Stormwater Analysis & Report

For

Definitive Subdivision Plan
for JRS Drive
Weymouth, MA

May 11, 2022

Prepared for:
1317 Washington Street Re Holdings LLC
190 Old Derby Street
Hingham, MA 02043

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5-11-2022

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SECTION 1 - NARRATIVE

1.1 EXECUTIVE SUMMARY

In accordance with the provisions of the Rules and Regulations of the Planning Board of Weymouth, Massachusetts Governing the Subdivision of Land, the Applicant, 1317 Washington Re Holdings LLC, proposes to develop a subdivision on the subject property off Washington Street. The following report also serves as the Environmental Impact Statement (EIS) per Town of Weymouth Subdivision Rules and Regulations Section 4.3.3.

The site is bound by Washington Street to the North with a mix of businesses, a quarry to the east and south and a residential street and homes to the west. The site topography peaks in the southeastern corner at approximately elevation 138+/- of the site and then slopes down towards the northwestern portion of the site to an elevation of 87 +/-.

The property consists of 19.9+/- acres and consists of three (3) underlying zoning districts Highway Transition (HT) Industrial (I-1) and Residence (R-2) and one (1) Commercial Corridor overlay district. Wetland resource areas are present at the site and were delineated in January and March of 2020 by South River Environmental and confirmed with the Conservation Commission with an ORAD issued on 7-28-2020. The site is entirely outside of the FEMA 100-year floodplain. The site is not located within an NHESP Estimated or Priority Habitat. Refer to Section 1.10 for the accompanying figures.

The proposed project consists of the development of a 320' of a subdivision roadway which would subdivide the property into two (2) lots meeting the requirements of the Subdivision Rules and Regs as well as the associated drainage and utility infrastructure.

The project has been designed to comply with the Massachusetts Stormwater Regulations as well as the Town of Weymouth Rules and Regulations Governing the Subdivision of Land.

1.2 OBJECTIVE OF CALCULATIONS

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

The goal of the stormwater management system design on this project is to provide improved water quality, reduce post-development peak runoff rates below pre-development peak flow rates, maximize the opportunities for recharge and infiltration, and protect the surrounding area from any potential flooding and/or environmental impacts associated with the unmitigated condition. The following stormwater hydrology calculations were performed using the 2-year, 10-year, 25-year, and 100-year frequency,

NOAA-14 Precipitation data design storms and were compared for both pre-development and post-development conditions.

1.3 METHODOLOGY

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

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

1.4 ON-SITE SOIL INFORMATION

The Natural Resource Conservation Service (NRCS) maps the majority of the on-site soil as Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes, Soil Map Unit 104C. There are also three (3) other soils present on the site; Urban Land, 0 to 15 percent slopes, Soil Map 602, Swansea Muck, 0 to 1 percent slopes, Soil Map 51 and in the center of the site Freetown Muck, 0 to 1 percent slopes, Soil Map 52. The stormwater system design is based off an assumed soil composition of A/B soils and shall be confirmed in the field prior to the start of construction.

1.5 WETLANDS AND ENVIRONMENTAL RESOURCE AREAS ANALYSIS

The project contains several jurisdictional wetland resource areas and therefore the project shall be permitted through the Weymouth Conservation Commission. An Order of Resource Area Delineation (ORAD) (MA DEP# 81-1253) was issued on July 28, 2020 for the entirety of the 19.9 +/- Acre parcel and is enclosed with this report in Section 8. We do not have any work proposed within the 50’ wetland buffer setback.

The site does not contain any areas designated as Estimated or Priority Endangered Species Habitat, certified vernal pools or Areas of Critical Environmental Concern. The site does not contain areas classified as Estimated Habitats of Rare Wildlife by the Natural Heritage and Endangered Species Program of the Division of Fisheries and Wildlife. The project site is not within any “critical areas” (Per MassGIS Oliver viewer).

The following is a summary of the buffer and protection zones:

1) 100' Bordering Vegetated Wetland (BVW) buffer (310 CMR 10.55)

   Portions of the proposed subdivision roadway and related drainage and utilities are proposed within the 100' BVW buffer zone. The proposed construction will improve the quality and peak flows of the runoff.

2) 50' BVW no-touch buffer (Weymouth Wetland Regulation)

   The Town of Weymouth does have town by-laws for wetland protection, including a 50' "no-touch" buffer to the BVW for commercial projects. The project complies and provides a 50' buffer to the surrounding BVW's.

1.6 SITE HYDROLOGY

Existing Conditions

Please refer to the attached Existing Conditions Watershed Analysis Plan in Section 3 of this report. The property has been divided into two subcatchment areas based on the existing site topography and flow paths.

Each subcatchment area has been analyzed and assigned an appropriate Curve Number to represent the existing vegetative cover and underlying soil conditions. Times of concentration have been calculated and the extend of pervious vs impervious cover computed. This data was then input into HydroCAD to determine peak rates of runoff at the various design points which provide the locations for white to compare existing versus proposed conditions to document compliance that the peak rates have been reduced in regulatory storm events as required.

For the purposes of this analysis, the pre- and post- development drainage conditions were analyzed at two (2) design points within the disturbed area where stormwater currently drains to under existing conditions.

- Design Point 1 is towards the Washington Street ROW (Rt. 53) and ultimately ends up flowing into the Washington Street drainage system.
- Design Point 2 flows towards the northeastern portion of the site onto the neighboring property.

The analyzed watershed consists of approximately 1.48 +/- Acres of mostly undeveloped land made up of wooded area, wetlands, and exposed outcrops of ledge. The site conveys a significant amount of stormwater to the Washington Street ROW drainage system, while

the rest of the site appears to convey stormwater to various BVW's located through the perimeter of the parcel.

- Subcatchment 1 consists of a mix of woods and impervious area. The subcatchment drains to the Washington Street ROW (Design Point 1) and eventually discharges into the Washington Street drainage system without treatment or attenuation. This area is a mix of impervious and pervious area (CN: 84) and the time of concentration was calculated to be 13.6 minutes.
- Subcatchment 2 consists of mainly wooded area. This subcatchment drains towards the neighboring property. This area is a mix of impervious and pervious area (CN: 77) and the time of concentration was calculated to be 6.9 minutes.

Proposed Conditions

The proposed project consists of the construction of a 320' +/- subdivision roadway. The roadway has been designed to drain to deep sump hooded catch basins, which will capture and convey stormwater runoff, via an underground pipe system, to a proprietary water quality unit and then to an underground infiltration system.

Please refer to the attached Proposed Conditions Watershed Analysis Plan in Section 3 of this report. The proposed subdivision has been divided into three (3) subcatchment areas and the infiltration BMP's have been modeled. Appropriate Times of Concentration and Curve Numbers have been assigned for each catchment area. A Summary table is provided in the Hydrology Model Results and Conclusions Section below.

- Subcatchment 1A consists of the pervious roadway as well as some wooded areas. The stormwater runoff in this area flows to deep sump catch basins, then to the underground infiltration system. This area is mostly impervious (CN:86) and the minimum time of concentration is 7.3 minutes.
- Subcatchment 1B consists of the underground drainage system This area is mainly impervious (CN: 79) and the minimum time of concentration is 9 minutes.
- Subcatchment 2 consists of undisturbed woodland area. This area is mainly impervious woodland area (CN: 77) and time minimum time of concentration is 8.5 minutes.

Hydrology Model Results and Conclusions

The goal of the stormwater design for the project is to fully comply with the Massachusetts Stormwater Policy and the Town of Weymouth Regulations. This analysis confirms that the stormwater system is receiving proper treatment and rates and volumes of runoff have been reduced to below pre-development rates and volumes and using stormwater Best Management Practices including deep sump hooded catch basins, a proprietary water

quality unit and an infiltration basin. The results of the pre- and post-development hydrology calculations provided in Section 3 are summarized in the following table:

PEAK RATE OF DISCHARGE									
Design Points	**2-Year Storm Event (CFS)**			**10-Year Storm Event (CFS)**			**100-Year Storm Event (CFS)**		
	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
DP-1	3.29	1.02	-2.27	6.10	2.04	-4.06	10.61	3.73	-6.88
DP-2	0.32	0.17	-0.15	0.66	0.34	-0.32	1.24	0.64	-0.6

As can be seen based on the above tables, the peak stormwater runoff rates and volumes generated by the development are the same or less in post development conditions versus the existing conditions in all cases. Refer to Section 3 for copies of the HydroCAD Analysis and pre and post development watershed plans.

1.7 STORMWATER MANAGEMENT

The following section describes each of the nine (9) Massachusetts Stormwater Management Standards and describes how the project complies with each.

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

All new stormwater system conveyances are treated prior to discharge and result in no erosion occurring on site. The drainage system has been designed to direct stormwater runoff from impervious areas through stormwater systems designed to capture, convey, treat, detain, recharge and infiltrate the runoff prior to discharge.

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

The stormwater system reduces peak rates of runoff to below pre-development levels.

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

annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The stormwater system has been designed to comply with the recharge requirements for both the MA Stormwater Management Regulations. Refer to Section 4.1 for a summary of the stormwater recharge calculations.

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

The project utilizes deep sump hooded catch basins, proprietary separator water quality units and subsurface infiltration, to meet the requirements.

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

The project is not considered a LUHPL (Land Use with Higher Potential Pollutant Load).

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

The project is not located within or near a critical area.

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

The project qualifies as a mix of redevelopment and new development qualify as a redevelopment and therefore this standard not does not apply.

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

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

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

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

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

An Illicit Discharge Compliance Statement is included as required.

1.8 BEST MANAGEMENT PRACTICES (BMP'S)

A system of deep sump hooded catch basins, a proprietary water quality unit and a subsurface infiltration system will be used to treat stormwater runoff on the site. See Section 4.4: Total Suspended Solids (TSS) Calculations.

1.9 PIPE SIZING

The tributary area for each inlet/subcatchment area has been computed along with pipe length, slope and friction coefficient. The Rational Method is then utilized to determine the hydraulic grade line. For design purposes, this approach was used to size the pipes such that the 25-year storm event is contained within the pipe. The 50-year storm was then checked to confirm the hydraulic grade line for the pipe network does not exceed the rim elevations of the drainage structures. Refer to Section 7 for calculations.

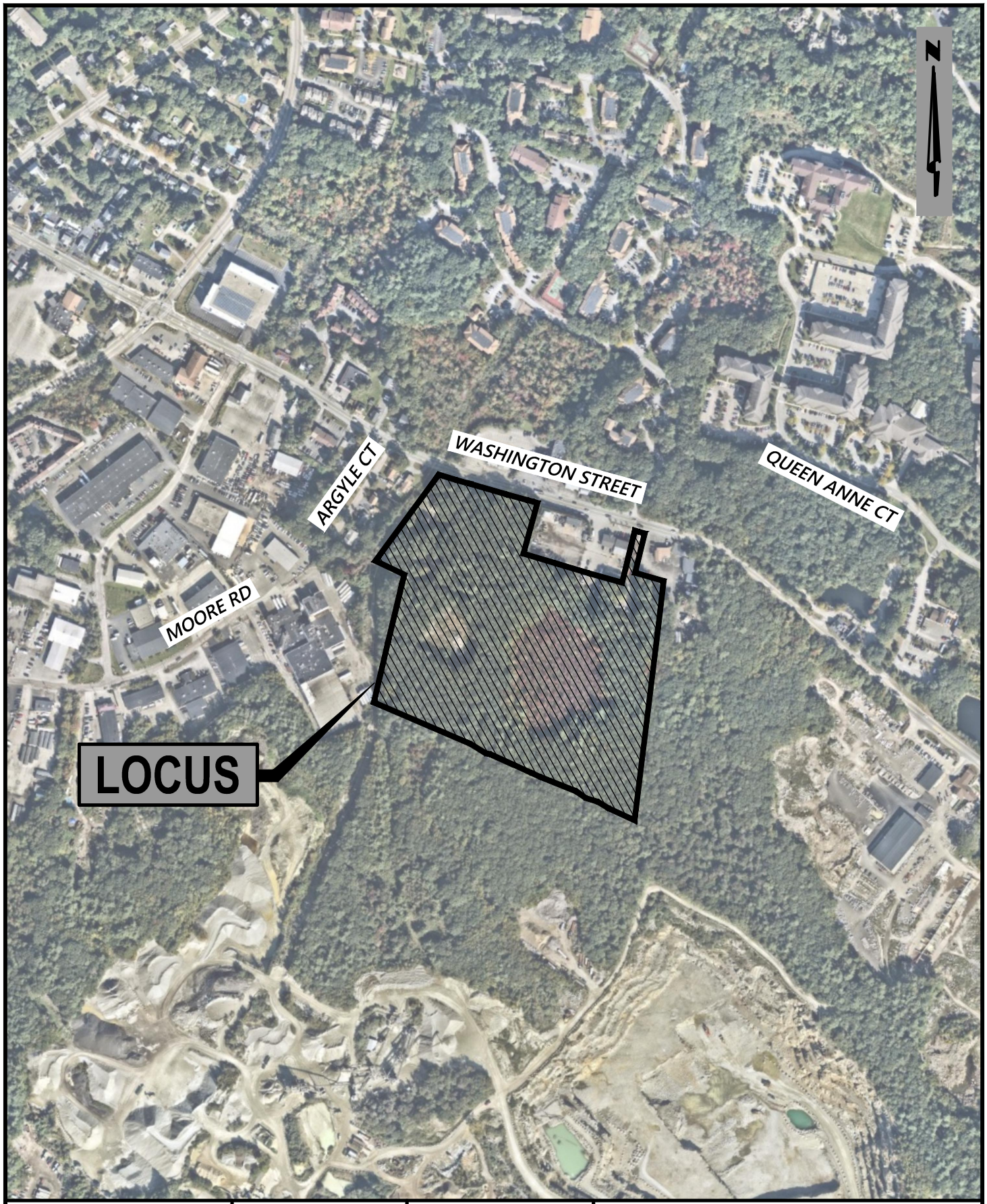
1.10 CONCLUSION

In conclusion, the project has been designed in accordance with the requirements of the MA Stormwater Management Regulations and in compliance with the Town of Weymouth Stormwater Management and Erosion Control By-Law.

1.11 FIGURES

The following pages contain the following accompanying figures:

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



Crocker Design Group
2 SHARP STREET, UNIT A
HINGHAM, MA 02043

Project
DEFINITIVE SUBDIVISION PLAN
WEYMOUTH , MA

Prepared for
1317 WASHINGTON RE HOLDINGS LLC
190 OLD DERBY STREET
HINGHAM, MA 02043

Drawing Title
AERIAL MAP

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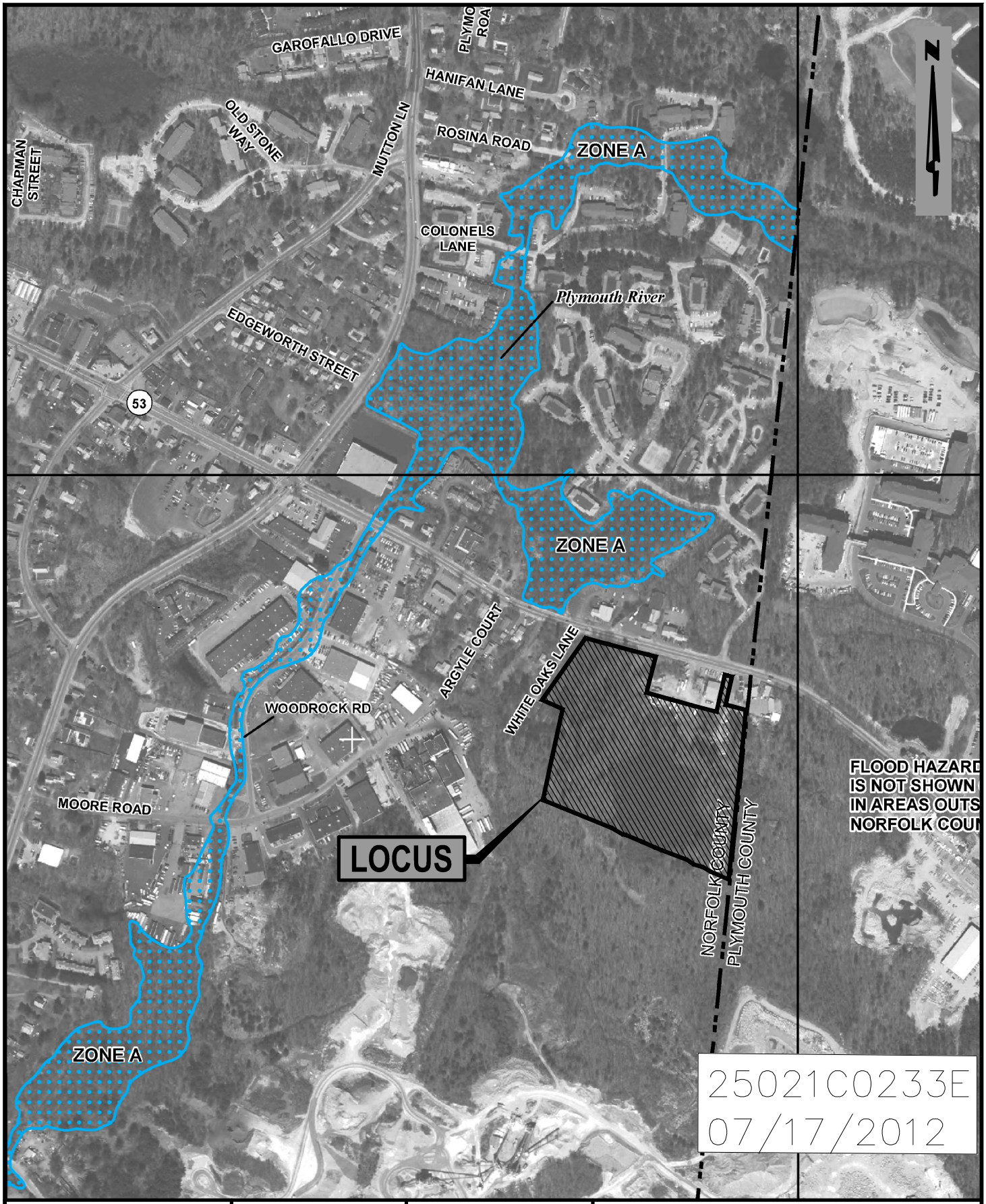

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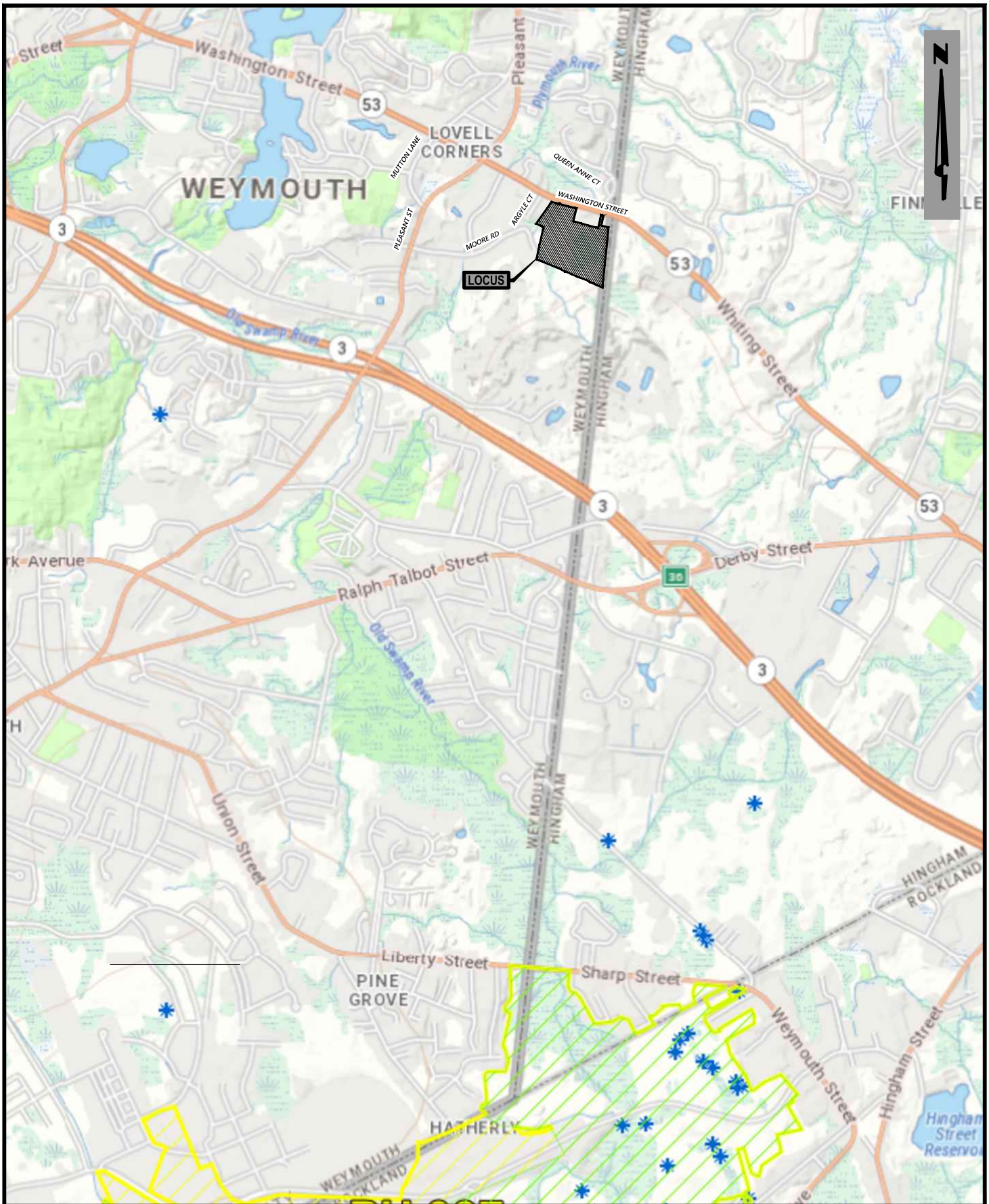

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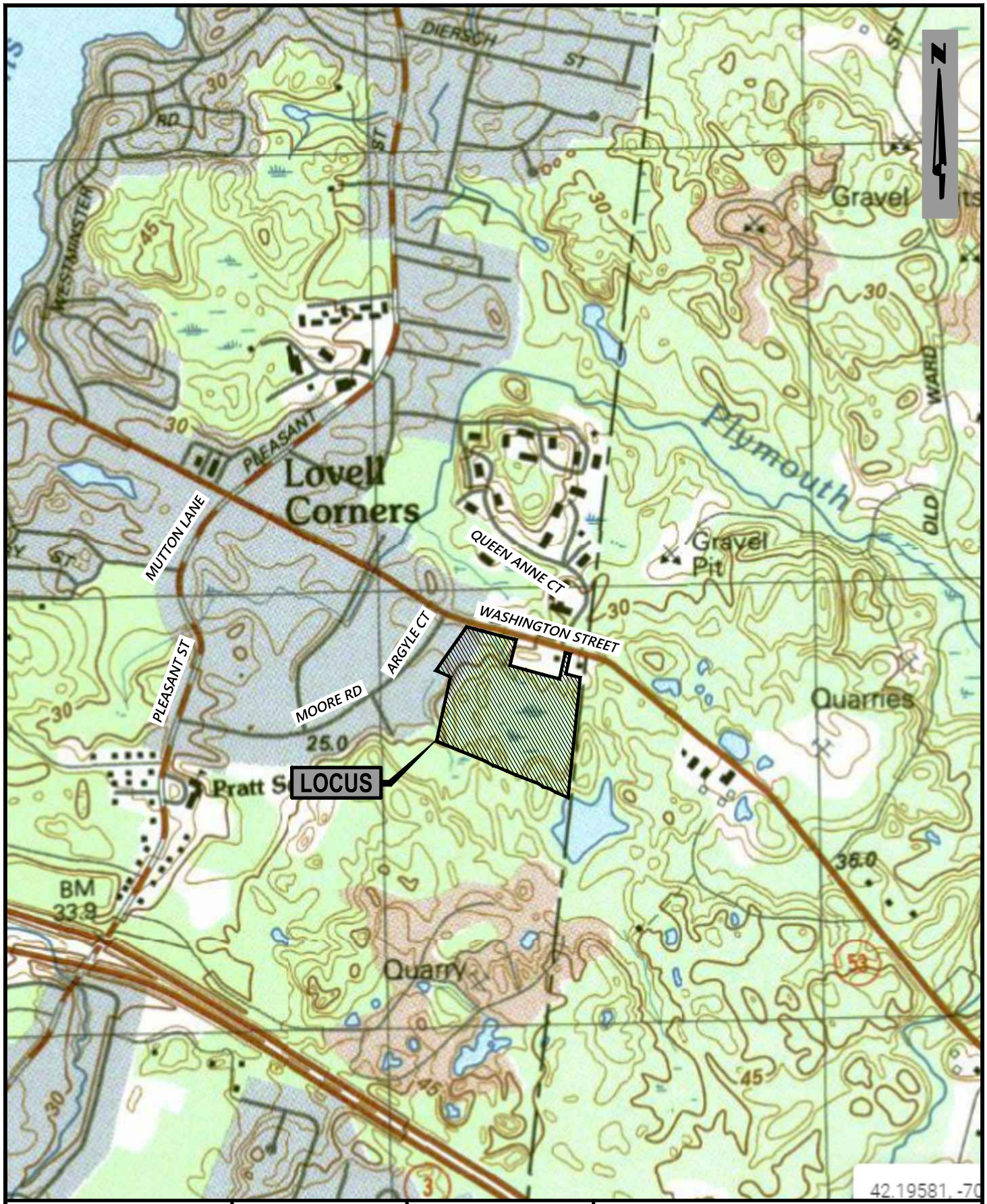

Crocker Design Group
2 SHARP STREET, UNIT A
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WEYMOUTH , MA

Prepared for
1317 WASHINGTON RE HOLDINGS LLC
190 OLD DERBY STREET
HINGHAM, MA 02043

Drawing Title
USGS MAP

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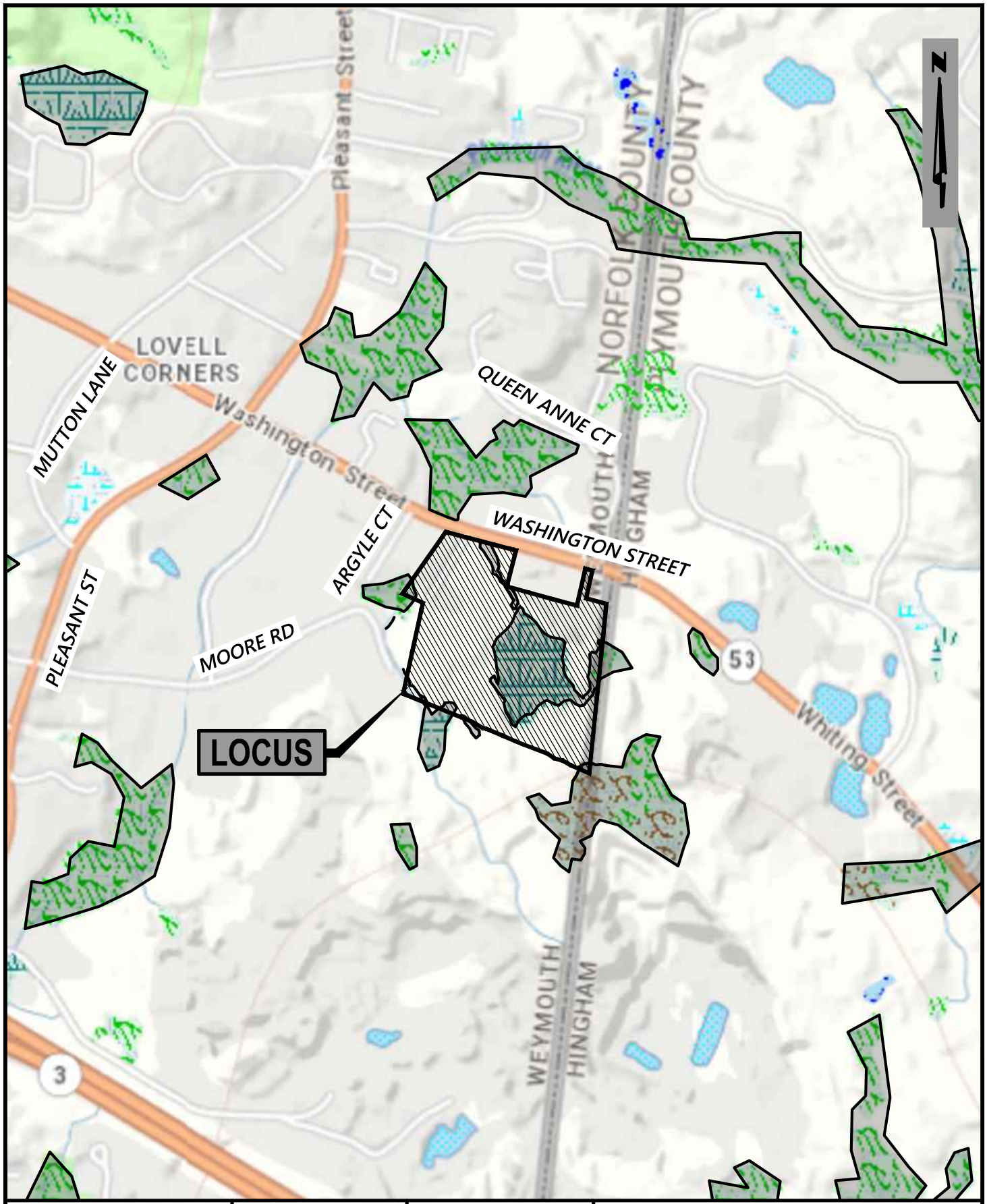

Crocker Design Group 2 SHARP STREET, UNIT A HINGHAM, MA 02043	Project **DEFINITIVE SUBDIVISION PLAN** **WEYMOUTH , MA**	Prepared for **1317 WASHINGTON RE HOLDINGS LLC** **190 OLD DERBY STREET** **HINGHAM, MA 02043**	Drawing Title: **WETLANDS MAP** DATE: 05.10.2022 | DRAWN: DF JOB NO.:100-081 | CHECK: CM SCALE: 500 300 0 500 **5**

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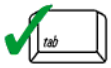
SECTION 2 – STORMWATER CHECKLIST

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

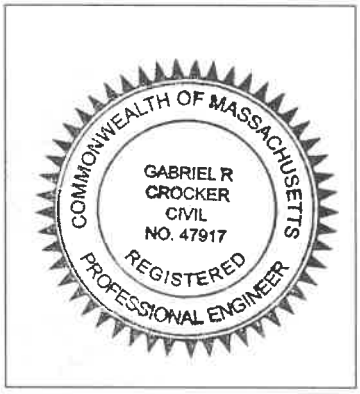
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



5/11/2022
Signature and Date

Checklist

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

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

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

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

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☐ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☒ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

☐ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

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

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

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

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

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

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

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

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

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

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

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☒ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

ILLICIT DISCHARGE COMPLIANCE STATEMENT

Standard 10: Massachusetts Stormwater Standards Handbook

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

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

Engineer's Name: _____
(please print)

Engineer's Signature: _____ Date: _____

Company: Crocker Design Group, LLC.

