

Garelick Farms Flooding Resiliency Improvements
Franklin, Massachusetts

STORMWATER MANAGEMENT REPORT

Dandreo Brothers General Contractors

September 2025

Tighe&Bond

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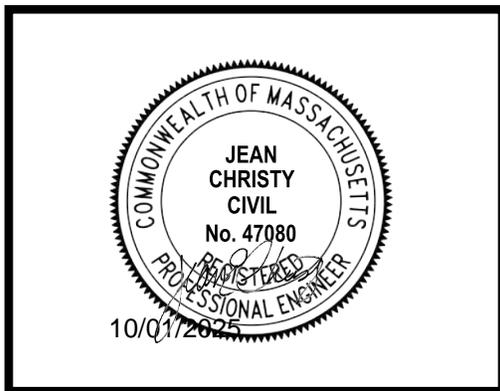
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SECTION 1

Section 1 Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the computations, published and site-specific soil information, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan, the Long-term Post-Construction Operation and Maintenance Plan and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist, provided in Appendix A, 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

Jean E. Christy
Signature, Date

10/1/2025

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SECTION 2

Section 2

Project Description

2.1 Project Introduction

On behalf of Garelick Farms (the "Applicant"), Tighe & Bond has prepared the following Stormwater Management Report to support local permitting efforts for the drainage improvements project at the Garelick Farms facility located at 1199 West Central Street in Franklin, Massachusetts (the facility).

On January 10, 2024, the facility experienced widespread flooding of the property resulting in significant property damage. A majority of the stormwater runoff entering the site enters through an existing culvert beneath Route 140, owned by the Massachusetts Department of Transportation (MassDOT), and it is understood that existing drainage infrastructure on the site is not adequate to handle flows through the culvert even during small rain events. The proposed project involves construction of a redundant stormwater conveyance system to provide additional capacity for stormwater runoff and avoid future flooding opportunities.

A United States Geological Survey (USGS) Site Location figure, Priority Resource figure, and Orthophotograph Aerial of the Project site are provided in Appendix B as Figures 1-3 (respectively). Project plans are provided separately.

2.2 Existing Conditions

The Site is located at the Garelick Farms property located in Franklin, MA, an approximately 52-acre parcel, and is zoned for industrial use. The existing site is developed with primarily a 210,000 square foot building with associated parking, trailer storage, and auxiliary buildings. The Site is situated directly north of Route 140 (West Central Street) and south of the railroad tracks operated by Massachusetts Bay Transportation Authority (MBTA). The Site is bound to the east by a parking lot associated with the MBTA and is bound to the west by undeveloped, vegetated land. Beyond the railroad, there is additional trailer storage used by Garelick Farms and beyond Route 140 is a forested area containing Rays Pond. A wetland resource area is located on the northeastern portion of the Site with a perennial stream that travels through the wetland. The area is relatively flat and paved with some landscaped areas.

The Natural Resources Conservation Service (NRCS) soil data was obtained through the Web Soil Survey portal on the United States Department of Agriculture (USDA) NRCS website. The areas surrounding the property were queried for soil types according to the record soil survey maps maintained by NRCS. Soils within the project area, as published in the USDA Soil Survey for Norfolk and Suffolk Counties, Version 19, dated September 10, 2023, include the Scarborough, Birdsall, Swansea, and Canton associations, as well as Udorthents. The NRCS Soils Mapping is provided in Appendix C. The hydrologic soil group (HSG) and further description for each soil association is presented in Table 2.1 below.

Table 2.1
Soil Descriptions

Soil Map Designation	Soil Name	Hydrologic Soil Group (HSG)
10	Scarboro and Birdsall soils, 0 to 3 percent slopes	A/D
51	Swansea muck, 0 to 1 percent slopes	B/D
420B	Canton fine sandy loam, 3 to 8 percent slopes	B
653	Udorthents	A

The hydrologic soil group designation (HSG) for this soil type is listed as A, B, and D. The HSG rating for soil types is based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long duration storms. Soils designated as HSG A are generally well draining and have a high capacity for water infiltration. Soils designated as HSG B generally have a moderate infiltration capacity and are well drained despite their finer texture. Soils designated as HSG D are very poorly draining and are typical of soils with shallow groundwater or bedrock or low-permeability soils such as clay. The dual-designation assignments of A/D and B/D represent soils in drained and undrained areas. For purposes of this report, any wetland within the dual-designation area was represented as HSG D, while the remainder of the soil grouping was represented as HSG A or B based on the first letter of the dual-designation. Based on this, soils within the project area vary in their ability to infiltrate water and in the development of runoff. The NRCS Soils Mapping is provided in Appendix C.

Under existing conditions, drainage from Route 140 and areas south of the Site drain onto the Garelick Farms property through a box culvert beneath Route 140. Rays Pond is located south of Route 140 and is fed from an approximately 278-acre watershed of undeveloped and developed land. Flow from the pond is restricted by a dam and outlet structure, which discharges water to the box culvert. The box culvert discharges to a small open drainage basin on Garelick property. This open channel then flows under an access road on site through a 48" diameter culvert, where it daylights into a drainage ditch in front of the building. At the building, flow passes through a protective grate, through which it flows under the facility and a portion of the parking lot through a closed 48" diameter culvert, and discharges into a wetland area behind the facility. Drainage systems through the property are comprised of a series of catch basins, drainage manholes, roof drains, subsurface infiltration units, and conveyance piping. Ultimately, drainage systems through the property discharge into the wetland area behind the facility.

The runoff curve numbers (CN) used in the calculation of the composite CN for each drainage area are based on the values provided in TR-55, Urban Hydrology for Small Watersheds. CN values vary depending on the type of ground cover and soil HSG. Existing Conditions Drainage Areas were delineated based on topography and stormwater discharge location. A summary of each existing conditions drainage area, including sizing,

CN and time of concentration calculations, are provided in the HydroCAD reports in Appendix D. An Existing Conditions Drainage Area Map is provided as Figure 4 in Appendix B.

2.3 Floodplain Management

The Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) Community Panel Number 25021C0304E, effective July 8, 2025, shows Zone A areas located within the project site, as attached in Appendix B. Zone A areas are not afforded a base flood elevation (BFE).

2.4 Proposed Improvements

The intent of the proposed project is to alleviate the Garelick Farms property of extensive flooding experienced during precipitation events, during which high volumes of stormwater runoff are conveyed onto the site through an existing culvert beneath Route 140, owned by MassDOT, which has resulted in property damage and operation losses, presenting a significant burden on the owner.

In order to introduce redundancy into the stormwater conveyance system to reduce future flooding occurrences due to increased storm intensity and frequency, a parallel, redundant conveyance system is proposed. The existing 48" drain line under the building will remain and continue to serve as the primary route for runoff from Rays Pond to the wetland north of the building. The proposed improvements include the installation of a 36" diameter reinforced concrete conveyance pipe (RCP) from the southern, smaller open basin to the wetland north of the building. The project does not include the creation of any new impervious area.

To improve stormwater treatment on-site, three existing catch basins will be replaced with deep-sump, hooded catch basins and connected to the new 36" redundant conveyance pipe. These new catch basins will improve Total Suspended Solid (TSS) removal. Other existing stormwater collection and conveyance systems on-site will remain.

2.5 Method of Hydrologic and Hydraulic Analysis

The following storm drainage design criteria were used in the hydrologic and hydraulic analyses:

1. Piped storm drainage system and the outlets are designed for a 25-year storm event.
2. Minimum time of concentration = 6 minutes.
3. For SCS peak flow calculations, Curve Number were as follows:
 - a. Woods, Good, HSG A = 30
 - b. > 75% Grass cover, Good, HSG A = 39
 - c. ½ acre lots, HSG A = 54
 - d. Woods, Good, HSG B = 55

- e. Woods/grass combination, Good, HSG B = 58
 - f. > 75% Grass cover, Good, HSG B = 61
 - g. Woods, Good, HSG C = 70
 - h. Woods, Good, HSG D = 77
 - i. Pavement = 98
 - j. Water Surface = 98
4. Minimum pipe slope = 0.5 percent
 5. Watershed areas delineated using polylines in AutoCAD Civil 3D 2025.

A comparative hydrologic analysis of the pre-development and post-development site was performed to determine the impacts of the proposed project to peak discharge rates and stormwater runoff volumes. HydroCAD Release 10.2-4c is a hydrology and hydraulics software using Technical Release (TR) 20 and TR-55 methodologies for the determination of stormwater runoff quantities.

The HydroCAD Report for both pre- and post-development conditions for each storm event is provided in Appendix D. Table 2.2 below presents the design rainfall depths for the storm events evaluated, as provided by the National Oceanic and Atmospheric Administration’s (NOAA) National Weather Service Atlas 14 PLUS.

Table 2.2
Design Rainfall Depths

Storm Event	Rainfall Depth (inches)
2-Year	3.36
10-Year	5.24
25-Year	6.40
100-Year	8.20

The proposed storm drain collection system was analyzed to verify that the pipe capacities proposed can assist the existing infrastructure within the 25-year storm event. Results of that analysis are provided in Appendix D.

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SECTION 3

Section 3

Regulatory Compliance

The project is considered a redevelopment project and is required to comply with the MassDEP Massachusetts Stormwater Management Standards (Standards) under the Massachusetts Wetlands Protection Act to the maximum extent practicable, as well as the Town of Franklin Stormwater Management Regulations. The Massachusetts Stormwater Checklist is provided in Appendix A.

3.1 LID Measures

MassDEP allows for reductions in structural stormwater Best Management Practice (BMP) requirements for water quantity and quality when certain criteria are met. The proposed project includes environmentally sensitive site design and low impact development techniques; however, the applicant is not requesting credit for LID measures.

Multiple alternatives were explored during the design development of this project, including measures for stormwater runoff infiltration to groundwater and pavement reduction. Due to on-site spatial construction as a result of existing infrastructure and underground utilities, additional stormwater BMPs beyond those which are included in the proposed design were determined to be infeasible. Additionally, regular site operations prohibited the reduction of impervious surfaces within the paved parking lot and driveway areas on-site, and limited the available space for above-ground stormwater detention and recharge facilities.

3.2 Standard 1: No New Untreated Discharges

The project will not result in any new stormwater conveyance discharging untreated stormwater directly to the Waters of the Commonwealth. Further documentation pertaining to stormwater treatment is provided in Section 3.5.

It is not anticipated that erosive stormwater velocities will be encountered post-construction subsequently causing erosion and siltation to Waters of the Commonwealth.

All outfalls will be equipped with stone outlet protection as shown on the Site Plans. These devices are designed based on the anticipated flow from the proposed outfall to dissipate energy and reduce the opportunity for erosion to develop.

3.3 Standard 2: Peak Discharge Rate Attenuation

Existing drainage patterns, discharge points, and contributing impervious areas will remain unchanged under the proposed project. The only modification proposed is the installation of a redundant drainage pipe, which serves as a resiliency measure to supplement the existing system and provide backup conveyance during storm events. This improvement is intended solely to reduce the potential for localized flooding; it does not alter the volume of runoff generated on-site or the peak rate of discharge from the site.

Accordingly, proposed runoff conditions remain consistent with existing conditions, and the project meets the requirements of Standard 2.

3.4 Standard 3: Groundwater Recharge

The required recharge volume is a function of the proposed impervious area for the project. The proposed project proposes no change in impervious area; therefore, designed infiltration of stormwater runoff from the proposed project to groundwater is not required.

3.5 Standard 4: Water Quality

Standard 4 of the Massachusetts Stormwater Standards addresses stormwater quality requirements. This standard requires that new stormwater management systems be designed to achieve an 80% TSS removal rate prior to discharge. Since this project is classified as a redevelopment, the TSS removal rate has to be met to the maximum extent practicable. MassDEP has published presumed removal rates for each of the BMP's featured in their design guidelines. Additionally, this standard addresses the required volume of stormwater runoff that is to be treated by the BMPs, as well as components of a long-term source control and pollution prevention plan.

The treatment train incorporated into the design consists of replacing existing catch basins with deep-sump, hooded catch basins connected to the proposed stormwater conveyance piping. The overall TSS removal for this train is 25%. This is considered an improvement to runoff quality as compared to existing conditions, as the existing stormwater management system on-site does not currently treat for TSS.

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

The proposed use is considered a LUHPPL. As such, the project has been designed to meet the more stringent requirements of Standard 5 to the maximum extent practicable, including the incorporation of BMPs suitable for treating runoff from LUHPPLs. These include deep-sump, hooded catch basins.

The required water quality volume is a function of the proposed impervious area for the project. The proposed project proposes no change in impervious area; therefore, the water quality treatment requirements for runoff from the site are not applicable. However, the incorporation of deep-sump, hooded catch basins into the design provides water quality improvements over existing conditions.

3.7 Standard 6: Critical Areas

The site discharges stormwater runoff to a wetland located to the northeast of the project, which discharges to Mine Brook. Mine Brook, specifically segment MA72-14, is listed as a Category 5 Water, which requires a Total Maximum Daily Load (TMDL) as listed in the Massachusetts Year 2022 Integrated List of Waters. The impairments listed for this segment of Mine Brook include Escherichia Coli (E. Coli) and temperature. Impairments that do not require a TMDL include habitat assessment.

The project has been designed to improve water quality under proposed conditions. The stormwater BMPs selected for the project remove 25% of annual average TSS loading when constructed and maintained property. Refer to Appendix D for pollutant removal calculations. The project is located outside of any MassDEP Wellhead Protection Areas, including Zones I, II, and any Interim Wellhead Protection Areas.

Other Critical Areas, as defined in the Massachusetts Stormwater Handbook, are shown on Figure 2 in Appendix B.

3.8 Standard 7: Redevelopment Projects

The project is considered a redevelopment; therefore, the project has been designed to comply to the maximum extent practicable with Standards 2 and 3, and the pretreatment and structural BMP requirements of Standards 4, 5, and 6. The project has been designed to fully comply with the remaining Standards.

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

A construction period Soil Erosion and Sediment Control Plan (SESCP) is provided in Appendix E. The SESCO presents the minimum soil erosion and sediment control practices to be used during construction. General soil erosion and sedimentation control BMPs are indicated on the Site Plans.

3.10 Standard 9: Long-Term Operation and Maintenance Plan

A Long-Term Stormwater Operations and Maintenance Plan is included in Appendix F of this report. The O&M plan indicates the responsible parties for the project, routine and non-routine maintenance tasks and inspection criteria. The O&M Plan also provides guidance on long-term pollution prevention practices for the project.

3.11 Standard 10: Prohibition of Illicit Discharges

Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater. Illicit discharge does not include discharges from the following activities or facilities: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing, and water used to clean residential buildings without detergents. A signed Illicit Discharge Statement will be provided prior to construction.

3.12 Local Stormwater Management Regulations

The Stormwater Management chapter of the Town of Franklin General Legislation states that control of stormwater runoff shall meet all federal and state requirements, including the Massachusetts Stormwater Handbook. Compliance with the Standards as described in the Massachusetts Stormwater Handbook is described in Sections 3.1-3.11 above.

Additional requirements for redevelopment projects within the Town of Franklin include that the proposed stormwater management system must also:

1. Retain the volume of runoff equivalent to, or greater than, 0.80 inch multiplied by the total post-construction impervious surface area on the site and/or
2. Remove 80% of the average annual post-construction load of TSS generated from the total post-construction impervious area on the site and 50% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on the site.

It is not feasible to meet these requirements in full. The intent of the proposed project is to alleviate the Garelick Farms property of extensive flooding experienced during precipitation events, during which high volumes of stormwater runoff are conveyed onto the site through an existing culvert beneath Route 140, owned by MassDOT. The contributory area upstream of this culvert is significantly larger than that which encompasses the project site itself, and the management of resulting run-on presents a significant burden on the property owner. This unregulated inflow significantly increases both the rate and volume of run-on entering the site, making it infeasible to achieve the prescribed retention and pollutant removal requirements within available space and operational constraints.

Several on-site constraints prevent the installation of detention and recharge facilities for stormwater management, including the presence of an extensive network of subsurface utilities which limits available space for conventional stormwater treatment and retention structures. Additionally, routine plant operations and traffic circulation preclude the installation of above-ground stormwater detention or infiltration features. Given these limitations, the project proposes a stormwater management system that maximizes feasible treatment within the site's constraints.

Three catch basins are proposed to be replaced with deep-sump catch basins, which will provide an improvement to runoff from the project site in terms of water quality. The deep-sump within the proposed catch basin structures will provide an opportunity for TSS removal.

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APPENDIX A



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 8²
- 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.



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.

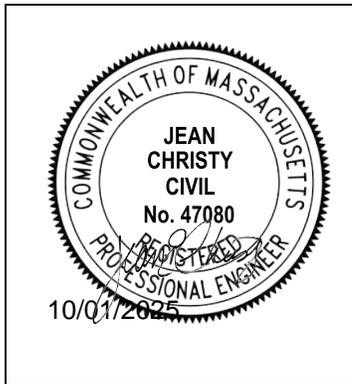
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



Jean E. Christy
Signature and Date

10/1/2025

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 Field¹
- 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)

Infiltration is not required due to the project's status as a redevelopment.

- 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.

Tighe&Bond

APPENDIX B

FIGURE 1
SITE LOCATION
 September 2025

Garelick Farms Stormwater Improvements Project
 1199 West Central Street
 Franklin, Massachusetts

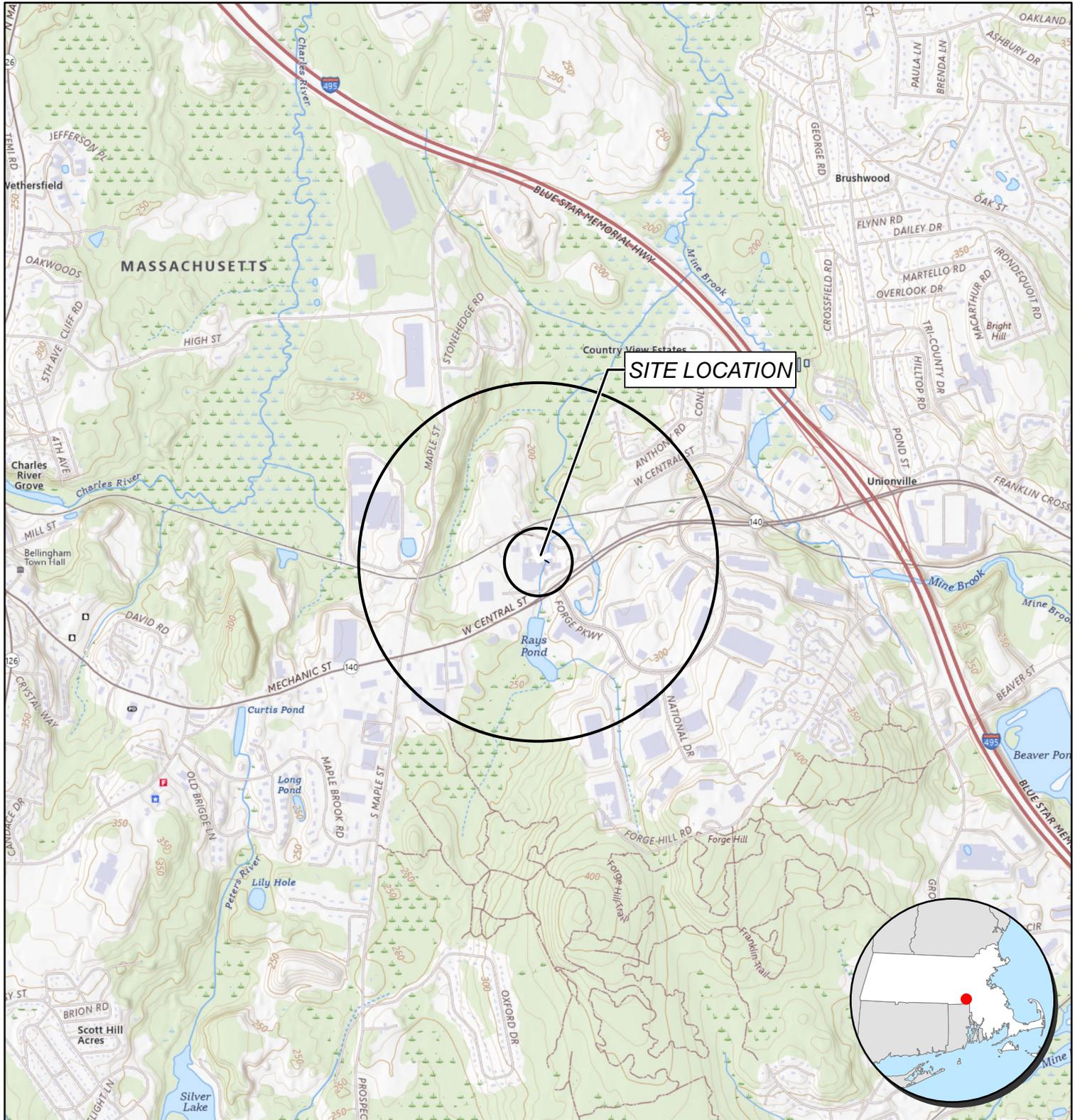
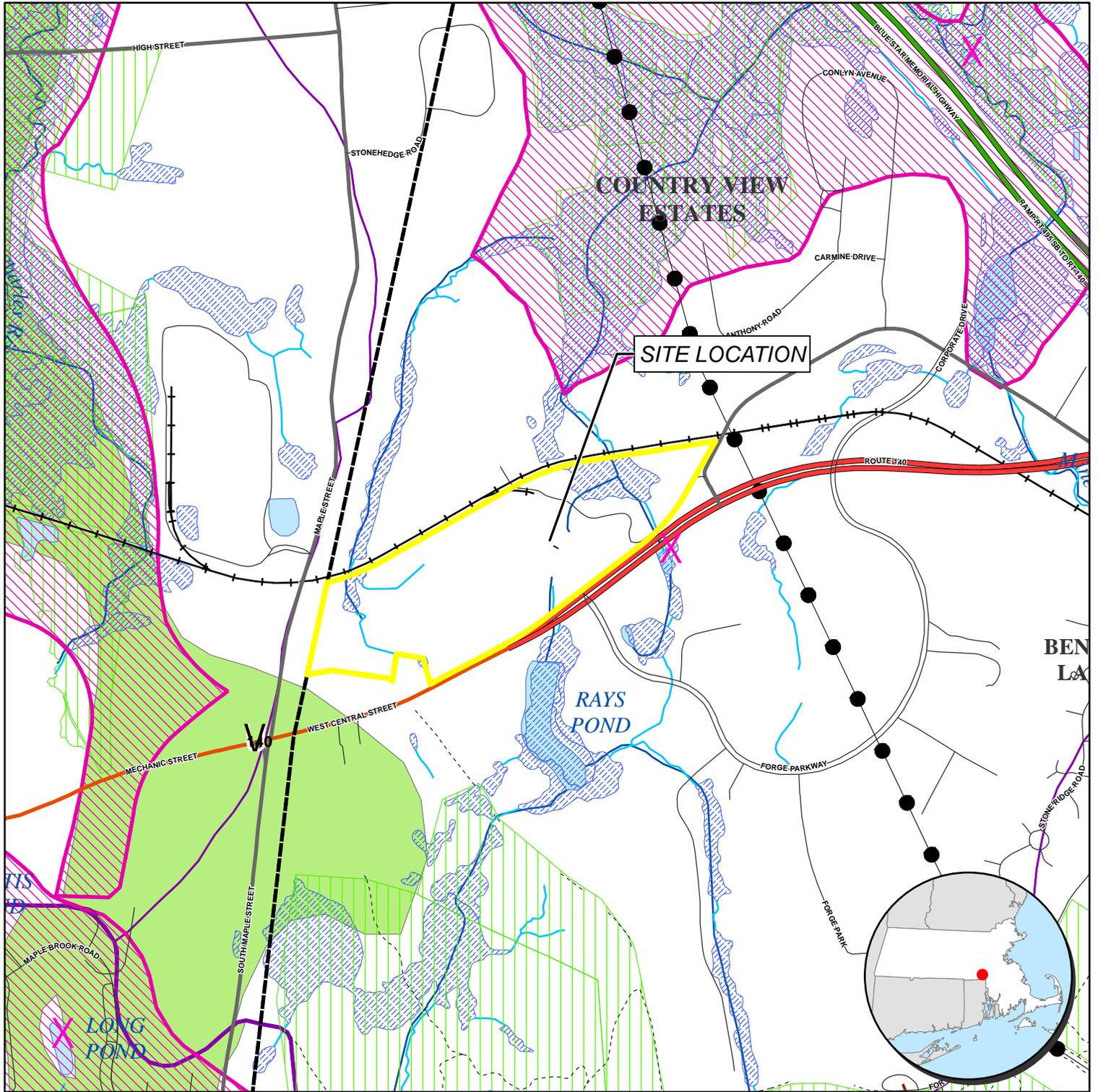


