA To Site Low Spot Runoff Area=25,645 sf 10.24% Impervious Runoff Depth>0.39"
Tc=5.0 min CN=37 Runoff=0.08 cfs 0.019 af

Subcatchment EA2: EXA To Site Low Spot 2 Runoff Area=36,183 sf 6.93% Impervious Runoff Depth>0.29"
Tc=5.0 min CN=35 Runoff=0.06 cfs 0.020 af

Subcatchment EA3: EXB To South PL Runoff Area=48,508 sf 0.00% Impervious Runoff Depth>0.13"
Flow Length=222' Tc=11.2 min CN=31 Runoff=0.02 cfs 0.012 af

Subcatchment PA1: WSD to CB1 Runoff Area=8,767 sf 100.00% Impervious Runoff Depth>5.96"
Tc=5.0 min CN=98 Runoff=1.27 cfs 0.100 af

Subcatchment PA2: WSD to CB2 Runoff Area=18,809 sf 71.86% Impervious Runoff Depth>4.06"
Tc=5.0 min CN=81 Runoff=2.12 cfs 0.146 af

Subcatchment PA3: Phase 1 Bldg Runoff Area=8,000 sf 100.00% Impervious Runoff Depth>5.96"
Tc=5.0 min CN=98 Runoff=1.16 cfs 0.091 af

Subcatchment PA4: Phase 2 Bldg (east) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>5.96"
Tc=5.0 min CN=98 Runoff=0.87 cfs 0.068 af

Subcatchment PA5: WSD to Basin 2 Runoff Area=38,304 sf 45.48% Impervious Runoff Depth>2.59"
Tc=5.0 min CN=66 Runoff=2.73 cfs 0.190 af

Subcatchment PA6: WSD to low spot Runoff Area=16,538 sf 0.00% Impervious Runoff Depth>0.50"
Tc=5.0 min CN=39 Runoff=0.08 cfs 0.016 af

Subcatchment PA7: Phase 2 Bldg (west) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>5.96"
Tc=5.0 min CN=98 Runoff=0.87 cfs 0.068 af

Subcatchment PA8: WSD to Yard Drain Runoff Area=7,918 sf 36.11% Impervious Runoff Depth>2.05"
Tc=5.0 min CN=60 Runoff=0.43 cfs 0.031 af

Reach EA: SOUTHERLY PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Reach PA: SOUTHERLY PROPERTY LINE Inflow=0.00 cfs 0.000 af
Outflow=0.00 cfs 0.000 af

Pond BMP: Basin Peak Elev=255.23' Storage=9,922 cf Inflow=9.49 cfs 0.666 af
Discarded=1.81 cfs 0.666 af Primary=0.00 cfs 0.000 af Outflow=1.81 cfs 0.666 af

Pond CB1: CB1, RIM 258.75 Peak Elev=256.54' Inflow=1.27 cfs 0.100 af
18.0" Round Culvert n=0.013 L=75.0' S=0.0000 '/' Outflow=1.27 cfs 0.100 af

Pond CB2: CB2, RIM 259 Peak Elev=256.61' Inflow=2.12 cfs 0.146 af
18.0" Round Culvert n=0.013 L=124.3' S=0.0000 '/' Outflow=2.12 cfs 0.146 af

Pond DMH1: DMH, RIM 260.1 Peak Elev=256.51' Inflow=5.84 cfs 0.437 af
18.0" Round Culvert n=0.013 L=108.0' S=0.0093 '/' Outflow=5.84 cfs 0.437 af

Pond LP1: Low Point 1 Peak Elev=257.34' Storage=840 cf Inflow=0.08 cfs 0.019 af
Outflow=0.00 cfs 0.000 af

Pond LP2: Low Point 2 Peak Elev=257.22' Storage=882 cf Inflow=0.06 cfs 0.020 af
Outflow=0.00 cfs 0.000 af

Pond LP3: Low Point 3 Peak Elev=257.22' Storage=509 cf Inflow=0.02 cfs 0.012 af
Outflow=0.00 cfs 0.000 af