SECTION 3 – STORMATER HYDROLOGY MODEL

MAP UNIT SYMBOL	MAP UNIT NAME	HYDROLOGIC RATING
602	URBAN LAND, 0-15% SLOPES	UNRANKED
104C	HOLLIS-ROCK OUTCROP-CHARLTON COMPLEX, 0-15% SLOPES	D

SF=SHEET FLOW
SCF= SHALLOW CONCENTRATED FLOW

FOR REGISTRY USE ONLY

APPROVAL UNDER THE SUBDIVISION CONTROL LAW WEYMOUTH PLANNING BOARD

DATE: _____

PLANNING BOARD ENDORSEMENT DOES NOT IMPLY CONFORMANCE WITH TOWN OF WEYMOUTH ZONING BY-LAW.

60 0 30 60 120

Date	Description	No.

Revisions

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

5-11-2022
GABRIEL R. CROCKER, P.E.

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No.47917
REGISTERED
PROFESSIONAL ENGINEER

5-11-2022
GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

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

Project
DEFINITIVE SUBDIVISION PLAN FOR JRS DRIVE

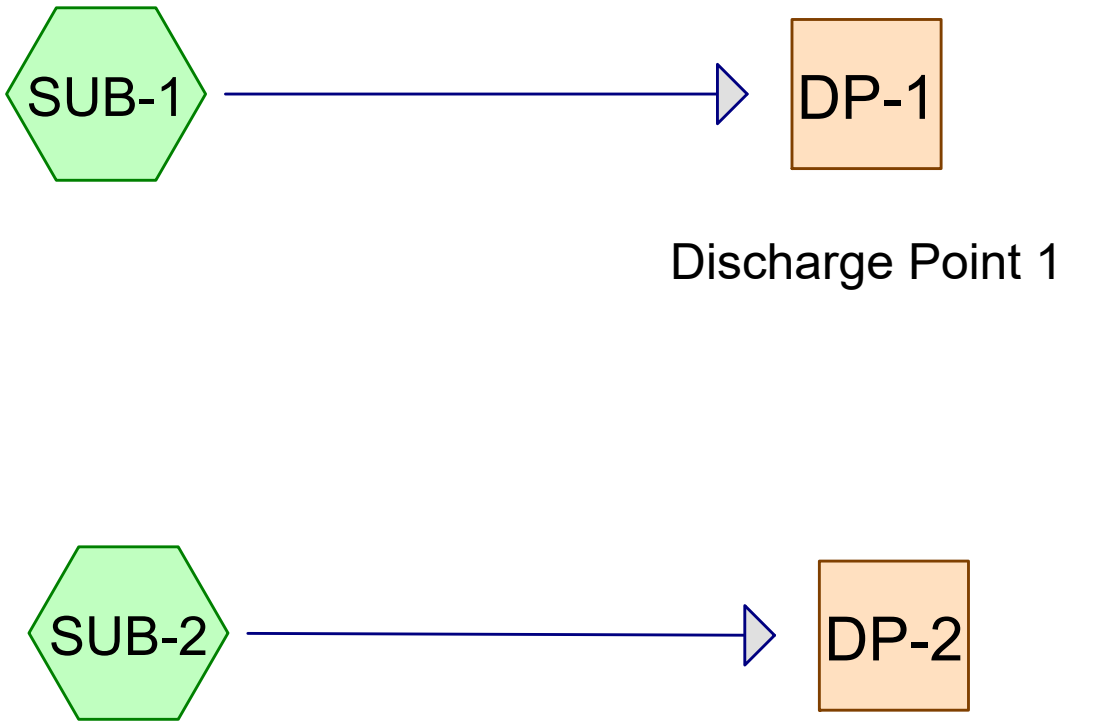
Prepared for
1317 WASHINGTON RE HOLDINGS LLC
190 OLD DERBY STREET, SUITE 311
HINGHAM, MA 02043

Drawing Title
EXISTING WATERSHED PLAN

Project No.	100-081
Date	05/12/22
Scale	
Drawn By	CRM
Approved By	GRC

Drawing No.
WS-1

C:\2021\Crocker Design Group, LLC\Gabriel Crocker - Projects\100-081 Weymouth - White Oaks Lane\Civil\Plot Sheets\Subdivision Application\Definitive Subdivision\Watershed.dwg, SITE - LAYOUT, May 11, 2022 16:32



Subcat Reach Pond Link

Routing Diagram for Existing
Prepared by HP Inc., Printed 5/10/2022
HydroCAD® 10.00-26 s/n 01012 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.557	91	Gravel roads, HSG D (SUB-1)
0.063	98	Paved parking, HSG D (SUB-1)
0.863	77	Woods, Good, HSG D (SUB-1, SUB-2)
1.482	**83**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
1.482	HSG D	SUB-1, SUB-2
0.000	Other	
1.482		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.557	0.000	0.557	Gravel roads	SUB-1
0.000	0.000	0.000	0.063	0.000	0.063	Paved parking	SUB-1
0.000	0.000	0.000	0.863	0.000	0.863	Woods, Good	SUB-1, SUB-2
0.000	**0.000**	**0.000**	**1.482**	**0.000**	**1.482**	**TOTAL AREA**	

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

Subcatchment SUB-1: Runoff Area=58,385 sf 4.69% Impervious Runoff Depth=1.83"
Flow Length=463' Tc=13.6 min CN=84 Runoff=3.29 cfs 0.204 af

Subcatchment SUB-2: Runoff Area=6,188 sf 0.00% Impervious Runoff Depth=1.33"
Flow Length=54' Slope=0.3700 '/' Tc=6.9 min CN=77 Runoff=0.32 cfs 0.016 af

Reach DP-1: Discharge Point 1 Inflow=3.29 cfs 0.204 af
Outflow=3.29 cfs 0.204 af

Reach DP-2: Discharge Point 2 Inflow=0.32 cfs 0.016 af
Outflow=0.32 cfs 0.016 af

Total Runoff Area = 1.482 ac Runoff Volume = 0.220 af Average Runoff Depth = 1.78"
95.76% Pervious = 1.420 ac 4.24% Impervious = 0.063 ac

Summary for Subcatchment SUB-1:

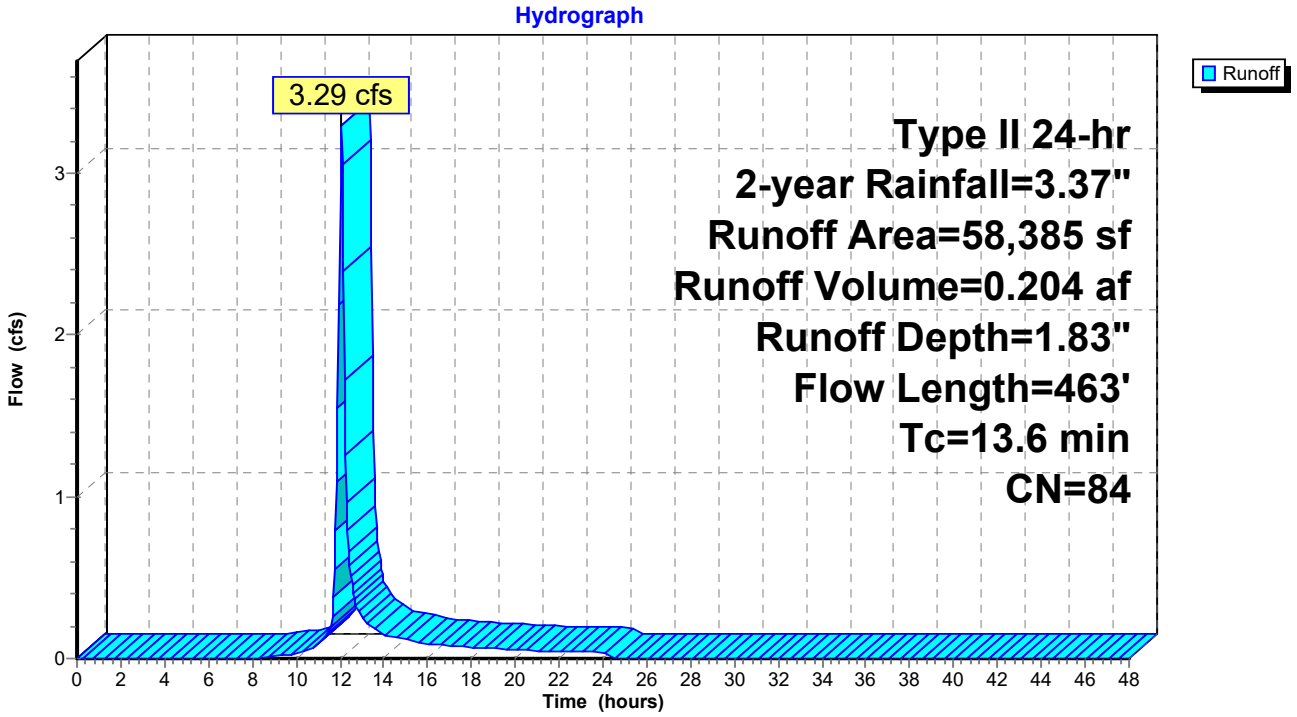
Runoff = 3.29 cfs @ 12.06 hrs, Volume= 0.204 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.37"

Area (sf)	CN	Description
31,397	77	Woods, Good, HSG D
2,736	98	Paved parking, HSG D
24,252	91	Gravel roads, HSG D
58,385	84	Weighted Average
55,649		95.31% Pervious Area
2,736		4.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	48	0.4000	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
2.9	147	0.0070	0.84		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
1.0	121	0.0400	2.00		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
3.4	113	0.0030	0.55		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
0.2	34	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.6	463	Total			

Subcatchment SUB-1:



Summary for Subcatchment SUB-2:

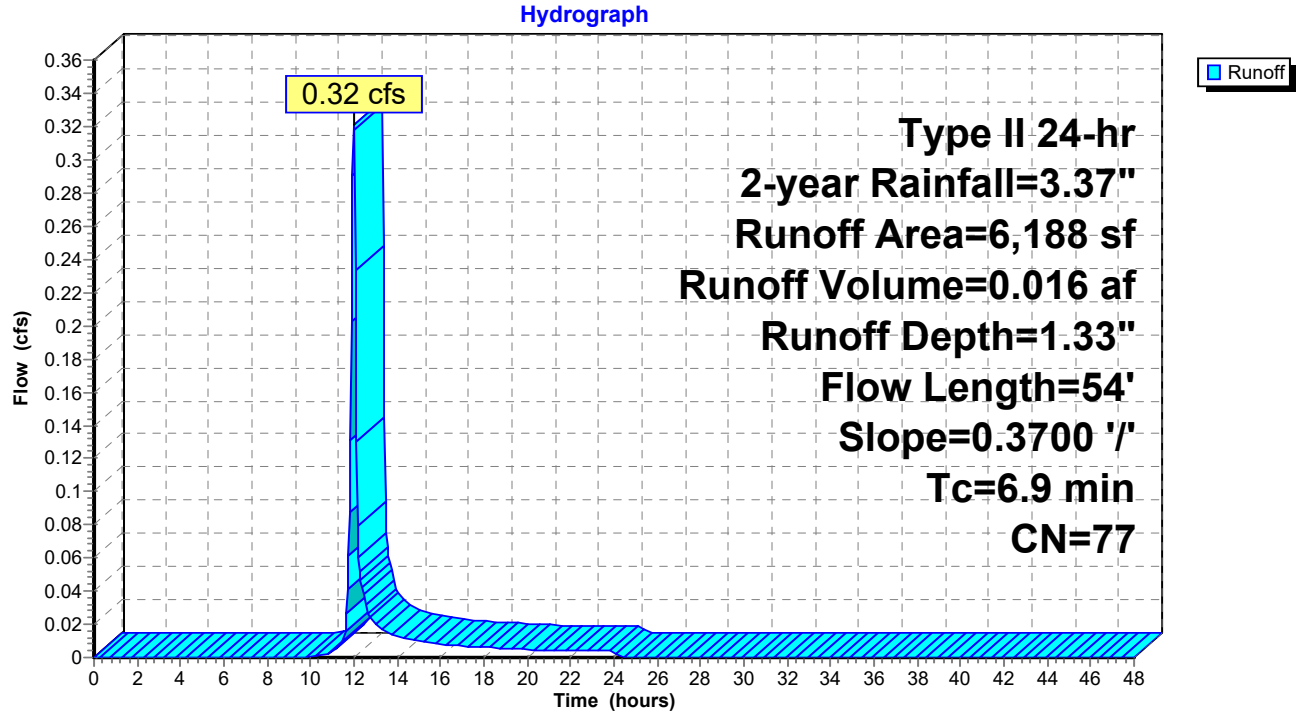
Runoff = 0.32 cfs @ 11.99 hrs, Volume= 0.016 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.37"

Area (sf)	CN	Description
6,188	77	Woods, Good, HSG D
6,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	54	0.3700	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"

Subcatchment SUB-2:



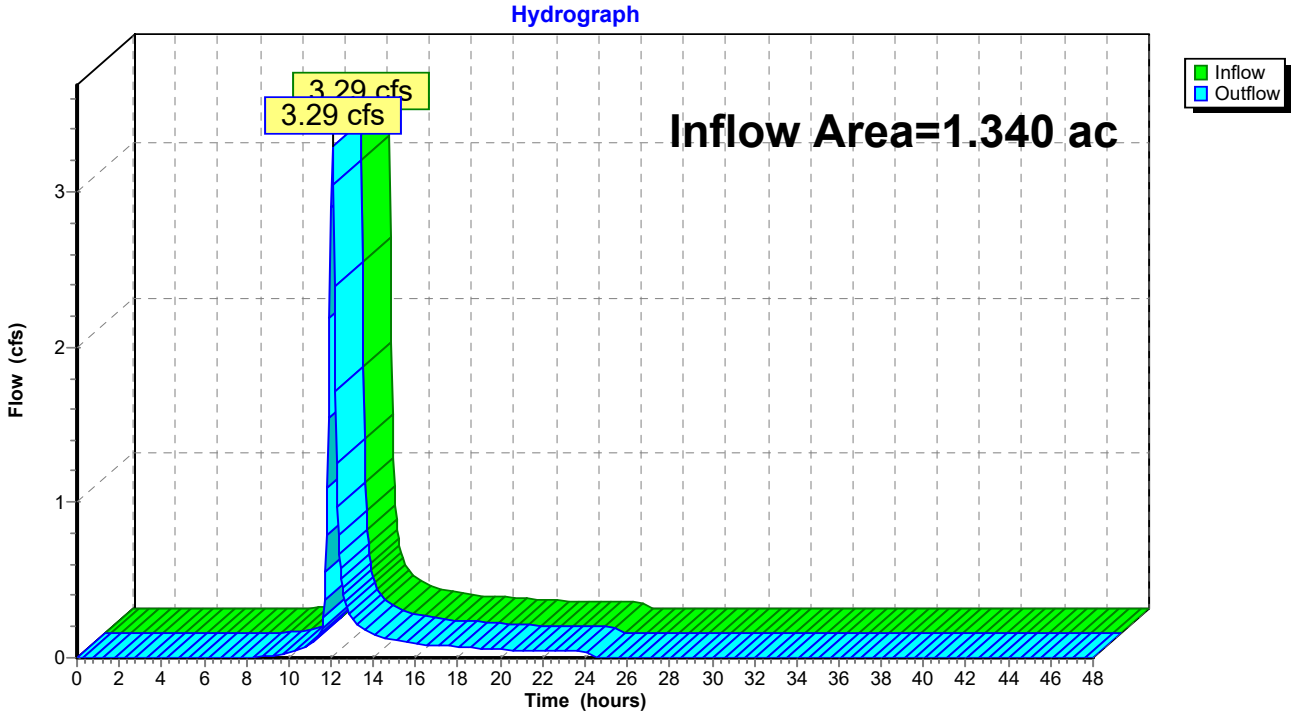
Summary for Reach DP-1: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.340 ac, 4.69% Impervious, Inflow Depth = 1.83" for 2-year event
Inflow = 3.29 cfs @ 12.06 hrs, Volume= 0.204 af
Outflow = 3.29 cfs @ 12.06 hrs, Volume= 0.204 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: Discharge Point 1



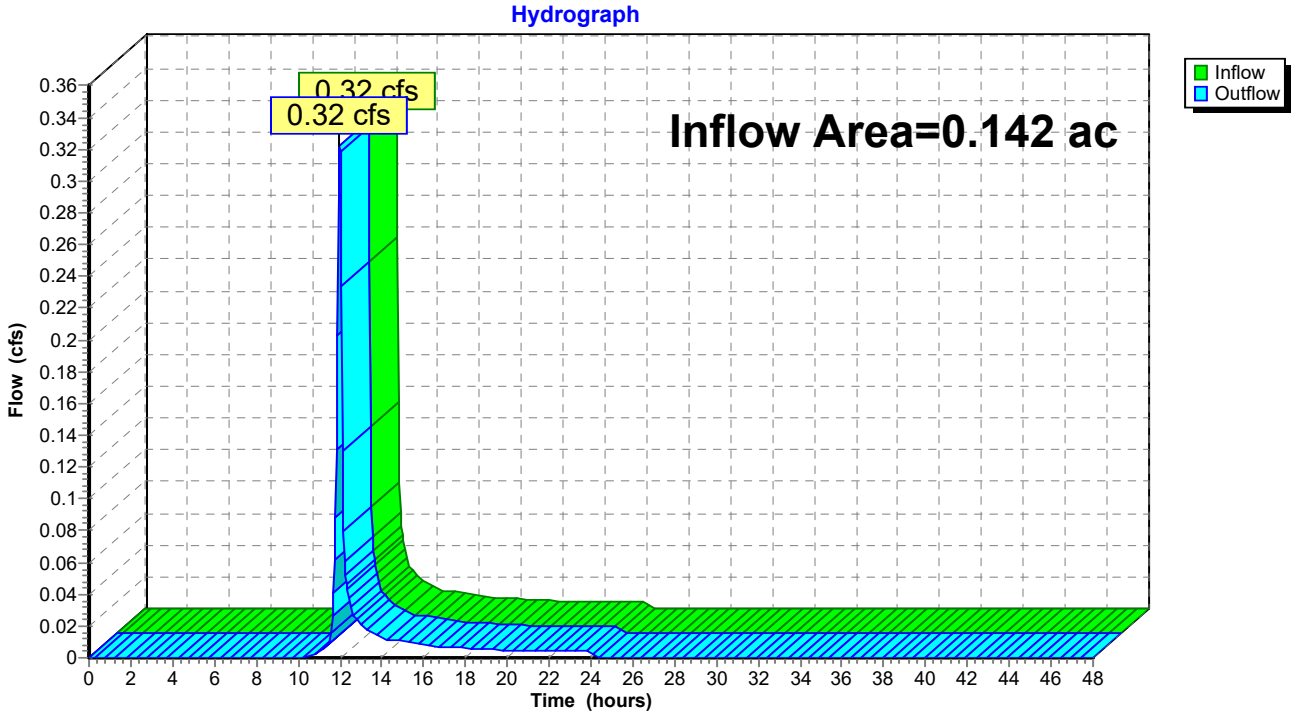
Summary for Reach DP-2: Discharge Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 1.33" for 2-year event
Inflow = 0.32 cfs @ 11.99 hrs, Volume= 0.016 af
Outflow = 0.32 cfs @ 11.99 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-2: Discharge Point 2



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

Subcatchment SUB-1: Runoff Area=58,385 sf 4.69% Impervious Runoff Depth=3.43"
Flow Length=463' Tc=13.6 min CN=84 Runoff=6.10 cfs 0.383 af

Subcatchment SUB-2: Runoff Area=6,188 sf 0.00% Impervious Runoff Depth=2.77"
Flow Length=54' Slope=0.3700 '/' Tc=6.9 min CN=77 Runoff=0.66 cfs 0.033 af

Reach DP-1: Discharge Point 1 Inflow=6.10 cfs 0.383 af
Outflow=6.10 cfs 0.383 af

Reach DP-2: Discharge Point 2 Inflow=0.66 cfs 0.033 af
Outflow=0.66 cfs 0.033 af

Total Runoff Area = 1.482 ac Runoff Volume = 0.415 af Average Runoff Depth = 3.36"
95.76% Pervious = 1.420 ac 4.24% Impervious = 0.063 ac

Summary for Subcatchment SUB-1:

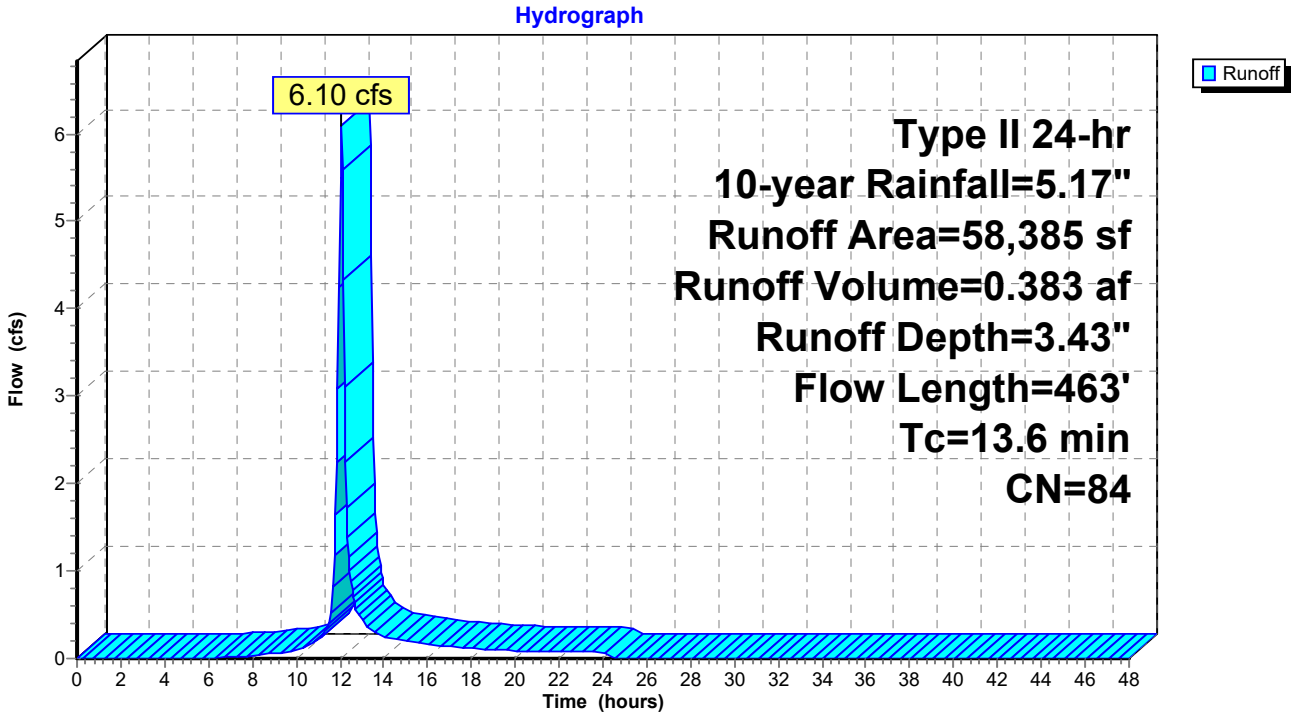
Runoff = 6.10 cfs @ 12.05 hrs, Volume= 0.383 af, Depth= 3.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.17"

Area (sf)	CN	Description
31,397	77	Woods, Good, HSG D
2,736	98	Paved parking, HSG D
24,252	91	Gravel roads, HSG D
58,385	84	Weighted Average
55,649		95.31% Pervious Area
2,736		4.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	48	0.4000	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
2.9	147	0.0070	0.84		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
1.0	121	0.0400	2.00		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
3.4	113	0.0030	0.55		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
0.2	34	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.6	463	Total			