FIGURE 2
PRIORITY RESOURCE
 September 2025

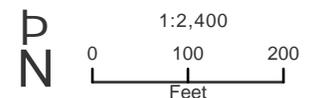


- | | | | | |
|---|---|----------------------------|---|---|
| NHESP Certified Vernal Pool | Non-Community Non-Transient Public Water Supply | Stream/Intermittent Stream | Protected and Recreational Open Space | MassDEP Not Interpreted Wetland |
| NHESP Potential Vernal Pool | Non-Community Transient Public Water Supply | Powerline | Solid Waste Landfill | Public Surface Water Supply (PSWS) |
| Non-Landfill Solid Waste Site | Limited Access Highway | Pipeline | Area of Critical Environmental Concern (ACEC) | Water Body |
| Proposed Well | Multi-Lane Highway, NOT Limited Access | Track or Trail | NHESP Priority Habitat for Rare Species | Non-Potential Drinking Water Source Area - High Yield |
| Emergency Surface Water | Other Numbered Route | Railroad | NHESP Estimated Habitat for Rare Wildlife | Non-Potential Drinking Water Source Area - Medium Yield |
| Community Public Water Supply - Surface Water | Major Road - Arterials and Collectors | Railroad | EPA Designated Sole Source Aquifer | Potentially Productive Medium Yield Aquifer |
| Community Public Water Supply - Groundwater | Minor Street or Road | Site Parcel | Major Drainage Basin | Potentially Productive High Yield Aquifer |
| Hydrologic Connection | DEP Approved Wellhead Protection Area (Zone I) | Railroad | Sub Drainage Basin | County Boundary |
| | DEP Approved Wellhead Protection Area (Zone II) | Railroad | MassDEP Inland Wetland | Municipal Boundary |
| | DEP Interim Wellhead Protection Area (IWPA) | Railroad | MassDEP Coastal Wetland | USGS Quadrangle Sheet Boundary |





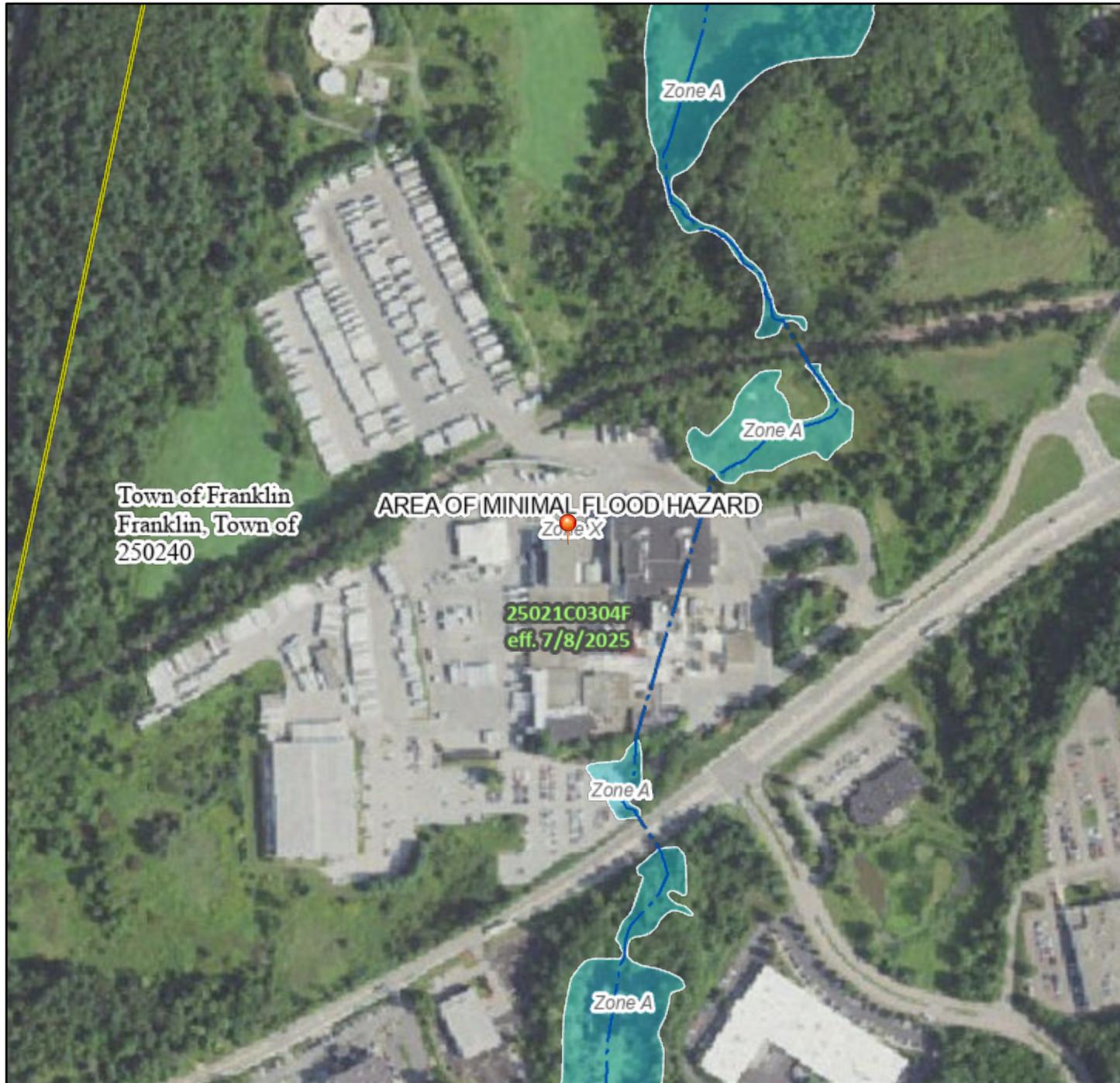
- (Bank Flag
- (Wetland Flag
- U Culvert
- Tree
- Delineated Stream Boundary
- Delineated Wetland Boundary
- ▨ Delineated Wetland



National Flood Hazard Layer FIRMMette



71°27'3"W 42°5'31"N



Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) <i>Zone A, V, A99</i>
		With BFE or Depth <i>Zone AE, AO, AH, VE, AR</i>
		Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile <i>Zone X</i>
		Future Conditions 1% Annual Chance Flood Hazard <i>Zone X</i>
		Area with Reduced Flood Risk due to Levee. See Notes. <i>Zone X</i>
		Area with Flood Risk due to Levee <i>Zone D</i>

OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard <i>Zone X</i>
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard <i>Zone D</i>
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall

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

MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **8/25/2025 at 1:37 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

0 250 500 1,000 1,500 2,000 Feet 1:6,000

71°26'26"W 42°5'4"N

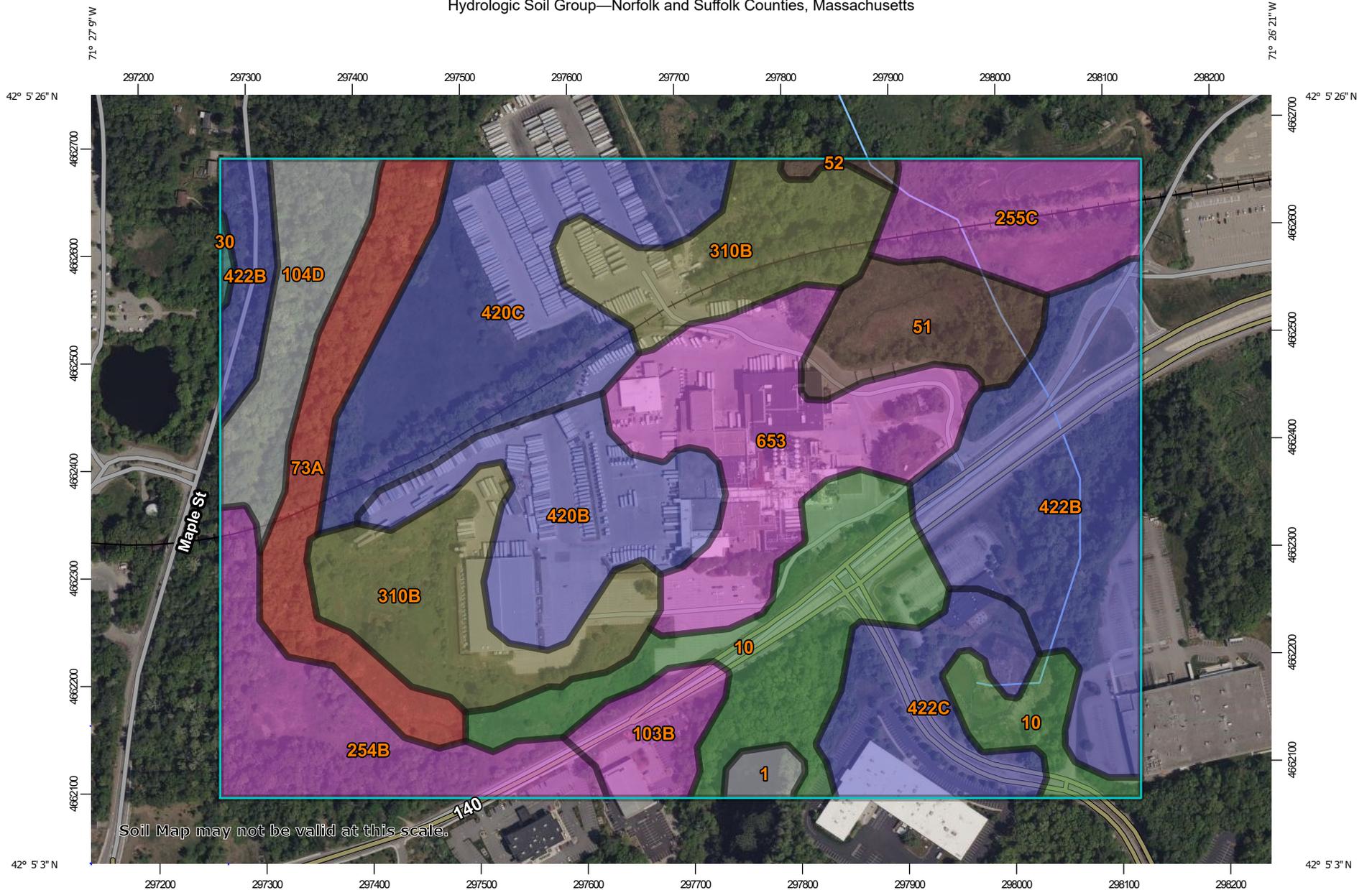
Basemap Imagery Source: USGS National Map 2023

FIGURE 6

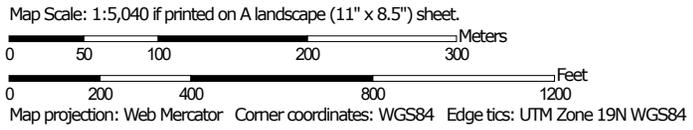
Tighe&Bond

APPENDIX C

Hydrologic Soil Group—Norfolk and Suffolk Counties, Massachusetts



Soil Map may not be valid at this scale.



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

Soil Rating Polygons

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines

 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points

 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
 Survey Area Data: Version 19, Sep 10, 2023

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

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

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		0.8	0.6%
10	Scarboro and Birdsall soils, 0 to 3 percent slopes	A/D	13.2	10.4%
30	Raynham silt loam, 0 to 3 percent slopes	C	0.2	0.1%
51	Swansea muck, 0 to 1 percent slopes	B/D	5.1	4.0%
52	Freetown muck, 0 to 1 percent slopes	B/D	0.4	0.3%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	D	7.4	5.8%
103B	Charlton-Hollis-Rock outcrop complex, 3 to 8 percent slopes	A	3.0	2.4%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 35 percent slopes		5.5	4.4%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	8.5	6.7%
255C	Windsor loamy sand, 8 to 15 percent slopes	A	6.3	5.0%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	15.9	12.5%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	9.1	7.2%
420C	Canton fine sandy loam, 8 to 15 percent slopes	B	15.1	11.9%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	B	17.1	13.5%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	B	6.8	5.4%
653	Udorthents, sandy	A	12.5	9.9%
Totals for Area of Interest			126.9	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Project: Garelick Farms Stormwater Improvements

 Location: Franklin, MA

 Client: Dandreo Brothers General Contractors

 Drilling Co. Geologic Earth Exploration

 Foreman: John Galvin

 T&B Rep.: Zachary Hill

 Date Start: 07/25/25 End: 07/25/25

 Location: See Exploration Location Plan

 GS. Elev. 233' Datum: NAVD 88

	Casing	Sampler
Type	FJC	Split Spoon
I.D./O.D.	4"/4.25"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	CME 75 (Auto Hammer)	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
25-Jul	14:00	4'	9'	5 Mins
28-Jul	13:00	4'	Well	3 Days

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec. (in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction	
5		S-1 / 7"	0.5 -2	5-6		Medium dense, brown, fine to coarse SAND, some Silt, trace fine Gravel, moist	0.3' ASPHALT	1		
				9			FILL			
			S-2 / 8"	2-4	9-11		Medium dense, brown, fine to coarse SAND, little Silt, little fine Gravel, moist			4'
					13-14					
			S-3 / 13"	4-6	10-7		Medium dense, light brown, fine to coarse SAND, some Silt, some fine to coarse Gravel, wet			
10				8-10			GLACIAL TILL	2		
			S-4 / 13"	6-8	18-16		Dense, brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, wet			
					16-20					
10			S-5 / 10"	9-10.5	19-40	Top 5": Brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, wet Bot 5": Brown, WEATHERED ROCK, little fine to coarse Sand, little Silt, wet	10'	3		
					43-50/0"		10.5' WEATHERED ROCK			
						Boring Terminated at 10.5' (Refusal)				
15										
20										
25										
30										

Notes:
 1. 1" topsoil lens observed in center of Sample S-2.
 2. Split Spoon and rollerbit refusal at about 10.5' below ground surface (bgs).
 3. Groundwater well installed to ±10.5ft bgs. Well consisted of 9ft 2-inch diameter slotted screen followed by 1.5ft of solid riser pipe to grade. Well backfilled with sand to ±1ft bgs followed by ±0.5ft granular bentonite seals and finished with a steel road box.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Project: Garelick Farms Stormwater Improvements

 Location: Franklin, MA

 Client: Dandreo Brothers General Contractors

 Drilling Co.: Geologic Earth Exploration

 Foreman: John Galvin

 T&B Rep.: Zachary Hill

 Date Start: 07/24/25 End: 07/24/25

 Location: See Exploration Location Plan

 GS. Elev. 234' Datum: NAVD 88
Casing Sampler

Type	FJC	Split Spoon
I.D./O.D.	4"/4.25"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	CME 75 (Auto Hammer)	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
24-Jul	12:00	6.5'	14'	5 min

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec. (in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		S-1 / 8"	0.5 -2	8-6		Medium dense, brown, fine to coarse SAND, little Silt, little fine Gravel, moist	0.3' ASPHALT		No Well Installed
				9			FILL		
		S-2 / 8"	2-4	16-13		Medium dense, light brown, fine to coarse SAND, little fine Gravel, little Silt, moist	2'		
				10-13					
		S-3 / 10"	4-6	10-11		Medium dense, light brown, fine to coarse SAND, little fine Gravel, little Silt, moist	GLACIAL TILL		
				15-20					
	S-4 / 10"	6-8	37-30		Very dense, light brown, fine to coarse SAND and SILT, little fine Gravel, wet				
			48-37						
10		S-5 / 9"	9-11	16-22				Very dense, brown, fine to coarse SAND and WEATHERED ROCK, some Silt, wet	
				30-19					
15		S-6 / 2"	14-14.5	70/6"			Grey, WEATHERED ROCK, little fine to coarse Sand, little Silt, wet	13'	1
							WEATHERED ROCK	2	
						Boring Terminated at 15' (Refusal)	15'		
20									
25									
30									

- Notes:
- Increased rig chatter and rollerbit resistance beginning at ±13' bgs.
 - Rollerbit advanced from ±14.5' to ±15' bgs prior to refusal.

Proportions Used

TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency

VERY LOOSE	0-4	VERY SOFT	<2
LOOSE	4-10	SOFT	2-4
MEDIUM DENSE	10-30	MEDIUM	4-8
DENSE	30-50	STIFF	8-15
VERY DENSE	>50	VERY STIFF	15-30
		HARD	>30

Drilling Co. Geologic Earth Exploration

Foreman: John Galvin
 T&B Rep.: Zachary Hill
 Date Start: 07/24/25 End: 07/24/25
 Location: See Exploration Location Plan
 GS. Elev. 234' Datum: NAVD 88

	Casing	Sampler
Type	FJC	Split Spoon
I.D./O.D.	4"/4.25"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	CME 75 (Auto Hammer)	

Groundwater Readings				
Date	Time	Depth	Casing	Sta. Time
24-Jul	14:00	17'	Well	30 min
28-Jul	13:00	11.5'	Well	4 days

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec. (in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		S-1 / 9"	0.5 -2	12-13		Medium dense, brown, fine to coarse SAND, some fine Gravel, little Silt, moist	0.3' ASPHALT		
				13					
		S-2 / 9"	2-4	16-18	16-18		Dense, dark brown, fine to coarse SAND, little fine Gravel, little Silt, moist	FILL	
10				23-22					
		S-3 / 2"	4-5	24-50/6"		Grey, fine to coarse GRAVEL, some fine to coarse Sand, little Silt, moist			
15				6-7		Medium dense, light brown, fine to medium SAND, trace Silt, trace fine Gravel, moist			
				7-6					
		S-4 / 8"	9-11	6-7					
20									
		S-5 / 11"	14-16	5-7		Medium dense, light brown, fine to coarse SAND, little fine Gravel, little Silt, wet			
25				11-24					
		S-6 / 9"	19-20.8	15-39		Very dense, brown, fine to coarse SAND, some Silt, some fine to coarse Gravel, wet			
30				24-50/3"					
		3:05	C-1 / 58"	22-27		Very hard, slightly weathered, moderately to slightly fractured, medium grained, grey, GRANITE. Joints: very close to wide, very thin to thin foliation, shallow dipping, rough, no Silt in joints.			
		3:15							
		3:20							
		2:55				REC: 58"/60" = 96.6% RQD: 73%			
		3:10							
						End of Boring at 27'			

Notes: 1. Spoon refusal at ±5' bgs, rock in tip of split spoon. Rollerbit advanced to ±6' bgs, inferred ±1' boulder. 2. Rollerbit advanced from ±20.8' to ±22' prior to refusal. Began rock coring at ±22'. ±300lb of crowd pressure during rock coring. 3. Groundwater well installed to ±20ft bgs. Well consisted of 15ft 2-inch diameter slotted screen followed by 5ft of solid riser pipe to grade. Well backfilled with sand to ±4ft bgs followed by ±1ft granular bentonite seals. Remaining well depth backfilled with drill cuttings and finished with a steel road box.	Proportions Used TRACE (TR.) 0 - <10% LITTLE (LI.) 10 - <20% SOME (SO.) 20 - <35% AND 35 - <50%	Density/Consistency VERY LOOSE 0-4 LOOSE 4-10 MEDIUM DENSE 10-30 DENSE 30-50 VERY DENSE >50 VERY SOFT <2 SOFT 2-4 MEDIUM 4-8 STIFF 8-15 VERY STIFF 15-30 HARD >30
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Project: Garelick Farms Stormwater Improvements

 Location: Franklin, MA

 Client: Dandreo Brothers General Contractors

 Drilling Co. Geologic Earth Exploration

 Foreman: John Galvin

 T&B Rep.: Zachary Hill

 Date Start: 07/28/25 End: 07/28/25

 Location: See Exploration Location Plan

 GS. Elev. 229' Datum: NAVD 88

	Casing	Sampler
Type	FJC	Split Spoon
I.D./O.D.	4"/4.25"	1-3/8"/2"
Hammer Wt.	140#	140#
Hammer Fall	30"	30"
Rig Make/Model	CME 75 (Auto Hammer)	

Groundwater Readings

Date	Time	Depth	Casing	Sta. Time
28-Jul	12:00	8'	24'	5 Mins

Depth (ft.)	Casing Blows Per Ft.	Sample No. / Rec.(in)	Sample Depth (ft.)	Blows Per 6"	PID Reading (ppm)	Sample Description	General Stratigraphy	Notes	Well Construction
5		S-1 / 8"	0.5 -2	20-12		Medium dense, dark grey, fine to coarse SAND and fine to coarse GRAVEL, little Silt, moist	0.3' ASPHALT		
				10					
		S-2 / 4"	2-4	2-9		Dense, dark grey, fine to coarse GRAVEL, some fine to coarse Sand, little Silt, moist	FILL		
				22-17					
	S-3 / 1"	4-6	22-34		Dense, dark grey, fine to coarse SAND, some fine Gravel, some Silt, moist	8'			
			10-4						
	S-4 / 2"	6-6.5	55/6"		Dark grey, fine to coarse GRAVEL and fine to coarse SAND, little Silt, trace wood, moist	GLACIAL TILL			
10		S-5 / 13"	9-11	5-17		Very dense, grey, fine to coarse SAND, some Silt, little fine to coarse Gravel, wet			
				50-56					
15		S-6 / 10"	14-16	27-23		Dense, grey/brown, fine to coarse SAND, some Silt, little fine to coarse Gravel, wet			
				22-21					
20		S-7 / 4"	19-21	18-20		Very dense, grey/brown, fine to coarse SAND, some fine to coarse Gravel, little Silt, wet			
				38-35					
25		S-8 / 2"	24-24.5	70/6"		Grey/brown, WEATHERED ROCK and fine to coarse SAND, little Silt, wet	24' WEATHERED ROCK 25'		
30						Boring Terminated at 25' (Refusal)			

- Notes:
- Rig chatter and increased casing resistance during advancement from ±4' to ±8' bgs.
 - Red plastic observed in wash water during rollerbit advancement from ±6.5' to ±9' bgs.
 - Rollerbit advanced from ±24.5' to ±25' bgs prior to refusal.