Pond LP4: Low Point 4 (Post-Devel) Peak Elev=257.34' Storage=693 cf Inflow=0.08 cfs 0.016 af
Outflow=0.00 cfs 0.000 af

Pond S: Sed Forebay 1 Peak Elev=255.23' Storage=1,230 cf Inflow=9.42 cfs 0.695 af
Outflow=9.49 cfs 0.666 af

Pond YD: Yard Drain, RIM 258.25 Peak Elev=256.71' Inflow=0.43 cfs 0.031 af
10.0" Round Culvert n=0.013 L=222.0' S=0.0011 '/' Outflow=0.43 cfs 0.031 af

Time span=0.00-24.00 hrs, dt=0.01 hrs, 2401 points x 2
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment EA1: EXA To Site Low Spot Runoff Area=25,645 sf 10.24% Impervious Runoff Depth>1.25"
Tc=5.0 min CN=37 Runoff=0.59 cfs 0.062 af

Subcatchment EA2: EXA To Site Low Spot 2 Runoff Area=36,183 sf 6.93% Impervious Runoff Depth>1.05"
Tc=5.0 min CN=35 Runoff=0.58 cfs 0.073 af

Subcatchment EA3: EXB To South PL Runoff Area=48,508 sf 0.00% Impervious Runoff Depth>0.68"
Flow Length=222' Tc=11.2 min CN=31 Runoff=0.30 cfs 0.063 af

Subcatchment PA1: WSD to CB1 Runoff Area=8,767 sf 100.00% Impervious Runoff Depth>8.45"
Tc=5.0 min CN=98 Runoff=1.78 cfs 0.142 af

Subcatchment PA2: WSD to CB2 Runoff Area=18,809 sf 71.86% Impervious Runoff Depth>6.40"
Tc=5.0 min CN=81 Runoff=3.28 cfs 0.230 af

Subcatchment PA3: Phase 1 Bldg Runoff Area=8,000 sf 100.00% Impervious Runoff Depth>8.45"
Tc=5.0 min CN=98 Runoff=1.63 cfs 0.129 af

Subcatchment PA4: Phase 2 Bldg (east) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>8.45"
Tc=5.0 min CN=98 Runoff=1.22 cfs 0.097 af

Subcatchment PA5: WSD to Basin 2 Runoff Area=38,304 sf 45.48% Impervious Runoff Depth>4.58"
Tc=5.0 min CN=66 Runoff=4.90 cfs 0.336 af

Subcatchment PA6: WSD to low spot Runoff Area=16,538 sf 0.00% Impervious Runoff Depth>1.46"
Tc=5.0 min CN=39 Runoff=0.49 cfs 0.046 af

Subcatchment PA7: Phase 2 Bldg (west) Runoff Area=6,000 sf 100.00% Impervious Runoff Depth>8.45"
Tc=5.0 min CN=98 Runoff=1.22 cfs 0.097 af

Subcatchment PA8: WSD to Yard Drain Runoff Area=7,918 sf 36.11% Impervious Runoff Depth>3.86"
Tc=5.0 min CN=60 Runoff=0.85 cfs 0.059 af

Reach EA: SOUTHERLY PROPERTY LINE Inflow=0.05 cfs 0.000 af
Outflow=0.05 cfs 0.000 af

Reach PA: SOUTHERLY PROPERTY LINE Inflow=0.05 cfs 0.016 af
Outflow=0.05 cfs 0.016 af

Pond BMP: Basin Peak Elev=256.22' Storage=17,268 cf Inflow=14.88 cfs 1.061 af
Discarded=2.45 cfs 1.062 af Primary=0.00 cfs 0.000 af Outflow=2.45 cfs 1.062 af

Pond CB1: CB1, RIM 258.75 Peak Elev=257.52' Inflow=1.78 cfs 0.142 af
18.0" Round Culvert n=0.013 L=75.0' S=0.0000 '/' Outflow=1.78 cfs 0.142 af