Subcatchment SUB-1:



Summary for Subcatchment SUB-2:

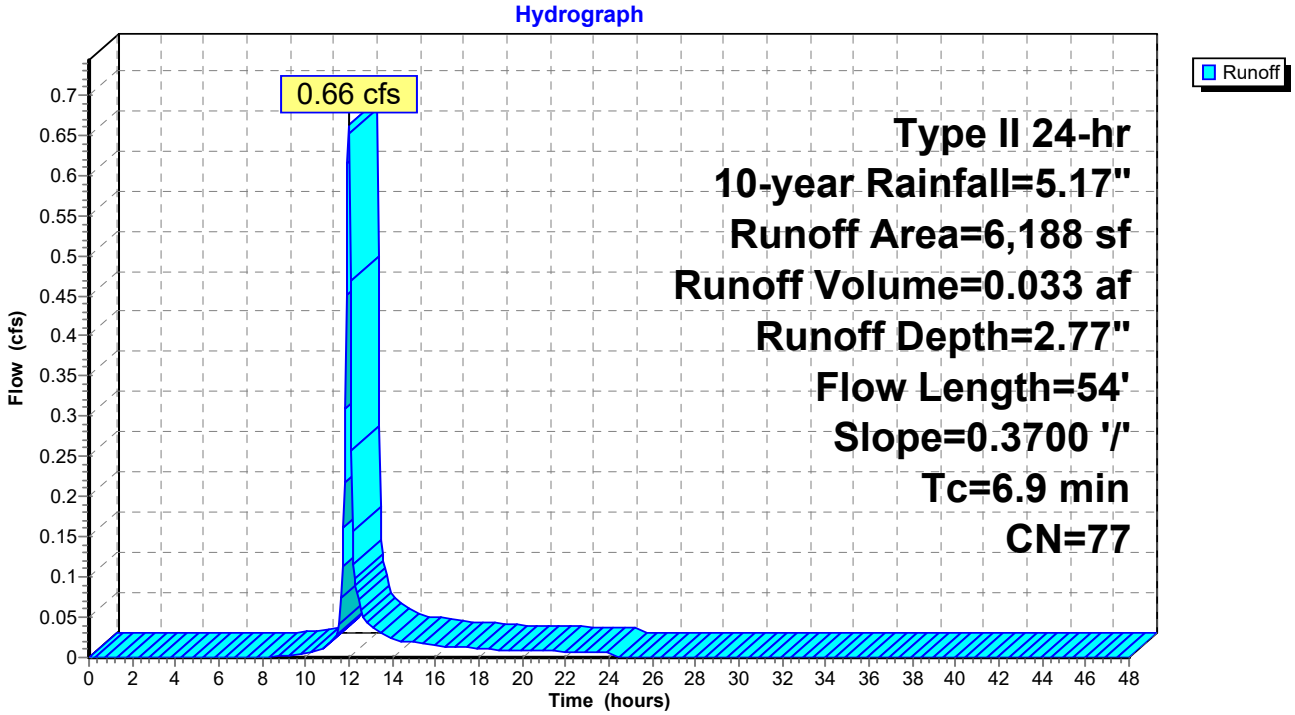
Runoff = 0.66 cfs @ 11.98 hrs, Volume= 0.033 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.17"

Area (sf)	CN	Description
6,188	77	Woods, Good, HSG D
6,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	54	0.3700	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"

Subcatchment SUB-2:



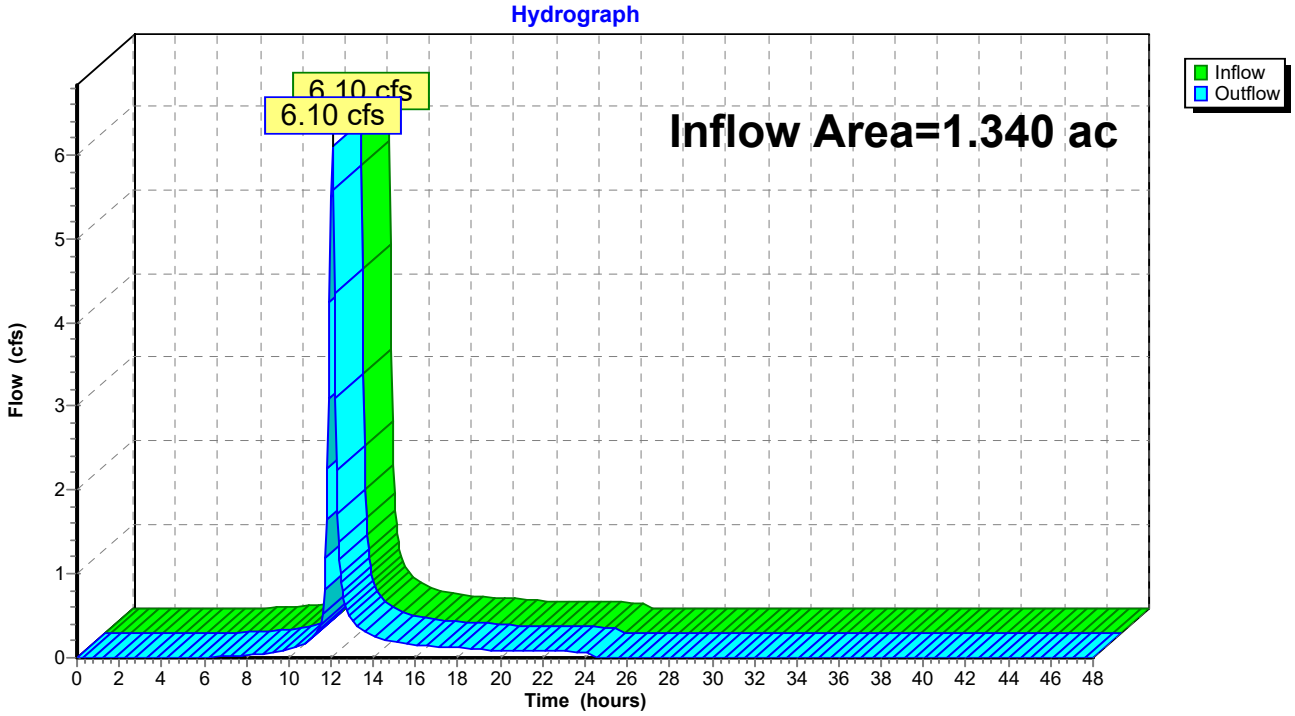
Summary for Reach DP-1: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.340 ac, 4.69% Impervious, Inflow Depth = 3.43" for 10-year event
Inflow = 6.10 cfs @ 12.05 hrs, Volume= 0.383 af
Outflow = 6.10 cfs @ 12.05 hrs, Volume= 0.383 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: Discharge Point 1



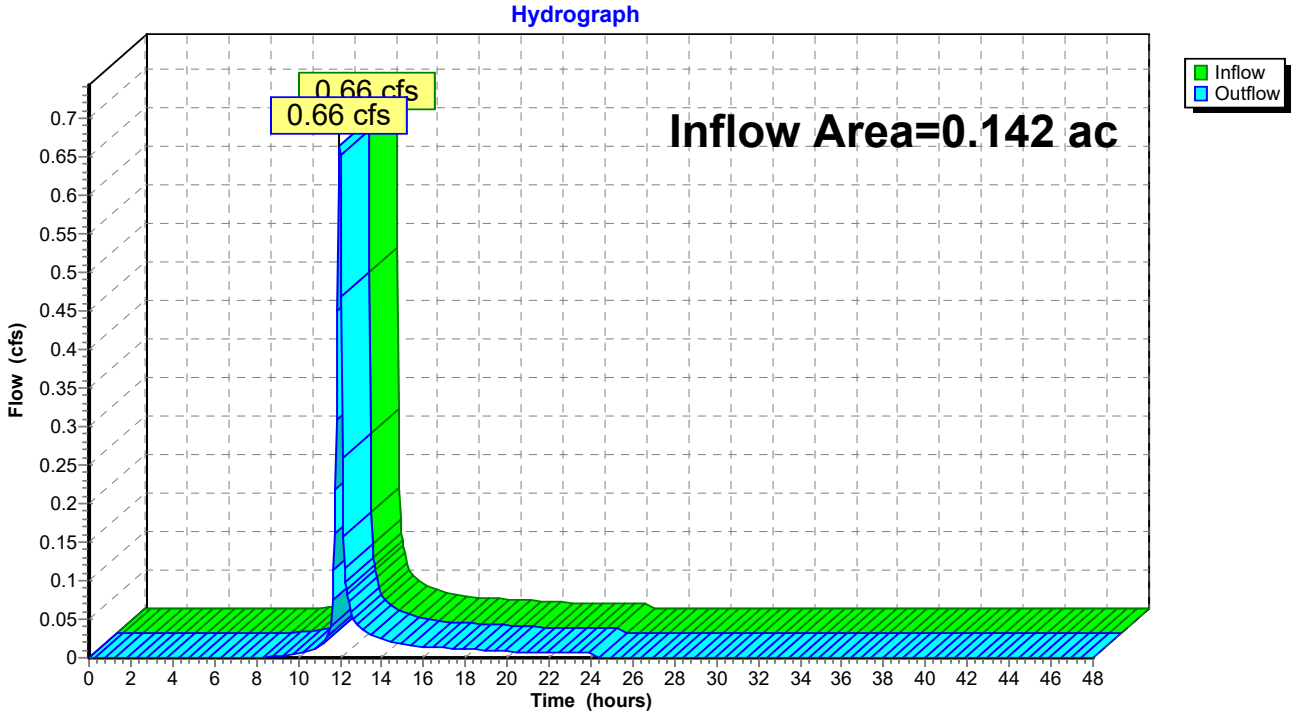
Summary for Reach DP-2: Discharge Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 2.77" for 10-year event
Inflow = 0.66 cfs @ 11.98 hrs, Volume= 0.033 af
Outflow = 0.66 cfs @ 11.98 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-2: Discharge Point 2



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

Subcatchment SUB-1: Runoff Area=58,385 sf 4.69% Impervious Runoff Depth=4.47"
Flow Length=463' Tc=13.6 min CN=84 Runoff=7.87 cfs 0.499 af

Subcatchment SUB-2: Runoff Area=6,188 sf 0.00% Impervious Runoff Depth=3.73"
Flow Length=54' Slope=0.3700 '/' Tc=6.9 min CN=77 Runoff=0.89 cfs 0.044 af

Reach DP-1: Discharge Point 1 Inflow=7.87 cfs 0.499 af
Outflow=7.87 cfs 0.499 af

Reach DP-2: Discharge Point 2 Inflow=0.89 cfs 0.044 af
Outflow=0.89 cfs 0.044 af

Total Runoff Area = 1.482 ac Runoff Volume = 0.543 af Average Runoff Depth = 4.40"
95.76% Pervious = 1.420 ac 4.24% Impervious = 0.063 ac

Summary for Subcatchment SUB-1:

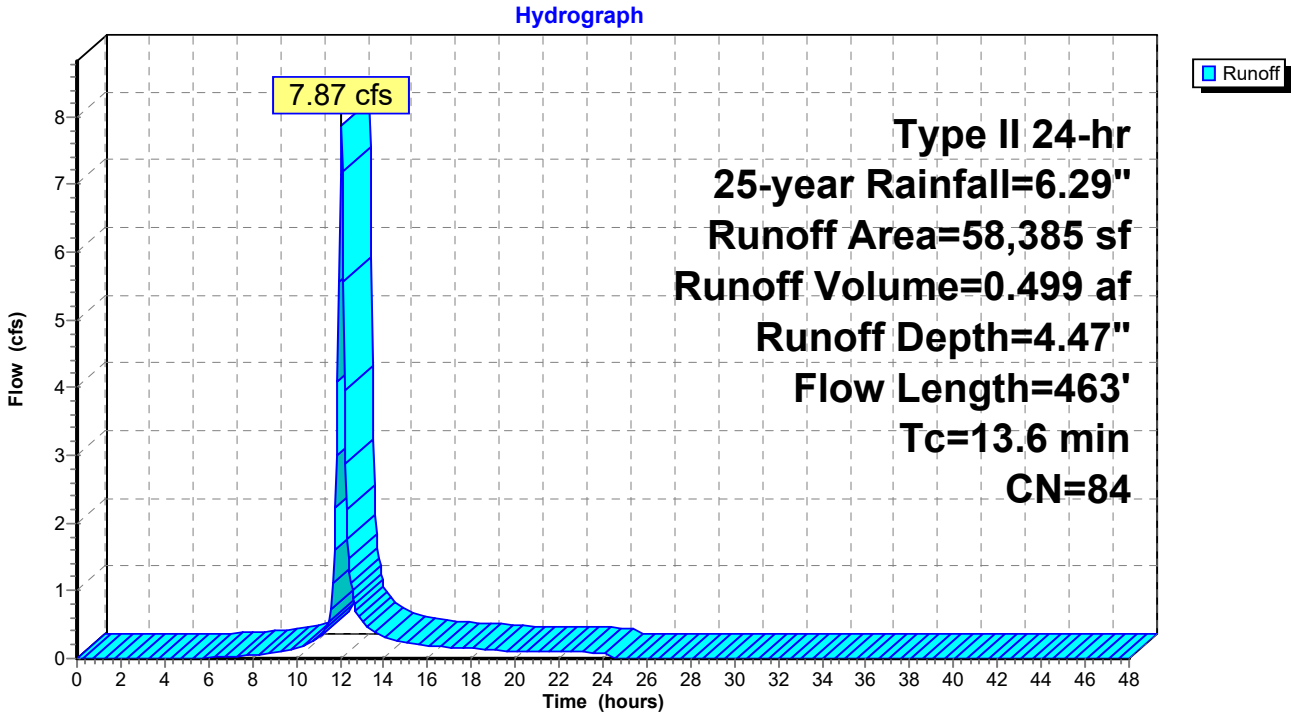
Runoff = 7.87 cfs @ 12.05 hrs, Volume= 0.499 af, Depth= 4.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year Rainfall=6.29"

Area (sf)	CN	Description
31,397	77	Woods, Good, HSG D
2,736	98	Paved parking, HSG D
24,252	91	Gravel roads, HSG D
58,385	84	Weighted Average
55,649		95.31% Pervious Area
2,736		4.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	48	0.4000	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
2.9	147	0.0070	0.84		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
1.0	121	0.0400	2.00		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
3.4	113	0.0030	0.55		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
0.2	34	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.6	463	Total			

Subcatchment SUB-1:



Summary for Subcatchment SUB-2:

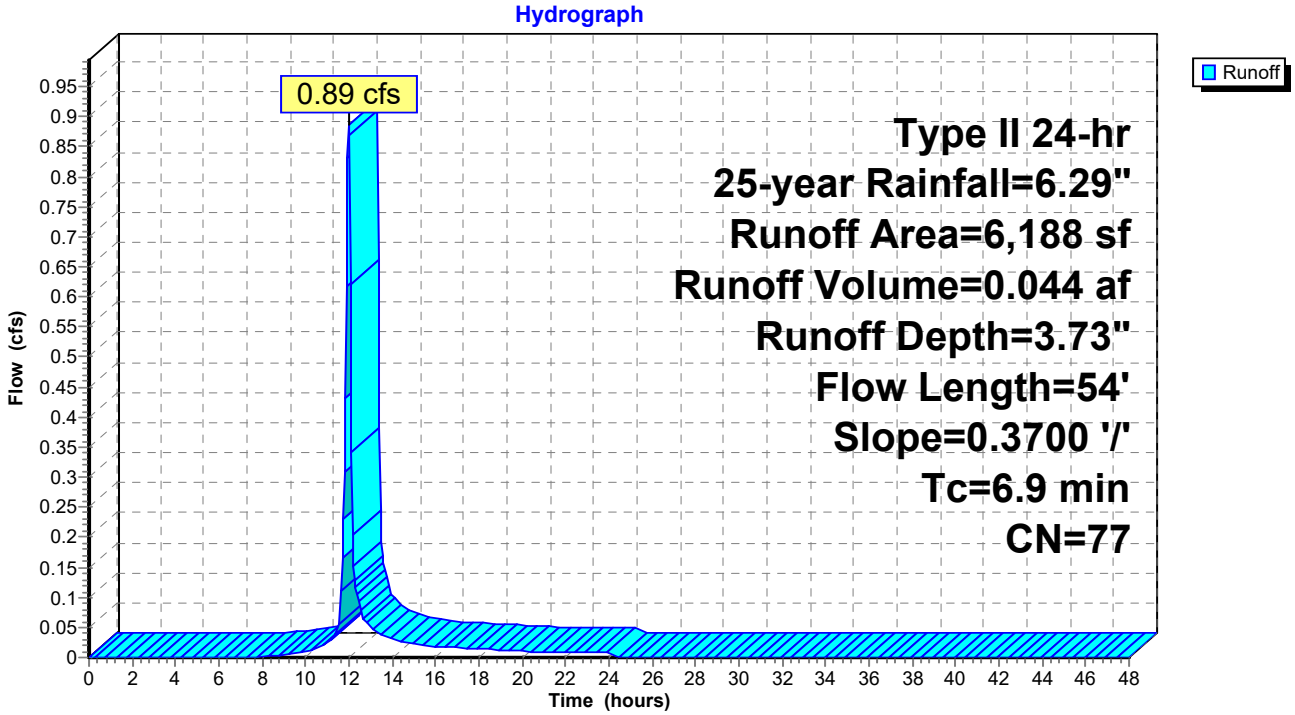
Runoff = 0.89 cfs @ 11.98 hrs, Volume= 0.044 af, Depth= 3.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year Rainfall=6.29"

Area (sf)	CN	Description
6,188	77	Woods, Good, HSG D
6,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	54	0.3700	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"

Subcatchment SUB-2:



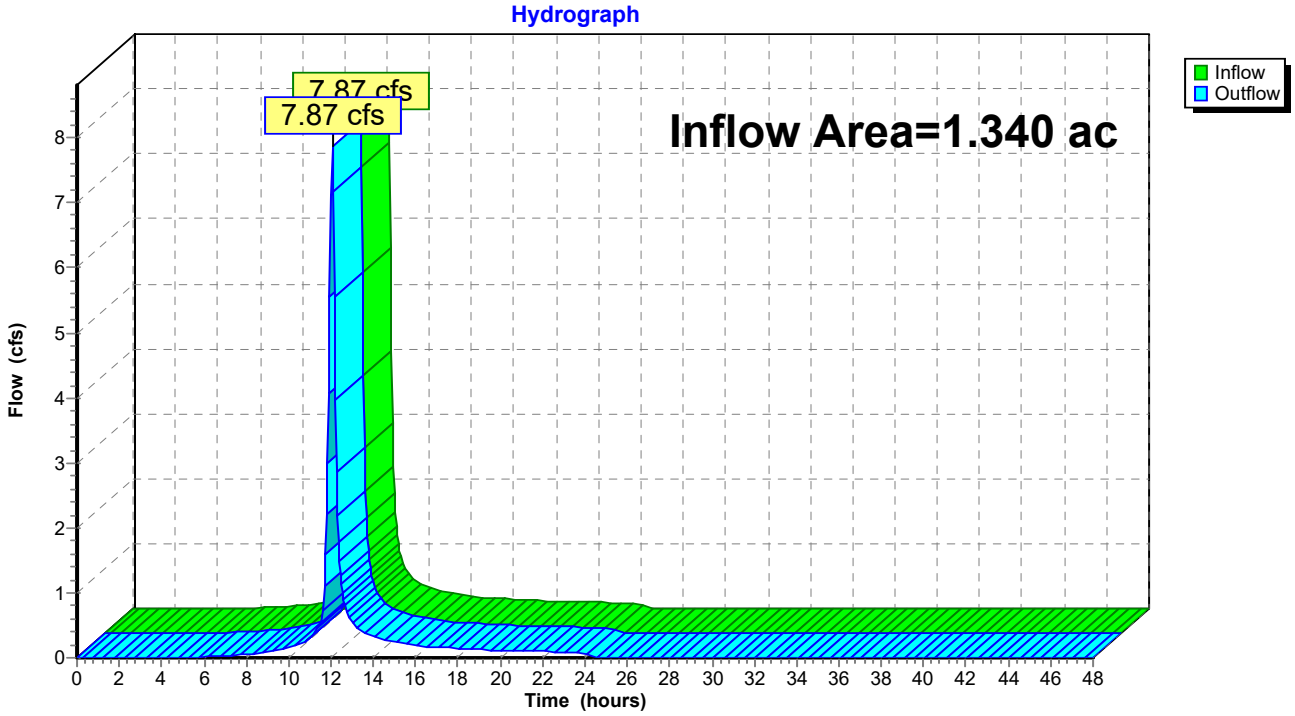
Summary for Reach DP-1: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.340 ac, 4.69% Impervious, Inflow Depth = 4.47" for 25-year event
Inflow = 7.87 cfs @ 12.05 hrs, Volume= 0.499 af
Outflow = 7.87 cfs @ 12.05 hrs, Volume= 0.499 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: Discharge Point 1



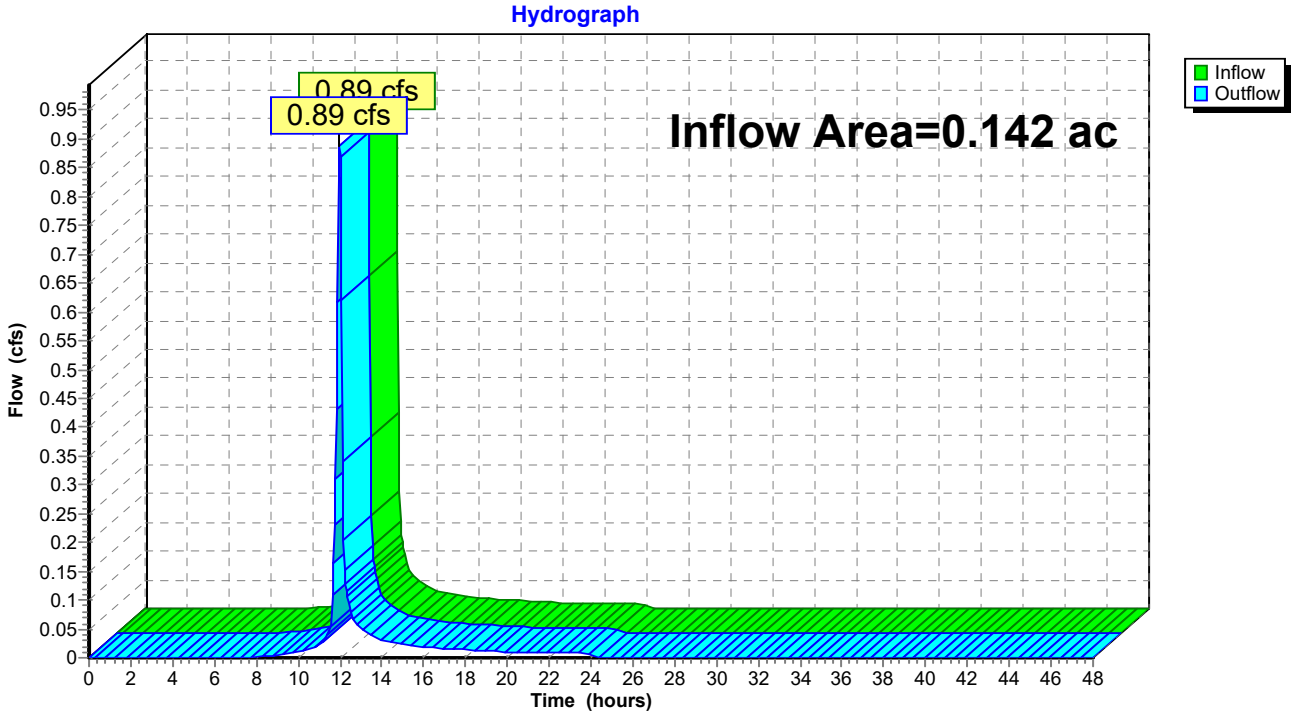
Summary for Reach DP-2: Discharge Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 3.73" for 25-year event
Inflow = 0.89 cfs @ 11.98 hrs, Volume= 0.044 af
Outflow = 0.89 cfs @ 11.98 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-2: Discharge Point 2



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

Subcatchment SUB-1: Runoff Area=58,385 sf 4.69% Impervious Runoff Depth=6.11"
Flow Length=463' Tc=13.6 min CN=84 Runoff=10.61 cfs 0.683 af

Subcatchment SUB-2: Runoff Area=6,188 sf 0.00% Impervious Runoff Depth=5.29"
Flow Length=54' Slope=0.3700 '/' Tc=6.9 min CN=77 Runoff=1.24 cfs 0.063 af

Reach DP-1: Discharge Point 1 Inflow=10.61 cfs 0.683 af
Outflow=10.61 cfs 0.683 af

Reach DP-2: Discharge Point 2 Inflow=1.24 cfs 0.063 af
Outflow=1.24 cfs 0.063 af

Total Runoff Area = 1.482 ac Runoff Volume = 0.746 af Average Runoff Depth = 6.04"
95.76% Pervious = 1.420 ac 4.24% Impervious = 0.063 ac

Summary for Subcatchment SUB-1:

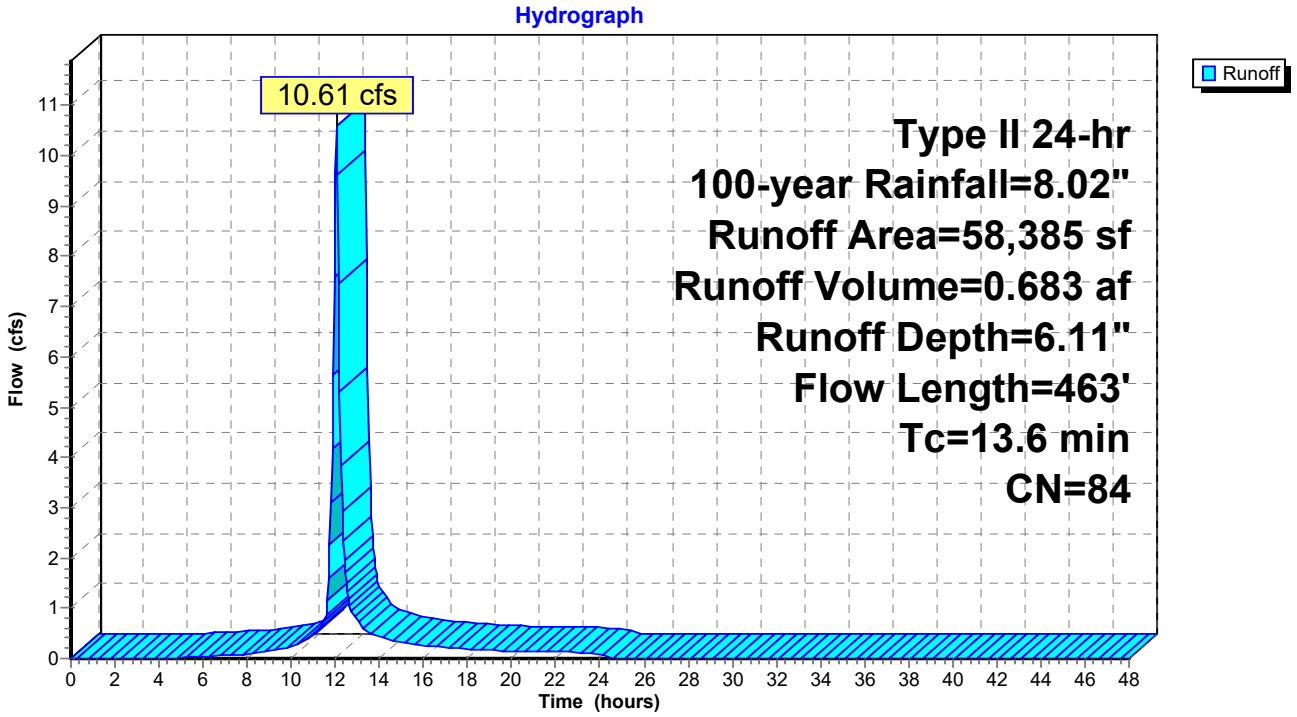
Runoff = 10.61 cfs @ 12.05 hrs, Volume= 0.683 af, Depth= 6.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year Rainfall=8.02"