Proportions Used	
TRACE (TR.)	0 - <10%
LITTLE (LI.)	10 - <20%
SOME (SO.)	20 - <35%
AND	35 - <50%

Density/Consistency		
VERY LOOSE	0-4	VERY SOFT <2
LOOSE	4-10	SOFT 2-4
MEDIUM DENSE	10-30	MEDIUM 4-8
DENSE	30-50	STIFF 8-15
VERY DENSE	>50	VERY STIFF 15-30
		HARD >30

Tighe&Bond

APPENDIX D

Atlas 14 Precipitation Data



NOAA Atlas 14, Volume 10, Version 3
Location name: Franklin, Massachusetts, USA*
Latitude: 42.0875°, Longitude: -71.4452°
Elevation: 231 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.327 (0.252-0.420)	0.395 (0.305-0.509)	0.507 (0.389-0.654)	0.600 (0.459-0.779)	0.729 (0.540-0.987)	0.826 (0.600-1.14)	0.927 (0.654-1.33)	1.04 (0.697-1.52)	1.19 (0.772-1.81)	1.32 (0.834-2.04)
10-min	0.463 (0.357-0.595)	0.560 (0.432-0.721)	0.719 (0.553-0.929)	0.851 (0.651-1.10)	1.03 (0.765-1.40)	1.17 (0.850-1.62)	1.31 (0.927-1.88)	1.47 (0.987-2.16)	1.69 (1.09-2.56)	1.87 (1.18-2.89)
15-min	0.544 (0.420-0.700)	0.659 (0.508-0.848)	0.846 (0.650-1.09)	1.00 (0.765-1.30)	1.22 (0.900-1.65)	1.38 (1.00-1.90)	1.54 (1.09-2.21)	1.73 (1.16-2.54)	1.99 (1.29-3.02)	2.20 (1.39-3.40)
30-min	0.743 (0.573-0.955)	0.900 (0.694-1.16)	1.16 (0.888-1.49)	1.37 (1.05-1.78)	1.66 (1.23-2.25)	1.88 (1.37-2.60)	2.11 (1.49-3.02)	2.36 (1.59-3.47)	2.72 (1.76-4.12)	3.00 (1.90-4.65)
60-min	0.941 (0.727-1.21)	1.14 (0.879-1.47)	1.47 (1.13-1.89)	1.74 (1.33-2.25)	2.11 (1.56-2.85)	2.39 (1.74-3.30)	2.68 (1.89-3.84)	3.00 (2.02-4.40)	3.45 (2.23-5.23)	3.81 (2.41-5.90)
2-hr	1.21 (0.939-1.54)	1.48 (1.14-1.89)	1.91 (1.48-2.46)	2.28 (1.75-2.94)	2.78 (2.07-3.75)	3.15 (2.30-4.34)	3.54 (2.53-5.08)	4.00 (2.70-5.84)	4.68 (3.04-7.06)	5.25 (3.33-8.07)
3-hr	1.40 (1.09-1.78)	1.71 (1.33-2.18)	2.23 (1.73-2.84)	2.65 (2.04-3.41)	3.24 (2.42-4.36)	3.67 (2.70-5.06)	4.14 (2.97-5.93)	4.69 (3.17-6.82)	5.52 (3.59-8.31)	6.23 (3.96-9.55)
6-hr	1.80 (1.41-2.28)	2.20 (1.72-2.79)	2.86 (2.23-3.63)	3.40 (2.64-4.34)	4.15 (3.13-5.56)	4.70 (3.48-6.45)	5.30 (3.83-7.58)	6.03 (4.09-8.72)	7.14 (4.66-10.7)	8.09 (5.16-12.3)
12-hr	2.29 (1.80-2.88)	2.79 (2.20-3.51)	3.61 (2.83-4.55)	4.29 (3.34-5.44)	5.22 (3.96-6.95)	5.91 (4.40-8.06)	6.66 (4.84-9.47)	7.57 (5.15-10.9)	8.97 (5.87-13.3)	10.2 (6.51-15.4)
24-hr	2.74 (2.17-3.42)	3.36 (2.66-4.20)	4.39 (3.46-5.50)	5.24 (4.11-6.60)	6.40 (4.88-8.48)	7.26 (5.44-9.86)	8.20 (6.00-11.6)	9.37 (6.39-13.4)	11.2 (7.34-16.5)	12.8 (8.19-19.2)
2-day	3.09 (2.46-3.83)	3.86 (3.07-4.79)	5.12 (4.06-6.37)	6.16 (4.86-7.71)	7.60 (5.83-10.0)	8.65 (6.52-11.7)	9.81 (7.24-13.9)	11.3 (7.73-16.0)	13.7 (8.99-20.0)	15.7 (10.1-23.5)
3-day	3.37 (2.70-4.16)	4.20 (3.35-5.19)	5.55 (4.42-6.88)	6.67 (5.28-8.32)	8.22 (6.32-10.8)	9.34 (7.07-12.6)	10.6 (7.84-15.0)	12.2 (8.36-17.2)	14.7 (9.72-21.5)	17.0 (10.9-25.2)
4-day	3.64 (2.92-4.48)	4.50 (3.60-5.54)	5.90 (4.71-7.29)	7.06 (5.60-8.78)	8.66 (6.68-11.3)	9.84 (7.45-13.2)	11.1 (8.24-15.6)	12.8 (8.78-18.0)	15.4 (10.1-22.4)	17.6 (11.4-26.2)
7-day	4.39 (3.53-5.37)	5.30 (4.26-6.49)	6.79 (5.44-8.34)	8.02 (6.39-9.92)	9.72 (7.52-12.6)	11.0 (8.32-14.6)	12.3 (9.12-17.1)	14.0 (9.67-19.6)	16.6 (11.0-24.0)	18.8 (12.2-27.7)
10-day	5.10 (4.12-6.21)	6.04 (4.87-7.37)	7.58 (6.10-9.29)	8.86 (7.08-10.9)	10.6 (8.22-13.7)	11.9 (9.05-15.7)	13.3 (9.83-18.3)	15.0 (10.4-20.9)	17.5 (11.6-25.2)	19.6 (12.7-28.8)
20-day	7.19 (5.84-8.71)	8.20 (6.65-9.94)	9.84 (7.96-12.0)	11.2 (9.01-13.7)	13.1 (10.2-16.7)	14.5 (11.0-18.9)	16.0 (11.7-21.5)	17.6 (12.3-24.4)	19.9 (13.3-28.5)	21.8 (14.2-31.8)
30-day	8.92 (7.28-10.8)	9.97 (8.12-12.0)	11.7 (9.48-14.2)	13.1 (10.6-16.0)	15.1 (11.7-19.1)	16.6 (12.6-21.4)	18.1 (13.2-24.1)	19.7 (13.7-27.1)	21.8 (14.6-31.1)	23.4 (15.3-34.2)
45-day	11.1 (9.07-13.3)	12.2 (9.96-14.7)	14.0 (11.4-16.9)	15.5 (12.5-18.8)	17.5 (13.6-22.0)	19.1 (14.5-24.4)	20.7 (15.1-27.2)	22.2 (15.5-30.4)	24.1 (16.2-34.1)	25.4 (16.6-36.9)
60-day	12.9 (10.6-15.5)	14.0 (11.5-16.8)	15.9 (13.0-19.1)	17.4 (14.1-21.1)	19.6 (15.3-24.4)	21.2 (16.1-27.0)	22.8 (16.6-29.8)	24.2 (17.0-33.1)	25.9 (17.5-36.6)	27.0 (17.7-39.1)

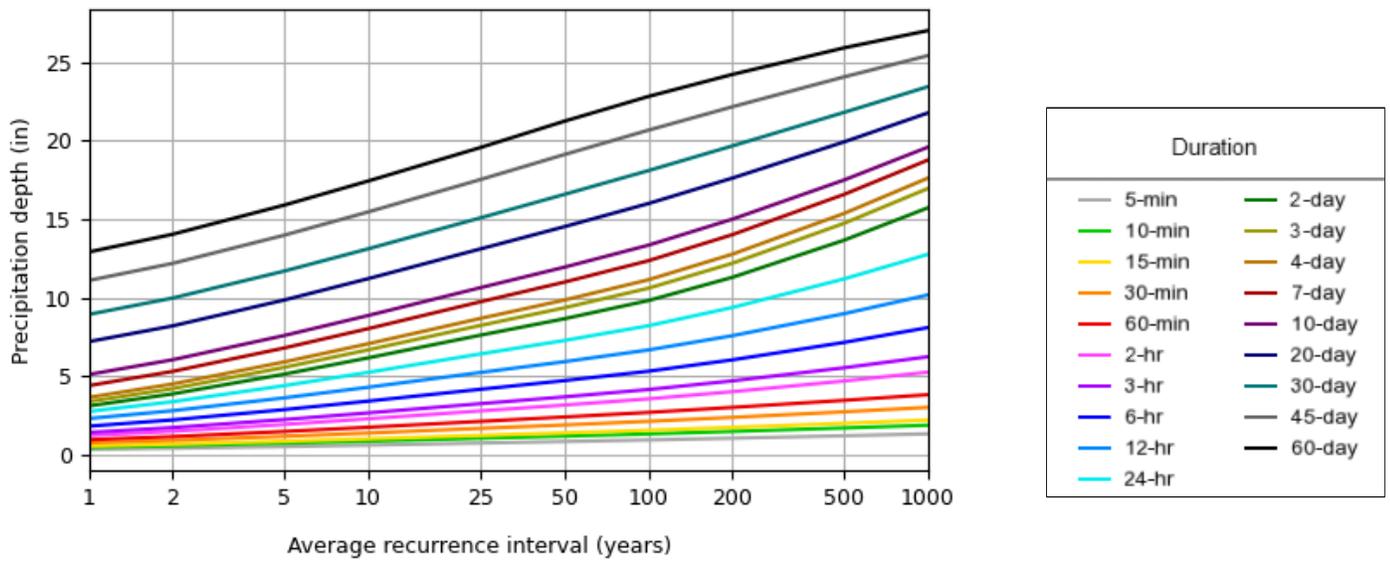
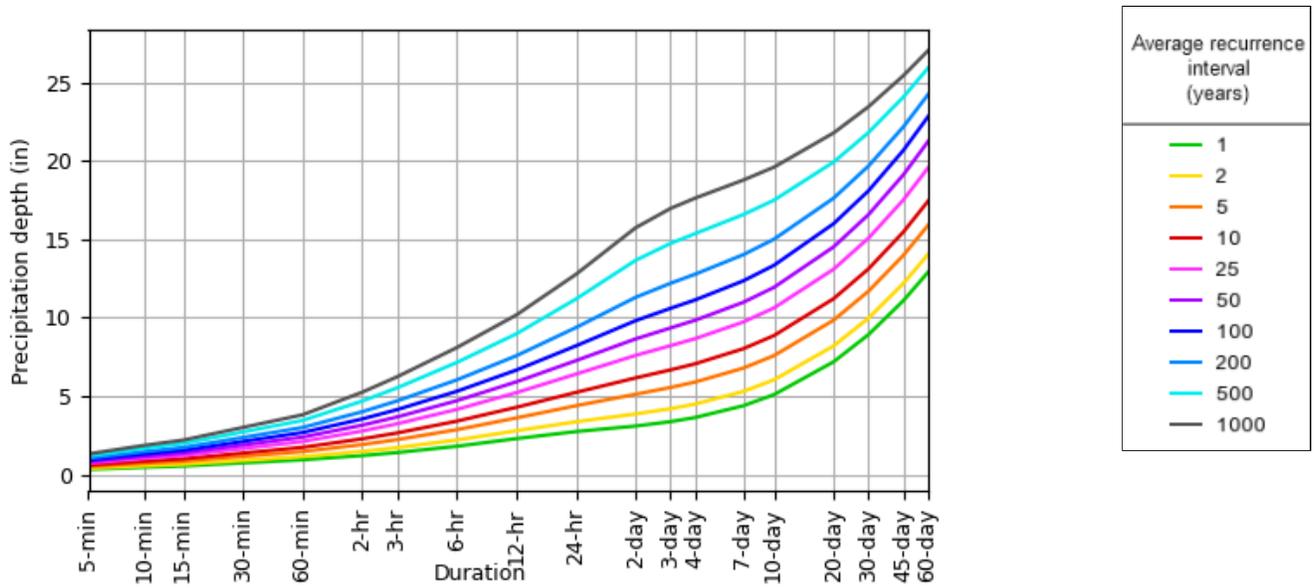
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves

Latitude: 42.0875°, Longitude: -71.4452°



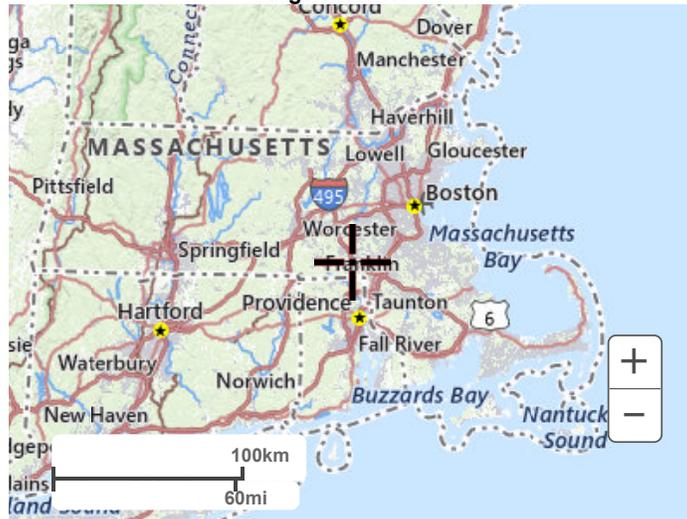
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Maps & aerials

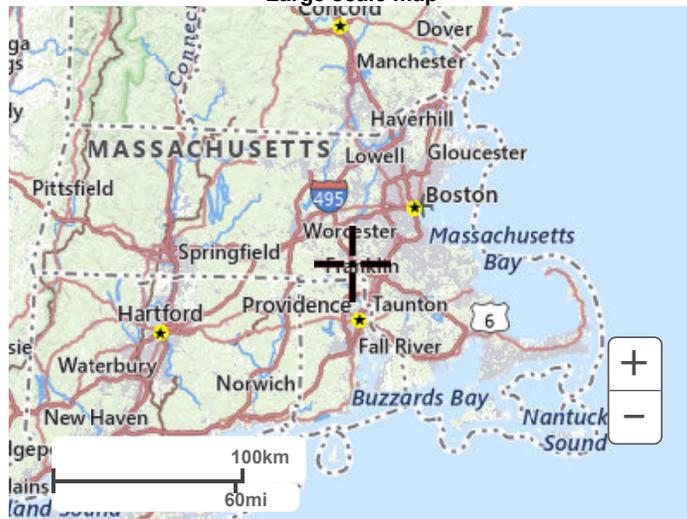
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Standard 4 Compliance Calculations

INSTRUCTIONS:

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location:

	B	C	D	E	F
	BMP ¹	TSS Removal Rate ¹	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
TSS Removal Calculation Worksheet	Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
		0.00	0.75	0.00	0.75
		0.00	0.75	0.00	0.75
		0.00	0.75	0.00	0.75
		0.00	0.75	0.00	0.75

Total TSS Removal =

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

Project:
 Prepared By:
 Date:

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

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
 1. From MassDEP Stormwater Handbook Vol. 1

Hydraulic Analysis

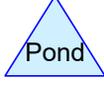
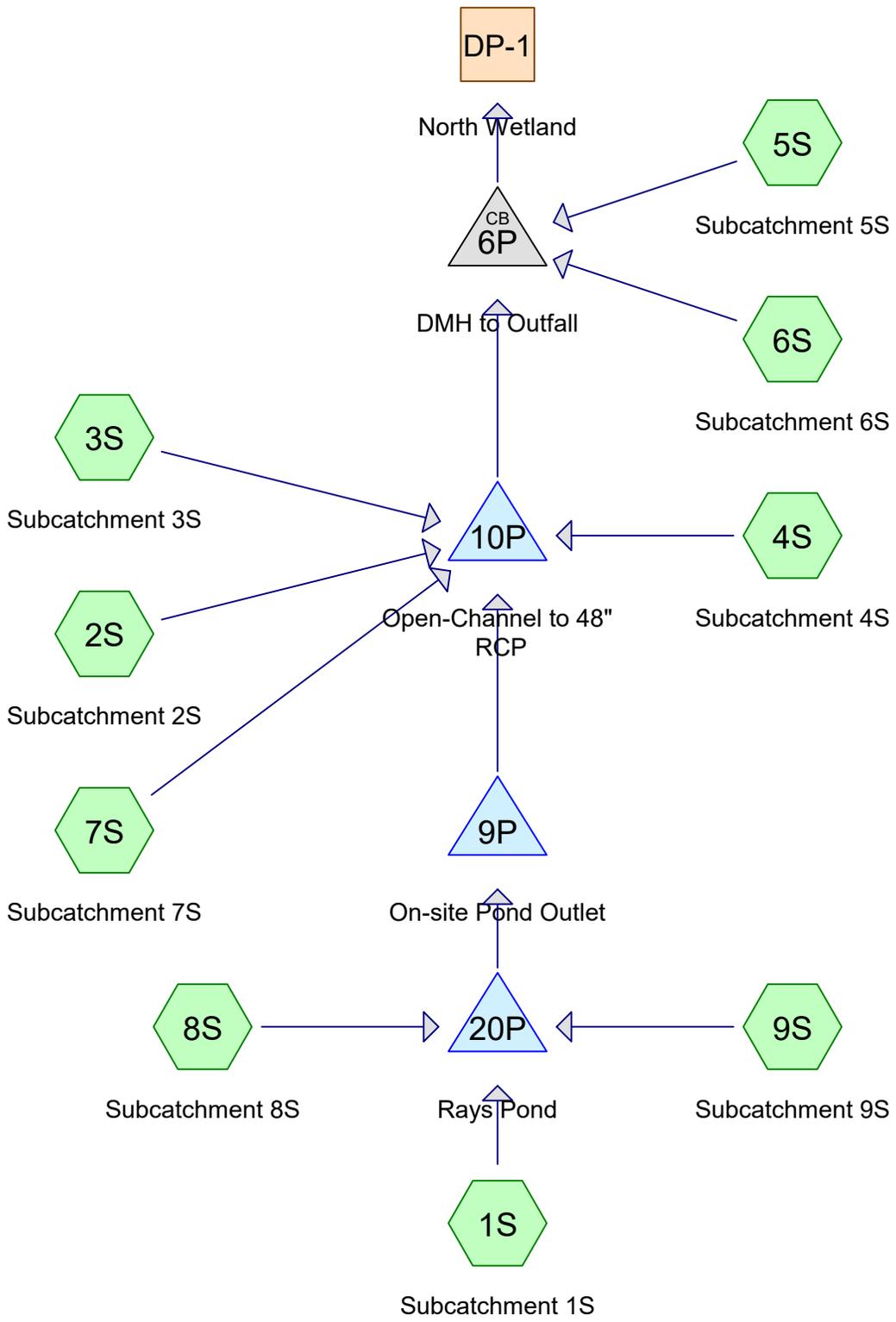


Pipe Material
Roughness Coefficient 0.012 RCP

Project: Garelick Farms
Date: 9/2025
Calculated by: TAL
Checked by: JEC

Upstream Structure	Downstream Structure	Anticipated Flow (cfs)*	Pipe Dia. (in)	Pipe Material	Pipe Area (sf)	Pipe Length (ft)	Upstream Invert	Downstream Invert	Pipe Slope (ft/ft)	Hydr. Radius (ft)	Full-Pipe Velocity (fps)	Full-Pipe Flow (cfs)
Headwall	DMH	23.90	36	HDPE	7.069	127	233.50	226.80	0.053	0.75	23.54	166.41
CB	DMH	1.36	12	HDPE	0.785	7	230.90	230.80	0.014	0.25	5.89	4.63
DMH	DMH	25.26	36	HDPE	7.069	229	224.50	223.10	0.006	0.75	8.01	56.65
CB	DMH	0.21	12	HDPE	0.785	15	229.00	228.90	0.007	0.25	4.02	3.16
DMH	DMH	25.47	36	HDPE	7.069	124	223.00	222.40	0.005	0.75	7.13	50.40
CB	DMH	1.75	12	HDPE	0.785	11	230.90	230.80	0.009	0.25	4.70	3.69
DMH	DMH	27.22	36	HDPE	7.069	290	222.30	220.90	0.005	0.75	7.12	50.34
DMH	Outfall	27.22	36	HDPE	7.069	133	220.80	220.00	0.006	0.75	7.95	56.19

Existing Hydrology



Routing Diagram for Existing Conditions G5099-003
 Prepared by Tighe & Bond, Printed 9/24/2025
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Existing Conditions G5099-003

Prepared by Tighe & Bond

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.36	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.24	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.40	2
4	100-Year	Type III 24-hr		Default	24.00	1	8.20	2

Existing Conditions G5099-003

Prepared by Tighe & Bond

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.942	54	1/2 acre lots, 25% imp, HSG A (1S)
0.622	39	>75% Grass cover, Good, HSG A (5S, 6S)
1.042	61	>75% Grass cover, Good, HSG B (3S, 6S, 7S)
5.367	98	Paved parking (2S, 4S, 5S, 6S, 7S)
2.314	98	Paved roads w/curbs & sewers (8S)
56.157	98	Unconnected pavement (1S, 9S)
8.956	98	Water Surface (1S)
8.612	30	Woods, Good, HSG A (1S)
96.272	55	Woods, Good, HSG B (1S)
91.290	70	Woods, Good, HSG C (1S)
3.933	77	Woods, Good, HSG D (1S)
0.263	58	Woods/grass comb., Good, HSG B (4S)
277.770	71	TOTAL AREA

Existing Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 1S: Subcatchment 1S Runoff Area=11,590,272 sf 23.96% Impervious Runoff Depth=0.73"
 Flow Length=4,100' Tc=210.9 min UI Adjusted CN=66 Runoff=32.28 cfs 16.086 af

Subcatchment 2S: Subcatchment 2S Runoff Area=73,226 sf 100.00% Impervious Runoff Depth=3.13"
 Flow Length=447' Tc=6.0 min CN=98 Runoff=5.36 cfs 0.438 af

Subcatchment 3S: Subcatchment 3S Runoff Area=15,373 sf 0.00% Impervious Runoff Depth=0.51"
 Flow Length=188' Tc=6.0 min CN=61 Runoff=0.14 cfs 0.015 af

Subcatchment 4S: Subcatchment 4S Runoff Area=16,463 sf 30.33% Impervious Runoff Depth=0.92"
 Flow Length=132' Tc=6.0 min CN=70 Runoff=0.37 cfs 0.029 af

Subcatchment 5S: Subcatchment 5S Runoff Area=57,217 sf 73.57% Impervious Runoff Depth=1.67"
 Flow Length=367' Tc=7.8 min CN=82 Runoff=2.38 cfs 0.183 af

Subcatchment 6S: Subcatchment 6S Runoff Area=78,123 sf 56.09% Impervious Runoff Depth=1.39"
 Flow Length=422' Tc=6.1 min CN=78 Runoff=2.82 cfs 0.208 af

Subcatchment 7S: Subcatchment 7S Runoff Area=77,306 sf 90.07% Impervious Runoff Depth=2.70"
 Flow Length=401' Tc=6.0 min CN=94 Runoff=5.24 cfs 0.399 af

Subcatchment 8S: Subcatchment 8S Runoff Area=100,813 sf 100.00% Impervious Runoff Depth=3.13"
 Flow Length=1,690' Slope=0.0200 '/' Tc=10.2 min CN=98 Runoff=6.51 cfs 0.603 af

Subcatchment 9S: Subcatchment 9S Runoff Area=90,858 sf 100.00% Impervious Runoff Depth=3.13"
 Tc=6.0 min CN=98 Runoff=6.65 cfs 0.544 af

Reach DP-1: North Wetland Inflow=33.36 cfs 18.504 af
 Outflow=33.36 cfs 18.504 af

Pond 6P: DMH to Outfall Peak Elev=218.88' Inflow=33.36 cfs 18.504 af
 48.0" Round Culvert n=0.012 L=92.0' S=0.0264 '/' Outflow=33.36 cfs 18.504 af

Pond 9P: On-site Pond Outlet Peak Elev=232.84' Storage=76 cf Inflow=32.66 cfs 17.233 af
 48.0" x 48.0" Box Culvert n=0.012 L=41.3' S=0.0153 '/' Outflow=32.66 cfs 17.233 af

Pond 10P: Open-Channel to 48" RCP Peak Elev=230.34' Storage=646 cf Inflow=33.09 cfs 18.114 af
 48.0" Round Culvert n=0.012 L=717.0' S=0.0158 '/' Outflow=33.09 cfs 18.114 af

Pond 20P: Rays Pond Peak Elev=235.61' Storage=9,990 cf Inflow=32.82 cfs 17.233 af
 48.0" x 48.0" Box Culvert n=0.012 L=92.0' S=0.0304 '/' Outflow=32.66 cfs 17.233 af

Total Runoff Area = 277.770 ac Runoff Volume = 18.505 af Average Runoff Depth = 0.80"
73.53% Pervious = 204.241 ac 26.47% Impervious = 73.529 ac

Existing Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Summary for Subcatchment 1S: Subcatchment 1S