Pond CB2: CB2, RIM 259 Peak Elev=257.69' Inflow=3.28 cfs 0.230 af
18.0" Round Culvert n=0.013 L=124.3' S=0.0000 '/' Outflow=3.28 cfs 0.230 af

Pond DMH1: DMH, RIM 260.1 Peak Elev=257.45' Inflow=8.75 cfs 0.657 af
18.0" Round Culvert n=0.013 L=108.0' S=0.0093 '/' Outflow=8.75 cfs 0.657 af

Pond LP1: Low Point 1 Peak Elev=257.67' Storage=2,679 cf Inflow=0.59 cfs 0.062 af
Outflow=0.00 cfs 0.000 af

Pond LP2: Low Point 2 Peak Elev=257.47' Storage=3,175 cf Inflow=0.58 cfs 0.073 af
Outflow=0.00 cfs 0.000 af

Pond LP3: Low Point 3 Peak Elev=257.40' Storage=2,735 cf Inflow=0.30 cfs 0.063 af
Outflow=0.05 cfs 0.000 af

Pond LP4: Low Point 4 (Post-Devel) Peak Elev=257.50' Storage=1,302 cf Inflow=0.49 cfs 0.046 af
Outflow=0.05 cfs 0.016 af

Pond S: Sed Forebay 1 Peak Elev=256.22' Storage=1,230 cf Inflow=14.87 cfs 1.090 af
Outflow=14.88 cfs 1.061 af

Pond YD: Yard Drain, RIM 258.25 Peak Elev=257.85' Inflow=0.85 cfs 0.059 af
10.0" Round Culvert n=0.013 L=222.0' S=0.0011 '/' Outflow=0.85 cfs 0.059 af

Appendix C – Soil Evaluations

STATE OF RHODE ISLAND
Department of Environmental Management
Office of Water Resources
Email: dem.OWTS@dem.ri.gov
Site Evaluation Form
Part A – Soil Profile Description **Application Number** _____

Property Owner: Andrew Barber
Property Location: 71 Harkney Hill Road Plat: _____ Lot: _____
Date of Test Hole: 10/31/24 Weather: Sunny 60 degrees Shaded: Yes ☐ No ☒ Time: 8:00-10:00
Soil Evaluator: Brian King License Number: D4010
Soil Evaluator email address: brian.king@crossmaneng.com

TH 1 Horizon	Depth Inches	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-10			10YR 4/4	___	____	ls	gr	fr	remove
Bw1	10-18	g	w	2.5Y 5/6	___	____	lfs	Sbk	fr	4
Bw2	18-30	g	w	2.5Y 6/4	___	____	lfs	Sbk	fr	4
C1	30-132	g	w	2.5Y 6/3	___	____	gcos	Osg	l	1

TH 2 Horizon	Depth Inches	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-12			10YR 3/4	___	____	sl	gr	fr	remove
Bw1	12-20	g	w	2.5Y 5/6	___	____	lfs	Sbk	fr	4
Bw2	20-26	g	w	2.5Y 6/4	___	____	lfs	Sbk	fr	4
C1	26-120	g	w	2.5Y 6/3	___	____	gcos	Osg	l	1

TH 1 Soil Class Outwash Total Depth 132" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT Design 96" (og)
TH 2 Soil Class Outwash Total Depth 120" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT Design 96" (og

Comments: TP 1 & 2 for OWTS design. Use design loading rate of 0.61 g/sf/d

STATE OF RHODE ISLAND
Department of Environmental Management
Office of Water Resources
Email: dem.OWTS@dem.ri.gov
Site Evaluation Form
Part A – Soil Profile Description **Application Number** _____

Property Owner: Andrew Barber
Property Location: 71 Harkney Hill Road Plat: _____ Lot: _____
Date of Test Hole: 10-31-24 Weather: Sunny 60 degrees Shaded: Yes ☐ No ☒ Time: 8:00 - 10:00
Soil Evaluator: Brian King License Number: D4010
Soil Evaluator email address: _____