Area (sf)	CN	Description
31,397	77	Woods, Good, HSG D
2,736	98	Paved parking, HSG D
24,252	91	Gravel roads, HSG D
58,385	84	Weighted Average
55,649		95.31% Pervious Area
2,736		4.69% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	48	0.4000	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
2.9	147	0.0070	0.84		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
1.0	121	0.0400	2.00		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
3.4	113	0.0030	0.55		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
0.2	34	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
13.6	463	Total			

Subcatchment SUB-1:



Summary for Subcatchment SUB-2:

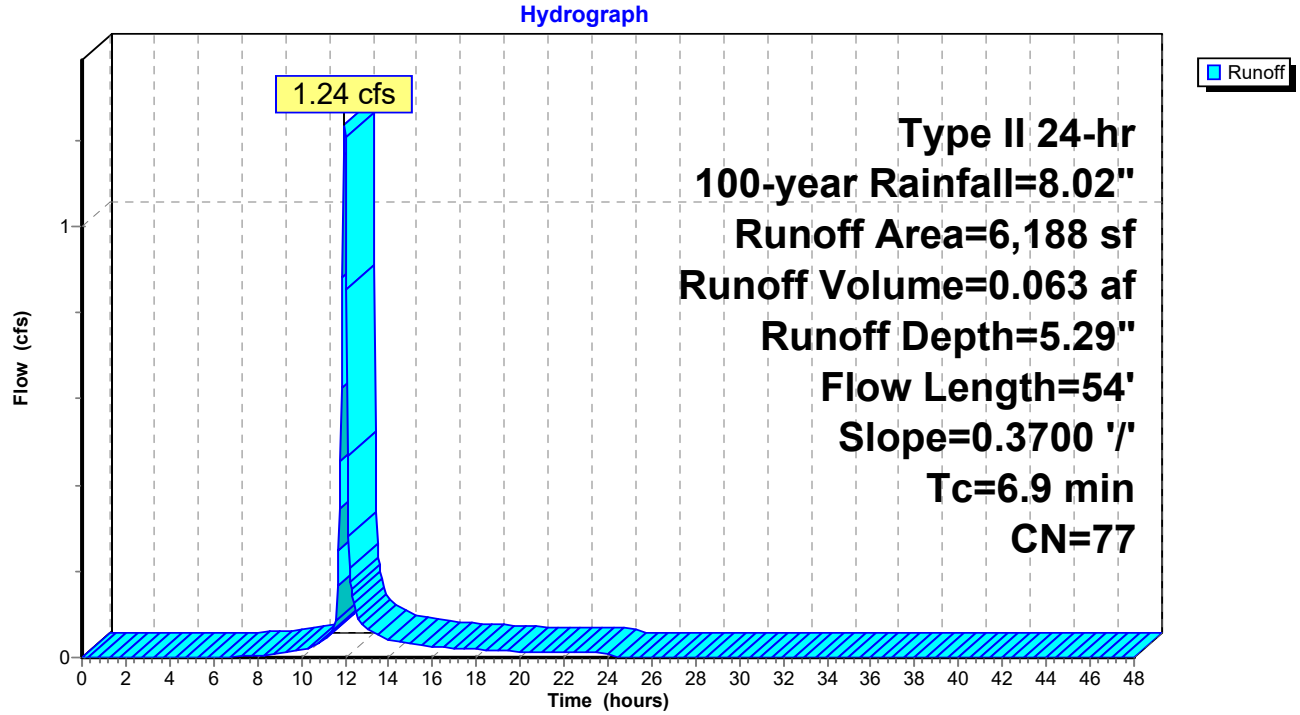
Runoff = 1.24 cfs @ 11.98 hrs, Volume= 0.063 af, Depth= 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year Rainfall=8.02"

Area (sf)	CN	Description
6,188	77	Woods, Good, HSG D
6,188		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.9	54	0.3700	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"

Subcatchment SUB-2:



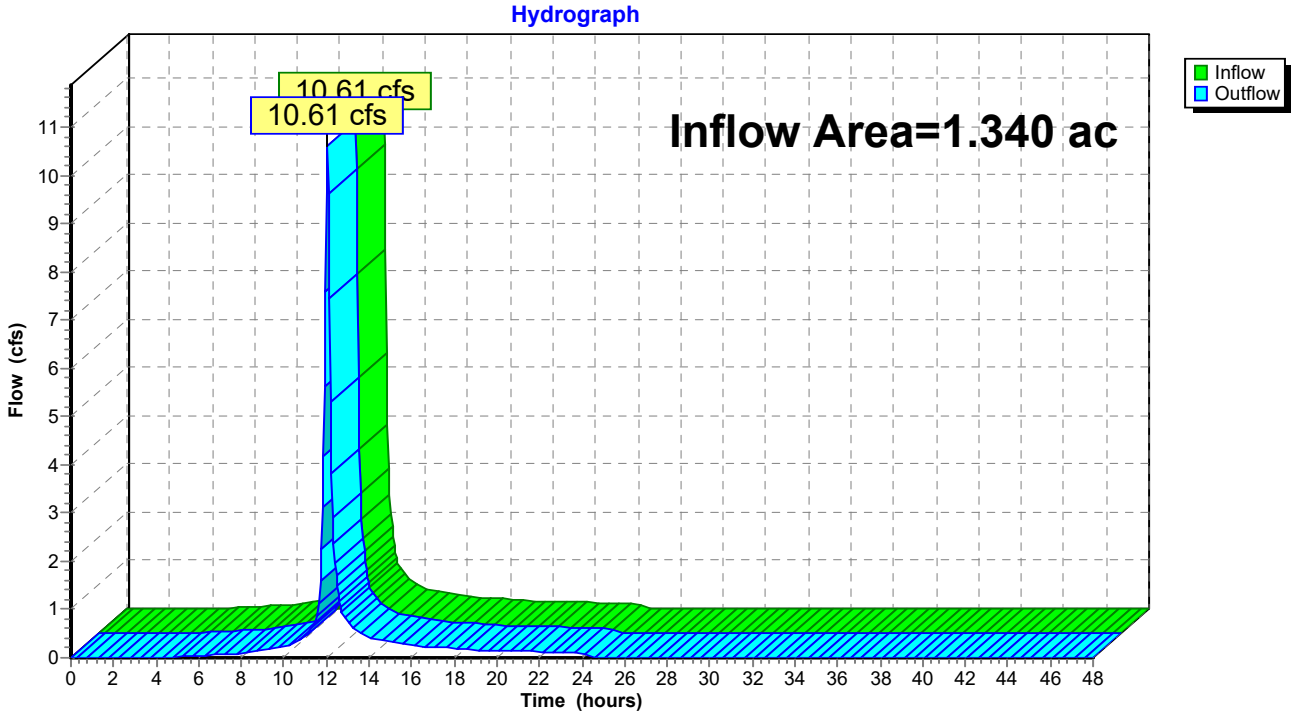
Summary for Reach DP-1: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.340 ac, 4.69% Impervious, Inflow Depth = 6.11" for 100-year event
Inflow = 10.61 cfs @ 12.05 hrs, Volume= 0.683 af
Outflow = 10.61 cfs @ 12.05 hrs, Volume= 0.683 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: Discharge Point 1



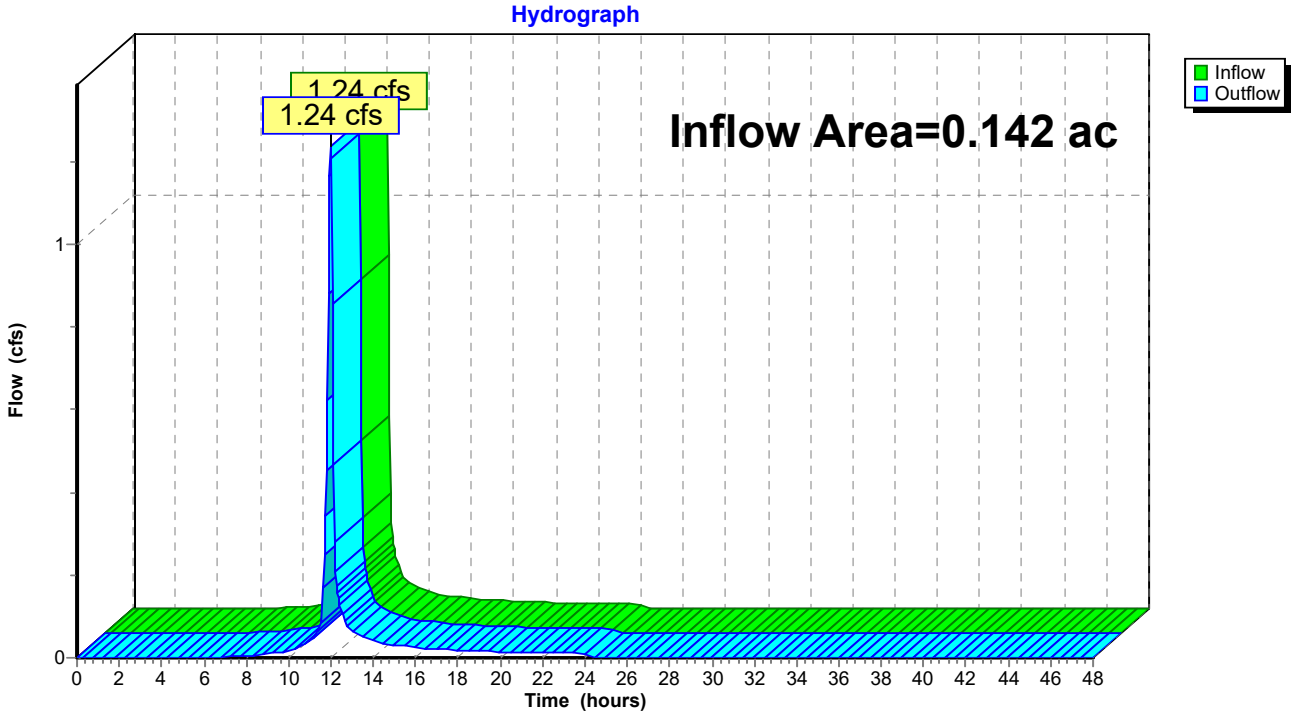
Summary for Reach DP-2: Discharge Point 2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.142 ac, 0.00% Impervious, Inflow Depth = 5.29" for 100-year event
Inflow = 1.24 cfs @ 11.98 hrs, Volume= 0.063 af
Outflow = 1.24 cfs @ 11.98 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-2: Discharge Point 2



MAP UNIT SYMBOL	MAP UNIT NAME	HYDROLOGIC RATING
602	URBAN LAND, 0-15% SLOPES	UNRANKED
104C	HOLLIS-ROCK OUTCROP-CHARLTON COMPLEX, 0-15% SLOPES	D

SF=SHEET FLOW
SCF= SHALLOW CONCENTRATED FLOW

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

5-11-2022

GABRIEL R. CROCKER, P.E.

FOR REGISTRY USE ONLY

APPROVAL UNDER THE SUBDIVISION CONTROL LAW
WEYMOUTH PLANNING BOARD

DATE:

PLANNING BOARD ENDORSEMENT DOES NOT IMPLY CONFORMANCE WITH TOWN OF WEYMOUTH ZONING BY-LAW.

60 0 30 60 120

Date	Description	No.

Revisions

COMMONWEALTH OF MASSACHUSETTS
GABRIEL R. CROCKER
CIVIL
No.47917
REGISTERED PROFESSIONAL ENGINEER

5-11-2022

GABRIEL R. CROCKER
PROFESSIONAL ENGINEER, MA REGISTRATION #47917

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

Project
DEFINITIVE SUBDIVISION PLAN FOR JRS DRIVE

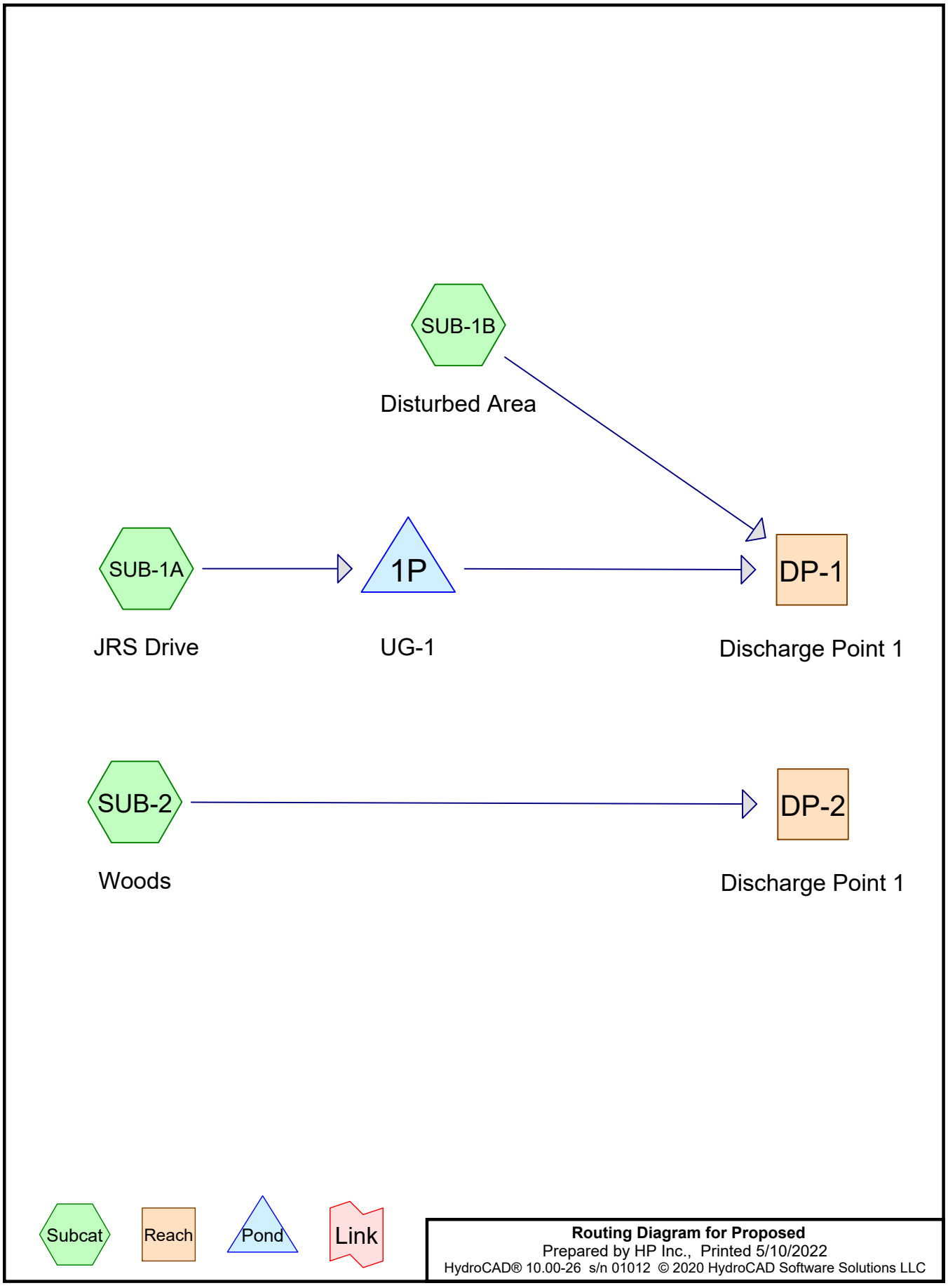
Prepared for
1317 WASHINGTON RE HOLDINGS LLC
190 OLD DERBY STREET, SUITE 311
HINGHAM, MA 02043

Drawing Title
PROPOSED WATERSHED PLAN

Project No.	100-081
Date	05 / 12 / 22
Scale	
Drawn By	CRM
Approved By	GRC

Drawing No.
WS-2

C:\CDG\Crocker Design Group, LLC\Crocker - Projects\100-081 Weymouth - White Oaks Lane\Civil\Plot Sheets\Subdivision Application\Definitive Subdivision\Watershed Proposed_SITE-LAYOUT_May 11, 2022 16:32



Routing Diagram for Proposed
Prepared by HP Inc., Printed 5/10/2022
HydroCAD® 10.00-26 s/n 01012 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.688	80	>75% Grass cover, Good, HSG D (SUB-1A, SUB-1B)
0.369	98	Paved parking, HSG D (SUB-1A)
0.426	77	Woods, Good, HSG D (SUB-1A, SUB-1B, SUB-2)
1.482	**84**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
1.482	HSG D	SUB-1A, SUB-1B, SUB-2
0.000	Other	
1.482		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.688	0.000	0.688	>75% Grass cover, Good	SUB-1A, SUB-1B
0.000	0.000	0.000	0.369	0.000	0.369	Paved parking	SUB-1A
0.000	0.000	0.000	0.426	0.000	0.426	Woods, Good	SUB-1A, SUB-1B, SUB-2
0.000	**0.000**	**0.000**	**1.482**	**0.000**	**1.482**	**TOTAL AREA**	

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

Subcatchment SUB-1A: JRS Drive Runoff Area=41,994 sf 38.26% Impervious Runoff Depth=1.98"
Flow Length=234' Tc=7.3 min CN=86 Runoff=3.17 cfs 0.159 af

Subcatchment SUB-1B: Disturbed Area Runoff Area=19,206 sf 0.00% Impervious Runoff Depth=1.47"
Flow Length=150' Tc=8.6 min CN=79 Runoff=1.03 cfs 0.054 af

Subcatchment SUB-2: Woods Runoff Area=3,373 sf 0.00% Impervious Runoff Depth=1.33"
Flow Length=43' Slope=0.1400 '/' Tc=8.5 min CN=77 Runoff=0.17 cfs 0.009 af

Reach DP-1: Discharge Point 1 Inflow=1.03 cfs 0.054 af
Outflow=1.03 cfs 0.054 af

Reach DP-2: Discharge Point 1 Inflow=0.17 cfs 0.009 af
Outflow=0.17 cfs 0.009 af

Pond 1P: UG-1 Peak Elev=102.54' Storage=2,502 cf Inflow=3.17 cfs 0.159 af
Discarded=0.33 cfs 0.160 af Primary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.160 af

Total Runoff Area = 1.482 ac Runoff Volume = 0.222 af Average Runoff Depth = 1.80"
75.12% Pervious = 1.114 ac 24.88% Impervious = 0.369 ac

Summary for Subcatchment SUB-1A: JRS Drive

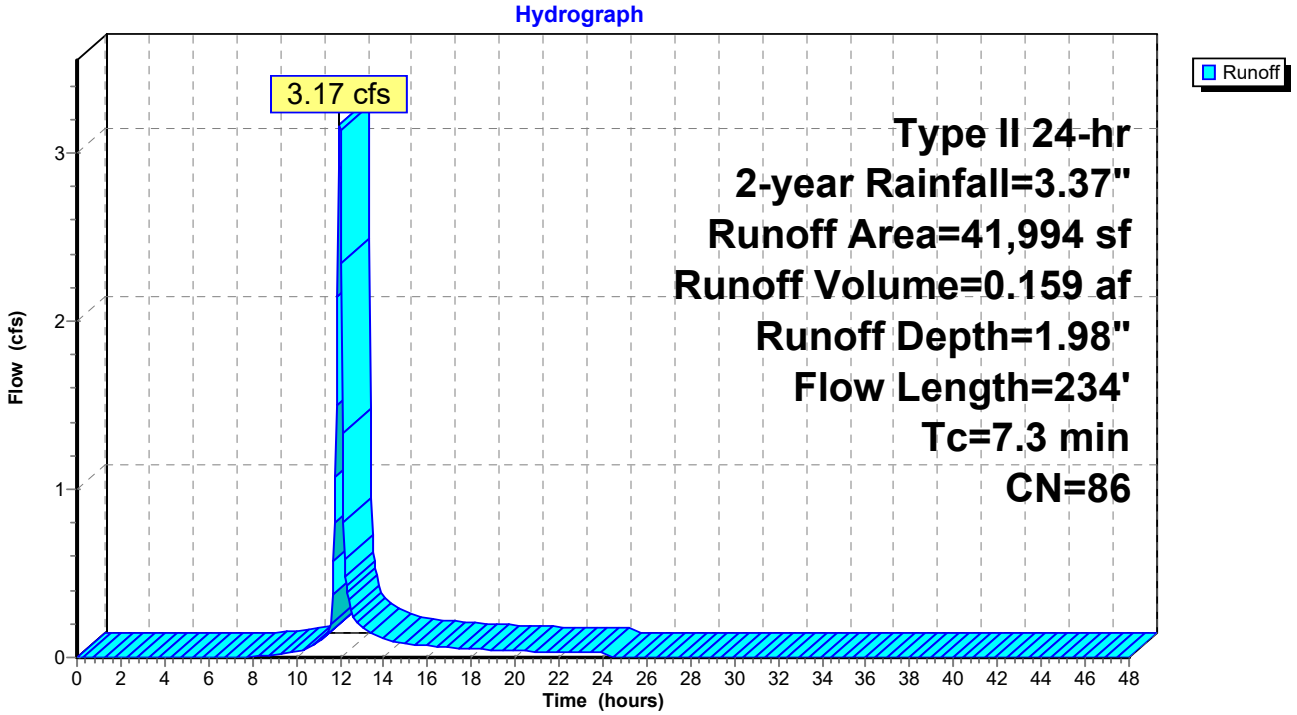
Runoff = 3.17 cfs @ 11.99 hrs, Volume= 0.159 af, Depth= 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.37"

Area (sf)	CN	Description
16,068	98	Paved parking, HSG D
15,563	80	>75% Grass cover, Good, HSG D
10,363	77	Woods, Good, HSG D
41,994	86	Weighted Average
25,926		61.74% Pervious Area
16,068		38.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	48	0.4000	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.6	101	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	85	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	234	Total			

Subcatchment SUB-1A: JRS Drive



Summary for Subcatchment SUB-1B: Disturbed Area

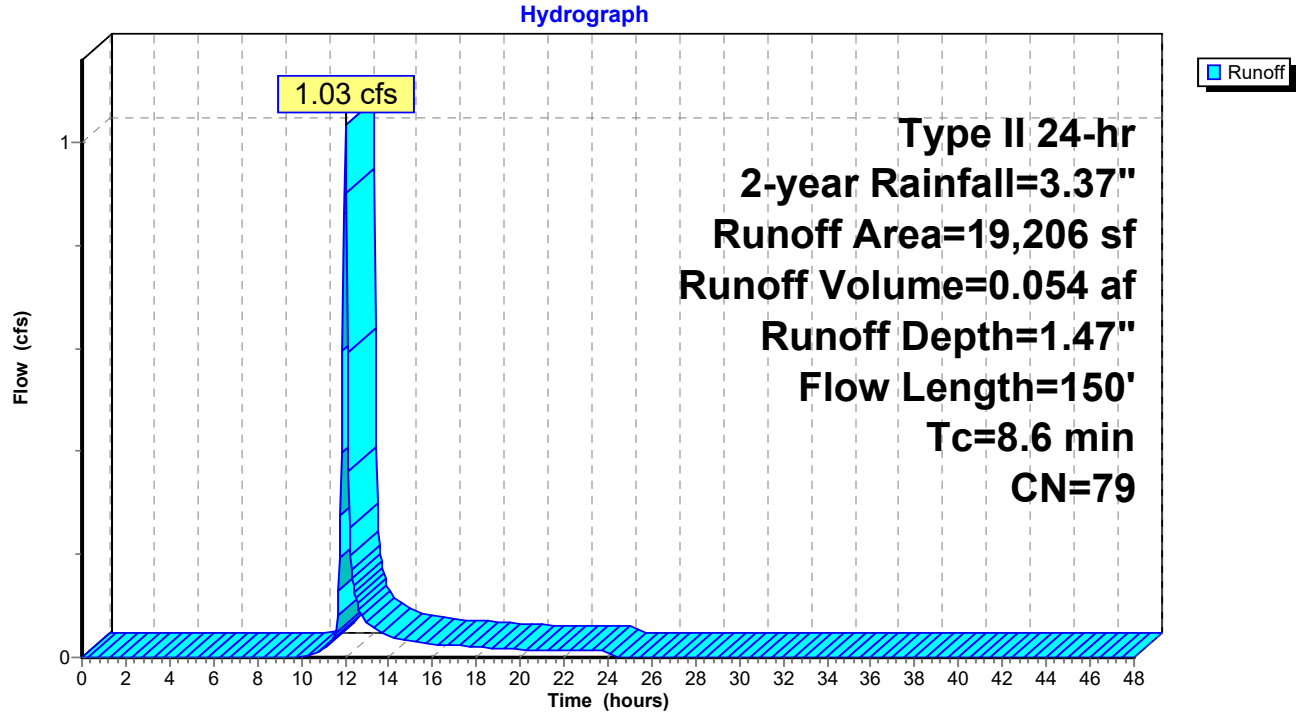
Runoff = 1.03 cfs @ 12.00 hrs, Volume= 0.054 af, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.37"

Area (sf)	CN	Description
4,804	77	Woods, Good, HSG D
14,402	80	>75% Grass cover, Good, HSG D
19,206	79	Weighted Average
19,206		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.2300	0.11		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.0	13	0.8000	14.40		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	87	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.6	150	Total			