Runoff = 32.28 cfs @ 15.24 hrs, Volume= 16.086 af, Depth= 0.73"

Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Adj	Description
375,158	30		Woods, Good, HSG A
128,154	54		1/2 acre lots, 25% imp, HSG A
* 159,783	98		Unconnected pavement
4,193,614	55		Woods, Good, HSG B
* 1,749,990	98		Unconnected pavement
3,976,585	70		Woods, Good, HSG C
* 445,547	98		Unconnected pavement
171,335	77		Woods, Good, HSG D
* 390,106	98		Water Surface
11,590,272	70	66	Weighted Average, UI Adjusted
8,812,808			76.04% Pervious Area
2,777,465			23.96% Impervious Area
2,355,320			84.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0400	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.36"
50.0	1,500	0.0400	0.50		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
93.2	2,500	0.0320	0.45		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
40.0					Direct Entry,
210.9	4,100	Total			

Summary for Subcatchment 2S: Subcatchment 2S

Runoff = 5.36 cfs @ 12.09 hrs, Volume= 0.438 af, Depth= 3.13"

Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 73,226	98	Paved parking
73,226		100.00% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	397	0.0250	3.21		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	447	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Subcatchment 3S

Runoff = 0.14 cfs @ 12.12 hrs, Volume= 0.015 af, Depth= 0.51"
 Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
15,373	61	>75% Grass cover, Good, HSG B
15,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	138	0.0217	1.03		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.0	188	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 0.37 cfs @ 12.10 hrs, Volume= 0.029 af, Depth= 0.92"
 Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 4,994	98	Paved parking
11,469	58	Woods/grass comb., Good, HSG B
16,463	70	Weighted Average
11,469		69.67% Pervious Area
4,994		30.33% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	28	0.0710	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
2.5	21	0.0250	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.5	83	0.0180	2.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	132	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Subcatchment 5S

Runoff = 2.38 cfs @ 12.11 hrs, Volume= 0.183 af, Depth= 1.67"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
15,121	39	>75% Grass cover, Good, HSG A
* 42,096	98	Paved parking
57,217	82	Weighted Average
15,121		26.43% Pervious Area
42,096		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.4	81	0.0370	0.96		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	236	0.0420	4.16		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.8	367	Total			

Summary for Subcatchment 6S: Subcatchment 6S

Runoff = 2.82 cfs @ 12.10 hrs, Volume= 0.208 af, Depth= 1.39"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 43,819	98	Paved parking
22,345	61	>75% Grass cover, Good, HSG B
11,959	39	>75% Grass cover, Good, HSG A
78,123	78	Weighted Average
34,304		43.91% Pervious Area
43,819		56.09% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.2	222	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.7	150	0.0330	3.69		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.1	422	Total			

Summary for Subcatchment 7S: Subcatchment 7S

Runoff = 5.24 cfs @ 12.09 hrs, Volume= 0.399 af, Depth= 2.70"
Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
7,673	61	>75% Grass cover, Good, HSG B
* 69,633	98	Paved parking
77,306	94	Weighted Average
7,673		9.93% Pervious Area
69,633		90.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.93		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.9	351	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.8	401	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Subcatchment 8S

Runoff = 6.51 cfs @ 12.14 hrs, Volume= 0.603 af, Depth= 3.13"
Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 100,813	98	Paved roads w/curbs & sewers
100,813		100.00% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
9.5	1,640	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.2	1,690	Total			

Summary for Subcatchment 9S: Subcatchment 9S

Runoff = 6.65 cfs @ 12.09 hrs, Volume= 0.544 af, Depth= 3.13"
Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 46,046	98	Unconnected pavement
* 44,812	98	Unconnected pavement
90,858	98	Weighted Average
90,858		100.00% Impervious Area
90,858		100.00% Unconnected

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

Summary for Reach DP-1: North Wetland

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth = 0.80" for 2-Year event
Inflow = 33.36 cfs @ 15.35 hrs, Volume= 18.504 af
Outflow = 33.36 cfs @ 15.35 hrs, Volume= 18.504 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Pond 6P: DMH to Outfall

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth = 0.80" for 2-Year event
Inflow = 33.36 cfs @ 15.35 hrs, Volume= 18.504 af
Outflow = 33.36 cfs @ 15.35 hrs, Volume= 18.504 af, Atten= 0%, Lag= 0.0 min
Primary = 33.36 cfs @ 15.35 hrs, Volume= 18.504 af
Routed to Reach DP-1 : North Wetland

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 218.88' @ 15.35 hrs
Flood Elev= 228.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.02'	48.0" Round Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200

Existing Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Inlet / Outlet Invert= 217.02' / 214.59' S= 0.0264 '/ Cc= 0.900
n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=33.34 cfs @ 15.35 hrs HW=218.88' (Free Discharge)

↑1=Culvert (Inlet Controls 33.34 cfs @ 5.81 fps)

Summary for Pond 9P: On-site Pond Outlet

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth = 0.76" for 2-Year event
Inflow = 32.66 cfs @ 15.36 hrs, Volume= 17.233 af
Outflow = 32.66 cfs @ 15.36 hrs, Volume= 17.233 af, Atten= 0%, Lag= 0.1 min
Primary = 32.66 cfs @ 15.36 hrs, Volume= 17.233 af
Routed to Pond 10P : Open-Channel to 48" RCP

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 232.84' @ 15.36 hrs Surf.Area= 123 sf Storage= 76 cf
Flood Elev= 234.80' Surf.Area= 509 sf Storage= 643 cf

Plug-Flow detention time= 0.1 min calculated for 17.233 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (1,059.0 - 1,059.0)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	750 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	1	0	0
232.00	16	17	17
233.00	143	80	97
234.00	301	222	319
235.00	561	431	750

Device	Routing	Invert	Outlet Devices
#1	Primary	230.98'	48.0" W x 48.0" H Box Box Culvert L= 41.3' Box, 10-30° wingwalls, square crown, Ke= 0.500 Inlet / Outlet Invert= 230.98' / 230.35' S= 0.0153 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=32.65 cfs @ 15.36 hrs HW=232.84' (Free Discharge)

↑1=Box Culvert (Inlet Controls 32.65 cfs @ 4.38 fps)

Summary for Pond 10P: Open-Channel to 48" RCP

Inflow Area = 274.663 ac, 26.05% Impervious, Inflow Depth = 0.79" for 2-Year event
Inflow = 33.09 cfs @ 15.35 hrs, Volume= 18.114 af
Outflow = 33.09 cfs @ 15.36 hrs, Volume= 18.114 af, Atten= 0%, Lag= 0.5 min
Primary = 33.09 cfs @ 15.36 hrs, Volume= 18.114 af
Routed to Pond 6P : DMH to Outfall

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

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Type III 24-hr 2-Year Rainfall=3.36"

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Peak Elev= 230.34' @ 15.36 hrs Surf.Area= 969 sf Storage= 646 cf
 Flood Elev= 231.90' Surf.Area= 2,335 sf Storage= 3,238 cf

Plug-Flow detention time= 0.3 min calculated for 18.114 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (1,045.5 - 1,045.2)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	3,476 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.00	1	0	0
229.00	35	18	18
230.00	670	353	371
231.00	1,560	1,115	1,486
232.00	2,421	1,991	3,476

Device	Routing	Invert	Outlet Devices
#1	Primary	228.48'	48.0" Round RCP_Round 48" L= 717.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 228.48' / 217.12' S= 0.0158 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=33.09 cfs @ 15.36 hrs HW=230.34' (Free Discharge)
 ↑1=RCP_Round 48" (Inlet Controls 33.09 cfs @ 5.80 fps)

Summary for Pond 20P: Rays Pond

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth = 0.76" for 2-Year event
 Inflow = 32.82 cfs @ 15.24 hrs, Volume= 17.233 af
 Outflow = 32.66 cfs @ 15.36 hrs, Volume= 17.233 af, Atten= 0%, Lag= 7.4 min
 Primary = 32.66 cfs @ 15.36 hrs, Volume= 17.233 af
 Routed to Pond 9P : On-site Pond Outlet

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 235.61' @ 15.36 hrs Surf.Area= 14,968 sf Storage= 9,990 cf

Plug-Flow detention time= 3.8 min calculated for 17.233 af (100% of inflow)
 Center-of-Mass det. time= 3.8 min (1,059.0 - 1,055.2)

Volume	Invert	Avail.Storage	Storage Description
#1	234.00'	856,184 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
234.00	629	119.0	0	0	629
236.00	21,382	1,103.0	17,119	17,119	96,325
238.00	45,969	1,385.0	65,802	82,920	152,213
240.00	100,000	2,000.0	142,513	225,433	317,910
242.00	600,977	5,627.0	630,750	856,184	2,519,285

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Type III 24-hr 2-Year Rainfall=3.36"

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Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	48.0" W x 48.0" H Box Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 234.00' / 231.20' S= 0.0304 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=32.65 cfs @ 15.36 hrs HW=235.61' (Free Discharge)

↑**1=Culvert** (Inlet Controls 32.65 cfs @ 5.08 fps)

Existing Conditions G5099-003

Type III 24-hr 10-Year Rainfall=5.24"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 1S: Subcatchment 1S Runoff Area=11,590,272 sf 23.96% Impervious Runoff Depth=1.89"
 Flow Length=4,100' Tc=210.9 min UI Adjusted CN=66 Runoff=93.34 cfs 41.975 af

Subcatchment 2S: Subcatchment 2S Runoff Area=73,226 sf 100.00% Impervious Runoff Depth=5.00"
 Flow Length=447' Tc=6.0 min CN=98 Runoff=8.42 cfs 0.701 af

Subcatchment 3S: Subcatchment 3S Runoff Area=15,373 sf 0.00% Impervious Runoff Depth=1.52"
 Flow Length=188' Tc=6.0 min CN=61 Runoff=0.57 cfs 0.045 af

Subcatchment 4S: Subcatchment 4S Runoff Area=16,463 sf 30.33% Impervious Runoff Depth=2.22"
 Flow Length=132' Tc=6.0 min CN=70 Runoff=0.95 cfs 0.070 af

Subcatchment 5S: Subcatchment 5S Runoff Area=57,217 sf 73.57% Impervious Runoff Depth=3.29"
 Flow Length=367' Tc=7.8 min CN=82 Runoff=4.69 cfs 0.361 af

Subcatchment 6S: Subcatchment 6S Runoff Area=78,123 sf 56.09% Impervious Runoff Depth=2.92"
 Flow Length=422' Tc=6.1 min CN=78 Runoff=6.00 cfs 0.436 af

Subcatchment 7S: Subcatchment 7S Runoff Area=77,306 sf 90.07% Impervious Runoff Depth=4.54"
 Flow Length=401' Tc=6.0 min CN=94 Runoff=8.56 cfs 0.672 af

Subcatchment 8S: Subcatchment 8S Runoff Area=100,813 sf 100.00% Impervious Runoff Depth=5.00"
 Flow Length=1,690' Slope=0.0200 '/' Tc=10.2 min CN=98 Runoff=10.22 cfs 0.965 af

Subcatchment 9S: Subcatchment 9S Runoff Area=90,858 sf 100.00% Impervious Runoff Depth=5.00"
 Tc=6.0 min CN=98 Runoff=10.45 cfs 0.870 af

Reach DP-1: North Wetland Inflow=94.52 cfs 46.093 af
 Outflow=94.52 cfs 46.093 af

Pond 6P: DMH to Outfall Peak Elev=220.57' Inflow=94.52 cfs 46.093 af
 48.0" Round Culvert n=0.012 L=92.0' S=0.0264 '/' Outflow=94.52 cfs 46.093 af

Pond 9P: On-site Pond Outlet Peak Elev=234.89' Storage=690 cf Inflow=93.29 cfs 43.810 af
 48.0" x 48.0" Box Culvert n=0.012 L=41.3' S=0.0153 '/' Outflow=93.28 cfs 43.810 af

Pond 10P: Open-Channel to 48" RCP Peak Elev=232.01' Storage=3,476 cf Inflow=94.02 cfs 45.297 af
 48.0" Round Culvert n=0.012 L=717.0' S=0.0158 '/' Outflow=94.02 cfs 45.297 af

Pond 20P: Rays Pond Peak Elev=237.23' Storage=51,771 cf Inflow=94.25 cfs 43.810 af
 48.0" x 48.0" Box Culvert n=0.012 L=92.0' S=0.0304 '/' Outflow=93.29 cfs 43.810 af

Total Runoff Area = 277.770 ac Runoff Volume = 46.094 af Average Runoff Depth = 1.99"
73.53% Pervious = 204.241 ac 26.47% Impervious = 73.529 ac

Existing Conditions G5099-003

Type III 24-hr 10-Year Rainfall=5.24"

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Summary for Subcatchment 1S: Subcatchment 1S

Runoff = 93.34 cfs @ 14.99 hrs, Volume= 41.975 af, Depth= 1.89"
 Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Adj	Description
375,158	30		Woods, Good, HSG A
128,154	54		1/2 acre lots, 25% imp, HSG A
* 159,783	98		Unconnected pavement
4,193,614	55		Woods, Good, HSG B
* 1,749,990	98		Unconnected pavement
3,976,585	70		Woods, Good, HSG C
* 445,547	98		Unconnected pavement
171,335	77		Woods, Good, HSG D
* 390,106	98		Water Surface
11,590,272	70	66	Weighted Average, UI Adjusted
8,812,808			76.04% Pervious Area
2,777,465			23.96% Impervious Area
2,355,320			84.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0400	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.36"
50.0	1,500	0.0400	0.50		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
93.2	2,500	0.0320	0.45		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
40.0					Direct Entry,
210.9	4,100	Total			

Summary for Subcatchment 2S: Subcatchment 2S

Runoff = 8.42 cfs @ 12.09 hrs, Volume= 0.701 af, Depth= 5.00"
 Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 73,226	98	Paved parking
73,226		100.00% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 10-Year Rainfall=5.24"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	397	0.0250	3.21		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	447	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Subcatchment 3S

Runoff = 0.57 cfs @ 12.10 hrs, Volume= 0.045 af, Depth= 1.52"
Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
15,373	61	>75% Grass cover, Good, HSG B
15,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	138	0.0217	1.03		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.0	188	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 0.95 cfs @ 12.10 hrs, Volume= 0.070 af, Depth= 2.22"
Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 4,994	98	Paved parking
11,469	58	Woods/grass comb., Good, HSG B
16,463	70	Weighted Average
11,469		69.67% Pervious Area
4,994		30.33% Impervious Area

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Type III 24-hr 10-Year Rainfall=5.24"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	28	0.0710	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
2.5	21	0.0250	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.5	83	0.0180	2.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	132	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Subcatchment 5S

Runoff = 4.69 cfs @ 12.11 hrs, Volume= 0.361 af, Depth= 3.29"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
15,121	39	>75% Grass cover, Good, HSG A
* 42,096	98	Paved parking
57,217	82	Weighted Average
15,121		26.43% Pervious Area
42,096		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.4	81	0.0370	0.96		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	236	0.0420	4.16		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.8	367	Total			

Summary for Subcatchment 6S: Subcatchment 6S

Runoff = 6.00 cfs @ 12.09 hrs, Volume= 0.436 af, Depth= 2.92"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 43,819	98	Paved parking
22,345	61	>75% Grass cover, Good, HSG B
11,959	39	>75% Grass cover, Good, HSG A
78,123	78	Weighted Average
34,304		43.91% Pervious Area
43,819		56.09% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 10-Year Rainfall=5.24"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.2	222	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.7	150	0.0330	3.69		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.1	422	Total			

Summary for Subcatchment 7S: Subcatchment 7S

Runoff = 8.56 cfs @ 12.09 hrs, Volume= 0.672 af, Depth= 4.54"
 Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
7,673	61	>75% Grass cover, Good, HSG B
* 69,633	98	Paved parking
77,306	94	Weighted Average
7,673		9.93% Pervious Area
69,633		90.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.93		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.9	351	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.8	401	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Subcatchment 8S

Runoff = 10.22 cfs @ 12.14 hrs, Volume= 0.965 af, Depth= 5.00"
 Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 100,813	98	Paved roads w/curbs & sewers
100,813		100.00% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 10-Year Rainfall=5.24"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
9.5	1,640	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.2	1,690	Total			

Summary for Subcatchment 9S: Subcatchment 9S

Runoff = 10.45 cfs @ 12.09 hrs, Volume= 0.870 af, Depth= 5.00"
Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 46,046	98	Unconnected pavement
* 44,812	98	Unconnected pavement
90,858	98	Weighted Average
90,858		100.00% Impervious Area
90,858		100.00% Unconnected

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

Summary for Reach DP-1: North Wetland

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth = 1.99" for 10-Year event
Inflow = 94.52 cfs @ 15.23 hrs, Volume= 46.093 af
Outflow = 94.52 cfs @ 15.23 hrs, Volume= 46.093 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Pond 6P: DMH to Outfall

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth = 1.99" for 10-Year event
Inflow = 94.52 cfs @ 15.23 hrs, Volume= 46.093 af
Outflow = 94.52 cfs @ 15.23 hrs, Volume= 46.093 af, Atten= 0%, Lag= 0.0 min
Primary = 94.52 cfs @ 15.23 hrs, Volume= 46.093 af
Routed to Reach DP-1 : North Wetland

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 220.57' @ 15.23 hrs
Flood Elev= 228.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.02'	48.0" Round Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200

Existing Conditions G5099-003

Type III 24-hr 10-Year Rainfall=5.24"

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Inlet / Outlet Invert= 217.02' / 214.59' S= 0.0264 '/' Cc= 0.900
n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=94.52 cfs @ 15.23 hrs HW=220.57' (Free Discharge)

↑1=Culvert (Inlet Controls 94.52 cfs @ 8.02 fps)

Summary for Pond 9P: On-site Pond Outlet

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth = 1.94" for 10-Year event
Inflow = 93.29 cfs @ 15.24 hrs, Volume= 43.810 af
Outflow = 93.28 cfs @ 15.24 hrs, Volume= 43.810 af, Atten= 0%, Lag= 0.3 min
Primary = 93.28 cfs @ 15.24 hrs, Volume= 43.810 af
Routed to Pond 10P : Open-Channel to 48" RCP

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 234.89' @ 15.24 hrs Surf.Area= 533 sf Storage= 690 cf
Flood Elev= 234.80' Surf.Area= 509 sf Storage= 643 cf

Plug-Flow detention time= 0.1 min calculated for 43.810 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,039.4 - 1,039.3)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	750 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	1	0	0
232.00	16	17	17
233.00	143	80	97
234.00	301	222	319
235.00	561	431	750

Device	Routing	Invert	Outlet Devices
#1	Primary	230.98'	48.0" W x 48.0" H Box Box Culvert L= 41.3' Box, 10-30° wingwalls, square crown, Ke= 0.500 Inlet / Outlet Invert= 230.98' / 230.35' S= 0.0153 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=93.28 cfs @ 15.24 hrs HW=234.89' (Free Discharge)

↑1=Box Culvert (Barrel Controls 93.28 cfs @ 7.95 fps)

Summary for Pond 10P: Open-Channel to 48" RCP

Inflow Area = 274.663 ac, 26.05% Impervious, Inflow Depth = 1.98" for 10-Year event
Inflow = 94.02 cfs @ 15.24 hrs, Volume= 45.297 af
Outflow = 94.02 cfs @ 15.24 hrs, Volume= 45.297 af, Atten= 0%, Lag= 0.0 min
Primary = 94.02 cfs @ 15.24 hrs, Volume= 45.297 af
Routed to Pond 6P : DMH to Outfall

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Existing Conditions G5099-003

Type III 24-hr 10-Year Rainfall=5.24"

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Peak Elev= 232.01' @ 15.24 hrs Surf.Area= 2,421 sf Storage= 3,476 cf
 Flood Elev= 231.90' Surf.Area= 2,335 sf Storage= 3,238 cf

Plug-Flow detention time= 0.4 min calculated for 45.234 af (100% of inflow)
 Center-of-Mass det. time= 0.4 min (1,030.8 - 1,030.4)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	3,476 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.00	1	0	0
229.00	35	18	18
230.00	670	353	371
231.00	1,560	1,115	1,486
232.00	2,421	1,991	3,476

Device	Routing	Invert	Outlet Devices
#1	Primary	228.48'	48.0" Round RCP_Round 48" L= 717.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 228.48' / 217.12' S= 0.0158 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=94.01 cfs @ 15.24 hrs HW=232.01' (Free Discharge)
 ↑1=RCP_Round 48" (Inlet Controls 94.01 cfs @ 8.00 fps)

Summary for Pond 20P: Rays Pond

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth = 1.94" for 10-Year event
 Inflow = 94.25 cfs @ 14.99 hrs, Volume= 43.810 af
 Outflow = 93.29 cfs @ 15.24 hrs, Volume= 43.810 af, Atten= 1%, Lag= 15.1 min
 Primary = 93.29 cfs @ 15.24 hrs, Volume= 43.810 af
 Routed to Pond 9P : On-site Pond Outlet

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 237.23' @ 15.24 hrs Surf.Area= 35,435 sf Storage= 51,771 cf

Plug-Flow detention time= 6.6 min calculated for 43.749 af (100% of inflow)
 Center-of-Mass det. time= 6.6 min (1,039.3 - 1,032.7)

Volume	Invert	Avail.Storage	Storage Description
#1	234.00'	856,184 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
234.00	629	119.0	0	0	629
236.00	21,382	1,103.0	17,119	17,119	96,325
238.00	45,969	1,385.0	65,802	82,920	152,213
240.00	100,000	2,000.0	142,513	225,433	317,910
242.00	600,977	5,627.0	630,750	856,184	2,519,285

Existing Conditions G5099-003

Type III 24-hr 10-Year Rainfall=5.24"

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Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	48.0" W x 48.0" H Box Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 234.00' / 231.20' S= 0.0304 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=93.27 cfs @ 15.24 hrs HW=237.23' (Free Discharge)

↑1=Culvert (Inlet Controls 93.27 cfs @ 7.21 fps)

Existing Conditions G5099-003

Type III 24-hr 25-Year Rainfall=6.40"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 1S: Subcatchment 1S Runoff Area=11,590,272 sf 23.96% Impervious Runoff Depth=2.74"
 Flow Length=4,100' Tc=210.9 min UI Adjusted CN=66 Runoff=138.64 cfs 60.766 af

Subcatchment 2S: Subcatchment 2S Runoff Area=73,226 sf 100.00% Impervious Runoff Depth=6.16"
 Flow Length=447' Tc=6.0 min CN=98 Runoff=10.30 cfs 0.863 af

Subcatchment 3S: Subcatchment 3S Runoff Area=15,373 sf 0.00% Impervious Runoff Depth=2.28"
 Flow Length=188' Tc=6.0 min CN=61 Runoff=0.89 cfs 0.067 af

Subcatchment 4S: Subcatchment 4S Runoff Area=16,463 sf 30.33% Impervious Runoff Depth=3.13"
 Flow Length=132' Tc=6.0 min CN=70 Runoff=1.36 cfs 0.098 af

Subcatchment 5S: Subcatchment 5S Runoff Area=57,217 sf 73.57% Impervious Runoff Depth=4.36"
 Flow Length=367' Tc=7.8 min CN=82 Runoff=6.16 cfs 0.477 af

Subcatchment 6S: Subcatchment 6S Runoff Area=78,123 sf 56.09% Impervious Runoff Depth=3.93"
 Flow Length=422' Tc=6.1 min CN=78 Runoff=8.06 cfs 0.588 af

Subcatchment 7S: Subcatchment 7S Runoff Area=77,306 sf 90.07% Impervious Runoff Depth=5.69"
 Flow Length=401' Tc=6.0 min CN=94 Runoff=10.59 cfs 0.842 af

Subcatchment 8S: Subcatchment 8S Runoff Area=100,813 sf 100.00% Impervious Runoff Depth=6.16"
 Flow Length=1,690' Slope=0.0200 '/' Tc=10.2 min CN=98 Runoff=12.51 cfs 1.188 af

Subcatchment 9S: Subcatchment 9S Runoff Area=90,858 sf 100.00% Impervious Runoff Depth=6.16"
 Tc=6.0 min CN=98 Runoff=12.78 cfs 1.071 af