TH 3 Horizon	Depth Inches	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-9			10YR 3/4	___	____	sl	gr	fr	remove
Bw1	9-16	g	w	2.5Y 5/6	___	____	lfs	Sbk	fr	4
Bw2	16-20	g	w	2.5Y 6/4	___	____	lfs	Sbk	fr	4
C1	20-120	g	w	2.5Y 6/3	___	____	gcos	Osg	1	1

TH 4 Horizon	Depth Inches	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-10			10YR 4/4	___	____	sl	gr	fr	remove
Bw1	10-21	g	w	2.5Y 5/6	___	____	lfs	Sbk	fr	4
C1	21-130	g	w	2.5Y 6/3	___	____	gcos (stratified)	Osg	1	1

TH 3 Soil Class Outwash Total Depth 120" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT design 102"(og)

TH 4 Soil Class Outwash Total Depth 130" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT design 102"(og

Comments: TP 3 For OWTS design, use design loading rate of 0.61 g/sf/d
TP4 For STU design infiltration rate use Rawls rate of 8.27 in/hr

STATE OF RHODE ISLAND
Department of Environmental Management
Office of Water Resources
Email: dem.OWTS@dem.ri.gov
Site Evaluation Form
Part A – Soil Profile Description **Application Number** _____

Property Owner: Andrew Barber
Property Location: 71 Harkney Hill Road Plat: _____ Lot: _____
Date of Test Hole: 10/31/24 Weather: Sunny 60 degrees Shaded: Yes ☐ No ☒ Time: 8:00-10:00
Soil Evaluator: Brian King License Number: D4010
Soil Evaluator email address: brian.king@crossmaneng.com

TH 5 Horizon	Depth Inches	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				
A	0-8			10YR 4/4	___	____	sl	gr	fr	remove
Bw1	8-25	g	w	2.5Y 5/6	___	____	lfs	Sbk	fr	4
Bw2	25-29	g	w	2.5Y 6/4	___	____	lfs	Sbk	fr	4
C1	29-126	g	w	2.5Y 6/3	___	____	gcos (stratified)	Osg	l	1

TH ____ Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox	Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab. S. Contr.				

TH 5 Soil Class Outwash Total Depth 126" Impervious/Limiting Layer Depth NA (og) GW Seepage Depth NA SHWT design 102" (og)

TH _____ Soil Class _____ Total Depth _____ Impervious/Limiting Layer Depth _____ (og) GW Seepage Depth _____ SHWT _____ (og

Comments: For STU design infiltration rate use Rawls rate of 8.27 in/hr

Appendix D – Soil Survey Map

Map Scale: 1:3,200 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 45 90 180 270

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
Survey Area Data: Version 24, Aug 30, 2024