Subcatchment SUB-1B: Disturbed Area



Summary for Subcatchment SUB-2: Woods

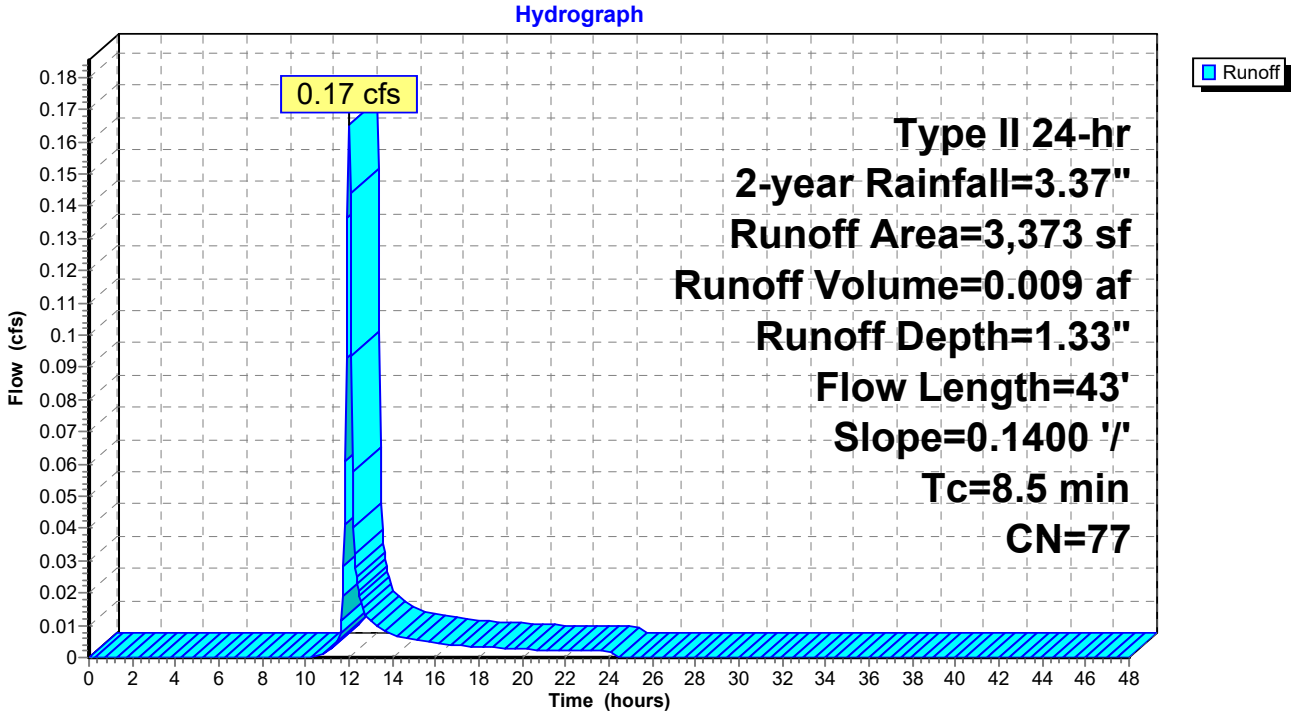
Runoff = 0.17 cfs @ 12.00 hrs, Volume= 0.009 af, Depth= 1.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.37"

Area (sf)	CN	Description
3,373	77	Woods, Good, HSG D
3,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	43	0.1400	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"

Subcatchment SUB-2: Woods



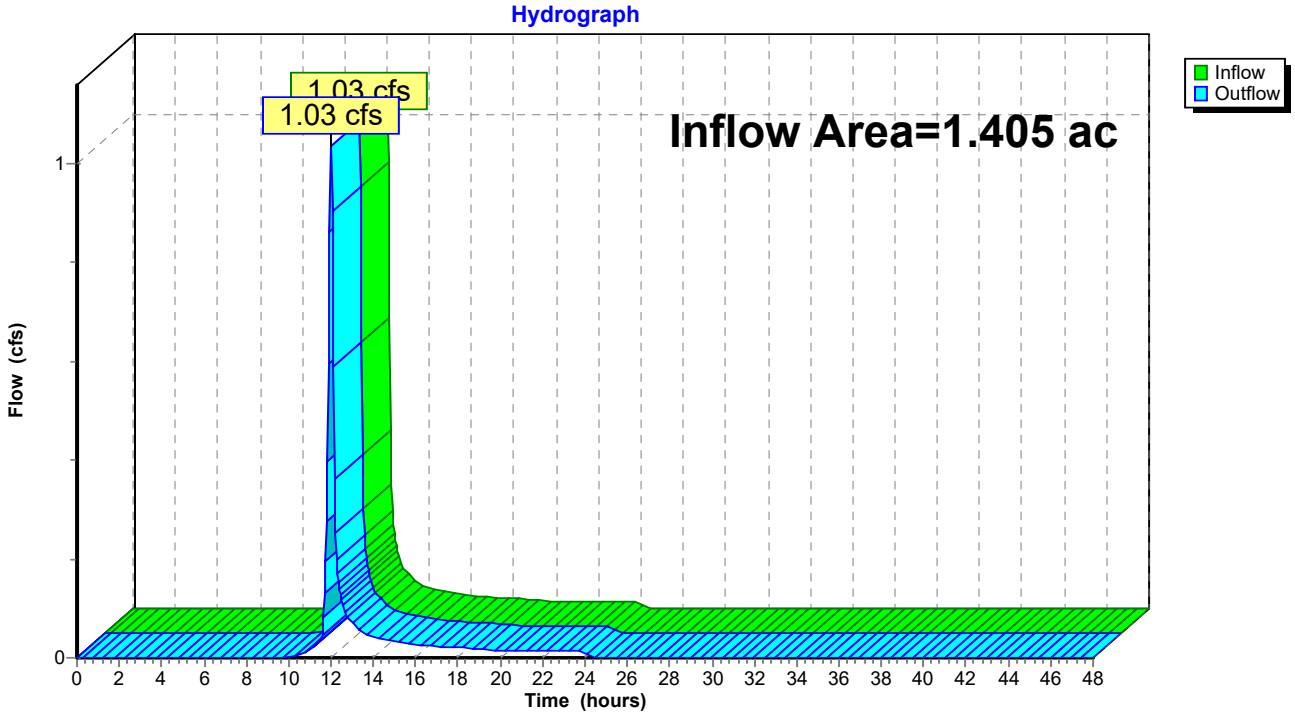
Summary for Reach DP-1: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.405 ac, 26.25% Impervious, Inflow Depth = 0.46" for 2-year event
Inflow = 1.03 cfs @ 12.00 hrs, Volume= 0.054 af
Outflow = 1.03 cfs @ 12.00 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: Discharge Point 1



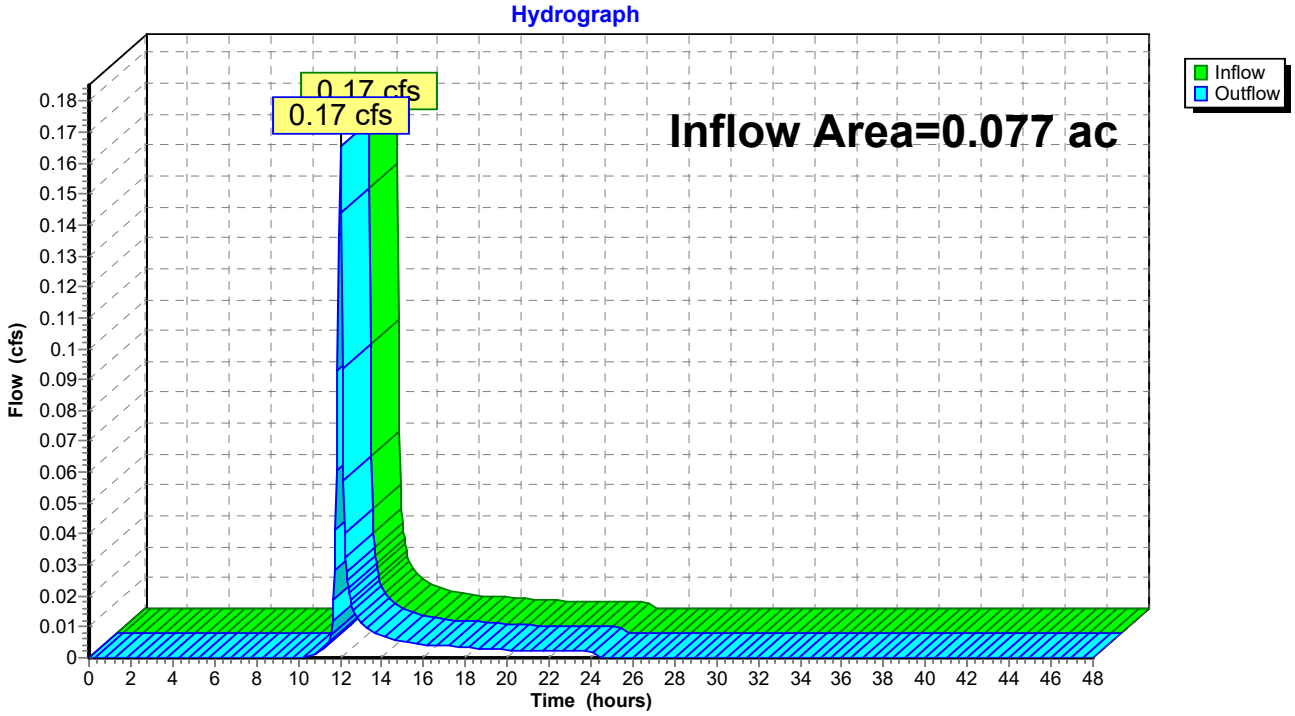
Summary for Reach DP-2: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.077 ac, 0.00% Impervious, Inflow Depth = 1.33" for 2-year event
Inflow = 0.17 cfs @ 12.00 hrs, Volume= 0.009 af
Outflow = 0.17 cfs @ 12.00 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-2: Discharge Point 1



Summary for Pond 1P: UG-1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=82)

Inflow Area = 0.964 ac, 38.26% Impervious, Inflow Depth = 1.98" for 2-year event
Inflow = 3.17 cfs @ 11.99 hrs, Volume= 0.159 af
Outflow = 0.33 cfs @ 11.80 hrs, Volume= 0.160 af, Atten= 90%, Lag= 0.0 min
Discarded = 0.33 cfs @ 11.80 hrs, Volume= 0.160 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 102.54' @ 12.45 hrs Surf.Area= 5,935 sf Storage= 2,502 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 52.4 min (870.8 - 818.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.65'	5,851 cf	**53.75'W x 110.42'L x 3.75'H Field A** 22,256 cf Overall - 7,629 cf Embedded = 14,626 cf x 40.0% Voids
#2A	102.40'	7,629 cf	**ADS_StormTech DC-780 +Cap** x 165 Inside #1 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 165 Chambers in 11 Rows
		13,480 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.65'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	105.37'	**18.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.33 cfs @ 11.80 hrs HW=101.74' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.65' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: UG-1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech DC-780 +Cap (ADS StormTech® DC-780 with cap length)
Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

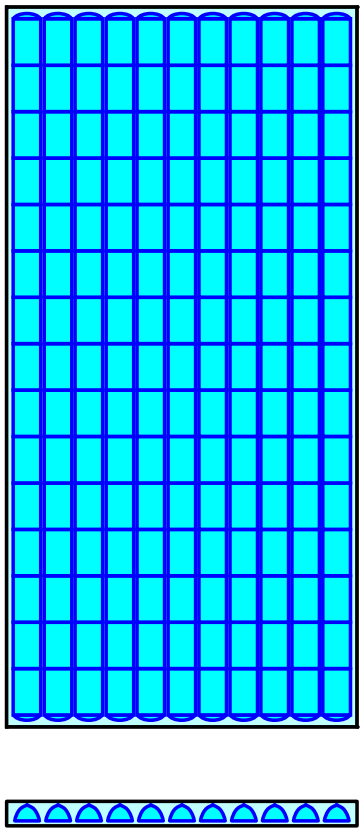
15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length
11 Rows x 51.0" Wide + 6.0" Spacing x 10 + 12.0" Side Stone x 2 = 53.75' Base Width
9.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.75' Field Height

165 Chambers x 46.2 cf = 7,629.4 cf Chamber Storage

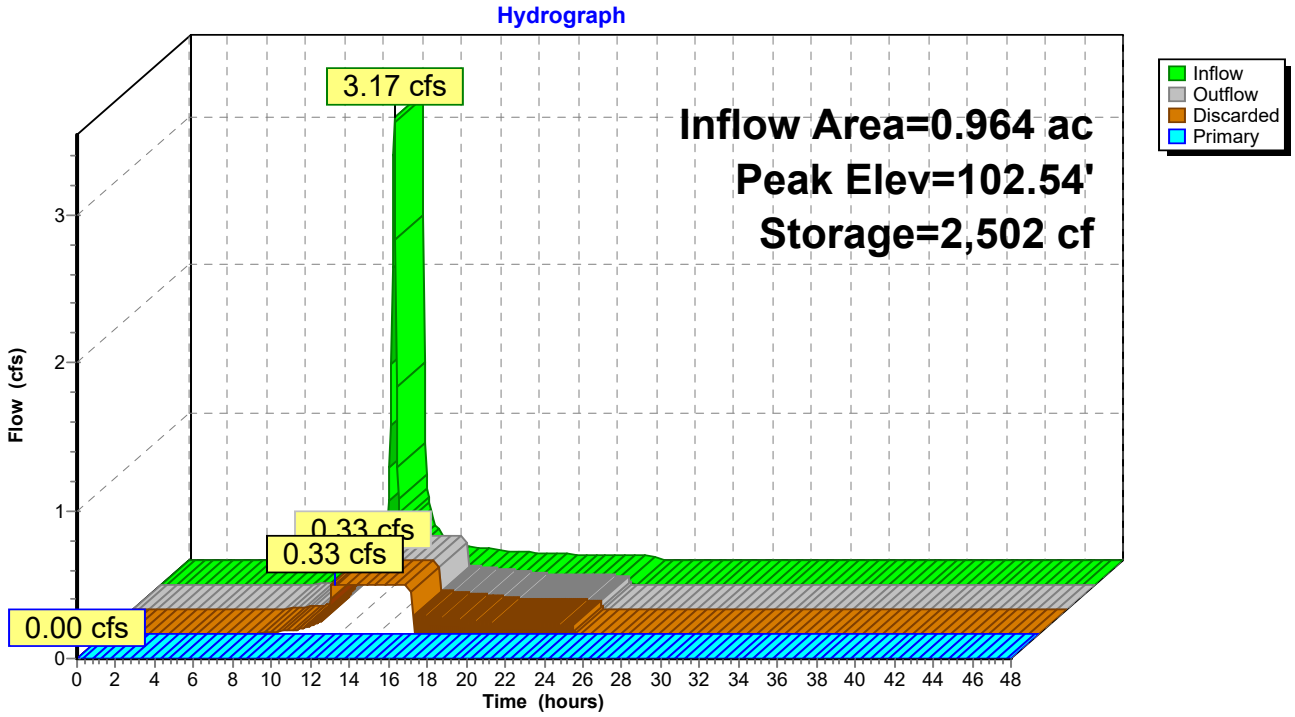
22,255.9 cf Field - 7,629.4 cf Chambers = 14,626.4 cf Stone x 40.0% Voids = 5,850.6 cf Stone Storage

Chamber Storage + Stone Storage = 13,480.0 cf = 0.309 af
Overall Storage Efficiency = 60.6%
Overall System Size = 110.42' x 53.75' x 3.75'

165 Chambers
824.3 cy Field
541.7 cy Stone



Pond 1P: UG-1


Hydrograph
3.17 cfs
0.33 cfs
0.33 cfs
0.00 cfs
Inflow Area=0.964 ac
Peak Elev=102.54'
Storage=2,502 cf
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 1 2 3
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

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

Subcatchment SUB-1A: JRS Drive Runoff Area=41,994 sf 38.26% Impervious Runoff Depth=3.63"
Flow Length=234' Tc=7.3 min CN=86 Runoff=5.63 cfs 0.291 af

Subcatchment SUB-1B: Disturbed Area Runoff Area=19,206 sf 0.00% Impervious Runoff Depth=2.95"
Flow Length=150' Tc=8.6 min CN=79 Runoff=2.07 cfs 0.108 af

Subcatchment SUB-2: Woods Runoff Area=3,373 sf 0.00% Impervious Runoff Depth=2.77"
Flow Length=43' Slope=0.1400 '/' Tc=8.5 min CN=77 Runoff=0.34 cfs 0.018 af

Reach DP-1: Discharge Point 1 Inflow=2.07 cfs 0.108 af
Outflow=2.07 cfs 0.108 af

Reach DP-2: Discharge Point 1 Inflow=0.34 cfs 0.018 af
Outflow=0.34 cfs 0.018 af

Pond 1P: UG-1 Peak Elev=103.16' Storage=5,496 cf Inflow=5.63 cfs 0.291 af
Discarded=0.33 cfs 0.292 af Primary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.292 af

Total Runoff Area = 1.482 ac Runoff Volume = 0.417 af Average Runoff Depth = 3.38"
75.12% Pervious = 1.114 ac 24.88% Impervious = 0.369 ac

Summary for Subcatchment SUB-1A: JRS Drive

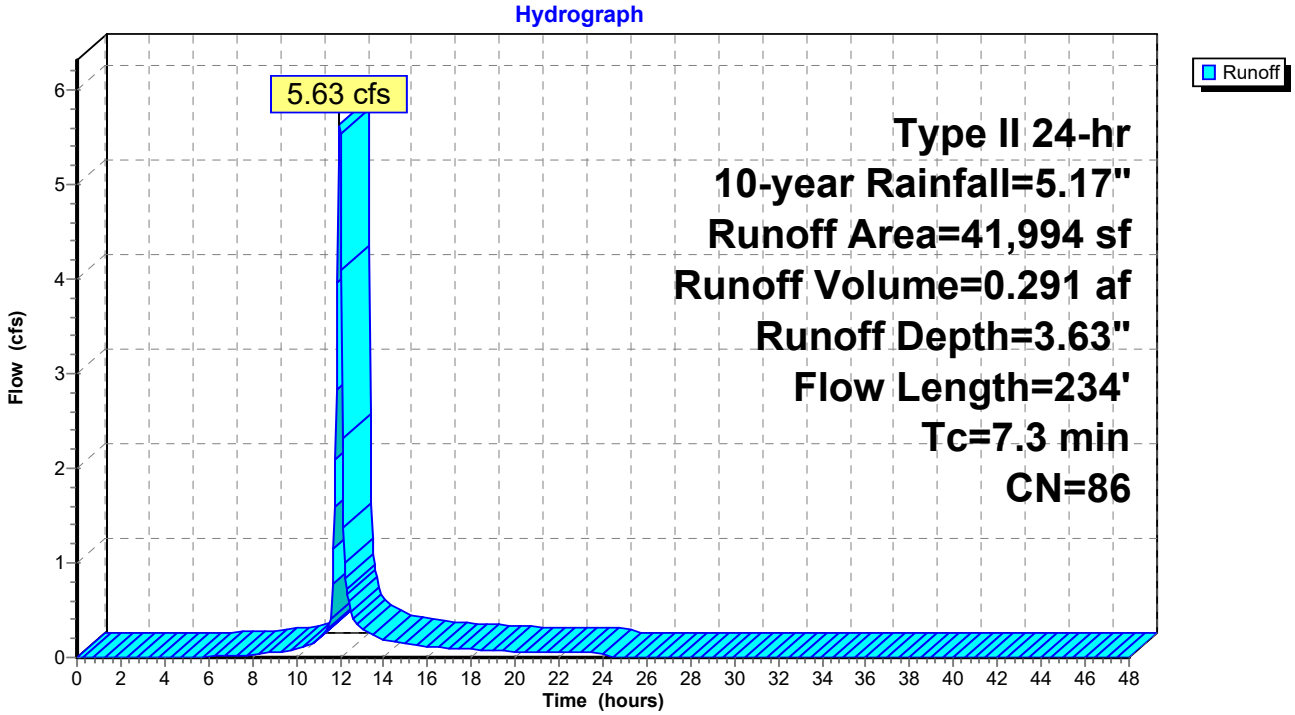
Runoff = 5.63 cfs @ 11.98 hrs, Volume= 0.291 af, Depth= 3.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.17"

Area (sf)	CN	Description
16,068	98	Paved parking, HSG D
15,563	80	>75% Grass cover, Good, HSG D
10,363	77	Woods, Good, HSG D
41,994	86	Weighted Average
25,926		61.74% Pervious Area
16,068		38.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	48	0.4000	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.6	101	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	85	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	234	Total			

Subcatchment SUB-1A: JRS Drive



Summary for Subcatchment SUB-1B: Disturbed Area

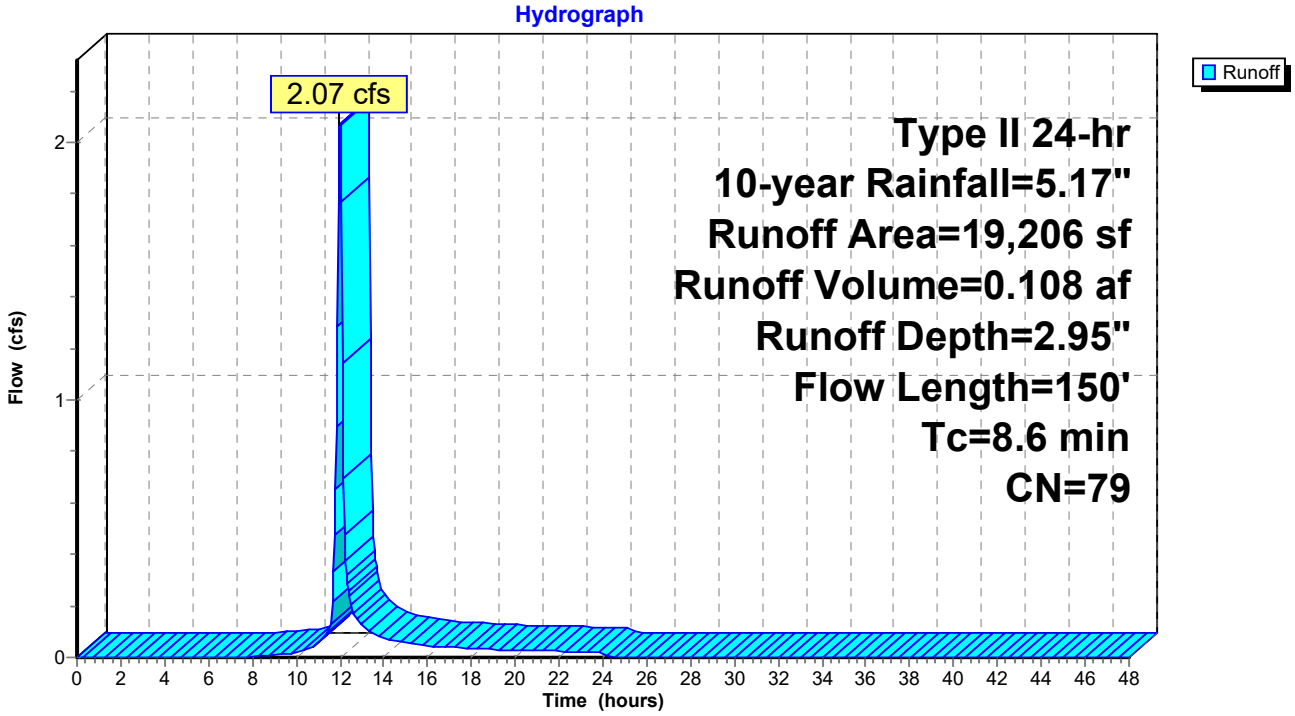
Runoff = 2.07 cfs @ 12.00 hrs, Volume= 0.108 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.17"

Area (sf)	CN	Description
4,804	77	Woods, Good, HSG D
14,402	80	>75% Grass cover, Good, HSG D
19,206	79	Weighted Average
19,206		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.2300	0.11		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.0	13	0.8000	14.40		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	87	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.6	150	Total			

Subcatchment SUB-1B: Disturbed Area



Summary for Subcatchment SUB-2: Woods

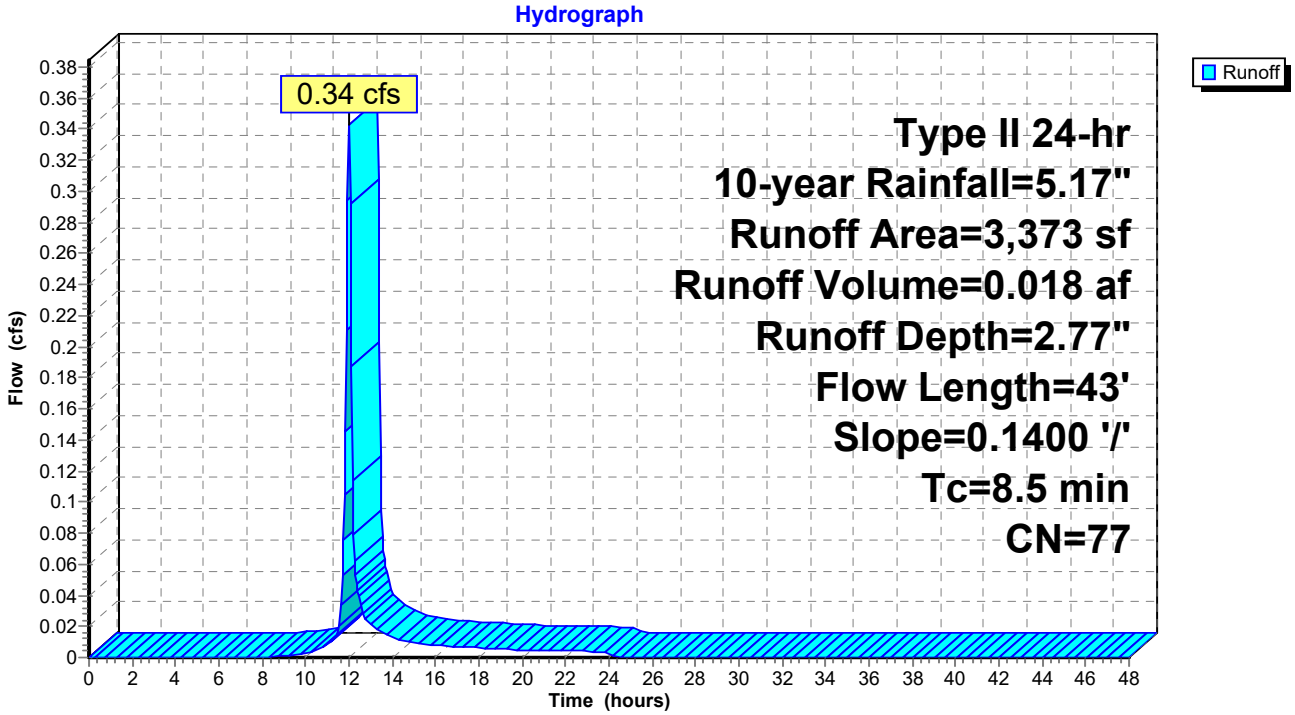
Runoff = 0.34 cfs @ 12.00 hrs, Volume= 0.018 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.17"

Area (sf)	CN	Description
3,373	77	Woods, Good, HSG D
3,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	43	0.1400	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"

Subcatchment SUB-2: Woods



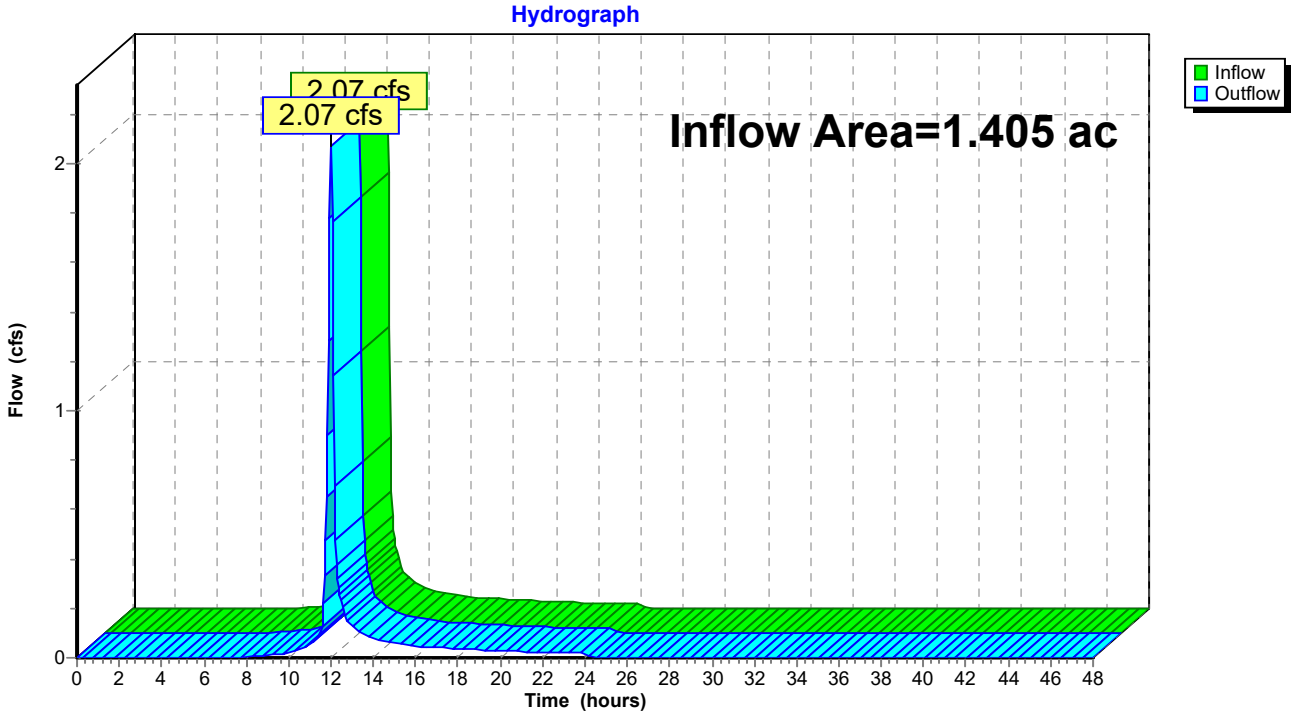
Summary for Reach DP-1: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.405 ac, 26.25% Impervious, Inflow Depth = 0.93" for 10-year event
Inflow = 2.07 cfs @ 12.00 hrs, Volume= 0.108 af
Outflow = 2.07 cfs @ 12.00 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: Discharge Point 1