Reach DP-1: North Wetland Inflow=139.15 cfs 65.960 af
 Outflow=139.15 cfs 65.960 af

Pond 6P: DMH to Outfall Peak Elev=222.40' Inflow=139.15 cfs 65.960 af
 48.0" Round Culvert n=0.012 L=92.0' S=0.0264 '/' Outflow=139.15 cfs 65.960 af

Pond 9P: On-site Pond Outlet Peak Elev=236.26' Storage=750 cf Inflow=137.00 cfs 63.025 af
 48.0" x 48.0" Box Culvert n=0.012 L=41.3' S=0.0153 '/' Outflow=137.09 cfs 63.025 af

Pond 10P: Open-Channel to 48" RCP Peak Elev=233.83' Storage=3,476 cf Inflow=138.02 cfs 64.895 af
 48.0" Round Culvert n=0.012 L=717.0' S=0.0158 '/' Outflow=138.51 cfs 64.895 af

Pond 20P: Rays Pond Peak Elev=238.21' Storage=92,953 cf Inflow=139.81 cfs 63.025 af
 48.0" x 48.0" Box Culvert n=0.012 L=92.0' S=0.0304 '/' Outflow=137.00 cfs 63.025 af

Total Runoff Area = 277.770 ac Runoff Volume = 65.960 af Average Runoff Depth = 2.85"
73.53% Pervious = 204.241 ac 26.47% Impervious = 73.529 ac

Existing Conditions G5099-003

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Type III 24-hr 25-Year Rainfall=6.40"

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Summary for Subcatchment 1S: Subcatchment 1S

Runoff = 138.64 cfs @ 14.82 hrs, Volume= 60.766 af, Depth= 2.74"
 Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Adj	Description
375,158	30		Woods, Good, HSG A
128,154	54		1/2 acre lots, 25% imp, HSG A
* 159,783	98		Unconnected pavement
4,193,614	55		Woods, Good, HSG B
* 1,749,990	98		Unconnected pavement
3,976,585	70		Woods, Good, HSG C
* 445,547	98		Unconnected pavement
171,335	77		Woods, Good, HSG D
* 390,106	98		Water Surface
11,590,272	70	66	Weighted Average, UI Adjusted
8,812,808			76.04% Pervious Area
2,777,465			23.96% Impervious Area
2,355,320			84.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0400	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.36"
50.0	1,500	0.0400	0.50		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
93.2	2,500	0.0320	0.45		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
40.0					Direct Entry,
210.9	4,100	Total			

Summary for Subcatchment 2S: Subcatchment 2S

Runoff = 10.30 cfs @ 12.09 hrs, Volume= 0.863 af, Depth= 6.16"
 Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 73,226	98	Paved parking
73,226		100.00% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 25-Year Rainfall=6.40"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	397	0.0250	3.21		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	447	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Subcatchment 3S

Runoff = 0.89 cfs @ 12.10 hrs, Volume= 0.067 af, Depth= 2.28"
Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
15,373	61	>75% Grass cover, Good, HSG B
15,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	138	0.0217	1.03		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.0	188	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 1.36 cfs @ 12.09 hrs, Volume= 0.098 af, Depth= 3.13"
Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 4,994	98	Paved parking
11,469	58	Woods/grass comb., Good, HSG B
16,463	70	Weighted Average
11,469		69.67% Pervious Area
4,994		30.33% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 25-Year Rainfall=6.40"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	28	0.0710	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
2.5	21	0.0250	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.5	83	0.0180	2.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	132	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Subcatchment 5S

Runoff = 6.16 cfs @ 12.11 hrs, Volume= 0.477 af, Depth= 4.36"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
15,121	39	>75% Grass cover, Good, HSG A
* 42,096	98	Paved parking
57,217	82	Weighted Average
15,121		26.43% Pervious Area
42,096		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.4	81	0.0370	0.96		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	236	0.0420	4.16		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.8	367	Total			

Summary for Subcatchment 6S: Subcatchment 6S

Runoff = 8.06 cfs @ 12.09 hrs, Volume= 0.588 af, Depth= 3.93"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 43,819	98	Paved parking
22,345	61	>75% Grass cover, Good, HSG B
11,959	39	>75% Grass cover, Good, HSG A
78,123	78	Weighted Average
34,304		43.91% Pervious Area
43,819		56.09% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 25-Year Rainfall=6.40"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.2	222	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.7	150	0.0330	3.69		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.1	422	Total			

Summary for Subcatchment 7S: Subcatchment 7S

Runoff = 10.59 cfs @ 12.09 hrs, Volume= 0.842 af, Depth= 5.69"
Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
7,673	61	>75% Grass cover, Good, HSG B
* 69,633	98	Paved parking
77,306	94	Weighted Average
7,673		9.93% Pervious Area
69,633		90.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.93		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.9	351	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.8	401	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Subcatchment 8S

Runoff = 12.51 cfs @ 12.14 hrs, Volume= 1.188 af, Depth= 6.16"
Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 100,813	98	Paved roads w/curbs & sewers
100,813		100.00% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 25-Year Rainfall=6.40"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
9.5	1,640	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.2	1,690	Total			

Summary for Subcatchment 9S: Subcatchment 9S

Runoff = 12.78 cfs @ 12.09 hrs, Volume= 1.071 af, Depth= 6.16"
Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 46,046	98	Unconnected pavement
* 44,812	98	Unconnected pavement
90,858	98	Weighted Average
90,858		100.00% Impervious Area
90,858		100.00% Unconnected

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

Summary for Reach DP-1: North Wetland

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth = 2.85" for 25-Year event
Inflow = 139.15 cfs @ 15.25 hrs, Volume= 65.960 af
Outflow = 139.15 cfs @ 15.25 hrs, Volume= 65.960 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Pond 6P: DMH to Outfall

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth = 2.85" for 25-Year event
Inflow = 139.15 cfs @ 15.25 hrs, Volume= 65.960 af
Outflow = 139.15 cfs @ 15.25 hrs, Volume= 65.960 af, Atten= 0%, Lag= 0.0 min
Primary = 139.15 cfs @ 15.25 hrs, Volume= 65.960 af
Routed to Reach DP-1 : North Wetland

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 222.40' @ 15.25 hrs
Flood Elev= 228.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.02'	48.0" Round Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200

Existing Conditions G5099-003

Type III 24-hr 25-Year Rainfall=6.40"

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Inlet / Outlet Invert= 217.02' / 214.59' S= 0.0264 '/ Cc= 0.900
n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=139.14 cfs @ 15.25 hrs HW=222.40' (Free Discharge)

↑1=Culvert (Inlet Controls 139.14 cfs @ 11.07 fps)

Summary for Pond 9P: On-site Pond Outlet

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth = 2.80" for 25-Year event
Inflow = 137.00 cfs @ 15.25 hrs, Volume= 63.025 af
Outflow = 137.09 cfs @ 15.20 hrs, Volume= 63.025 af, Atten= 0%, Lag= 0.0 min
Primary = 137.09 cfs @ 15.20 hrs, Volume= 63.025 af
Routed to Pond 10P : Open-Channel to 48" RCP

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 236.26' @ 15.20 hrs Surf.Area= 561 sf Storage= 750 cf
Flood Elev= 234.80' Surf.Area= 509 sf Storage= 643 cf

Plug-Flow detention time= 0.1 min calculated for 63.025 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,031.9 - 1,031.8)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	750 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	1	0	0
232.00	16	17	17
233.00	143	80	97
234.00	301	222	319
235.00	561	431	750

Device	Routing	Invert	Outlet Devices
#1	Primary	230.98'	48.0" W x 48.0" H Box Box Culvert L= 41.3' Box, 10-30° wingwalls, square crown, Ke= 0.500 Inlet / Outlet Invert= 230.98' / 230.35' S= 0.0153 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=137.09 cfs @ 15.20 hrs HW=236.26' (Free Discharge)

↑1=Box Culvert (Inlet Controls 137.09 cfs @ 8.57 fps)

Summary for Pond 10P: Open-Channel to 48" RCP

Inflow Area = 274.663 ac, 26.05% Impervious, Inflow Depth = 2.84" for 25-Year event
Inflow = 138.02 cfs @ 15.21 hrs, Volume= 64.895 af
Outflow = 138.51 cfs @ 15.25 hrs, Volume= 64.895 af, Atten= 0%, Lag= 2.6 min
Primary = 138.51 cfs @ 15.25 hrs, Volume= 64.895 af
Routed to Pond 6P : DMH to Outfall

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Existing Conditions G5099-003

Type III 24-hr 25-Year Rainfall=6.40"

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Peak Elev= 233.83' @ 15.25 hrs Surf.Area= 2,421 sf Storage= 3,476 cf
 Flood Elev= 231.90' Surf.Area= 2,335 sf Storage= 3,238 cf

Plug-Flow detention time= 0.5 min calculated for 64.895 af (100% of inflow)
 Center-of-Mass det. time= 0.4 min (1,024.5 - 1,024.1)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	3,476 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.00	1	0	0
229.00	35	18	18
230.00	670	353	371
231.00	1,560	1,115	1,486
232.00	2,421	1,991	3,476

Device	Routing	Invert	Outlet Devices
#1	Primary	228.48'	48.0" Round RCP_Round 48" L= 717.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 228.48' / 217.12' S= 0.0158 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=138.50 cfs @ 15.25 hrs HW=233.83' (Free Discharge)
 ↳1=RCP_Round 48" (Inlet Controls 138.50 cfs @ 11.02 fps)

Summary for Pond 20P: Rays Pond

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth = 2.80" for 25-Year event
 Inflow = 139.81 cfs @ 14.82 hrs, Volume= 63.025 af
 Outflow = 137.00 cfs @ 15.25 hrs, Volume= 63.025 af, Atten= 2%, Lag= 26.0 min
 Primary = 137.00 cfs @ 15.25 hrs, Volume= 63.025 af
 Routed to Pond 9P : On-site Pond Outlet

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 238.21' @ 15.25 hrs Surf.Area= 50,618 sf Storage= 92,953 cf

Plug-Flow detention time= 8.1 min calculated for 63.025 af (100% of inflow)
 Center-of-Mass det. time= 8.1 min (1,031.8 - 1,023.7)

Volume	Invert	Avail.Storage	Storage Description
#1	234.00'	856,184 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
234.00	629	119.0	0	0	629
236.00	21,382	1,103.0	17,119	17,119	96,325
238.00	45,969	1,385.0	65,802	82,920	152,213
240.00	100,000	2,000.0	142,513	225,433	317,910
242.00	600,977	5,627.0	630,750	856,184	2,519,285

Existing Conditions G5099-003

Type III 24-hr 25-Year Rainfall=6.40"

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Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	48.0" W x 48.0" H Box Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 234.00' / 231.20' S= 0.0304 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=137.01 cfs @ 15.25 hrs HW=238.21' (Free Discharge)

↑**1=Culvert** (Inlet Controls 137.01 cfs @ 8.56 fps)

Existing Conditions G5099-003

Type III 24-hr 100-Year Rainfall=8.20"

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Time span=0.00-36.00 hrs, dt=0.05 hrs, 721 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 1S: Subcatchment 1S Runoff Area=11,590,272 sf 23.96% Impervious Runoff Depth=4.17"
 Flow Length=4,100' Tc=210.9 min UI Adjusted CN=66 Runoff=215.65 cfs 92.507 af

Subcatchment 2S: Subcatchment 2S Runoff Area=73,226 sf 100.00% Impervious Runoff Depth=7.96"
 Flow Length=447' Tc=6.0 min CN=98 Runoff=13.22 cfs 1.115 af

Subcatchment 3S: Subcatchment 3S Runoff Area=15,373 sf 0.00% Impervious Runoff Depth=3.60"
 Flow Length=188' Tc=6.0 min CN=61 Runoff=1.45 cfs 0.106 af

Subcatchment 4S: Subcatchment 4S Runoff Area=16,463 sf 30.33% Impervious Runoff Depth=4.64"
 Flow Length=132' Tc=6.0 min CN=70 Runoff=2.01 cfs 0.146 af

Subcatchment 5S: Subcatchment 5S Runoff Area=57,217 sf 73.57% Impervious Runoff Depth=6.05"
 Flow Length=367' Tc=7.8 min CN=82 Runoff=8.45 cfs 0.662 af

Subcatchment 6S: Subcatchment 6S Runoff Area=78,123 sf 56.09% Impervious Runoff Depth=5.58"
 Flow Length=422' Tc=6.1 min CN=78 Runoff=11.32 cfs 0.833 af

Subcatchment 7S: Subcatchment 7S Runoff Area=77,306 sf 90.07% Impervious Runoff Depth=7.48"
 Flow Length=401' Tc=6.0 min CN=94 Runoff=13.71 cfs 1.106 af

Subcatchment 8S: Subcatchment 8S Runoff Area=100,813 sf 100.00% Impervious Runoff Depth=7.96"
 Flow Length=1,690' Slope=0.0200 '/' Tc=10.2 min CN=98 Runoff=16.05 cfs 1.535 af

Subcatchment 9S: Subcatchment 9S Runoff Area=90,858 sf 100.00% Impervious Runoff Depth=7.96"
 Tc=6.0 min CN=98 Runoff=16.40 cfs 1.384 af

Reach DP-1: North Wetland Inflow=199.59 cfs 99.394 af
 Outflow=199.59 cfs 99.394 af

Pond 6P: DMH to Outfall Peak Elev=225.98' Inflow=199.59 cfs 99.394 af
 48.0" Round Culvert n=0.012 L=92.0' S=0.0264 '/' Outflow=199.59 cfs 99.394 af

Pond 9P: On-site Pond Outlet Peak Elev=239.53' Storage=750 cf Inflow=196.28 cfs 95.425 af
 48.0" x 48.0" Box Culvert n=0.012 L=41.3' S=0.0153 '/' Outflow=196.32 cfs 95.425 af

Pond 10P: Open-Channel to 48" RCP Peak Elev=237.53' Storage=3,476 cf Inflow=197.37 cfs 97.899 af
 48.0" Round Culvert n=0.012 L=717.0' S=0.0158 '/' Outflow=198.82 cfs 97.898 af

Pond 20P: Rays Pond Peak Elev=240.24' Storage=253,330 cf Inflow=217.15 cfs 95.425 af
 48.0" x 48.0" Box Culvert n=0.012 L=92.0' S=0.0304 '/' Outflow=196.28 cfs 95.425 af

Total Runoff Area = 277.770 ac Runoff Volume = 99.394 af Average Runoff Depth = 4.29"
73.53% Pervious = 204.241 ac 26.47% Impervious = 73.529 ac

Existing Conditions G5099-003

Type III 24-hr 100-Year Rainfall=8.20"

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Summary for Subcatchment 1S: Subcatchment 1S

Runoff = 215.65 cfs @ 14.79 hrs, Volume= 92.507 af, Depth= 4.17"
 Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Adj	Description
375,158	30		Woods, Good, HSG A
128,154	54		1/2 acre lots, 25% imp, HSG A
* 159,783	98		Unconnected pavement
4,193,614	55		Woods, Good, HSG B
* 1,749,990	98		Unconnected pavement
3,976,585	70		Woods, Good, HSG C
* 445,547	98		Unconnected pavement
171,335	77		Woods, Good, HSG D
* 390,106	98		Water Surface
11,590,272	70	66	Weighted Average, UI Adjusted
8,812,808			76.04% Pervious Area
2,777,465			23.96% Impervious Area
2,355,320			84.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0400	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.36"
50.0	1,500	0.0400	0.50		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
93.2	2,500	0.0320	0.45		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
40.0					Direct Entry,
210.9	4,100	Total			

Summary for Subcatchment 2S: Subcatchment 2S

Runoff = 13.22 cfs @ 12.09 hrs, Volume= 1.115 af, Depth= 7.96"
 Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 73,226	98	Paved parking
73,226		100.00% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 100-Year Rainfall=8.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	397	0.0250	3.21		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	447	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Subcatchment 3S

Runoff = 1.45 cfs @ 12.10 hrs, Volume= 0.106 af, Depth= 3.60"
Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
15,373	61	>75% Grass cover, Good, HSG B
15,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	138	0.0217	1.03		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.0	188	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 2.01 cfs @ 12.09 hrs, Volume= 0.146 af, Depth= 4.64"
Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 4,994	98	Paved parking
11,469	58	Woods/grass comb., Good, HSG B
16,463	70	Weighted Average
11,469		69.67% Pervious Area
4,994		30.33% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 100-Year Rainfall=8.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	28	0.0710	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
2.5	21	0.0250	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.5	83	0.0180	2.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	132	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Subcatchment 5S

Runoff = 8.45 cfs @ 12.11 hrs, Volume= 0.662 af, Depth= 6.05"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
15,121	39	>75% Grass cover, Good, HSG A
* 42,096	98	Paved parking
57,217	82	Weighted Average
15,121		26.43% Pervious Area
42,096		73.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	50	0.0200	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.4	81	0.0370	0.96		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.9	236	0.0420	4.16		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.8	367	Total			

Summary for Subcatchment 6S: Subcatchment 6S

Runoff = 11.32 cfs @ 12.09 hrs, Volume= 0.833 af, Depth= 5.58"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 43,819	98	Paved parking
22,345	61	>75% Grass cover, Good, HSG B
11,959	39	>75% Grass cover, Good, HSG A
78,123	78	Weighted Average
34,304		43.91% Pervious Area
43,819		56.09% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 100-Year Rainfall=8.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.2	222	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.7	150	0.0330	3.69		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.1	422	Total			

Summary for Subcatchment 7S: Subcatchment 7S

Runoff = 13.71 cfs @ 12.09 hrs, Volume= 1.106 af, Depth= 7.48"
Routed to Pond 10P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
7,673	61	>75% Grass cover, Good, HSG B
* 69,633	98	Paved parking
77,306	94	Weighted Average
7,673		9.93% Pervious Area
69,633		90.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.93		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.9	351	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.8	401	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Subcatchment 8S

Runoff = 16.05 cfs @ 12.14 hrs, Volume= 1.535 af, Depth= 7.96"
Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 100,813	98	Paved roads w/curbs & sewers
100,813		100.00% Impervious Area

Existing Conditions G5099-003

Type III 24-hr 100-Year Rainfall=8.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
9.5	1,640	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.2	1,690	Total			

Summary for Subcatchment 9S: Subcatchment 9S

Runoff = 16.40 cfs @ 12.09 hrs, Volume= 1.384 af, Depth= 7.96"
Routed to Pond 20P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 46,046	98	Unconnected pavement
* 44,812	98	Unconnected pavement
90,858	98	Weighted Average
90,858		100.00% Impervious Area
90,858		100.00% Unconnected

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

Summary for Reach DP-1: North Wetland

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth = 4.29" for 100-Year event
Inflow = 199.59 cfs @ 15.55 hrs, Volume= 99.394 af
Outflow = 199.59 cfs @ 15.55 hrs, Volume= 99.394 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Pond 6P: DMH to Outfall

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth = 4.29" for 100-Year event
Inflow = 199.59 cfs @ 15.55 hrs, Volume= 99.394 af
Outflow = 199.59 cfs @ 15.55 hrs, Volume= 99.394 af, Atten= 0%, Lag= 0.0 min
Primary = 199.59 cfs @ 15.55 hrs, Volume= 99.394 af
Routed to Reach DP-1 : North Wetland

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 225.98' @ 15.55 hrs
Flood Elev= 228.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.02'	48.0" Round Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200

Existing Conditions G5099-003

Type III 24-hr 100-Year Rainfall=8.20"

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Inlet / Outlet Invert= 217.02' / 214.59' S= 0.0264 '/' Cc= 0.900
n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=199.58 cfs @ 15.55 hrs HW=225.98' (Free Discharge)

↑1=Culvert (Inlet Controls 199.58 cfs @ 15.88 fps)

Summary for Pond 9P: On-site Pond Outlet

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth = 4.23" for 100-Year event
Inflow = 196.28 cfs @ 15.58 hrs, Volume= 95.425 af
Outflow = 196.32 cfs @ 15.59 hrs, Volume= 95.425 af, Atten= 0%, Lag= 0.8 min
Primary = 196.32 cfs @ 15.59 hrs, Volume= 95.425 af
Routed to Pond 10P : Open-Channel to 48" RCP

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
Peak Elev= 239.53' @ 15.59 hrs Surf.Area= 561 sf Storage= 750 cf
Flood Elev= 234.80' Surf.Area= 509 sf Storage= 643 cf

Plug-Flow detention time= 0.1 min calculated for 95.293 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (1,025.8 - 1,025.8)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	750 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	1	0	0
232.00	16	17	17
233.00	143	80	97
234.00	301	222	319
235.00	561	431	750

Device	Routing	Invert	Outlet Devices
#1	Primary	230.98'	48.0" W x 48.0" H Box Box Culvert L= 41.3' Box, 10-30° wingwalls, square crown, Ke= 0.500 Inlet / Outlet Invert= 230.98' / 230.35' S= 0.0153 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=196.31 cfs @ 15.59 hrs HW=239.52' (Free Discharge)

↑1=Box Culvert (Inlet Controls 196.31 cfs @ 12.27 fps)

Summary for Pond 10P: Open-Channel to 48" RCP

Inflow Area = 274.663 ac, 26.05% Impervious, Inflow Depth = 4.28" for 100-Year event
Inflow = 197.37 cfs @ 15.59 hrs, Volume= 97.899 af
Outflow = 198.82 cfs @ 15.55 hrs, Volume= 97.898 af, Atten= 0%, Lag= 0.0 min
Primary = 198.82 cfs @ 15.55 hrs, Volume= 97.898 af
Routed to Pond 6P : DMH to Outfall

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Existing Conditions G5099-003

Type III 24-hr 100-Year Rainfall=8.20"

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Peak Elev= 237.53' @ 15.55 hrs Surf.Area= 2,421 sf Storage= 3,476 cf
 Flood Elev= 231.90' Surf.Area= 2,335 sf Storage= 3,238 cf

Plug-Flow detention time= 0.4 min calculated for 97.898 af (100% of inflow)
 Center-of-Mass det. time= 0.4 min (1,019.5 - 1,019.1)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	3,476 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.00	1	0	0
229.00	35	18	18
230.00	670	353	371
231.00	1,560	1,115	1,486
232.00	2,421	1,991	3,476

Device	Routing	Invert	Outlet Devices
#1	Primary	228.48'	48.0" Round RCP_Round 48" L= 717.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 228.48' / 217.12' S= 0.0158 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=198.81 cfs @ 15.55 hrs HW=237.53' (Free Discharge)
 ↳1=RCP_Round 48" (Barrel Controls 198.81 cfs @ 15.82 fps)

Summary for Pond 20P: Rays Pond

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth = 4.23" for 100-Year event
 Inflow = 217.15 cfs @ 14.78 hrs, Volume= 95.425 af
 Outflow = 196.28 cfs @ 15.58 hrs, Volume= 95.425 af, Atten= 10%, Lag= 47.7 min
 Primary = 196.28 cfs @ 15.58 hrs, Volume= 95.425 af
 Routed to Pond 9P : On-site Pond Outlet

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs
 Peak Elev= 240.24' @ 15.58 hrs Surf.Area= 137,217 sf Storage= 253,330 cf

Plug-Flow detention time= 12.5 min calculated for 95.425 af (100% of inflow)
 Center-of-Mass det. time= 12.5 min (1,025.8 - 1,013.3)

Volume	Invert	Avail.Storage	Storage Description
#1	234.00'	856,184 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
234.00	629	119.0	0	0	629
236.00	21,382	1,103.0	17,119	17,119	96,325
238.00	45,969	1,385.0	65,802	82,920	152,213
240.00	100,000	2,000.0	142,513	225,433	317,910
242.00	600,977	5,627.0	630,750	856,184	2,519,285

Existing Conditions G5099-003

Type III 24-hr 100-Year Rainfall=8.20"