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

Date(s) aerial images were photographed: Jun 14, 2022—Jul 1, 2022

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

Map Unit Legend

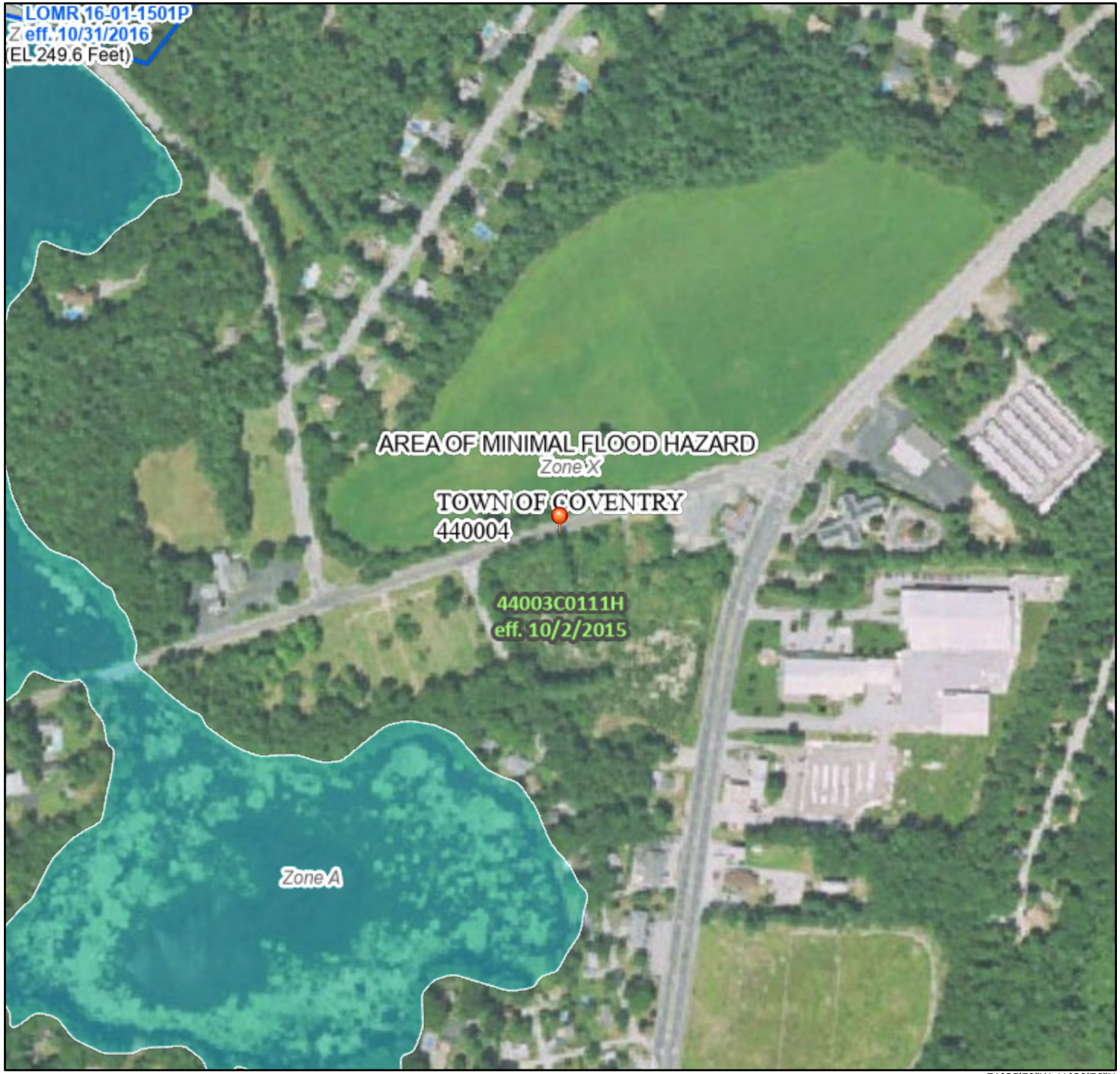
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HkA	Hinckley loamy sand, 0 to 3 percent slopes	15.8	31.7%
MmA	Merrimac fine sandy loam, 0 to 3 percent slopes	26.1	52.3%
W	Water	8.0	16.0%
Totals for Area of Interest		**49.8**	**100.0%**

Appendix E – FEMA Flood Map

National Flood Hazard Layer FIRMette

FEMA

71°36'28"W 41°40'23"N



71°35'50"W 41°39'56"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

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*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

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

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/3/2024 at 2:24 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix F – Groundwater Mounding Analyais

Infiltration Basin Groundwater Mounding Analysis

The proposed Infiltration Basin provides storage for the recharge of impervious runoff and for the mitigation of peak flows and runoff volumes from the 1-, 10-, 25-, and 100- year storm events. The minimum separation from the bottom of the system to seasonal high groundwater provided is 3.0 feet and the separation from the bottom of the system to the restrictive layer is greater than 6.0 feet. This mounding analysis was performed to verify the system will drain between storm events. The response of the water table was predicted by using the "USGS SIR 2010-5102 Simulation of Groundwater Mounding Beneath Hypothetical Infiltration Basins Spread Sheet" which is based upon the Hantush Method (1967). The program modeled the mound created by the 100-year storm event infiltration volume determined by the Hydrocad program with groundwater levels at the seasonal high elevation. The input data is shown below:

100 Year – Storm Event Groundwater Mound Analysis Input Data:

1. Recharge Rate = 8.27 in/hour = 16.54 ft/day (sand)
2. Specific Yield of saturated zone = 0.22 (sand)
3. Horizontal Hydraulic Conductivity of saturated zone = Vertical Conductivity x 10 = 8.27 in/hour (sand) x 10 = 82.7 in/hour = 165.4 ft/day
4. Dimension of System: Width = 4' min, Length = 227' (1,256 sf bottom of basin)
5. Duration of Infiltration Period:
   100-year storm, 24-hour exfiltration (discarded) volume = 1.057 acre-feet
   = 46,043 cf *(Hyd. BMP)*
   Estimated Time to Drain = (46,043 cf)/[(8.27 in/hr) (1'/12") (1,256 sf)]
   = 53.20 hours = 2.22 days
6. Initial thickness of Saturated Zone = 6.0'
7. Range of Model = 120 feet

The results are shown on the following page and indicate that under these conditions the resulting mound does not break out above land.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
16.5400	***R***	**Recharge (infiltration) rate (feet/day)**
0.220	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
165.40	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
113.500	**x**	**1/2 length of basin (x direction, in feet)**
2.000	**y**	**1/2 width of basin (y direction, in feet)**
2.220	**t**	**duration of infiltration period (days)**
6.000	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

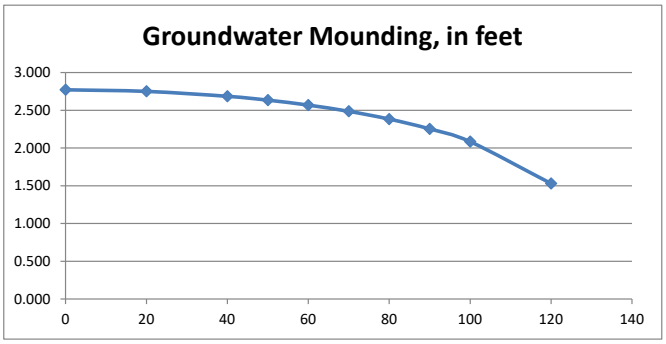
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

8.771	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
2.771	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
2.771	**0**
2.750	**20**
2.685	**40**
2.634	**50**
2.569	**60**
2.486	**70**
2.383	**80**
2.253	**90**
2.084	**100**
1.530	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
16.5400	***R***	**Recharge (infiltration) rate (feet/day)**
0.220	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
165.40	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
2.000	**x**	**1/2 length of basin (x direction, in feet)**
113.500	**y**	**1/2 width of basin (y direction, in feet)**
2.220	**t**	**duration of infiltration period (days)**
6.000	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

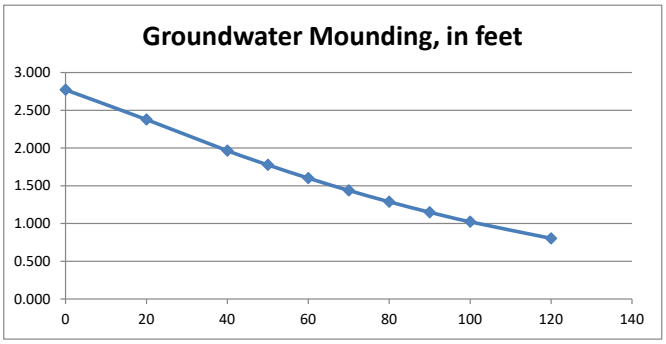
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

8.771	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
2.771	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
2.771	**0**
2.377	**20**
1.964	**40**
1.777	**50**
1.601	**60**
1.438	**70**
1.288	**80**
1.149	**90**
1.023	**100**
0.803	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Appendix G - Watershed Maps