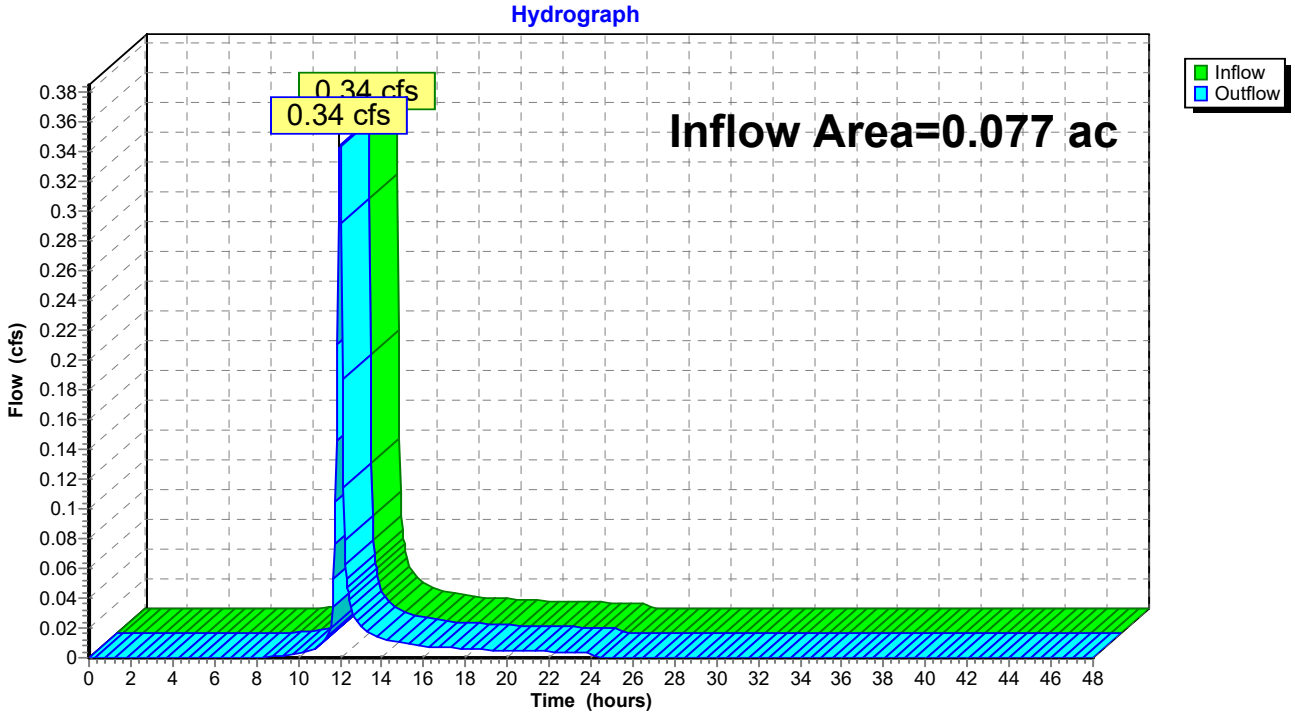
Summary for Reach DP-2: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.077 ac, 0.00% Impervious, Inflow Depth = 2.77" for 10-year event
Inflow = 0.34 cfs @ 12.00 hrs, Volume= 0.018 af
Outflow = 0.34 cfs @ 12.00 hrs, Volume= 0.018 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-2: Discharge Point 1



Summary for Pond 1P: UG-1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=38)

Inflow Area = 0.964 ac, 38.26% Impervious, Inflow Depth = 3.63" for 10-year event
Inflow = 5.63 cfs @ 11.98 hrs, Volume= 0.291 af
Outflow = 0.33 cfs @ 11.70 hrs, Volume= 0.292 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.33 cfs @ 11.70 hrs, Volume= 0.292 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 103.16' @ 12.88 hrs Surf.Area= 5,935 sf Storage= 5,496 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 133.9 min (935.2 - 801.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.65'	5,851 cf	**53.75'W x 110.42'L x 3.75'H Field A** 22,256 cf Overall - 7,629 cf Embedded = 14,626 cf x 40.0% Voids
#2A	102.40'	7,629 cf	**ADS_StormTech DC-780 +Cap** x 165 Inside #1 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 165 Chambers in 11 Rows
		13,480 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.65'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	105.37'	**18.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.33 cfs @ 11.70 hrs HW=101.73' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.65' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: UG-1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech DC-780 +Cap (ADS StormTech® DC-780 with cap length)
Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

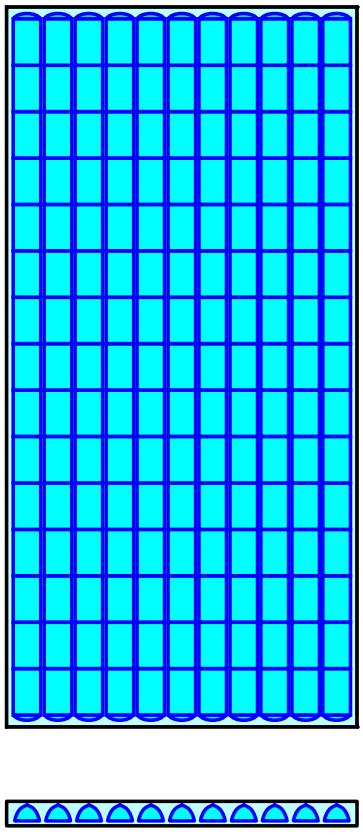
15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length
11 Rows x 51.0" Wide + 6.0" Spacing x 10 + 12.0" Side Stone x 2 = 53.75' Base Width
9.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.75' Field Height

165 Chambers x 46.2 cf = 7,629.4 cf Chamber Storage

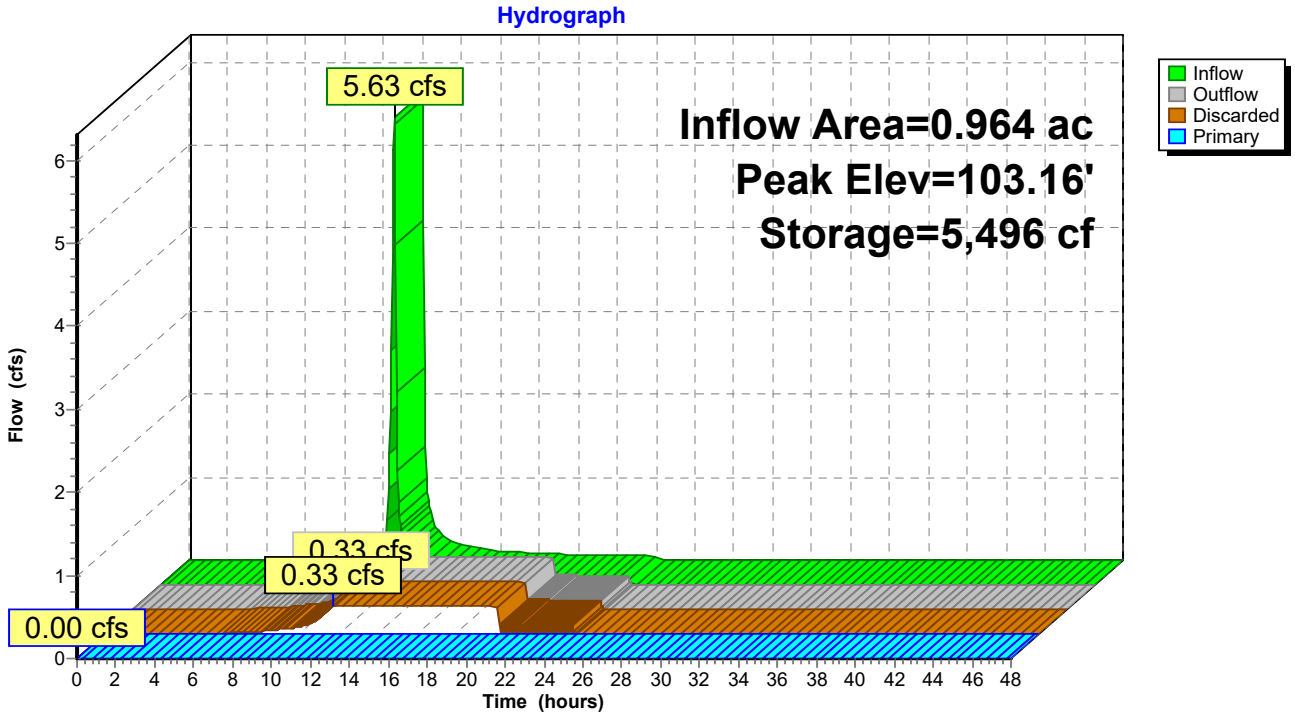
22,255.9 cf Field - 7,629.4 cf Chambers = 14,626.4 cf Stone x 40.0% Voids = 5,850.6 cf Stone Storage

Chamber Storage + Stone Storage = 13,480.0 cf = 0.309 af
Overall Storage Efficiency = 60.6%
Overall System Size = 110.42' x 53.75' x 3.75'

165 Chambers
824.3 cy Field
541.7 cy Stone



Pond 1P: UG-1


Hydrograph
Inflow
Outflow
Discarded
Primary
5.63 cfs
Inflow Area=0.964 ac
Peak Elev=103.16'
Storage=5,496 cf
0.33 cfs
0.33 cfs
0.00 cfs
Flow (cfs)
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
0 1 2 3 4 5 6

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

Subcatchment SUB-1A: JRS Drive Runoff Area=41,994 sf 38.26% Impervious Runoff Depth=4.69"
Flow Length=234' Tc=7.3 min CN=86 Runoff=7.17 cfs 0.376 af

Subcatchment SUB-1B: Disturbed Area Runoff Area=19,206 sf 0.00% Impervious Runoff Depth=3.94"
Flow Length=150' Tc=8.6 min CN=79 Runoff=2.74 cfs 0.145 af

Subcatchment SUB-2: Woods Runoff Area=3,373 sf 0.00% Impervious Runoff Depth=3.73"
Flow Length=43' Slope=0.1400 '/' Tc=8.5 min CN=77 Runoff=0.46 cfs 0.024 af

Reach DP-1: Discharge Point 1 Inflow=2.74 cfs 0.145 af
Outflow=2.74 cfs 0.145 af

Reach DP-2: Discharge Point 1 Inflow=0.46 cfs 0.024 af
Outflow=0.46 cfs 0.024 af

Pond 1P: UG-1 Peak Elev=103.62' Storage=7,615 cf Inflow=7.17 cfs 0.376 af
Discarded=0.33 cfs 0.377 af Primary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.377 af

Total Runoff Area = 1.482 ac Runoff Volume = 0.545 af Average Runoff Depth = 4.41"
75.12% Pervious = 1.114 ac 24.88% Impervious = 0.369 ac

Summary for Subcatchment SUB-1A: JRS Drive

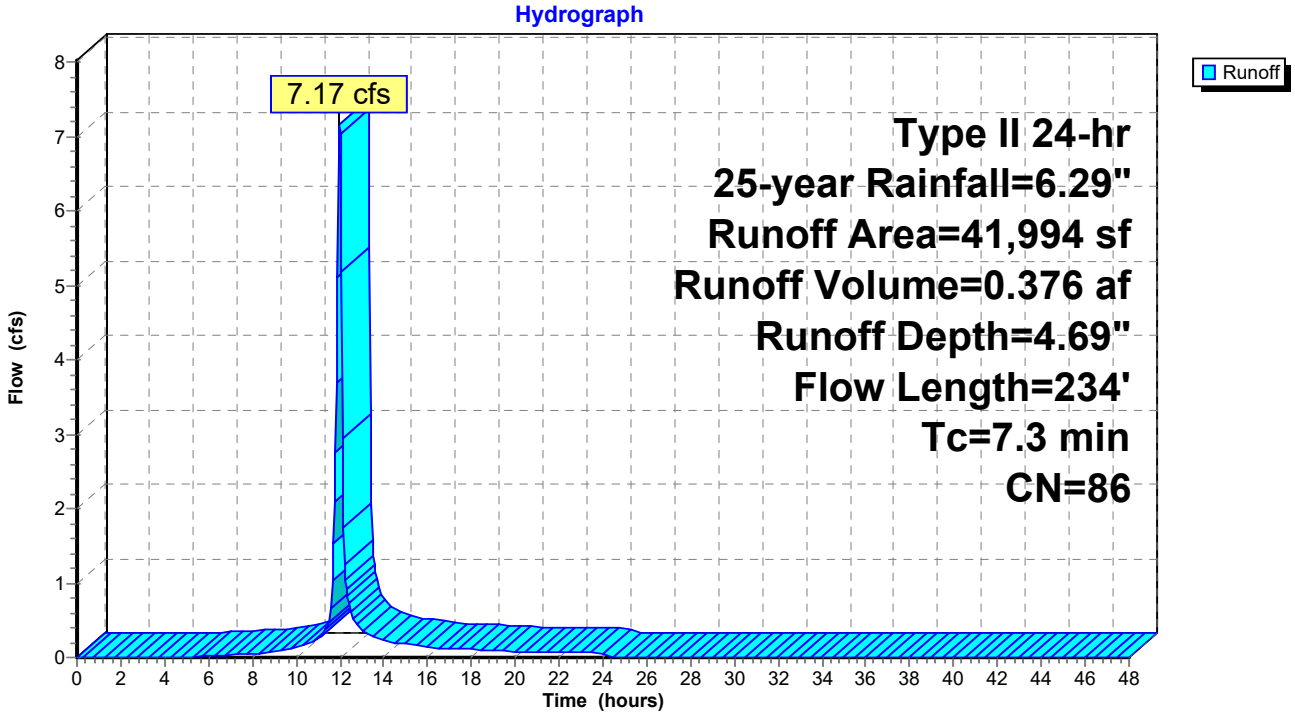
Runoff = 7.17 cfs @ 11.98 hrs, Volume= 0.376 af, Depth= 4.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year Rainfall=6.29"

Area (sf)	CN	Description
16,068	98	Paved parking, HSG D
15,563	80	>75% Grass cover, Good, HSG D
10,363	77	Woods, Good, HSG D
41,994	86	Weighted Average
25,926		61.74% Pervious Area
16,068		38.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	48	0.4000	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.6	101	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	85	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	234	Total			

Subcatchment SUB-1A: JRS Drive



Summary for Subcatchment SUB-1B: Disturbed Area

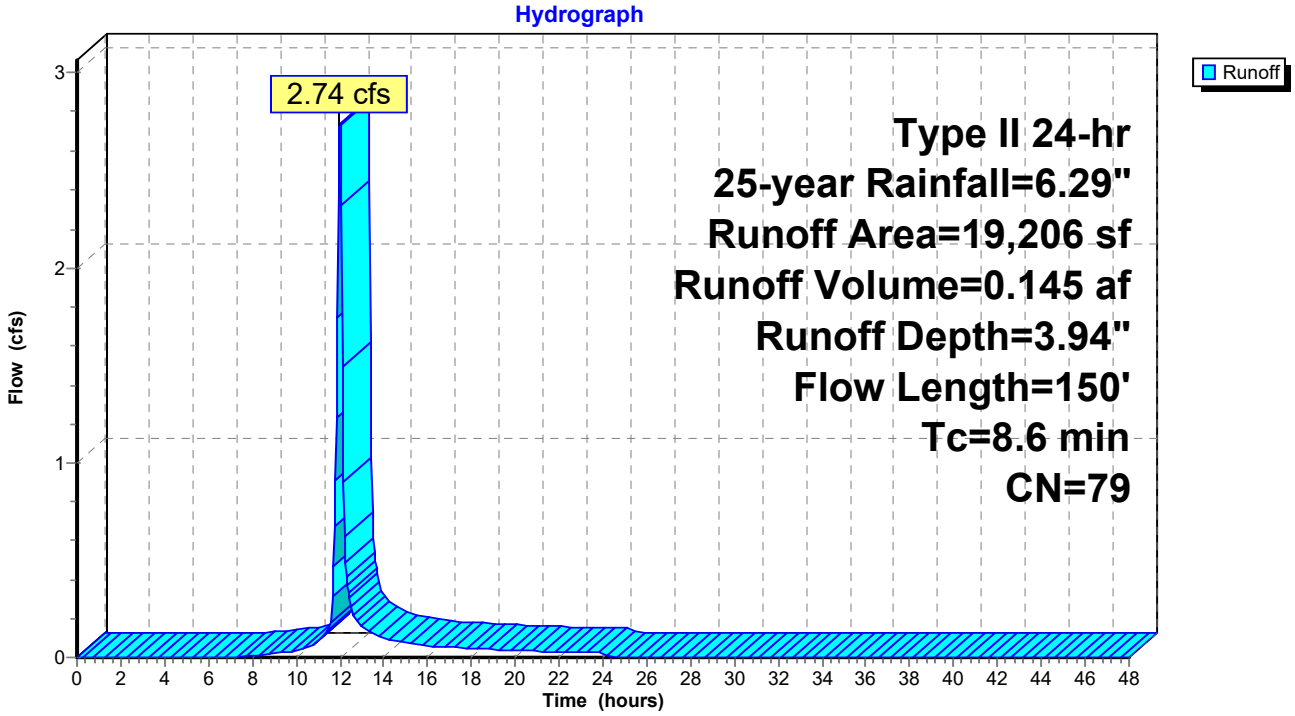
Runoff = 2.74 cfs @ 12.00 hrs, Volume= 0.145 af, Depth= 3.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year Rainfall=6.29"

Area (sf)	CN	Description
4,804	77	Woods, Good, HSG D
14,402	80	>75% Grass cover, Good, HSG D
19,206	79	Weighted Average
19,206		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.2300	0.11		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.0	13	0.8000	14.40		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	87	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.6	150	Total			

Subcatchment SUB-1B: Disturbed Area



Summary for Subcatchment SUB-2: Woods

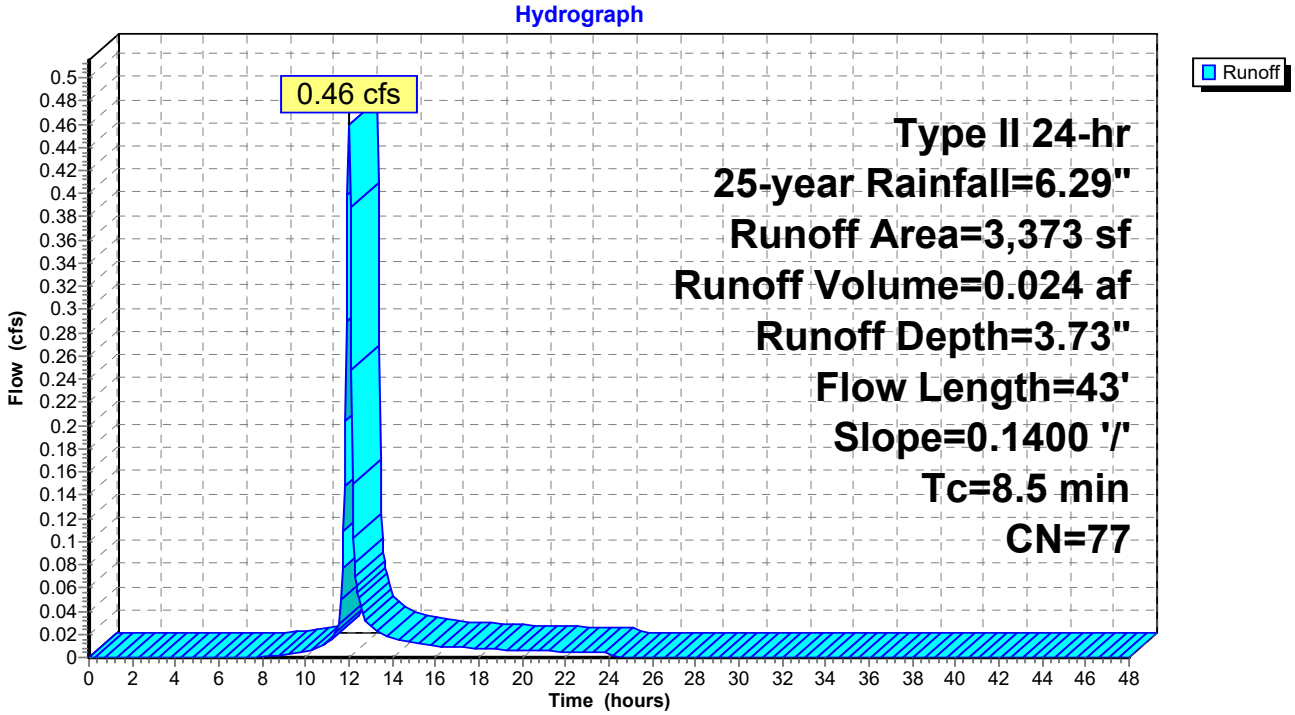
Runoff = 0.46 cfs @ 12.00 hrs, Volume= 0.024 af, Depth= 3.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-year Rainfall=6.29"

Area (sf)	CN	Description
3,373	77	Woods, Good, HSG D
3,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	43	0.1400	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"

Subcatchment SUB-2: Woods



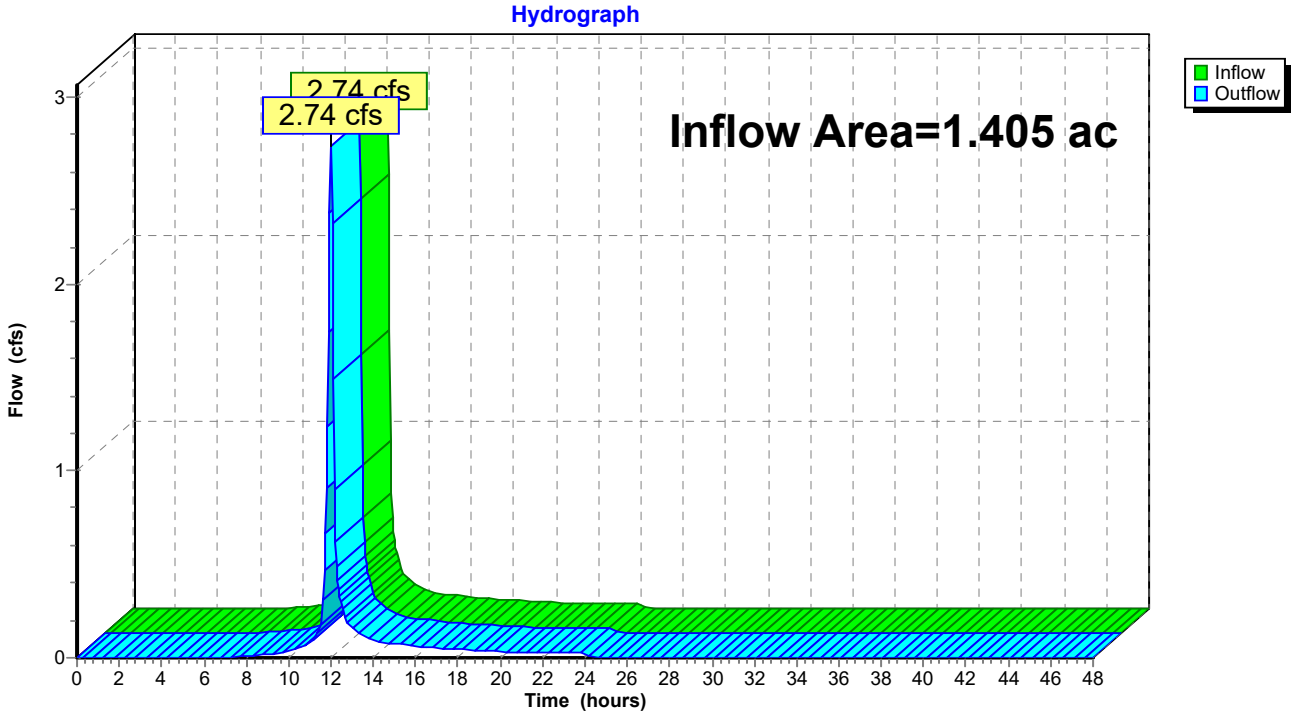
Summary for Reach DP-1: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.405 ac, 26.25% Impervious, Inflow Depth = 1.24" for 25-year event
Inflow = 2.74 cfs @ 12.00 hrs, Volume= 0.145 af
Outflow = 2.74 cfs @ 12.00 hrs, Volume= 0.145 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: Discharge Point 1



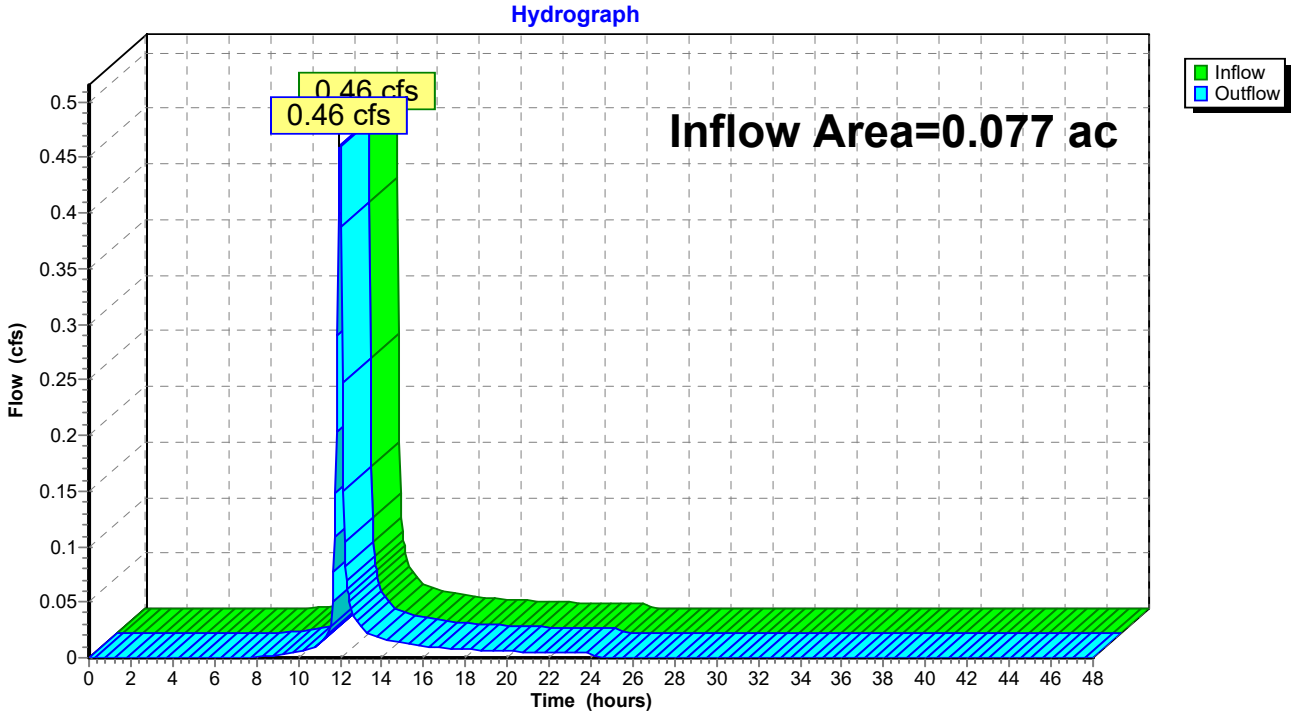
Summary for Reach DP-2: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.077 ac, 0.00% Impervious, Inflow Depth = 3.73" for 25-year event
Inflow = 0.46 cfs @ 12.00 hrs, Volume= 0.024 af
Outflow = 0.46 cfs @ 12.00 hrs, Volume= 0.024 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-2: Discharge Point 1