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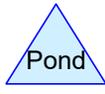
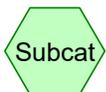
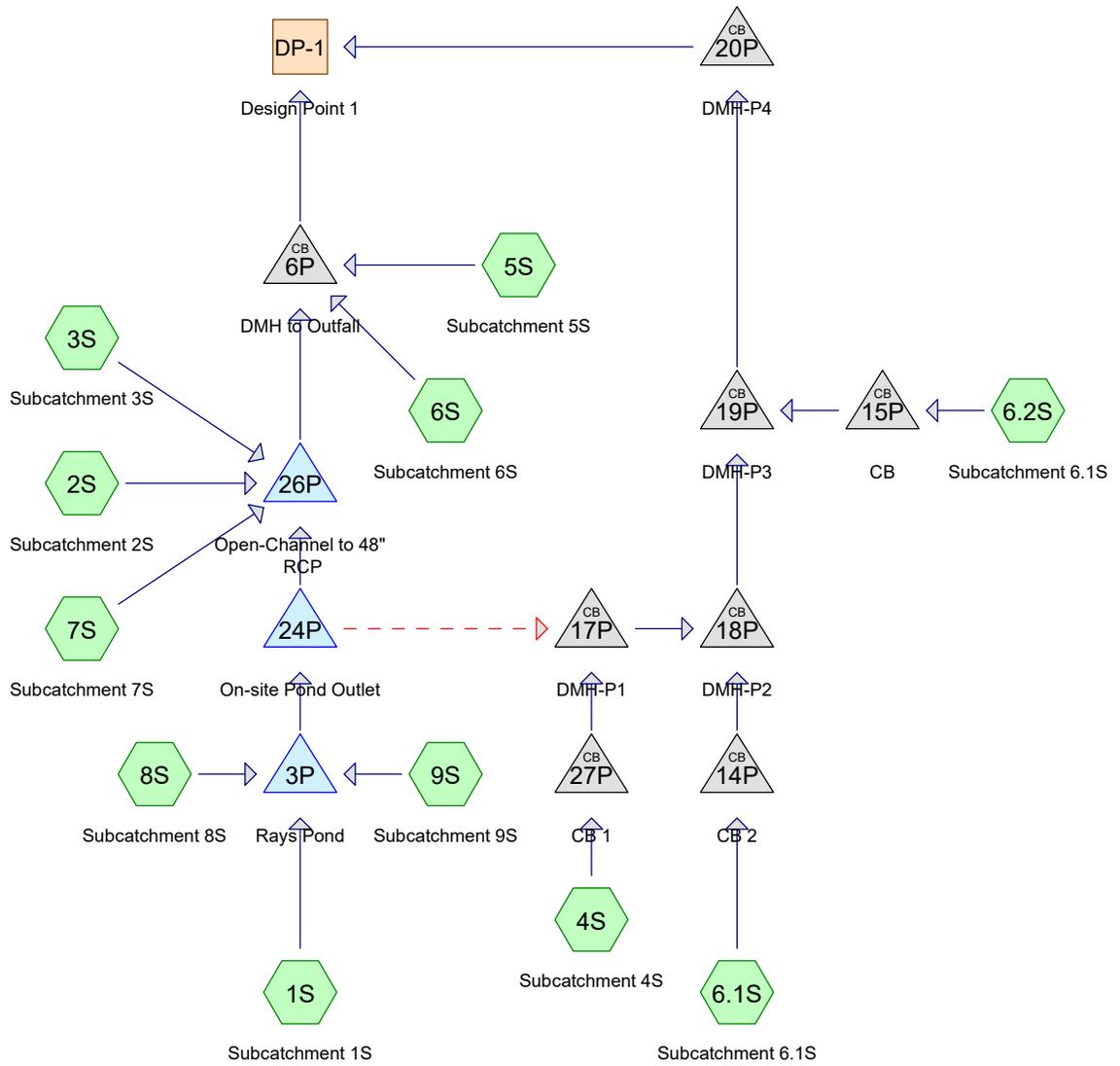
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Device	Routing	Invert	Outlet Devices
#1	Primary	234.00'	48.0" W x 48.0" H Box Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 234.00' / 231.20' S= 0.0304 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=196.27 cfs @ 15.58 hrs HW=240.24' (Free Discharge)

↑**1=Culvert** (Inlet Controls 196.27 cfs @ 12.27 fps)

Proposed Hydrology



Routing Diagram for Proposed Conditions G5099-003
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Proposed Conditions G5099-003

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.36	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.24	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.40	2
4	100-Year	Type III 24-hr		Default	24.00	1	8.20	2

Proposed Conditions G5099-003

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.942	54	1/2 acre lots, 25% imp, HSG A (1S)
0.626	39	>75% Grass cover, Good, HSG A (5S, 6.1S, 6.2S)
1.042	61	>75% Grass cover, Good, HSG B (3S, 6.1S, 6.2S, 6S, 7S)
5.362	98	Paved parking (2S, 4S, 5S, 6.1S, 6.2S, 6S, 7S)
2.314	98	Paved roads w/curbs & sewers (8S)
56.157	98	Unconnected pavement (1S, 9S)
8.956	98	Water Surface, (1S)
8.612	30	Woods, Good, HSG A (1S)
96.272	55	Woods, Good, HSG B (1S)
91.290	70	Woods, Good, HSG C (1S)
3.933	77	Woods, Good, HSG D (1S)
0.263	58	Woods/grass comb., Good, HSG B (4S)
277.770	71	TOTAL AREA

Proposed Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Subcatchment 1S Runoff Area=11,590,272 sf 23.96% Impervious Runoff Depth>0.55"
Flow Length=4,100' Tc=210.9 min UI Adjusted CN=66 Runoff=32.28 cfs 12.170 af

Subcatchment 2S: Subcatchment 2S Runoff Area=73,226 sf 100.00% Impervious Runoff Depth>2.92"
Flow Length=447' Tc=6.0 min CN=98 Runoff=5.36 cfs 0.409 af

Subcatchment 3S: Subcatchment 3S Runoff Area=15,373 sf 0.00% Impervious Runoff Depth>0.45"
Flow Length=188' Tc=6.0 min CN=61 Runoff=0.14 cfs 0.013 af

Subcatchment 4S: Subcatchment 4S Runoff Area=16,463 sf 30.33% Impervious Runoff Depth>0.84"
Flow Length=132' Tc=6.0 min CN=70 Runoff=0.37 cfs 0.026 af

Subcatchment 5S: Subcatchment 5S Runoff Area=57,217 sf 73.24% Impervious Runoff Depth>1.55"
Tc=6.0 min CN=82 Runoff=2.51 cfs 0.169 af

Subcatchment 6.1S: Subcatchment 6.1S Runoff Area=12,226 sf 9.09% Impervious Runoff Depth>0.05"
Tc=6.0 min CN=45 Runoff=0.00 cfs 0.001 af

Subcatchment 6.2S: Subcatchment 6.1S Runoff Area=18,325 sf 42.59% Impervious Runoff Depth>1.10"
Flow Length=320' Tc=6.0 min CN=75 Runoff=0.56 cfs 0.039 af

Subcatchment 6S: Subcatchment 6S Runoff Area=47,572 sf 73.37% Impervious Runoff Depth>2.01"
Flow Length=422' Tc=6.1 min CN=88 Runoff=2.67 cfs 0.183 af

Subcatchment 7S: Subcatchment 7S Runoff Area=77,306 sf 90.07% Impervious Runoff Depth>2.55"
Flow Length=401' Tc=6.0 min CN=94 Runoff=5.24 cfs 0.377 af

Subcatchment 8S: Subcatchment 8S Runoff Area=100,813 sf 100.00% Impervious Runoff Depth>2.92"
Flow Length=1,690' Slope=0.0200 '/' Tc=10.2 min CN=98 Runoff=6.51 cfs 0.563 af

Subcatchment 9S: Subcatchment 9S Runoff Area=90,858 sf 100.00% Impervious Runoff Depth>2.92"
Tc=6.0 min CN=98 Runoff=6.65 cfs 0.508 af

Subcatchment 28S: (new Subcat) Runoff=0.00 cfs 0.000 af

Reach DP-1: Design Point 1 Inflow=33.26 cfs 14.362 af
Outflow=33.26 cfs 14.362 af

Pond 3P: Rays Pond Peak Elev=235.90' Storage=15,125 cf Inflow=32.82 cfs 13.241 af
48.0" x 48.0" Box Culvert n=0.012 L=92.0' S=0.0337 '/' Outflow=32.58 cfs 13.147 af

Pond 6P: DMH to Outfall Peak Elev=218.88' Inflow=33.21 cfs 14.296 af
48.0" Round Culvert n=0.012 L=92.0' S=0.0264 '/' Outflow=33.21 cfs 14.296 af

Pond 14P: CB 2 Peak Elev=229.01' Inflow=0.00 cfs 0.001 af
12.0" Round Culvert n=0.012 L=15.0' S=0.0067 '/' Outflow=0.00 cfs 0.001 af

Proposed Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Pond 15P: CB Peak Elev=231.31' Inflow=0.56 cfs 0.039 af
12.0" Round Culvert n=0.012 L=11.0' S=0.0091 '/ Outflow=0.56 cfs 0.039 af

Pond 17P: DMH-P1 Peak Elev=224.73' Inflow=0.37 cfs 0.026 af
36.0" Round Culvert n=0.012 L=229.0' S=0.0061 '/ Outflow=0.37 cfs 0.026 af

Pond 18P: DMH-P2 Peak Elev=223.24' Inflow=0.37 cfs 0.027 af
36.0" Round Culvert n=0.012 L=124.0' S=0.0048 '/ Outflow=0.37 cfs 0.027 af

Pond 19P: DMH-P3 Peak Elev=222.68' Inflow=0.93 cfs 0.066 af
36.0" Round Culvert n=0.012 L=290.0' S=0.0048 '/ Outflow=0.93 cfs 0.066 af

Pond 20P: DMH-P4 Peak Elev=221.17' Inflow=0.93 cfs 0.066 af
36.0" Round Culvert n=0.012 L=133.0' S=0.0060 '/ Outflow=0.93 cfs 0.066 af

Pond 24P: On-site Pond Outlet Peak Elev=232.84' Storage=75 cf Inflow=32.58 cfs 13.147 af
Primary=32.58 cfs 13.147 af Secondary=0.00 cfs 0.000 af Outflow=32.58 cfs 13.147 af

Pond 26P: Open-Channel to 48" RCP Peak Elev=230.33' Storage=642 cf Inflow=32.98 cfs 13.946 af
48.0" Round Culvert n=0.012 L=717.0' S=0.0158 '/ Outflow=32.98 cfs 13.943 af

Pond 27P: CB 1 Peak Elev=231.21' Inflow=0.37 cfs 0.026 af
12.0" Round Culvert n=0.012 L=7.0' S=0.0143 '/ Outflow=0.37 cfs 0.026 af

Total Runoff Area = 277.770 ac Runoff Volume = 14.459 af Average Runoff Depth = 0.62"
73.53% Pervious = 204.246 ac 26.47% Impervious = 73.524 ac

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Type III 24-hr 2-Year Rainfall=3.36"

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Summary for Subcatchment 1S: Subcatchment 1S

Runoff = 32.28 cfs @ 15.24 hrs, Volume= 12.170 af, Depth> 0.55"
 Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Adj	Description
375,158	30		Woods, Good, HSG A
128,154	54		1/2 acre lots, 25% imp, HSG A
* 159,783	98		Unconnected pavement
4,193,614	55		Woods, Good, HSG B
* 1,749,990	98		Unconnected pavement
3,976,585	70		Woods, Good, HSG C
* 445,547	98		Unconnected pavement
171,335	77		Woods, Good, HSG D
* 390,106	98		Water Surface,
11,590,272	70	66	Weighted Average, UI Adjusted
8,812,808			76.04% Pervious Area
2,777,465			23.96% Impervious Area
2,355,320			84.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0400	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.36"
50.0	1,500	0.0400	0.50		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
93.2	2,500	0.0320	0.45		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
40.0					Direct Entry,
210.9	4,100	Total			

Summary for Subcatchment 2S: Subcatchment 2S

Runoff = 5.36 cfs @ 12.09 hrs, Volume= 0.409 af, Depth> 2.92"
 Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 73,226	98	Paved parking
73,226		100.00% Impervious Area

Proposed Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	397	0.0250	3.21		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	447	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Subcatchment 3S

Runoff = 0.14 cfs @ 12.12 hrs, Volume= 0.013 af, Depth> 0.45"
Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
15,373	61	>75% Grass cover, Good, HSG B
15,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	138	0.0217	1.03		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.0	188	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 0.37 cfs @ 12.10 hrs, Volume= 0.026 af, Depth> 0.84"
Routed to Pond 27P : CB 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
4,994	98	Paved parking
11,469	58	Woods/grass comb., Good, HSG B
16,463	70	Weighted Average
11,469		69.67% Pervious Area
4,994		30.33% Impervious Area

Proposed Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	28	0.0710	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
2.5	21	0.0250	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.5	83	0.0180	2.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	132	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Subcatchment 5S

Runoff = 2.51 cfs @ 12.09 hrs, Volume= 0.169 af, Depth> 1.55"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
15,312	39	>75% Grass cover, Good, HSG A
* 41,905	98	Paved parking
57,217	82	Weighted Average
15,312		26.76% Pervious Area
41,905		73.24% Impervious Area

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

Summary for Subcatchment 6.1S: Subcatchment 6.1S

Runoff = 0.00 cfs @ 15.00 hrs, Volume= 0.001 af, Depth> 0.05"
Routed to Pond 14P : CB 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 1,111	98	Paved parking
10,811	39	>75% Grass cover, Good, HSG A
304	61	>75% Grass cover, Good, HSG B
12,226	45	Weighted Average
11,115		90.91% Pervious Area
1,111		9.09% Impervious Area

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

Proposed Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Summary for Subcatchment 6.2S: Subcatchment 6.1S

Runoff = 0.56 cfs @ 12.10 hrs, Volume= 0.039 af, Depth> 1.10"
 Routed to Pond 15P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 7,804	98	Paved parking
9,373	61	>75% Grass cover, Good, HSG B
1,148	39	>75% Grass cover, Good, HSG A
18,325	75	Weighted Average
10,521		57.41% Pervious Area
7,804		42.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0375	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.1	7	0.0610	1.73		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	240	0.0170	2.65		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	23	0.0808	5.77		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.0	320	Total			

Summary for Subcatchment 6S: Subcatchment 6S

Runoff = 2.67 cfs @ 12.09 hrs, Volume= 0.183 af, Depth> 2.01"
 Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 34,904	98	Paved parking
12,668	61	>75% Grass cover, Good, HSG B
47,572	88	Weighted Average
12,668		26.63% Pervious Area
34,904		73.37% Impervious Area

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Type III 24-hr 2-Year Rainfall=3.36"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.2	222	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.7	150	0.0330	3.69		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.1	422	Total			

Summary for Subcatchment 7S: Subcatchment 7S

Runoff = 5.24 cfs @ 12.09 hrs, Volume= 0.377 af, Depth> 2.55"
Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
7,673	61	>75% Grass cover, Good, HSG B
* 69,633	98	Paved parking
77,306	94	Weighted Average
7,673		9.93% Pervious Area
69,633		90.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.93		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.9	351	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.8	401	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Subcatchment 8S

Runoff = 6.51 cfs @ 12.14 hrs, Volume= 0.563 af, Depth> 2.92"
Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 100,813	98	Paved roads w/curbs & sewers
100,813		100.00% Impervious Area

Proposed Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
9.5	1,640	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.2	1,690	Total			

Summary for Subcatchment 9S: Subcatchment 9S

Runoff = 6.65 cfs @ 12.09 hrs, Volume= 0.508 af, Depth> 2.92"
Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Area (sf)	CN	Description
* 46,046	98	Unconnected pavement
* 44,812	98	Unconnected pavement
90,858	98	Weighted Average
90,858		100.00% Impervious Area
90,858		100.00% Unconnected

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

Summary for Subcatchment 28S: (new Subcat)

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.36"

Summary for Reach DP-1: Design Point 1

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth > 0.62" for 2-Year event
Inflow = 33.26 cfs @ 15.40 hrs, Volume= 14.362 af
Outflow = 33.26 cfs @ 15.40 hrs, Volume= 14.362 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Rays Pond

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth > 0.59" for 2-Year event
Inflow = 32.82 cfs @ 15.24 hrs, Volume= 13.241 af
Outflow = 32.58 cfs @ 15.42 hrs, Volume= 13.147 af, Atten= 1%, Lag= 10.6 min
Primary = 32.58 cfs @ 15.42 hrs, Volume= 13.147 af
Routed to Pond 24P : On-site Pond Outlet

Proposed Conditions G5099-003

Type III 24-hr 2-Year Rainfall=3.36"

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Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 235.90' @ 15.42 hrs Surf.Area= 19,696 sf Storage= 15,125 cf

Plug-Flow detention time= 7.2 min calculated for 13.103 af (99% of inflow)
 Center-of-Mass det. time= 5.4 min (960.5 - 955.1)

Volume	Invert	Avail.Storage	Storage Description			
#1	234.00'	856,184 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
234.00	629	119.0	0	0	629	
236.00	21,382	1,103.0	17,119	17,119	96,325	
238.00	45,969	1,385.0	65,802	82,920	152,213	
240.00	100,000	2,000.0	142,513	225,433	317,910	
242.00	600,977	5,627.0	630,750	856,184	2,519,285	

Device	Routing	Invert	Outlet Devices
#1	Primary	234.30'	48.0" W x 48.0" H Box Culvert L= 92.0' Box, headwall w/3 rounded edges, Ke= 0.200 Inlet / Outlet Invert= 234.30' / 231.20' S= 0.0337 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=32.57 cfs @ 15.42 hrs HW=235.90' (Free Discharge)
 ↑1=Culvert (Inlet Controls 32.57 cfs @ 5.08 fps)

Summary for Pond 6P: DMH to Outfall

Inflow Area = 276.690 ac, 26.46% Impervious, Inflow Depth > 0.62" for 2-Year event
 Inflow = 33.21 cfs @ 15.40 hrs, Volume= 14.296 af
 Outflow = 33.21 cfs @ 15.40 hrs, Volume= 14.296 af, Atten= 0%, Lag= 0.0 min
 Primary = 33.21 cfs @ 15.40 hrs, Volume= 14.296 af
 Routed to Reach DP-1 : Design Point 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 218.88' @ 15.40 hrs
 Flood Elev= 228.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.02'	48.0" Round Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 217.02' / 214.59' S= 0.0264 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=33.19 cfs @ 15.40 hrs HW=218.88' (Free Discharge)
 ↑1=Culvert (Inlet Controls 33.19 cfs @ 5.80 fps)

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Type III 24-hr 2-Year Rainfall=3.36"

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Summary for Pond 14P: CB 2

Inflow Area = 0.281 ac, 9.09% Impervious, Inflow Depth > 0.05" for 2-Year event
Inflow = 0.00 cfs @ 15.00 hrs, Volume= 0.001 af
Outflow = 0.00 cfs @ 15.00 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min
Primary = 0.00 cfs @ 15.00 hrs, Volume= 0.001 af
Routed to Pond 18P : DMH-P2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 229.01' @ 15.00 hrs
Flood Elev= 234.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	12.0" Round Culvert L= 15.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 229.00' / 228.90' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.00 cfs @ 15.00 hrs HW=229.01' (Free Discharge)
↑1=Culvert (Barrel Controls 0.00 cfs @ 0.34 fps)

Summary for Pond 15P: CB

Inflow Area = 0.421 ac, 42.59% Impervious, Inflow Depth > 1.10" for 2-Year event
Inflow = 0.56 cfs @ 12.10 hrs, Volume= 0.039 af
Outflow = 0.56 cfs @ 12.10 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min
Primary = 0.56 cfs @ 12.10 hrs, Volume= 0.039 af
Routed to Pond 19P : DMH-P3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 231.31' @ 12.10 hrs
Flood Elev= 235.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	230.90'	12.0" Round Culvert L= 11.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 230.90' / 230.80' S= 0.0091 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.56 cfs @ 12.10 hrs HW=231.31' (Free Discharge)
↑1=Culvert (Barrel Controls 0.56 cfs @ 2.78 fps)

Summary for Pond 17P: DMH-P1

Inflow Area = 0.378 ac, 30.33% Impervious, Inflow Depth > 0.84" for 2-Year event
Inflow = 0.37 cfs @ 12.10 hrs, Volume= 0.026 af
Outflow = 0.37 cfs @ 12.10 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
Primary = 0.37 cfs @ 12.10 hrs, Volume= 0.026 af
Routed to Pond 18P : DMH-P2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr 2-Year Rainfall=3.36"

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Peak Elev= 224.73' @ 12.10 hrs

Flood Elev= 233.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	224.50'	36.0" Round Culvert L= 229.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 224.50' / 223.10' S= 0.0061 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=0.35 cfs @ 12.10 hrs HW=224.73' (Free Discharge)

↑1=Culvert (Barrel Controls 0.35 cfs @ 2.20 fps)

Summary for Pond 18P: DMH-P2

Inflow Area = 0.659 ac, 21.28% Impervious, Inflow Depth > 0.50" for 2-Year event
 Inflow = 0.37 cfs @ 12.10 hrs, Volume= 0.027 af
 Outflow = 0.37 cfs @ 12.10 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.37 cfs @ 12.10 hrs, Volume= 0.027 af
 Routed to Pond 19P : DMH-P3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 223.24' @ 12.10 hrs

Flood Elev= 234.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	223.00'	36.0" Round Culvert L= 124.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 223.00' / 222.40' S= 0.0048 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=0.35 cfs @ 12.10 hrs HW=223.24' (Free Discharge)

↑1=Culvert (Barrel Controls 0.35 cfs @ 2.01 fps)

Summary for Pond 19P: DMH-P3

Inflow Area = 1.079 ac, 29.58% Impervious, Inflow Depth > 0.73" for 2-Year event
 Inflow = 0.93 cfs @ 12.10 hrs, Volume= 0.066 af
 Outflow = 0.93 cfs @ 12.10 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.93 cfs @ 12.10 hrs, Volume= 0.066 af
 Routed to Pond 20P : DMH-P4

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 222.68' @ 12.10 hrs

Flood Elev= 234.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	222.30'	36.0" Round Culvert L= 290.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.30' / 220.90' S= 0.0048 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

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Type III 24-hr 2-Year Rainfall=3.36"

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Primary OutFlow Max=0.92 cfs @ 12.10 hrs HW=222.68' (Free Discharge)

↑1=Culvert (Barrel Controls 0.92 cfs @ 2.68 fps)

Summary for Pond 20P: DMH-P4

Inflow Area = 1.079 ac, 29.58% Impervious, Inflow Depth > 0.73" for 2-Year event
Inflow = 0.93 cfs @ 12.10 hrs, Volume= 0.066 af
Outflow = 0.93 cfs @ 12.10 hrs, Volume= 0.066 af, Atten= 0%, Lag= 0.0 min
Primary = 0.93 cfs @ 12.10 hrs, Volume= 0.066 af
Routed to Reach DP-1 : Design Point 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 221.17' @ 12.10 hrs
Flood Elev= 229.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	220.80'	36.0" Round Culvert L= 133.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 220.80' / 220.00' S= 0.0060 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=0.92 cfs @ 12.10 hrs HW=221.17' (Free Discharge)

↑1=Culvert (Barrel Controls 0.92 cfs @ 2.83 fps)

Summary for Pond 24P: On-site Pond Outlet

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth > 0.58" for 2-Year event
Inflow = 32.58 cfs @ 15.42 hrs, Volume= 13.147 af
Outflow = 32.58 cfs @ 15.42 hrs, Volume= 13.147 af, Atten= 0%, Lag= 0.1 min
Primary = 32.58 cfs @ 15.42 hrs, Volume= 13.147 af
Routed to Pond 26P : Open-Channel to 48" RCP
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af
Routed to Pond 17P : DMH-P1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 232.84' @ 15.42 hrs Surf.Area= 123 sf Storage= 75 cf
Flood Elev= 234.80' Surf.Area= 509 sf Storage= 643 cf

Plug-Flow detention time= 0.0 min calculated for 13.147 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (960.5 - 960.5)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	750 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Type III 24-hr 2-Year Rainfall=3.36"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	1	0	0
232.00	16	17	17
233.00	143	80	97
234.00	301	222	319
235.00	561	431	750

Device	Routing	Invert	Outlet Devices
#1	Primary	230.98'	48.0" W x 48.0" H Box Box Culvert-48" L= 41.3' Box, 10-30° wingwalls, square crown, Ke= 0.500 Inlet / Outlet Invert= 230.98' / 230.35' S= 0.0153 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 16.00 sf
#2	Secondary	233.50'	36.0" Round Culvert L= 127.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 233.50' / 226.80' S= 0.0528 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=32.57 cfs @ 15.42 hrs HW=232.84' (Free Discharge)
 ↑**1=Box Culvert-48"** (Inlet Controls 32.57 cfs @ 4.38 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=230.00' (Free Discharge)
 ↑**2=Culvert** (Controls 0.00 cfs)

Summary for Pond 26P: Open-Channel to 48" RCP

Inflow Area = 274.285 ac, 26.05% Impervious, Inflow Depth > 0.61" for 2-Year event
 Inflow = 32.98 cfs @ 15.40 hrs, Volume= 13.946 af
 Outflow = 32.98 cfs @ 15.41 hrs, Volume= 13.943 af, Atten= 0%, Lag= 0.5 min
 Primary = 32.98 cfs @ 15.41 hrs, Volume= 13.943 af
 Routed to Pond 6P : DMH to Outfall

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 230.33' @ 15.41 hrs Surf.Area= 966 sf Storage= 642 cf
 Flood Elev= 231.90' Surf.Area= 2,335 sf Storage= 3,238 cf

Plug-Flow detention time= 0.3 min calculated for 13.897 af (100% of inflow)
 Center-of-Mass det. time= 0.2 min (948.6 - 948.4)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	3,476 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.00	1	0	0
229.00	35	18	18
230.00	670	353	371
231.00	1,560	1,115	1,486
232.00	2,421	1,991	3,476

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Type III 24-hr 2-Year Rainfall=3.36"

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Device	Routing	Invert	Outlet Devices
#1	Primary	228.48'	48.0" Round RCP_Round 48" L= 717.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 228.48' / 217.12' S= 0.0158 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 12.57 sf

Primary OutFlow Max=32.98 cfs @ 15.41 hrs HW=230.33' (Free Discharge)
 ↑1=RCP_Round 48" (Inlet Controls 32.98 cfs @ 5.79 fps)

Summary for Pond 27P: CB 1

Inflow Area = 0.378 ac, 30.33% Impervious, Inflow Depth > 0.84" for 2-Year event
 Inflow = 0.37 cfs @ 12.10 hrs, Volume= 0.026 af
 Outflow = 0.37 cfs @ 12.10 hrs, Volume= 0.026 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.37 cfs @ 12.10 hrs, Volume= 0.026 af
 Routed to Pond 17P : DMH-P1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 231.21' @ 12.10 hrs
 Flood Elev= 234.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	230.90'	12.0" Round Culvert L= 7.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 230.90' / 230.80' S= 0.0143 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.10 hrs HW=231.21' (Free Discharge)
 ↑1=Culvert (Barrel Controls 0.36 cfs @ 2.65 fps)

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Type III 24-hr 10-Year Rainfall=5.24"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Subcatchment 1S Runoff Area=11,590,272 sf 23.96% Impervious Runoff Depth>1.52"
Flow Length=4,100' Tc=210.9 min UI Adjusted CN=66 Runoff=93.34 cfs 33.609 af

Subcatchment 2S: Subcatchment 2S Runoff Area=73,226 sf 100.00% Impervious Runoff Depth>4.64"
Flow Length=447' Tc=6.0 min CN=98 Runoff=8.42 cfs 0.650 af

Subcatchment 3S: Subcatchment 3S Runoff Area=15,373 sf 0.00% Impervious Runoff Depth>1.38"
Flow Length=188' Tc=6.0 min CN=61 Runoff=0.57 cfs 0.040 af

Subcatchment 4S: Subcatchment 4S Runoff Area=16,463 sf 30.33% Impervious Runoff Depth>2.04"
Flow Length=132' Tc=6.0 min CN=70 Runoff=0.95 cfs 0.064 af

Subcatchment 5S: Subcatchment 5S Runoff Area=57,217 sf 73.24% Impervious Runoff Depth>3.09"
Tc=6.0 min CN=82 Runoff=4.95 cfs 0.338 af

Subcatchment 6.1S: Subcatchment 6.1S Runoff Area=12,226 sf 9.09% Impervious Runoff Depth>0.45"
Tc=6.0 min CN=45 Runoff=0.07 cfs 0.010 af

Subcatchment 6.2S: Subcatchment 6.1S Runoff Area=18,325 sf 42.59% Impervious Runoff Depth>2.46"
Flow Length=320' Tc=6.0 min CN=75 Runoff=1.28 cfs 0.086 af

Subcatchment 6S: Subcatchment 6S Runoff Area=47,572 sf 73.37% Impervious Runoff Depth>3.68"
Flow Length=422' Tc=6.1 min CN=88 Runoff=4.74 cfs 0.335 af

Subcatchment 7S: Subcatchment 7S Runoff Area=77,306 sf 90.07% Impervious Runoff Depth>4.29"
Flow Length=401' Tc=6.0 min CN=94 Runoff=8.56 cfs 0.634 af

Subcatchment 8S: Subcatchment 8S Runoff Area=100,813 sf 100.00% Impervious Runoff Depth>4.64"
Flow Length=1,690' Slope=0.0200 '/' Tc=10.2 min CN=98 Runoff=10.22 cfs 0.894 af

Subcatchment 9S: Subcatchment 9S Runoff Area=90,858 sf 100.00% Impervious Runoff Depth>4.64"
Tc=6.0 min CN=98 Runoff=10.45 cfs 0.806 af

Subcatchment 28S: (new Subcat) Runoff=0.00 cfs 0.000 af

Reach DP-1: Design Point 1 Inflow=94.28 cfs 37.206 af
Outflow=94.28 cfs 37.206 af

Pond 3P: Rays Pond Peak Elev=237.53' Storage=62,796 cf Inflow=94.25 cfs 35.309 af
48.0" x 48.0" Box Culvert n=0.012 L=92.0' S=0.0337 '/' Outflow=93.07 cfs 35.059 af

Pond 6P: DMH to Outfall Peak Elev=220.32' Inflow=85.61 cfs 35.741 af
48.0" Round Culvert n=0.012 L=92.0' S=0.0264 '/' Outflow=85.61 cfs 35.741 af

Pond 14P: CB 2 Peak Elev=229.14' Inflow=0.07 cfs 0.010 af
12.0" Round Culvert n=0.012 L=15.0' S=0.0067 '/' Outflow=0.07 cfs 0.010 af

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Type III 24-hr 10-Year Rainfall=5.24"

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Pond 15P: CB Peak Elev=231.55' Inflow=1.28 cfs 0.086 af
12.0" Round Culvert n=0.012 L=11.0' S=0.0091 '/ Outflow=1.28 cfs 0.086 af

Pond 17P: DMH-P1 Peak Elev=225.60' Inflow=8.59 cfs 1.368 af
36.0" Round Culvert n=0.012 L=229.0' S=0.0061 '/ Outflow=8.59 cfs 1.368 af

Pond 18P: DMH-P2 Peak Elev=224.24' Inflow=8.60 cfs 1.379 af
36.0" Round Culvert n=0.012 L=124.0' S=0.0048 '/ Outflow=8.60 cfs 1.379 af

Pond 19P: DMH-P3 Peak Elev=223.49' Inflow=8.66 cfs 1.465 af
36.0" Round Culvert n=0.012 L=290.0' S=0.0048 '/ Outflow=8.66 cfs 1.465 af

Pond 20P: DMH-P4 Peak Elev=221.98' Inflow=8.66 cfs 1.465 af
36.0" Round Culvert n=0.012 L=133.0' S=0.0060 '/ Outflow=8.66 cfs 1.465 af

Pond 24P: On-site Pond Outlet Peak Elev=234.61' Storage=551 cf Inflow=93.07 cfs 35.059 af
Primary=84.53 cfs 33.754 af Secondary=8.54 cfs 1.304 af Outflow=93.07 cfs 35.058 af

Pond 26P: Open-Channel to 48" RCP Peak Elev=231.77' Storage=2,932 cf Inflow=85.21 cfs 35.078 af
48.0" Round Culvert n=0.012 L=717.0' S=0.0158 '/ Outflow=85.21 cfs 35.068 af

Pond 27P: CB 1 Peak Elev=231.43' Inflow=0.95 cfs 0.064 af
12.0" Round Culvert n=0.012 L=7.0' S=0.0143 '/ Outflow=0.95 cfs 0.064 af

Total Runoff Area = 277.770 ac Runoff Volume = 37.466 af Average Runoff Depth = 1.62"
73.53% Pervious = 204.246 ac 26.47% Impervious = 73.524 ac

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Type III 24-hr 10-Year Rainfall=5.24"

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Summary for Subcatchment 1S: Subcatchment 1S

Runoff = 93.34 cfs @ 14.99 hrs, Volume= 33.609 af, Depth> 1.52"
 Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Adj	Description
375,158	30		Woods, Good, HSG A
128,154	54		1/2 acre lots, 25% imp, HSG A
* 159,783	98		Unconnected pavement
4,193,614	55		Woods, Good, HSG B
* 1,749,990	98		Unconnected pavement
3,976,585	70		Woods, Good, HSG C
* 445,547	98		Unconnected pavement
171,335	77		Woods, Good, HSG D
* 390,106	98		Water Surface,
11,590,272	70	66	Weighted Average, UI Adjusted
8,812,808			76.04% Pervious Area
2,777,465			23.96% Impervious Area
2,355,320			84.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0400	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.36"
50.0	1,500	0.0400	0.50		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
93.2	2,500	0.0320	0.45		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
40.0					Direct Entry,
210.9	4,100	Total			

Summary for Subcatchment 2S: Subcatchment 2S

Runoff = 8.42 cfs @ 12.09 hrs, Volume= 0.650 af, Depth> 4.64"
 Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 73,226	98	Paved parking
73,226		100.00% Impervious Area

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Type III 24-hr 10-Year Rainfall=5.24"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	397	0.0250	3.21		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	447	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Subcatchment 3S

Runoff = 0.57 cfs @ 12.10 hrs, Volume= 0.040 af, Depth> 1.38"
 Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
15,373	61	>75% Grass cover, Good, HSG B
15,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	138	0.0217	1.03		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.0	188	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 0.95 cfs @ 12.10 hrs, Volume= 0.064 af, Depth> 2.04"
 Routed to Pond 27P : CB 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
4,994	98	Paved parking
11,469	58	Woods/grass comb., Good, HSG B
16,463	70	Weighted Average
11,469		69.67% Pervious Area
4,994		30.33% Impervious Area

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Type III 24-hr 10-Year Rainfall=5.24"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	28	0.0710	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
2.5	21	0.0250	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.5	83	0.0180	2.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	132	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Subcatchment 5S

Runoff = 4.95 cfs @ 12.09 hrs, Volume= 0.338 af, Depth> 3.09"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
15,312	39	>75% Grass cover, Good, HSG A
* 41,905	98	Paved parking
57,217	82	Weighted Average
15,312		26.76% Pervious Area
41,905		73.24% Impervious Area

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

Summary for Subcatchment 6.1S: Subcatchment 6.1S

Runoff = 0.07 cfs @ 12.25 hrs, Volume= 0.010 af, Depth> 0.45"
Routed to Pond 14P : CB 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 1,111	98	Paved parking
10,811	39	>75% Grass cover, Good, HSG A
304	61	>75% Grass cover, Good, HSG B
12,226	45	Weighted Average
11,115		90.91% Pervious Area
1,111		9.09% Impervious Area

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

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Type III 24-hr 10-Year Rainfall=5.24"

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Summary for Subcatchment 6.2S: Subcatchment 6.1S

Runoff = 1.28 cfs @ 12.09 hrs, Volume= 0.086 af, Depth> 2.46"
 Routed to Pond 15P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 7,804	98	Paved parking
9,373	61	>75% Grass cover, Good, HSG B
1,148	39	>75% Grass cover, Good, HSG A
18,325	75	Weighted Average
10,521		57.41% Pervious Area
7,804		42.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0375	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.1	7	0.0610	1.73		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	240	0.0170	2.65		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	23	0.0808	5.77		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.0	320	Total			

Summary for Subcatchment 6S: Subcatchment 6S

Runoff = 4.74 cfs @ 12.09 hrs, Volume= 0.335 af, Depth> 3.68"
 Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 34,904	98	Paved parking
12,668	61	>75% Grass cover, Good, HSG B
47,572	88	Weighted Average
12,668		26.63% Pervious Area
34,904		73.37% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.2	222	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.7	150	0.0330	3.69		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.1	422	Total			

Summary for Subcatchment 7S: Subcatchment 7S

Runoff = 8.56 cfs @ 12.09 hrs, Volume= 0.634 af, Depth> 4.29"
Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
7,673	61	>75% Grass cover, Good, HSG B
* 69,633	98	Paved parking
77,306	94	Weighted Average
7,673		9.93% Pervious Area
69,633		90.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.93		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.9	351	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.8	401	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Subcatchment 8S

Runoff = 10.22 cfs @ 12.14 hrs, Volume= 0.894 af, Depth> 4.64"
Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 100,813	98	Paved roads w/curbs & sewers
100,813		100.00% Impervious Area

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Type III 24-hr 10-Year Rainfall=5.24"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
9.5	1,640	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.2	1,690	Total			

Summary for Subcatchment 9S: Subcatchment 9S

Runoff = 10.45 cfs @ 12.09 hrs, Volume= 0.806 af, Depth> 4.64"
Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Area (sf)	CN	Description
* 46,046	98	Unconnected pavement
* 44,812	98	Unconnected pavement
90,858	98	Weighted Average
90,858		100.00% Impervious Area
90,858		100.00% Unconnected

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

Summary for Subcatchment 28S: (new Subcat)

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.24"

Summary for Reach DP-1: Design Point 1

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth > 1.61" for 10-Year event
Inflow = 94.28 cfs @ 15.27 hrs, Volume= 37.206 af
Outflow = 94.28 cfs @ 15.27 hrs, Volume= 37.206 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Rays Pond

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth > 1.57" for 10-Year event
Inflow = 94.25 cfs @ 14.99 hrs, Volume= 35.309 af
Outflow = 93.07 cfs @ 15.26 hrs, Volume= 35.059 af, Atten= 1%, Lag= 16.4 min
Primary = 93.07 cfs @ 15.26 hrs, Volume= 35.059 af
Routed to Pond 24P : On-site Pond Outlet

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Type III 24-hr 10-Year Rainfall=5.24"

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Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 237.53' @ 15.26 hrs Surf.Area= 39,323 sf Storage= 62,796 cf

Plug-Flow detention time= 9.8 min calculated for 34.942 af (99% of inflow)
 Center-of-Mass det. time= 8.0 min (956.1 - 948.1)

Volume	Invert	Avail.Storage	Storage Description			
#1	234.00'	856,184 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
234.00	629	119.0	0	0	629	
236.00	21,382	1,103.0	17,119	17,119	96,325	
238.00	45,969	1,385.0	65,802	82,920	152,213	
240.00	100,000	2,000.0	142,513	225,433	317,910	
242.00	600,977	5,627.0	630,750	856,184	2,519,285	

Device	Routing	Invert	Outlet Devices
#1	Primary	234.30'	48.0" W x 48.0" H Box Culvert L= 92.0' Box, headwall w/3 rounded edges, Ke= 0.200 Inlet / Outlet Invert= 234.30' / 231.20' S= 0.0337 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=93.06 cfs @ 15.26 hrs HW=237.53' (Free Discharge)
 ↑1=Culvert (Inlet Controls 93.06 cfs @ 7.21 fps)

Summary for Pond 6P: DMH to Outfall

Inflow Area = 276.690 ac, 26.46% Impervious, Inflow Depth > 1.55" for 10-Year event
 Inflow = 85.61 cfs @ 15.27 hrs, Volume= 35.741 af
 Outflow = 85.61 cfs @ 15.27 hrs, Volume= 35.741 af, Atten= 0%, Lag= 0.0 min
 Primary = 85.61 cfs @ 15.27 hrs, Volume= 35.741 af
 Routed to Reach DP-1 : Design Point 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 220.32' @ 15.27 hrs
 Flood Elev= 228.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.02'	48.0" Round Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 217.02' / 214.59' S= 0.0264 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=85.62 cfs @ 15.27 hrs HW=220.32' (Free Discharge)
 ↑1=Culvert (Inlet Controls 85.62 cfs @ 7.73 fps)

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Type III 24-hr 10-Year Rainfall=5.24"

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Summary for Pond 14P: CB 2

Inflow Area = 0.281 ac, 9.09% Impervious, Inflow Depth > 0.45" for 10-Year event
Inflow = 0.07 cfs @ 12.25 hrs, Volume= 0.010 af
Outflow = 0.07 cfs @ 12.25 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min
Primary = 0.07 cfs @ 12.25 hrs, Volume= 0.010 af
Routed to Pond 18P : DMH-P2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 229.14' @ 12.25 hrs
Flood Elev= 234.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	12.0" Round Culvert L= 15.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 229.00' / 228.90' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.07 cfs @ 12.25 hrs HW=229.14' (Free Discharge)
↑1=Culvert (Barrel Controls 0.07 cfs @ 1.56 fps)

Summary for Pond 15P: CB

Inflow Area = 0.421 ac, 42.59% Impervious, Inflow Depth > 2.46" for 10-Year event
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 0.086 af
Outflow = 1.28 cfs @ 12.09 hrs, Volume= 0.086 af, Atten= 0%, Lag= 0.0 min
Primary = 1.28 cfs @ 12.09 hrs, Volume= 0.086 af
Routed to Pond 19P : DMH-P3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 231.55' @ 12.09 hrs
Flood Elev= 235.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	230.90'	12.0" Round Culvert L= 11.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 230.90' / 230.80' S= 0.0091 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.26 cfs @ 12.09 hrs HW=231.54' (Free Discharge)
↑1=Culvert (Barrel Controls 1.26 cfs @ 3.34 fps)

Summary for Pond 17P: DMH-P1

Inflow Area = 0.378 ac, 30.33% Impervious, Inflow Depth > 43.44" for 10-Year event
Inflow = 8.59 cfs @ 15.26 hrs, Volume= 1.368 af
Outflow = 8.59 cfs @ 15.26 hrs, Volume= 1.368 af, Atten= 0%, Lag= 0.0 min
Primary = 8.59 cfs @ 15.26 hrs, Volume= 1.368 af
Routed to Pond 18P : DMH-P2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr 10-Year Rainfall=5.24"

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Peak Elev= 225.60' @ 15.26 hrs

Flood Elev= 233.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	224.50'	36.0" Round Culvert L= 229.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 224.50' / 223.10' S= 0.0061 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=8.58 cfs @ 15.26 hrs HW=225.60' (Free Discharge)

↑1=Culvert (Barrel Controls 8.58 cfs @ 5.41 fps)

Summary for Pond 18P: DMH-P2

Inflow Area = 0.659 ac, 21.28% Impervious, Inflow Depth > 25.12" for 10-Year event
 Inflow = 8.60 cfs @ 15.26 hrs, Volume= 1.379 af
 Outflow = 8.60 cfs @ 15.26 hrs, Volume= 1.379 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.60 cfs @ 15.26 hrs, Volume= 1.379 af
 Routed to Pond 19P : DMH-P3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 224.24' @ 15.26 hrs

Flood Elev= 234.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	223.00'	36.0" Round Culvert L= 124.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 223.00' / 222.40' S= 0.0048 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=8.59 cfs @ 15.26 hrs HW=224.24' (Free Discharge)

↑1=Culvert (Barrel Controls 8.59 cfs @ 4.63 fps)

Summary for Pond 19P: DMH-P3

Inflow Area = 1.079 ac, 29.58% Impervious, Inflow Depth > 16.29" for 10-Year event
 Inflow = 8.66 cfs @ 15.26 hrs, Volume= 1.465 af
 Outflow = 8.66 cfs @ 15.26 hrs, Volume= 1.465 af, Atten= 0%, Lag= 0.0 min
 Primary = 8.66 cfs @ 15.26 hrs, Volume= 1.465 af
 Routed to Pond 20P : DMH-P4

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 223.49' @ 15.26 hrs

Flood Elev= 234.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	222.30'	36.0" Round Culvert L= 290.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.30' / 220.90' S= 0.0048 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

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Type III 24-hr 10-Year Rainfall=5.24"

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Primary OutFlow Max=8.66 cfs @ 15.26 hrs HW=223.49' (Free Discharge)

↑1=Culvert (Barrel Controls 8.66 cfs @ 4.92 fps)

Summary for Pond 20P: DMH-P4

Inflow Area = 1.079 ac, 29.58% Impervious, Inflow Depth > 16.29" for 10-Year event
Inflow = 8.66 cfs @ 15.26 hrs, Volume= 1.465 af
Outflow = 8.66 cfs @ 15.26 hrs, Volume= 1.465 af, Atten= 0%, Lag= 0.0 min
Primary = 8.66 cfs @ 15.26 hrs, Volume= 1.465 af
Routed to Reach DP-1 : Design Point 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 221.98' @ 15.26 hrs
Flood Elev= 229.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	220.80'	36.0" Round Culvert L= 133.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 220.80' / 220.00' S= 0.0060 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=8.65 cfs @ 15.26 hrs HW=221.98' (Free Discharge)

↑1=Culvert (Barrel Controls 8.65 cfs @ 4.95 fps)

Summary for Pond 24P: On-site Pond Outlet

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 93.07 cfs @ 15.26 hrs, Volume= 35.059 af
Outflow = 93.07 cfs @ 15.27 hrs, Volume= 35.058 af, Atten= 0%, Lag= 0.2 min
Primary = 84.53 cfs @ 15.27 hrs, Volume= 33.754 af
Routed to Pond 26P : Open-Channel to 48" RCP
Secondary = 8.54 cfs @ 15.27 hrs, Volume= 1.304 af
Routed to Pond 17P : DMH-P1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 234.61' @ 15.27 hrs Surf.Area= 460 sf Storage= 551 cf
Flood Elev= 234.80' Surf.Area= 509 sf Storage= 643 cf

Plug-Flow detention time= 0.1 min calculated for 35.058 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (956.1 - 956.1)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	750 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	1	0	0
232.00	16	17	17
233.00	143	80	97
234.00	301	222	319
235.00	561	431	750

Device	Routing	Invert	Outlet Devices
#1	Primary	230.98'	48.0" W x 48.0" H Box Box Culvert-48" L= 41.3' Box, 10-30° wingwalls, square crown, Ke= 0.500 Inlet / Outlet Invert= 230.98' / 230.35' S= 0.0153 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 16.00 sf
#2	Secondary	233.50'	36.0" Round Culvert L= 127.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 233.50' / 226.80' S= 0.0528 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=84.52 cfs @ 15.27 hrs HW=234.61' (Free Discharge)

↑**1=Box Culvert-48"** (Barrel Controls 84.52 cfs @ 7.76 fps)

Secondary OutFlow Max=8.53 cfs @ 15.27 hrs HW=234.61' (Free Discharge)

↑**2=Culvert** (Inlet Controls 8.53 cfs @ 3.59 fps)

Summary for Pond 26P: Open-Channel to 48" RCP

Inflow Area = 274.285 ac, 26.05% Impervious, Inflow Depth > 1.53" for 10-Year event
 Inflow = 85.21 cfs @ 15.26 hrs, Volume= 35.078 af
 Outflow = 85.21 cfs @ 15.27 hrs, Volume= 35.068 af, Atten= 0%, Lag= 1.1 min
 Primary = 85.21 cfs @ 15.27 hrs, Volume= 35.068 af
 Routed to Pond 6P : DMH to Outfall

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 231.77' @ 15.27 hrs Surf.Area= 2,219 sf Storage= 2,932 cf
 Flood Elev= 231.90' Surf.Area= 2,335 sf Storage= 3,238 cf