Summary for Pond 1P: UG-1

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=8)

Inflow Area = 0.964 ac, 38.26% Impervious, Inflow Depth = 4.69" for 25-year event
Inflow = 7.17 cfs @ 11.98 hrs, Volume= 0.376 af
Outflow = 0.33 cfs @ 11.60 hrs, Volume= 0.377 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.33 cfs @ 11.60 hrs, Volume= 0.377 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 103.62' @ 13.22 hrs Surf.Area= 5,935 sf Storage= 7,615 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 196.0 min (990.1 - 794.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.65'	5,851 cf	**53.75'W x 110.42'L x 3.75'H Field A** 22,256 cf Overall - 7,629 cf Embedded = 14,626 cf x 40.0% Voids
#2A	102.40'	7,629 cf	**ADS_StormTech DC-780 +Cap** x 165 Inside #1 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 165 Chambers in 11 Rows
		13,480 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.65'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	105.37'	**18.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.33 cfs @ 11.60 hrs HW=101.71' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.65' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: UG-1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech DC-780 +Cap (ADS StormTech® DC-780 with cap length)
Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

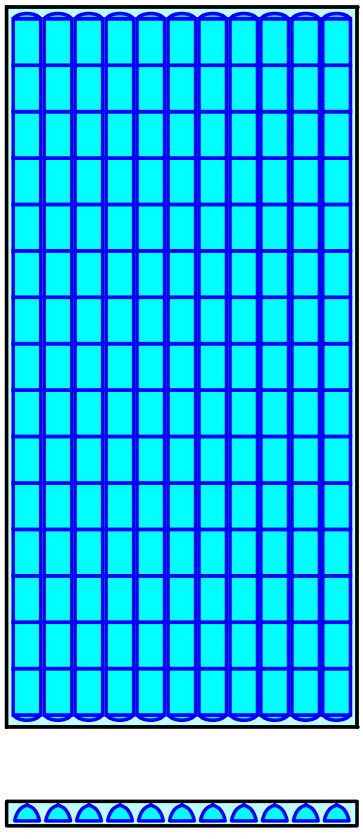
15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length
11 Rows x 51.0" Wide + 6.0" Spacing x 10 + 12.0" Side Stone x 2 = 53.75' Base Width
9.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.75' Field Height

165 Chambers x 46.2 cf = 7,629.4 cf Chamber Storage

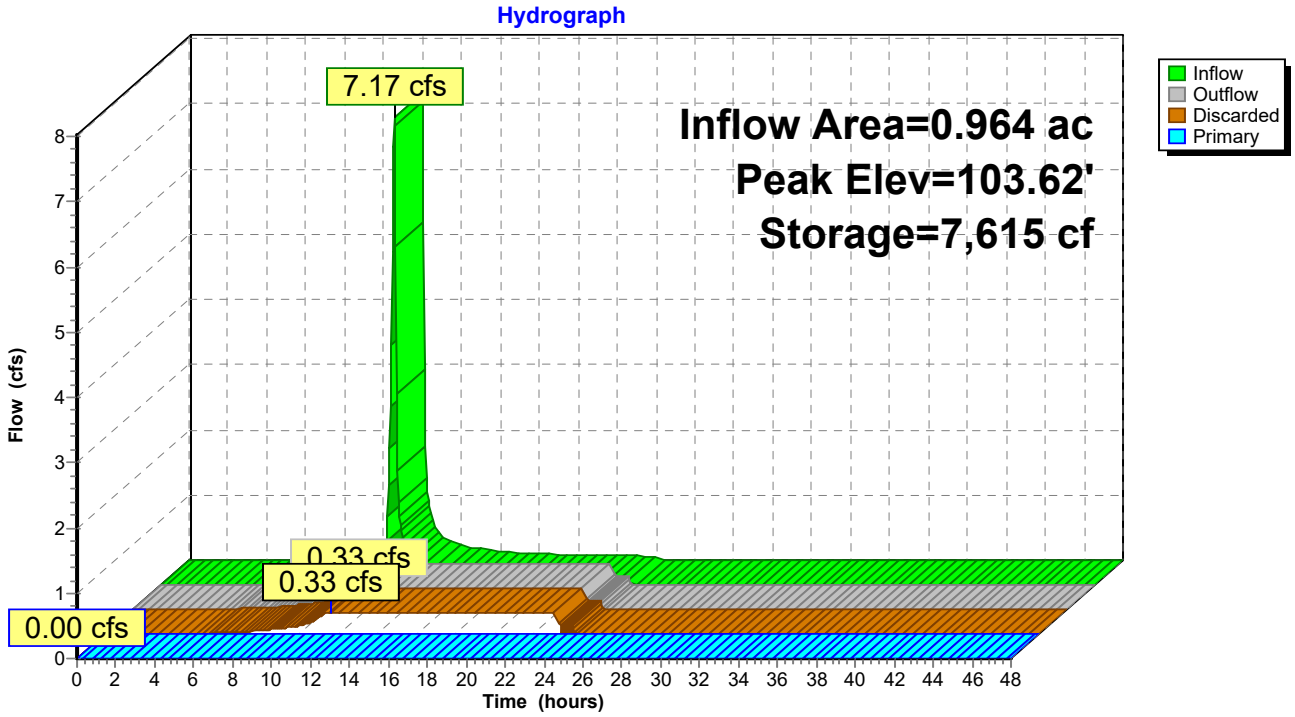
22,255.9 cf Field - 7,629.4 cf Chambers = 14,626.4 cf Stone x 40.0% Voids = 5,850.6 cf Stone Storage

Chamber Storage + Stone Storage = 13,480.0 cf = 0.309 af
Overall Storage Efficiency = 60.6%
Overall System Size = 110.42' x 53.75' x 3.75'

165 Chambers
824.3 cy Field
541.7 cy Stone



Pond 1P: UG-1


Hydrograph
Inflow
Outflow
Discarded
Primary
7.17 cfs
0.33 cfs
0.33 cfs
0.00 cfs
Inflow Area=0.964 ac
Peak Elev=103.62'
Storage=7,615 cf
Flow (cfs)
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
0 1 2 3 4 5 6 7 8

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

Subcatchment SUB-1A: JRS Drive Runoff Area=41,994 sf 38.26% Impervious Runoff Depth=6.35"
Flow Length=234' Tc=7.3 min CN=86 Runoff=9.54 cfs 0.510 af

Subcatchment SUB-1B: Disturbed Area Runoff Area=19,206 sf 0.00% Impervious Runoff Depth=5.53"
Flow Length=150' Tc=8.6 min CN=79 Runoff=3.78 cfs 0.203 af

Subcatchment SUB-2: Woods Runoff Area=3,373 sf 0.00% Impervious Runoff Depth=5.29"
Flow Length=43' Slope=0.1400 '/' Tc=8.5 min CN=77 Runoff=0.64 cfs 0.034 af

Reach DP-1: Discharge Point 1 Inflow=3.78 cfs 0.203 af
Outflow=3.78 cfs 0.203 af

Reach DP-2: Discharge Point 1 Inflow=0.64 cfs 0.034 af
Outflow=0.64 cfs 0.034 af

Pond 1P: UG-1 Peak Elev=104.51' Storage=11,192 cf Inflow=9.54 cfs 0.510 af
Discarded=0.33 cfs 0.511 af Primary=0.00 cfs 0.000 af Outflow=0.33 cfs 0.511 af

Total Runoff Area = 1.482 ac Runoff Volume = 0.747 af Average Runoff Depth = 6.05"
75.12% Pervious = 1.114 ac 24.88% Impervious = 0.369 ac

Summary for Subcatchment SUB-1A: JRS Drive

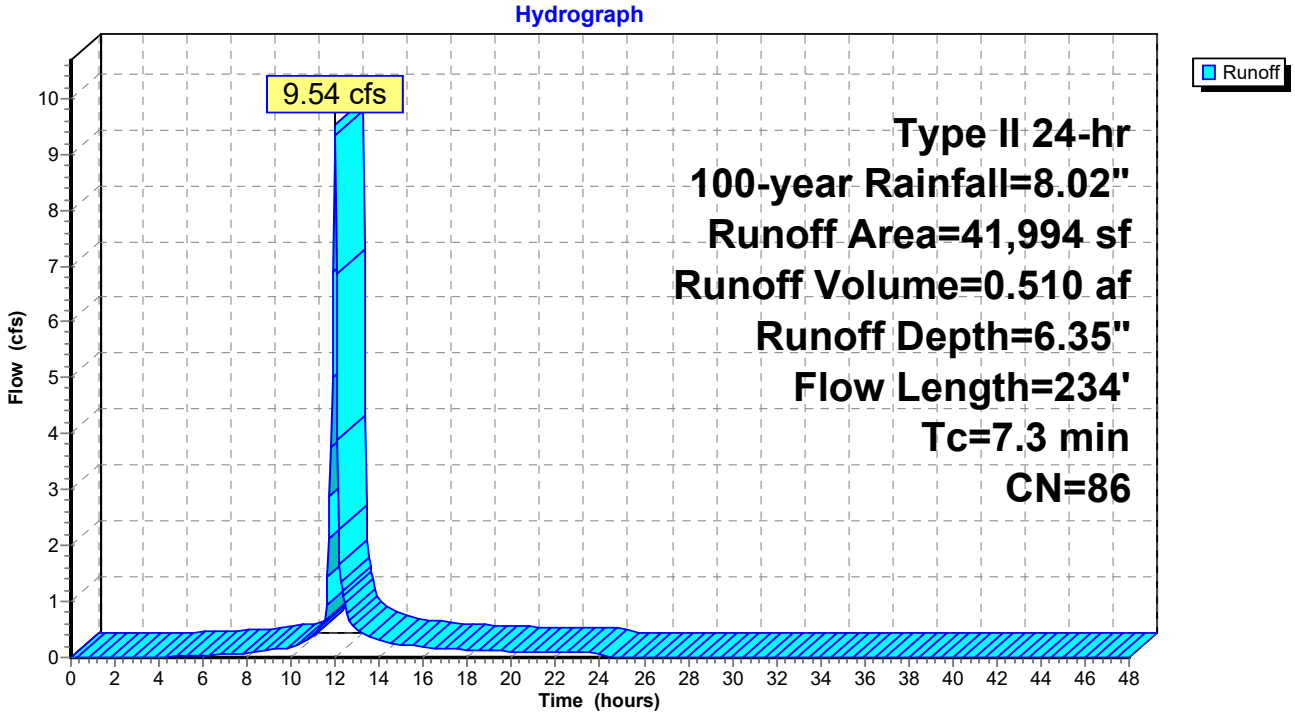
Runoff = 9.54 cfs @ 11.98 hrs, Volume= 0.510 af, Depth= 6.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year Rainfall=8.02"

Area (sf)	CN	Description
16,068	98	Paved parking, HSG D
15,563	80	>75% Grass cover, Good, HSG D
10,363	77	Woods, Good, HSG D
41,994	86	Weighted Average
25,926		61.74% Pervious Area
16,068		38.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	48	0.4000	0.13		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.6	101	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.6	85	0.0150	2.49		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.3	234	Total			

Subcatchment SUB-1A: JRS Drive



Summary for Subcatchment SUB-1B: Disturbed Area

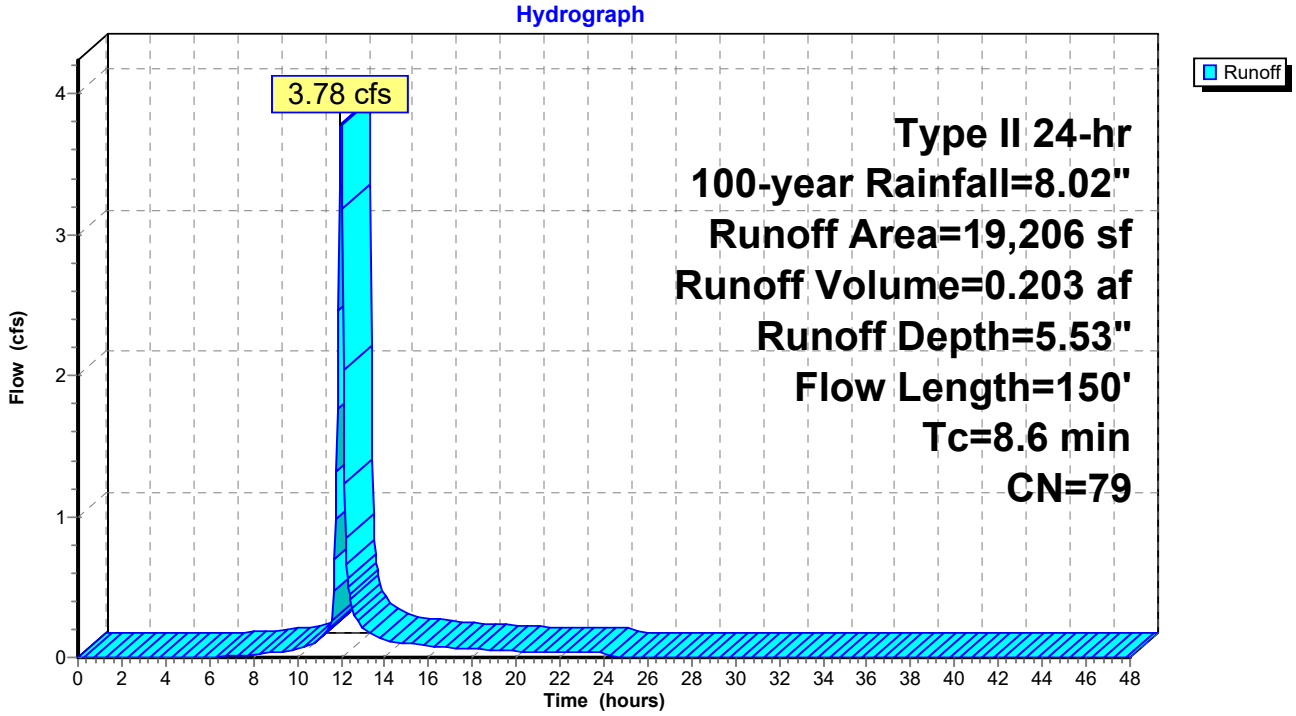
Runoff = 3.78 cfs @ 12.00 hrs, Volume= 0.203 af, Depth= 5.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year Rainfall=8.02"

Area (sf)	CN	Description
4,804	77	Woods, Good, HSG D
14,402	80	>75% Grass cover, Good, HSG D
19,206	79	Weighted Average
19,206		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	50	0.2300	0.11		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"
0.0	13	0.8000	14.40		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.7	87	0.0170	2.10		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
8.6	150	Total			

Subcatchment SUB-1B: Disturbed Area



Summary for Subcatchment SUB-2: Woods

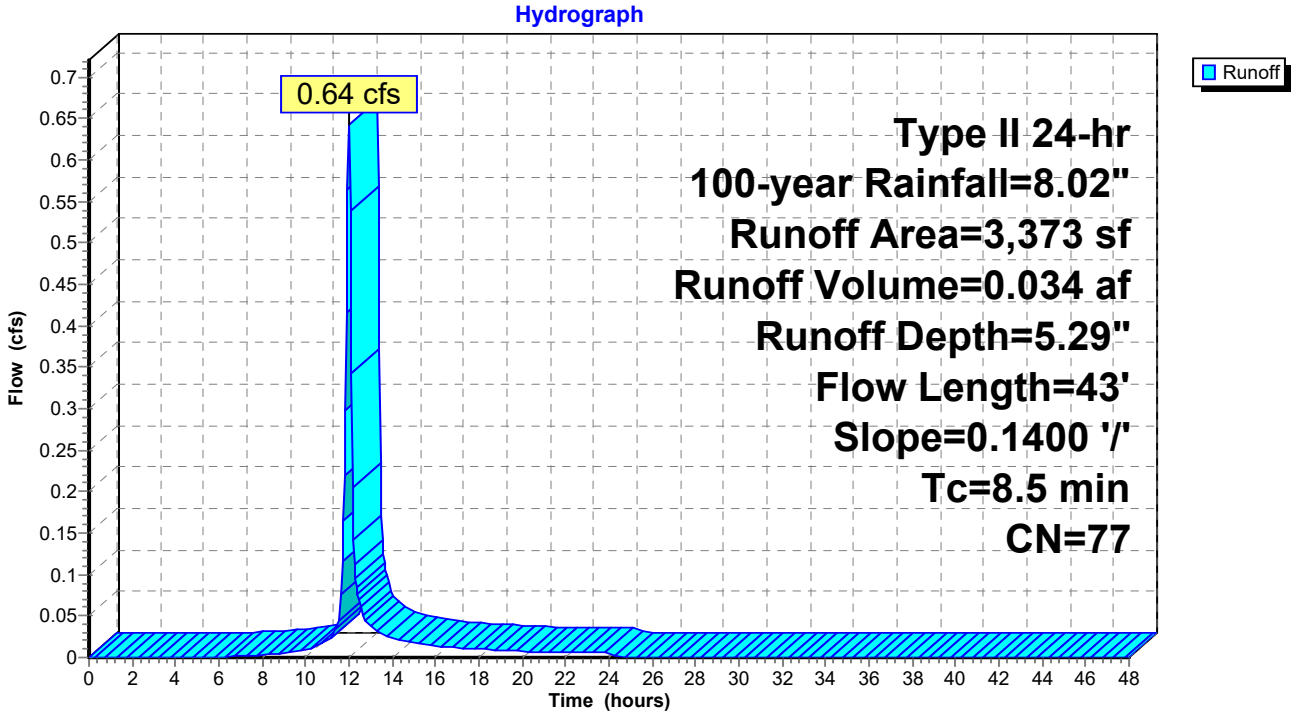
Runoff = 0.64 cfs @ 12.00 hrs, Volume= 0.034 af, Depth= 5.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-year Rainfall=8.02"

Area (sf)	CN	Description
3,373	77	Woods, Good, HSG D
3,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	43	0.1400	0.08		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.36"

Subcatchment SUB-2: Woods



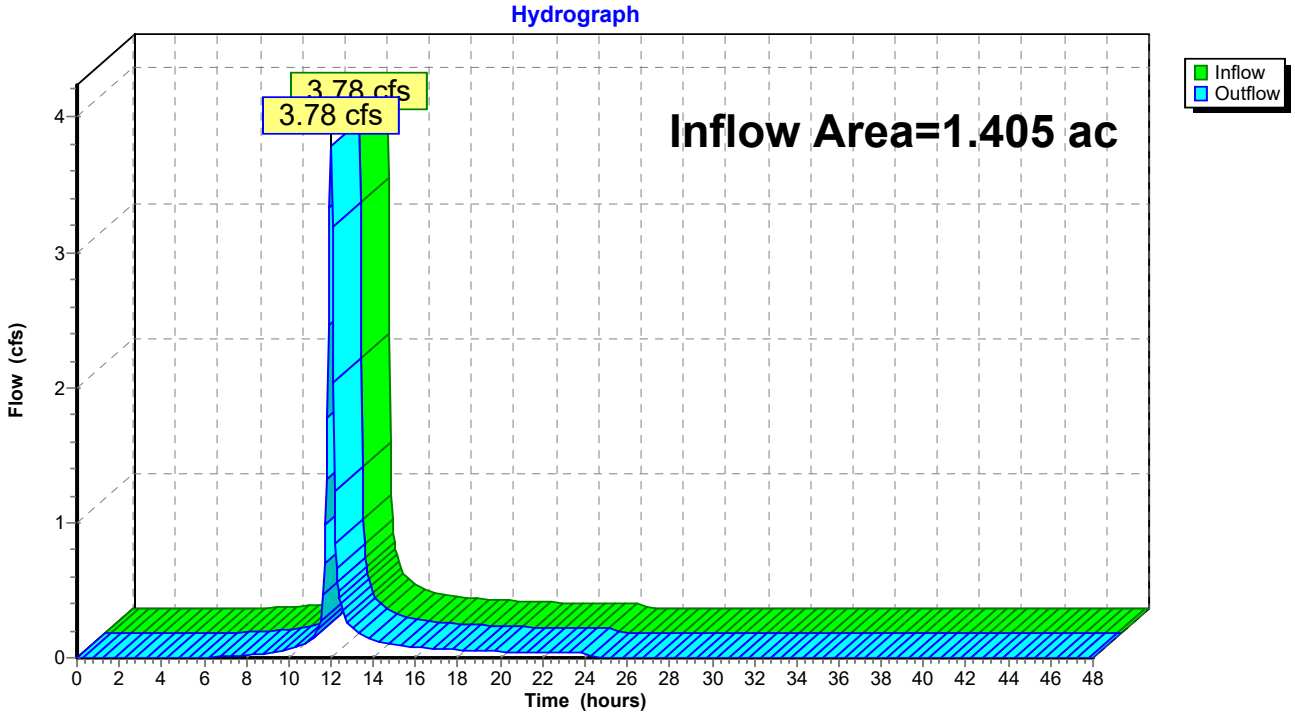
Summary for Reach DP-1: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 1.405 ac, 26.25% Impervious, Inflow Depth = 1.73" for 100-year event
Inflow = 3.78 cfs @ 12.00 hrs, Volume= 0.203 af
Outflow = 3.78 cfs @ 12.00 hrs, Volume= 0.203 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-1: Discharge Point 1



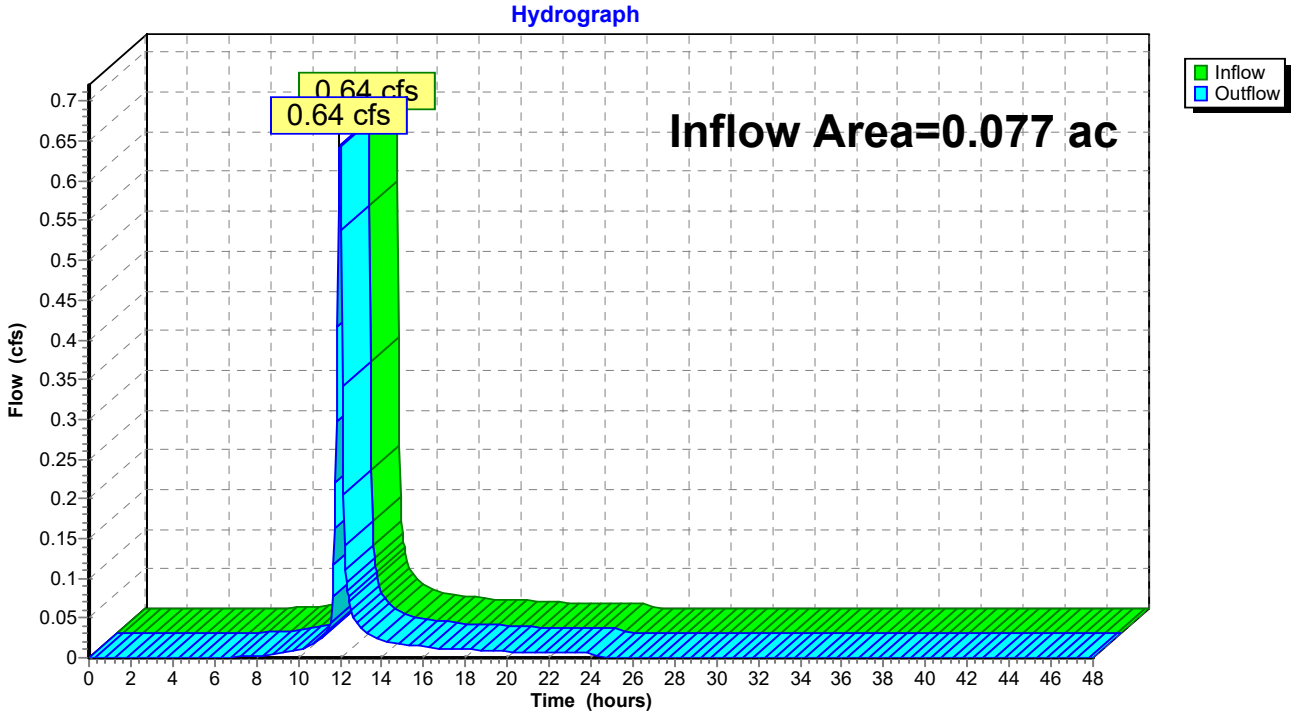
Summary for Reach DP-2: Discharge Point 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 0.077 ac, 0.00% Impervious, Inflow Depth = 5.29" for 100-year event
Inflow = 0.64 cfs @ 12.00 hrs, Volume= 0.034 af
Outflow = 0.64 cfs @ 12.00 hrs, Volume= 0.034 af, Atten= 0%, Lag= 0.0 min

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

Reach DP-2: Discharge Point 1



Summary for Pond 1P: UG-1

Inflow Area = 0.964 ac, 38.26% Impervious, Inflow Depth = 6.35" for 100-year event
Inflow = 9.54 cfs @ 11.98 hrs, Volume= 0.510 af
Outflow = 0.33 cfs @ 11.30 hrs, Volume= 0.511 af, Atten= 97%, Lag= 0.0 min
Discarded = 0.33 cfs @ 11.30 hrs, Volume= 0.511 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 104.51' @ 13.74 hrs Surf.Area= 5,935 sf Storage= 11,192 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 303.0 min (1,088.7 - 785.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	101.65'	5,851 cf	**53.75'W x 110.42'L x 3.75'H Field A** 22,256 cf Overall - 7,629 cf Embedded = 14,626 cf x 40.0% Voids
#2A	102.40'	7,629 cf	**ADS_StormTech DC-780 +Cap** x 165 Inside #1 Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 165 Chambers in 11 Rows
		13,480 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	101.65'	**2.410 in/hr Exfiltration over Horizontal area**
#2	Primary	105.37'	**18.0" Vert. Orifice/Grate** C= 0.600

Discarded OutFlow Max=0.33 cfs @ 11.30 hrs HW=101.71' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=101.65' TW=0.00' (Dynamic Tailwater)
↑—**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 1P: UG-1 - Chamber Wizard Field A

Chamber Model = ADS_StormTech DC-780 +Cap (ADS StormTech® DC-780 with cap length)
Effective Size= 45.4"W x 30.0"H => 6.49 sf x 7.12'L = 46.2 cf
Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

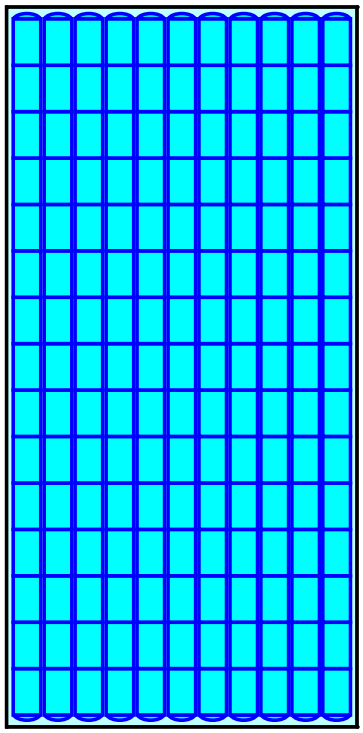
15 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 108.42' Row Length +12.0" End Stone x 2 = 110.42' Base Length
11 Rows x 51.0" Wide + 6.0" Spacing x 10 + 12.0" Side Stone x 2 = 53.75' Base Width
9.0" Base + 30.0" Chamber Height + 6.0" Cover = 3.75' Field Height

165 Chambers x 46.2 cf = 7,629.4 cf Chamber Storage

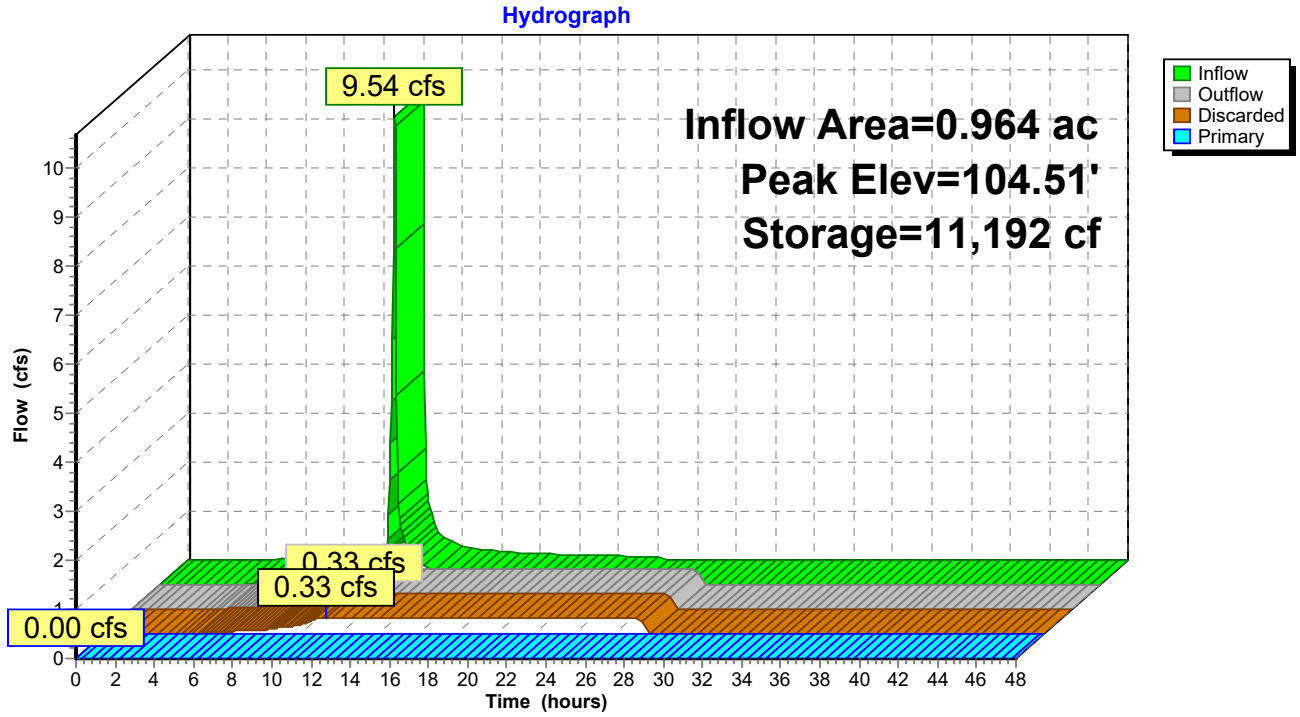
22,255.9 cf Field - 7,629.4 cf Chambers = 14,626.4 cf Stone x 40.0% Voids = 5,850.6 cf Stone Storage

Chamber Storage + Stone Storage = 13,480.0 cf = 0.309 af
Overall Storage Efficiency = 60.6%
Overall System Size = 110.42' x 53.75' x 3.75'

165 Chambers
824.3 cy Field
541.7 cy Stone



Pond 1P: UG-1


Hydrograph
9.54 cfs
Inflow Area=0.964 ac
Peak Elev=104.51'
Storage=11,192 cf
0.33 cfs
0.33 cfs
0.00 cfs
Inflow
Outflow
Discarded
Primary
Flow (cfs)
Time (hours)
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48
0 1 2 3 4 5 6 7 8 9 10

SECTION 4 – STORMWATER MANAGEMENT CALCS

4.1 RECHARGE CALCULATIONS

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

- Rv = F x impervious area (Equation 1) Volume 3, Ch 1, page 15
- *Rv = Required Recharge Volume*, expressed in cubic feet, cubic yards, or acre-feet
- *F* = Target Depth Factor associated with each Hydrologic Soil Group (HSG)
- *Impervious Area* = new pavement and new rooftop area
- *The Target Depth Factor "F" per Table 2.3.2, Volume 3, Chapter 1 for each soil classification is as follows:*
    - A soils = 0.60 inches
    - B soils = 0.35 inches
    - C soils = 0.25 inches
    - D soils = 0.10 inches

Based on the above formula, the required recharge volume for the site is as follows:

Recharge Within "D" Soils:

- Impervious Area = 16,385 SF
- 0.1 inches x 1/12 feet x 16,385 SF = 137 CUBIC FEET

TOTAL RECHARGE VOLUME REQUIRED = 137 CUBIC FEET

Capture Area Adjustment:

Performing the capture area adjustment. Dividing total impervious area of 16,385 S.F. by impervious area draining to recharge areas, 16,385 S.F. yields an adjusted required recharge volume of 1.00 times the calculated amount. Thus, 1.00 x 137 S.F. yields an adjusted total recharge volume required of 137 cubic feet.

All the impervious area is directed to recharge the BMPs.

TOTAL RECHARGE VOLUME PROVIDED = 13,480 CUBIC FEET (see next page)

Recharge Volume BMP Table

TOTAL RECHARGE VOLUME			
Infiltration BMP	***Infiltration Rate (in/hr) k***	***Storage (Recharge) Volume (c.f.) Rv***	***Bottom Area (s.f.)***
UG-1	*2.41*	*13,480*	*5,935*
Totals		***13,480***	
k = saturdated hydraulic conductivity (in/hr) *Rv = storage volume (c.f.)* *Bottom Area (s.f.)* *Volume 3, Chapter 1 of the MA Stormwater Handbook*			

The Storage Recharge volume numbers provided in the table above have been derived utilizing the HydroCAD output for stage storage. The following pages provide a copy of those printouts and the cumulative stage-storage up to the controlling invert elevation has been highlighted.

Conclusion:

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

4.2 DRAWDOWN TIME

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

- Drawdown Time = Rv / (K*Bottom Area)
- Rv = Storage Volume (cf)
- K – Saturated Hydraulic Conductivity per Rawls Rate Table
- Bottom Area = Area of Bottom of Proposed Recharge Structure

Below is a summary table of the drawdown calculations:

BASIN DRAWDOWN CALCULATIONS				
Infiltration BMP	***Infiltration Rate (in/hr) k***	***Storage (Recharge) Volume (c.f.) Rv***	***Bottom Area (s.f.)***	***Draw Down Time(hours)***
UG-1	*2.41*	*13,480*	*5,935*	11.3
Totals		***13,480***		11.3
k = saturdated hydraulic conductivity (in/hr) *Rv = storage volume (c.f.)* *Bottom Area (s.f.)* *Volume 3, Chapter 1 of the MA Stormwater Handbook*				

Conclusion:

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

4.3 WATER QUALITY

The BMP's have been designed to treat 1.0" of water quality volume (WQV), which exceeds the required 0.5" of WQV. A table has been provided below that provides the water quality need to be treated in the CDS2015 Water Quality Unit (WQU). Also, a table has been provided below that provides the sizing of ADS Isolator Row treatment chamber systems

Water Quality Unit Sizing Using Equivalent Flow from 1" Rainfall Depth

Basin / WQ structure	Tributary Area (acres)	Tributary Area (sq miles)	Pervious (sf)	Impervious %	CN Value (Estimated)	WQV (In)	Tc (min)	qu (csm/in)	WQF = qu A Q (cfs)	Unit
WQU #1	0.96	0.0009	25,612	39%	75	1.00	6	795	0.27	CDS1515

The water quality calculated flow in the pipes flowing to the water quality units listed in the table above are 0.96 cfs to WQU#1. A CDS model CDS-1515 is proposed to handle the treatment for all the tributary areas. The unit has rated treatment capacity is 0.7 cfs and is equipped with a fiberglass separation cylinder that allows larger flows to bypass. The TSS removal rate for Water Quality Unit #1 (WQU#1) is 80%. Please see Section 4.5: TSS Removal for more information.

4.4 RIP RAP SPLASH PAD

Rip rap splash pads are designed to dissipate energy, prevent scour at the stormwater outlet, and minimize the potential for downstream erosion. The underground system was designed to have no discharge up through the 100-year storm event therefore a rip-rap splash pad is not necessary. In this case, the lowest catch basin rim will act as the emergency outlet to the infiltration system.

4.5 TSS REMOVAL

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

Please refer to the attached TSS calculation sheets that follow:

INSTRUCTIONS:

Non-automated: Mar. 4, 2008

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

Location: **All Catch Basins, Manholes, and Water Quality Units**

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
CDS Water Quality Unit	**0.80**	**0.75**	**0.60**	**0.15**

Total TSS Removal = **85%**

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

Project: **Definitive Subdivision for JRS Drive**

Prepared By: **CRM**

Date: **5/11/2022**

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

SECTION 5- LONG-TERM STORMWATER OPERATION & MAINTENANCE PLAN

LONG-TERM STORMWATER OPERATION & MAINTENANCE PLAN
1317 Washington Street Re Holdings LLC

PROJECT OVERVIEW:

The proposed project consists of the construction of 320 +/- subdivision right of way and two (2) lots. The project has been designed to comply with the Massachusetts Stormwater Management Regulations.

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

OWNER AND RESPONSIBLE PARTY:

Current Land Owners:
1317 Washington Street Re Holdings LLC
190 Old Derby Street
Hingham, MA 02043

Proposed Owner:
1317 Washington Street Re Holdings LLC
190 Old Derby Street
Hingham, MA 02043

Contractor should have facilities maintenance personnel on-staff. For any service beyond their service ability, the contractor should subcontract to the appropriate vendors such as street sweeping, catch basin and water quality unit cleaning, etc.

Ultimately, the owner will take over long-term O&M Responsibilities upon project completion and turnover from the contractor to the owner.

CONSTRUCTION MANAGEMENT:

A construction manager with adequate knowledge and experience on projects of similar size and scope shall be employed to oversee all site work related construction. The contractor shall incorporate the appropriate techniques to control sediment and erosion pollution during construction in accordance with the *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban Areas* and any conditions of approval from the local conservation commission.

Care should be taken when constructing stormwater control structures. Light earth-moving equipment shall be used to excavate in the vicinity of the infiltration areas. Use of heavy-

equipment causes excessive compaction of the soils beneath the basin resulting in reduced infiltration capacity. At no time shall temporary infiltration areas or settling basins be constructed in the vicinity of the proposed infiltration basins in order to prevent the soils from becoming clogged with sediment.

ON-GOING MAINTENANCE CONTRACT

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

MAINTENANCE LOG

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

STORMWATER BMP MAINTENANCE

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

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

STRUCTURAL BMPs

Deep Sump Hooded Catch Basins

On a regular basis the inlet pipe and outlet pipe shall be checked for debris and removed as necessary to ensure unobstructed flow of water. Inspections shall occur at least twice annually, once in the fall and then in the spring after the snow melts. Inspections shall verify the tees are secure and free flowing. Depth of sediment below water line. Basins are to be cleaned whenever sediment and hydrocarbons are observed. Basins shall be

cleaned using a vacuum pump. All liquid shall be pumped from the sump of each basin at least once per year. All sediments and hydrocarbons should be properly handled and disposed of in accordance with local, state and federal guidelines and regulations.

Subsurface Infiltration System

The subsurface system (Stormtech) has been designed with drain manholes at grade to aid in the removal of sediment and debris accumulating in the structure and inspection ports to monitor the accumulation of sediment. Preventative maintenance shall be performed in accordance with manufacturer's instructions, which is enclosed in this section. Inspection should occur monthly during the first year following installation, and then twice annually, once in the fall and then in the spring after the snow melts. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections. Refer to the enclosed "StormTech O&M Manual."

Proprietary Separator Water Quality Units

Water quality units shall be maintained in accordance with the manufacturer's recommendations. Refer to the enclosed "CDS-2015 Operation and Maintenance" guide. Typically a vacuum truck removes accumulated sediment and oil most efficiently. See maintenance documentation from the manufacturer. Inspection should occur at least twice annually, once in the fall and then in the spring after the snow melts. Ideally the unit should be checked frequently throughout the first year, and that will dictate the schedule going forward. All sediment and hydrocarbons should be properly handled and disposed of in accordance with local, state and federal guidelines and regulations. Cleaning will take place at the completion of construction and as deemed necessary based on the inspections and manufacturer's requirements.

NON-STRUCTURAL BMPs

Pavement Sweeping

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

Pervious Areas and Slopes

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

Pest and Insect Control

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

- If the First-Line Defense fails, as determined by the owner or party responsible for maintenance, in its sole but reasonable discretion, non-organic approaches to pest/insect control may be used, the same to be applied by a professional licensed in the Commonwealth of Massachusetts, where required. But in no event shall such non-organic approaches be used within the 25ft. buffer zone to the wetlands.

Snow Removal

Deicing compounds must be stored or sheltered on impervious pads (i.e. in garages or maintenance room). Snow that is plowed from the paved parking surfaces shall be plowed to the edges of the pavement. Refer to landscape plan for designated snow storage areas. When capacity of these areas is exceeded, accumulated snow shall be removed.

Hazardous Waste and Spill Control Containment

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

Stormwater BMP Inspection and Maintenance Log

Facility Name	
Address	
Begin Date	End Date

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

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

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

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

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

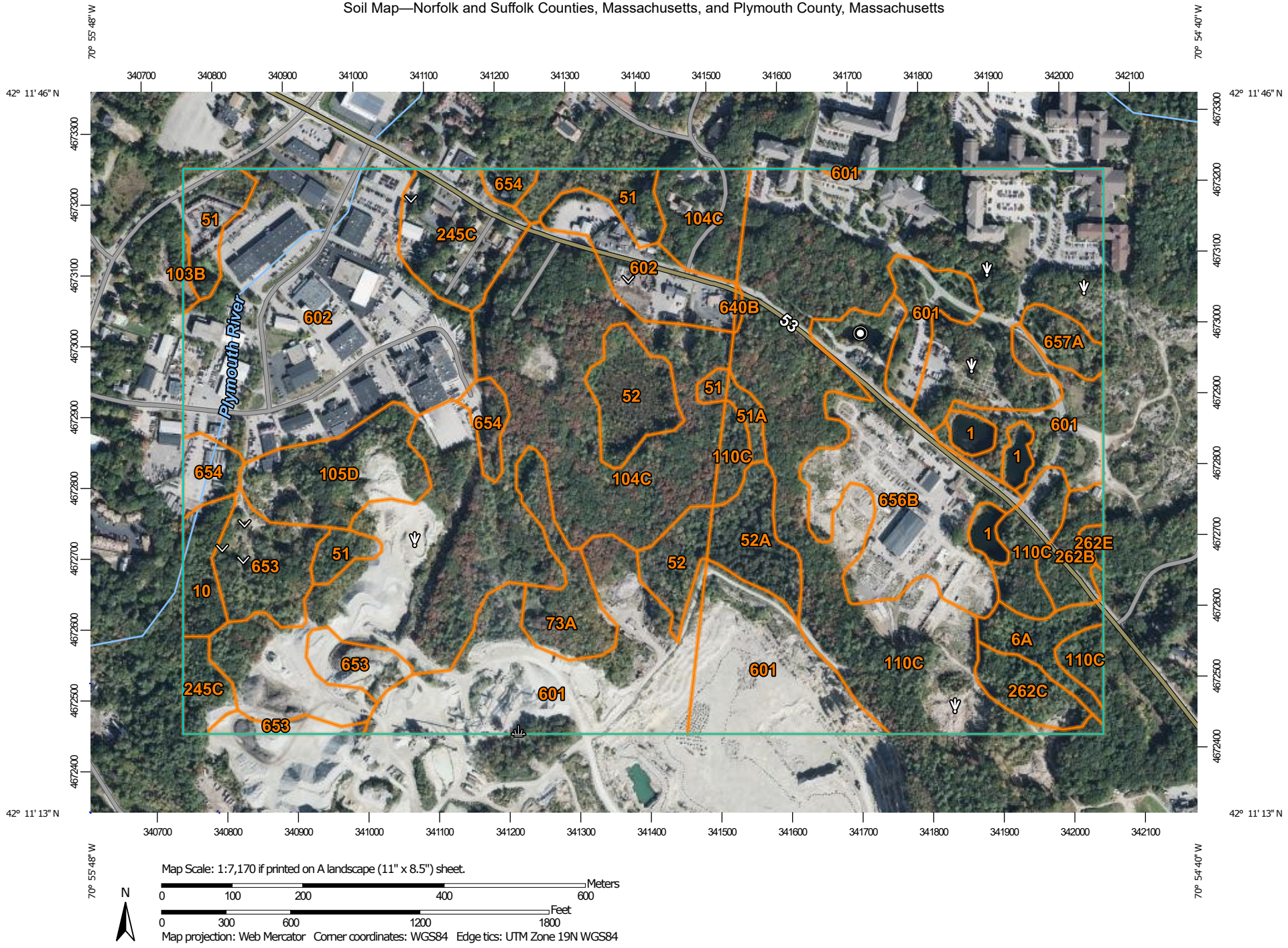
Exceptions noted — Note any condition that requires correction or indicates a need for maintenance.

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

Stormwater BMP Inspection Matrix

Conventional & LID Best Management Practices	**Inspection & Maint. Frequency**	**Erosion& Scour**	**Obstructions**	**Trash & Debris**	**Sediment Build-Up Removal**	**Vegetation Cover**	**Remove/Reset Filter Fabric & Stone As Required**	**Vac Truck Sediment & Contaminants**	**Remove/Reset Riprap as Required**
Deep Hooded Catch Basins	Twice-Annually (Spring and Fall)								
Pavement	Twice-Annually (Spring and Fall)								
Proprietary Separator Water Quality Units	Twice-Annually (Spring and Fall)								
Infiltration System	Twice-Annually (Spring and Fall)								

SECTION 6 – SOILS TESTING DATA


70° 55' 48" W
70° 54' 40" W
42° 11' 46" N
42° 11' 13" N
340700
340800
340900
341000
341100
341200
341300
341400
341500
341600
341700
341800
341900
342000
342100
4673300
4673200
4673100
4673000
4672900
4672800
4672700
4672600
4672500
4672400
Plymouth River
53
51
103B
245C
654
602
51
104C
601
640B
601
657A
52
51
51A
1
601
654
105D
110C
104C
1
656B
653
51
52A
262E
110C
262B
10
52
73A
6A
653
601
110C
110C
245C
601
262C
653
Map Scale: 1:7,170 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0
100
200
400
600
Feet
0
300
600
1200
1800
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 scales ranging from 1:12,000 to 1:25,000.

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: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 17, Sep 3, 2021

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 14, Sep 2, 2021

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Sep 26, 2020—Oct 15, 2020

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
10	Scarboro and Birdsall soils, 0 to 3 percent slopes	2.5	1.0%
51	Swansea muck, 0 to 1 percent slopes	7.3	2.8%
52	Freetown muck, 0 to 1 percent slopes	6.6	2.6%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	4.5	1.7%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	0.3	0.1%
104C	Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes	48.9	18.9%
105D	Rock outcrop-Hollis complex, 3 to 25 percent slopes	7.2	2.8%
245C	Hinckley loamy sand, 8 to 15 percent slopes	8.1	3.1%
601	Pits, quarry	17.2	6.7%
602	Urban land, 0 to 15 percent slopes	35.7	13.8%
653	Udorthents, sandy	8.1	3.1%
654	Udorthents, loamy	3.9	1.5%
Subtotals for Soil Survey Area		**150.3**	**58.2%**
Totals for Area of Interest		**258.2**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	2.4	0.9%
6A	Scarboro muck, coastal lowland, 0 to 3 percent slopes	3.0	1.2%
51A	Swansea muck, 0 to 1 percent slopes	0.8	0.3%
52A	Freetown muck, 0 to 1 percent slopes	3.8	1.5%
110C	Canton-Chatfield-Rock outcrop complex, 8 to 15 percent slopes, very stony	55.9	21.7%
262B	Quonset sandy loam, 3 to 8 percent slopes	2.5	1.0%
262C	Quonset sandy loam, 8 to 15 percent slopes	2.6	1.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
262E	Quonset sandy loam, 15 to 35 percent slopes	0.4	0.1%
601	Pits, quarry	18.7	7.3%
640B	Urban land, till substratum, 0 to 8 percent slopes	0.1	0.1%
656B	Udorthents - Urban land complex, 0 to 8 percent slopes	15.8	6.1%
657A	Aquepts, 0 to 3 percent slopes	1.8	0.7%
Subtotals for Soil Survey Area		**107.9**	**41.8%**
Totals for Area of Interest		**258.2**	**100.0%**

Norfolk and Suffolk Counties, Massachusetts

602—Urban land, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: vkyj
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 99 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Rock outcrops

Percent of map unit: 1 percent
Hydric soil rating: Unranked

Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 17, Sep 3, 2021

Norfolk and Suffolk Counties, Massachusetts

51—Swansea muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2trl2
Elevation: 0 to 1,140 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Swansea and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swansea

Setting

Landform: Bogs, swamps
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material over loose sandy and gravelly glaciofluvial deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 34 inches: muck
Cg - 34 to 79 inches: coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands
Hydric soil rating: Yes

Minor Components

Freetown

Percent of map unit: 10 percent
Landform: Bogs, swamps
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 17, Sep 3, 2021

Norfolk and Suffolk Counties, Massachusetts

52—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9
Elevation: 0 to 1,110 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Freetown

Setting

Landform: Depressions, depressions, swamps, kettles, marshes, bogs
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Surface area covered with cobbles, stones or boulders: 0.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D
Ecological site: F144AY043MA - Acidic Organic Wetlands

Hydric soil rating: Yes

Minor Components

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 5 percent
Landform: Bogs, swamps, marshes, depressions, depressions, kettles
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 17, Sep 3, 2021

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 14, Sep 2, 2021

Norfolk and Suffolk Counties, Massachusetts

104C—Hollis-Rock outcrop-Charlton complex, 0 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w69p
Elevation: 0 to 1,270 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis, extremely stony, and similar soils: 35 percent
Charlton, extremely stony, and similar soils: 25 percent
Rock outcrop: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis, Extremely Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: gravelly fine sandy loam
Bw - 7 to 16 inches: gravelly fine sandy loam
2R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 8 to 23 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Charlton, Extremely Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Ridges, hills
Parent material: Igneous and metamorphic rock

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Canton, extremely stony

Percent of map unit: 7 percent
Landform: Moraines, hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, extremely stony

Percent of map unit: 6 percent
Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Montauk, extremely stony

Percent of map unit: 1 percent
Landform: Hills, recessionial moraines, ground moraines, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Scituate, extremely stony

Percent of map unit: 1 percent
Landform: Ground moraines, hills, drumlins
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex

Hydric soil rating: No

Data Source Information

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 17, Sep 3, 2021

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 14, Sep 2, 2021

SECTION 7 – HYDRAULIC PIPE SIZING

STORM DRAIN DESIGN

Design Assumptions

Project No. 100-081
Project JRS Drive Definitive Subdivision
Location Weymouth, MA

25 Year Storm
24 Hour Duration
Pipe Coefficient "n" 0.013 Concrete

COMPUTED BY CRM DATE 5/10/2022
REVISED DATE
CHECKED BY DATE

DRAINAGE STURCTURE		TRIBUTRARY AREA		RUNOFF COEFFICIENT	RUNOFF						PIPE								FROM STRUCTURE
FROM	TO	INCREMENTAL				TIME OF FLOW		RAINFALL INTENSITY	DISCHARGE (Q)								FROM	TO	
STA STRUCT.	STRUCT.	(AC)	TOTAL	"C"	"C" X "A"	TC(MIN)	TF(MIN)	(IN/HR)	INCREM	TOTAL	LENGTH	DIA	SLOPE	Q	VF	VR	INVERT	INVERT	RIM
CB-1	DMH-1	0.121	0.121	0.83	0.10	6		6.29	0.63	0.63	18	12	0.005	2.52	3.21		104.20	104.11	107.20
CB-2	DMH-1	0.144	0.144	0.71	0.10	6		6.29	0.64	0.64	3.6	12	0.025	5.64	7.19		104.20	104.11	107.20
DMH-1	DMH-2	0.265	0.265	0.77	0.20		6	6.29	1.29	1.29	149.4	18	0.005	7.46	4.22		104.01	103.26	107.24
DMH-2	DMH-3	0.265	0.265	0.77	0.20		6	6.29	1.29	1.29	55.2	12	0.005	2.54	3.24		103.16	102.88	108.43
CB-3	DMH-4	0.150	0.150	0.33	0.05	6		6.29	0.31	0.31	11.5	12	0.010	3.65	4.64		103.24	103.12	109.21
CB-4	DMH-4	0.061	0.061	0.53	0.05	6		6.29	0.31	0.31	7.2	12	0.011	3.76	4.79		103.2	103.12	109.21
DMH-4	DMH-3	0.210	0.210	0.43	0.09		6	6.29	0.56	0.56	27.6	12	0.005	2.54	3.24		103.02	102.88	109.37
DMH-3	DMH-5	0.475	0.475	0.60	0.29		6	6.29	1.79	1.79	17.5	12	0.005	2.56	3.26		102.78	102.69	109.37
CB-5	DMH-5	0.06	0.061	0.53	0.03	6		6.29	0.20	0.20	18.9	12	0.010	3.58	4.56		102.88	102.69	109.31
CB-6	DMH-5	0.43	0.427	0.19	0.08	6		6.29	0.51	0.51	10.3	12	0.011	3.69	4.70		102.80	102.69	109.31
DMH-5	WQU-1	0.96	0.964	0.44	0.42		6	6.29	2.67	2.67	9.1	12	0.007	2.90	3.69		102.59	102.53	109.19
WQU-1	DMH-6	0.96	0.964	0.44	0.42		6	6.29	2.67	2.67	3.4	12	0.006	2.74	3.49		102.53	102.51	109.45

Section 8—Plans Under Separate Cover