Plug-Flow detention time= 0.5 min calculated for 34.952 af (100% of inflow)
 Center-of-Mass det. time= 0.4 min (949.7 - 949.3)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	3,476 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.00	1	0	0
229.00	35	18	18
230.00	670	353	371
231.00	1,560	1,115	1,486
232.00	2,421	1,991	3,476

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Type III 24-hr 10-Year Rainfall=5.24"

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Device	Routing	Invert	Outlet Devices
#1	Primary	228.48'	48.0" Round RCP_Round 48" L= 717.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 228.48' / 217.12' S= 0.0158 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 12.57 sf

Primary OutFlow Max=85.20 cfs @ 15.27 hrs HW=231.77' (Free Discharge)
 ↑1=RCP_Round 48" (Inlet Controls 85.20 cfs @ 7.71 fps)

Summary for Pond 27P: CB 1

Inflow Area = 0.378 ac, 30.33% Impervious, Inflow Depth > 2.04" for 10-Year event
 Inflow = 0.95 cfs @ 12.10 hrs, Volume= 0.064 af
 Outflow = 0.95 cfs @ 12.10 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min
 Primary = 0.95 cfs @ 12.10 hrs, Volume= 0.064 af
 Routed to Pond 17P : DMH-P1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 231.43' @ 12.10 hrs
 Flood Elev= 234.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	230.90'	12.0" Round Culvert L= 7.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 230.90' / 230.80' S= 0.0143 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.94 cfs @ 12.10 hrs HW=231.43' (Free Discharge)
 ↑1=Culvert (Barrel Controls 0.94 cfs @ 3.23 fps)

Proposed Conditions G5099-003

Type III 24-hr 25-Year Rainfall=6.40"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Subcatchment 1S Runoff Area=11,590,272 sf 23.96% Impervious Runoff Depth>2.23"
Flow Length=4,100' Tc=210.9 min UI Adjusted CN=66 Runoff=138.64 cfs 49.499 af

Subcatchment 2S: Subcatchment 2S Runoff Area=73,226 sf 100.00% Impervious Runoff Depth>5.69"
Flow Length=447' Tc=6.0 min CN=98 Runoff=10.30 cfs 0.797 af

Subcatchment 3S: Subcatchment 3S Runoff Area=15,373 sf 0.00% Impervious Runoff Depth>2.09"
Flow Length=188' Tc=6.0 min CN=61 Runoff=0.89 cfs 0.061 af

Subcatchment 4S: Subcatchment 4S Runoff Area=16,463 sf 30.33% Impervious Runoff Depth>2.90"
Flow Length=132' Tc=6.0 min CN=70 Runoff=1.36 cfs 0.091 af

Subcatchment 5S: Subcatchment 5S Runoff Area=57,217 sf 73.24% Impervious Runoff Depth>4.10"
Tc=6.0 min CN=82 Runoff=6.49 cfs 0.448 af

Subcatchment 6.1S: Subcatchment 6.1S Runoff Area=12,226 sf 9.09% Impervious Runoff Depth>0.85"
Tc=6.0 min CN=45 Runoff=0.21 cfs 0.020 af

Subcatchment 6.2S: Subcatchment 6.1S Runoff Area=18,325 sf 42.59% Impervious Runoff Depth>3.38"
Flow Length=320' Tc=6.0 min CN=75 Runoff=1.75 cfs 0.119 af

Subcatchment 6S: Subcatchment 6S Runoff Area=47,572 sf 73.37% Impervious Runoff Depth>4.74"
Flow Length=422' Tc=6.1 min CN=88 Runoff=6.02 cfs 0.431 af

Subcatchment 7S: Subcatchment 7S Runoff Area=77,306 sf 90.07% Impervious Runoff Depth>5.36"
Flow Length=401' Tc=6.0 min CN=94 Runoff=10.59 cfs 0.792 af

Subcatchment 8S: Subcatchment 8S Runoff Area=100,813 sf 100.00% Impervious Runoff Depth>5.69"
Flow Length=1,690' Slope=0.0200 '/' Tc=10.2 min CN=98 Runoff=12.51 cfs 1.098 af

Subcatchment 9S: Subcatchment 9S Runoff Area=90,858 sf 100.00% Impervious Runoff Depth>5.69"
Tc=6.0 min CN=98 Runoff=12.78 cfs 0.989 af

Subcatchment 28S: (new Subcat) Runoff=0.00 cfs 0.000 af

Reach DP-1: Design Point 1 Inflow=138.80 cfs 53.941 af
Outflow=138.80 cfs 53.941 af

Pond 3P: Rays Pond Peak Elev=238.49' Storage=108,371 cf Inflow=139.81 cfs 51.586 af
48.0" x 48.0" Box Culvert n=0.012 L=92.0' S=0.0337 '/' Outflow=136.45 cfs 51.199 af

Pond 6P: DMH to Outfall Peak Elev=221.32' Inflow=114.76 cfs 48.860 af
48.0" Round Culvert n=0.012 L=92.0' S=0.0264 '/' Outflow=114.76 cfs 48.860 af

Pond 14P: CB 2 Peak Elev=229.25' Inflow=0.21 cfs 0.020 af
12.0" Round Culvert n=0.012 L=15.0' S=0.0067 '/' Outflow=0.21 cfs 0.020 af

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Pond 15P: CB Peak Elev=231.69' Inflow=1.75 cfs 0.119 af
12.0" Round Culvert n=0.012 L=11.0' S=0.0091 '/' Outflow=1.75 cfs 0.119 af

Pond 17P: DMH-P1 Peak Elev=226.46' Inflow=23.93 cfs 4.942 af
36.0" Round Culvert n=0.012 L=229.0' S=0.0061 '/' Outflow=23.93 cfs 4.942 af

Pond 18P: DMH-P2 Peak Elev=225.25' Inflow=23.96 cfs 4.962 af
36.0" Round Culvert n=0.012 L=124.0' S=0.0048 '/' Outflow=23.96 cfs 4.962 af

Pond 19P: DMH-P3 Peak Elev=224.44' Inflow=24.04 cfs 5.081 af
36.0" Round Culvert n=0.012 L=290.0' S=0.0048 '/' Outflow=24.04 cfs 5.081 af

Pond 20P: DMH-P4 Peak Elev=222.96' Inflow=24.04 cfs 5.081 af
36.0" Round Culvert n=0.012 L=133.0' S=0.0060 '/' Outflow=24.04 cfs 5.081 af

Pond 24P: On-site Pond Outlet Peak Elev=235.49' Storage=750 cf Inflow=136.45 cfs 51.199 af
Primary=112.73 cfs 46.346 af Secondary=23.87 cfs 4.851 af Outflow=136.60 cfs 51.197 af

Pond 26P: Open-Channel to 48" RCP Peak Elev=232.76' Storage=3,476 cf Inflow=113.57 cfs 47.997 af
48.0" Round Culvert n=0.012 L=717.0' S=0.0158 '/' Outflow=114.25 cfs 47.981 af

Pond 27P: CB 1 Peak Elev=231.56' Inflow=1.36 cfs 0.091 af
12.0" Round Culvert n=0.012 L=7.0' S=0.0143 '/' Outflow=1.36 cfs 0.091 af

Total Runoff Area = 277.770 ac Runoff Volume = 54.346 af Average Runoff Depth = 2.35"
73.53% Pervious = 204.246 ac 26.47% Impervious = 73.524 ac

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Type III 24-hr 25-Year Rainfall=6.40"

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Summary for Subcatchment 1S: Subcatchment 1S

Runoff = 138.64 cfs @ 14.82 hrs, Volume= 49.499 af, Depth> 2.23"
 Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Adj	Description
375,158	30		Woods, Good, HSG A
128,154	54		1/2 acre lots, 25% imp, HSG A
* 159,783	98		Unconnected pavement
4,193,614	55		Woods, Good, HSG B
* 1,749,990	98		Unconnected pavement
3,976,585	70		Woods, Good, HSG C
* 445,547	98		Unconnected pavement
171,335	77		Woods, Good, HSG D
* 390,106	98		Water Surface,
11,590,272	70	66	Weighted Average, UI Adjusted
8,812,808			76.04% Pervious Area
2,777,465			23.96% Impervious Area
2,355,320			84.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0400	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.36"
50.0	1,500	0.0400	0.50		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
93.2	2,500	0.0320	0.45		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
40.0					Direct Entry,
210.9	4,100	Total			

Summary for Subcatchment 2S: Subcatchment 2S

Runoff = 10.30 cfs @ 12.09 hrs, Volume= 0.797 af, Depth> 5.69"
 Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 73,226	98	Paved parking
73,226		100.00% Impervious Area

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Type III 24-hr 25-Year Rainfall=6.40"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	397	0.0250	3.21		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	447	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Subcatchment 3S

Runoff = 0.89 cfs @ 12.10 hrs, Volume= 0.061 af, Depth> 2.09"
Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
15,373	61	>75% Grass cover, Good, HSG B
15,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	138	0.0217	1.03		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.0	188	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 1.36 cfs @ 12.09 hrs, Volume= 0.091 af, Depth> 2.90"
Routed to Pond 27P : CB 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 4,994	98	Paved parking
11,469	58	Woods/grass comb., Good, HSG B
16,463	70	Weighted Average
11,469		69.67% Pervious Area
4,994		30.33% Impervious Area

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Type III 24-hr 25-Year Rainfall=6.40"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	28	0.0710	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
2.5	21	0.0250	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.5	83	0.0180	2.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	132	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Subcatchment 5S

Runoff = 6.49 cfs @ 12.09 hrs, Volume= 0.448 af, Depth> 4.10"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
15,312	39	>75% Grass cover, Good, HSG A
* 41,905	98	Paved parking
57,217	82	Weighted Average
15,312		26.76% Pervious Area
41,905		73.24% Impervious Area

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

Summary for Subcatchment 6.1S: Subcatchment 6.1S

Runoff = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af, Depth> 0.85"
Routed to Pond 14P : CB 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 1,111	98	Paved parking
10,811	39	>75% Grass cover, Good, HSG A
304	61	>75% Grass cover, Good, HSG B
12,226	45	Weighted Average
11,115		90.91% Pervious Area
1,111		9.09% Impervious Area

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

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Type III 24-hr 25-Year Rainfall=6.40"

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Summary for Subcatchment 6.2S: Subcatchment 6.1S

Runoff = 1.75 cfs @ 12.09 hrs, Volume= 0.119 af, Depth> 3.38"
 Routed to Pond 15P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 7,804	98	Paved parking
9,373	61	>75% Grass cover, Good, HSG B
1,148	39	>75% Grass cover, Good, HSG A
18,325	75	Weighted Average
10,521		57.41% Pervious Area
7,804		42.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0375	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.1	7	0.0610	1.73		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	240	0.0170	2.65		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	23	0.0808	5.77		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.0	320	Total			

Summary for Subcatchment 6S: Subcatchment 6S

Runoff = 6.02 cfs @ 12.09 hrs, Volume= 0.431 af, Depth> 4.74"
 Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 34,904	98	Paved parking
12,668	61	>75% Grass cover, Good, HSG B
47,572	88	Weighted Average
12,668		26.63% Pervious Area
34,904		73.37% Impervious Area

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Type III 24-hr 25-Year Rainfall=6.40"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.2	222	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.7	150	0.0330	3.69		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.1	422	Total			

Summary for Subcatchment 7S: Subcatchment 7S

Runoff = 10.59 cfs @ 12.09 hrs, Volume= 0.792 af, Depth> 5.36"
Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
7,673	61	>75% Grass cover, Good, HSG B
* 69,633	98	Paved parking
77,306	94	Weighted Average
7,673		9.93% Pervious Area
69,633		90.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.93		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.9	351	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.8	401	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Subcatchment 8S

Runoff = 12.51 cfs @ 12.14 hrs, Volume= 1.098 af, Depth> 5.69"
Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 100,813	98	Paved roads w/curbs & sewers
100,813		100.00% Impervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
9.5	1,640	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.2	1,690	Total			

Summary for Subcatchment 9S: Subcatchment 9S

Runoff = 12.78 cfs @ 12.09 hrs, Volume= 0.989 af, Depth> 5.69"
Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Area (sf)	CN	Description
* 46,046	98	Unconnected pavement
* 44,812	98	Unconnected pavement
90,858	98	Weighted Average
90,858		100.00% Impervious Area
90,858		100.00% Unconnected

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

Summary for Subcatchment 28S: (new Subcat)

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.40"

Summary for Reach DP-1: Design Point 1

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth > 2.33" for 25-Year event
Inflow = 138.80 cfs @ 15.25 hrs, Volume= 53.941 af
Outflow = 138.80 cfs @ 15.25 hrs, Volume= 53.941 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Rays Pond

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth > 2.29" for 25-Year event
Inflow = 139.81 cfs @ 14.82 hrs, Volume= 51.586 af
Outflow = 136.45 cfs @ 15.28 hrs, Volume= 51.199 af, Atten= 2%, Lag= 27.7 min
Primary = 136.45 cfs @ 15.28 hrs, Volume= 51.199 af
Routed to Pond 24P : On-site Pond Outlet

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Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 238.49' @ 15.28 hrs Surf.Area= 57,375 sf Storage= 108,371 cf

Plug-Flow detention time= 11.2 min calculated for 51.198 af (99% of inflow)
 Center-of-Mass det. time= 9.2 min (953.3 - 944.1)

Volume	Invert	Avail.Storage	Storage Description			
#1	234.00'	856,184 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
234.00	629	119.0	0	0	629	
236.00	21,382	1,103.0	17,119	17,119	96,325	
238.00	45,969	1,385.0	65,802	82,920	152,213	
240.00	100,000	2,000.0	142,513	225,433	317,910	
242.00	600,977	5,627.0	630,750	856,184	2,519,285	

Device	Routing	Invert	Outlet Devices
#1	Primary	234.30'	48.0" W x 48.0" H Box Culvert L= 92.0' Box, headwall w/3 rounded edges, Ke= 0.200 Inlet / Outlet Invert= 234.30' / 231.20' S= 0.0337 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=136.45 cfs @ 15.28 hrs HW=238.49' (Free Discharge)

↑**1=Culvert** (Inlet Controls 136.45 cfs @ 8.53 fps)

Summary for Pond 6P: DMH to Outfall

Inflow Area = 276.690 ac, 26.46% Impervious, Inflow Depth > 2.12" for 25-Year event
 Inflow = 114.76 cfs @ 15.25 hrs, Volume= 48.860 af
 Outflow = 114.76 cfs @ 15.25 hrs, Volume= 48.860 af, Atten= 0%, Lag= 0.0 min
 Primary = 114.76 cfs @ 15.25 hrs, Volume= 48.860 af
 Routed to Reach DP-1 : Design Point 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 221.32' @ 15.25 hrs
 Flood Elev= 228.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.02'	48.0" Round Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 217.02' / 214.59' S= 0.0264 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=114.76 cfs @ 15.25 hrs HW=221.32' (Free Discharge)

↑**1=Culvert** (Inlet Controls 114.76 cfs @ 9.13 fps)

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Summary for Pond 14P: CB 2

Inflow Area = 0.281 ac, 9.09% Impervious, Inflow Depth > 0.85" for 25-Year event
Inflow = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af
Outflow = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min
Primary = 0.21 cfs @ 12.12 hrs, Volume= 0.020 af
Routed to Pond 18P : DMH-P2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 229.25' @ 12.12 hrs
Flood Elev= 234.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	12.0" Round Culvert L= 15.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 229.00' / 228.90' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.20 cfs @ 12.12 hrs HW=229.24' (Free Discharge)
↑1=Culvert (Barrel Controls 0.20 cfs @ 2.08 fps)

Summary for Pond 15P: CB

Inflow Area = 0.421 ac, 42.59% Impervious, Inflow Depth > 3.38" for 25-Year event
Inflow = 1.75 cfs @ 12.09 hrs, Volume= 0.119 af
Outflow = 1.75 cfs @ 12.09 hrs, Volume= 0.119 af, Atten= 0%, Lag= 0.0 min
Primary = 1.75 cfs @ 12.09 hrs, Volume= 0.119 af
Routed to Pond 19P : DMH-P3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 231.69' @ 12.09 hrs
Flood Elev= 235.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	230.90'	12.0" Round Culvert L= 11.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 230.90' / 230.80' S= 0.0091 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.72 cfs @ 12.09 hrs HW=231.68' (Free Discharge)
↑1=Culvert (Barrel Controls 1.72 cfs @ 3.61 fps)

Summary for Pond 17P: DMH-P1

Inflow Area = 0.378 ac, 30.33% Impervious, Inflow Depth >156.92" for 25-Year event
Inflow = 23.93 cfs @ 15.25 hrs, Volume= 4.942 af
Outflow = 23.93 cfs @ 15.25 hrs, Volume= 4.942 af, Atten= 0%, Lag= 0.0 min
Primary = 23.93 cfs @ 15.25 hrs, Volume= 4.942 af
Routed to Pond 18P : DMH-P2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr 25-Year Rainfall=6.40"

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Peak Elev= 226.46' @ 15.25 hrs

Flood Elev= 233.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	224.50'	36.0" Round Culvert L= 229.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 224.50' / 223.10' S= 0.0061 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=23.92 cfs @ 15.25 hrs HW=226.46' (Free Discharge)

↑1=Culvert (Barrel Controls 23.92 cfs @ 6.93 fps)

Summary for Pond 18P: DMH-P2

Inflow Area = 0.659 ac, 21.28% Impervious, Inflow Depth > 90.41" for 25-Year event
 Inflow = 23.96 cfs @ 15.25 hrs, Volume= 4.962 af
 Outflow = 23.96 cfs @ 15.25 hrs, Volume= 4.962 af, Atten= 0%, Lag= 0.0 min
 Primary = 23.96 cfs @ 15.25 hrs, Volume= 4.962 af
 Routed to Pond 19P : DMH-P3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 225.25' @ 15.25 hrs

Flood Elev= 234.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	223.00'	36.0" Round Culvert L= 124.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 223.00' / 222.40' S= 0.0048 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=23.94 cfs @ 15.25 hrs HW=225.25' (Free Discharge)

↑1=Culvert (Barrel Controls 23.94 cfs @ 5.84 fps)

Summary for Pond 19P: DMH-P3

Inflow Area = 1.079 ac, 29.58% Impervious, Inflow Depth > 56.49" for 25-Year event
 Inflow = 24.04 cfs @ 15.25 hrs, Volume= 5.081 af
 Outflow = 24.04 cfs @ 15.25 hrs, Volume= 5.081 af, Atten= 0%, Lag= 0.0 min
 Primary = 24.04 cfs @ 15.25 hrs, Volume= 5.081 af
 Routed to Pond 20P : DMH-P4

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 224.44' @ 15.25 hrs

Flood Elev= 234.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	222.30'	36.0" Round Culvert L= 290.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.30' / 220.90' S= 0.0048 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

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Type III 24-hr 25-Year Rainfall=6.40"

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Primary OutFlow Max=24.03 cfs @ 15.25 hrs HW=224.44' (Free Discharge)

↑1=Culvert (Barrel Controls 24.03 cfs @ 6.24 fps)

Summary for Pond 20P: DMH-P4

Inflow Area = 1.079 ac, 29.58% Impervious, Inflow Depth > 56.49" for 25-Year event
Inflow = 24.04 cfs @ 15.25 hrs, Volume= 5.081 af
Outflow = 24.04 cfs @ 15.25 hrs, Volume= 5.081 af, Atten= 0%, Lag= 0.0 min
Primary = 24.04 cfs @ 15.25 hrs, Volume= 5.081 af
Routed to Reach DP-1 : Design Point 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 222.96' @ 15.25 hrs
Flood Elev= 229.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	220.80'	36.0" Round Culvert L= 133.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 220.80' / 220.00' S= 0.0060 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=24.03 cfs @ 15.25 hrs HW=222.96' (Free Discharge)

↑1=Culvert (Barrel Controls 24.03 cfs @ 6.16 fps)

Summary for Pond 24P: On-site Pond Outlet

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth > 2.27" for 25-Year event
Inflow = 136.45 cfs @ 15.28 hrs, Volume= 51.199 af
Outflow = 136.60 cfs @ 15.25 hrs, Volume= 51.197 af, Atten= 0%, Lag= 0.0 min
Primary = 112.73 cfs @ 15.25 hrs, Volume= 46.346 af
Routed to Pond 26P : Open-Channel to 48" RCP
Secondary = 23.87 cfs @ 15.25 hrs, Volume= 4.851 af
Routed to Pond 17P : DMH-P1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 235.49' @ 15.25 hrs Surf.Area= 561 sf Storage= 750 cf
Flood Elev= 234.80' Surf.Area= 509 sf Storage= 643 cf

Plug-Flow detention time= 0.1 min calculated for 51.197 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (953.4 - 953.3)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	750 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	1	0	0
232.00	16	17	17
233.00	143	80	97
234.00	301	222	319
235.00	561	431	750

Device	Routing	Invert	Outlet Devices
#1	Primary	230.98'	48.0" W x 48.0" H Box Box Culvert-48" L= 41.3' Box, 10-30° wingwalls, square crown, Ke= 0.500 Inlet / Outlet Invert= 230.98' / 230.35' S= 0.0153 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 16.00 sf
#2	Secondary	233.50'	36.0" Round Culvert L= 127.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 233.50' / 226.80' S= 0.0528 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=112.71 cfs @ 15.25 hrs HW=235.49' (Free Discharge)

↑**1=Box Culvert-48"** (Barrel Controls 112.71 cfs @ 8.34 fps)

Secondary OutFlow Max=23.85 cfs @ 15.25 hrs HW=235.49' (Free Discharge)

↑**2=Culvert** (Inlet Controls 23.85 cfs @ 4.80 fps)

Summary for Pond 26P: Open-Channel to 48" RCP

Inflow Area = 274.285 ac, 26.05% Impervious, Inflow Depth > 2.10" for 25-Year event
 Inflow = 113.57 cfs @ 15.25 hrs, Volume= 47.997 af
 Outflow = 114.25 cfs @ 15.25 hrs, Volume= 47.981 af, Atten= 0%, Lag= 0.0 min
 Primary = 114.25 cfs @ 15.25 hrs, Volume= 47.981 af
 Routed to Pond 6P : DMH to Outfall

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 232.76' @ 15.25 hrs Surf.Area= 2,421 sf Storage= 3,476 cf
 Flood Elev= 231.90' Surf.Area= 2,335 sf Storage= 3,238 cf

Plug-Flow detention time= 0.5 min calculated for 47.980 af (100% of inflow)
 Center-of-Mass det. time= 0.4 min (948.9 - 948.5)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	3,476 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.00	1	0	0
229.00	35	18	18
230.00	670	353	371
231.00	1,560	1,115	1,486
232.00	2,421	1,991	3,476

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Type III 24-hr 25-Year Rainfall=6.40"

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Device	Routing	Invert	Outlet Devices
#1	Primary	228.48'	48.0" Round RCP_Round 48" L= 717.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 228.48' / 217.12' S= 0.0158 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 12.57 sf

Primary OutFlow Max=114.24 cfs @ 15.25 hrs HW=232.76' (Free Discharge)

↑1=RCP_Round 48" (Inlet Controls 114.24 cfs @ 9.09 fps)

Summary for Pond 27P: CB 1

Inflow Area = 0.378 ac, 30.33% Impervious, Inflow Depth > 2.90" for 25-Year event
 Inflow = 1.36 cfs @ 12.09 hrs, Volume= 0.091 af
 Outflow = 1.36 cfs @ 12.09 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
 Primary = 1.36 cfs @ 12.09 hrs, Volume= 0.091 af
 Routed to Pond 17P : DMH-P1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 231.56' @ 12.09 hrs

Flood Elev= 234.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	230.90'	12.0" Round Culvert L= 7.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 230.90' / 230.80' S= 0.0143 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.33 cfs @ 12.09 hrs HW=231.55' (Free Discharge)

↑1=Culvert (Barrel Controls 1.33 cfs @ 3.49 fps)

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Type III 24-hr 100-Year Rainfall=8.20"

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Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: Subcatchment 1S Runoff Area=11,590,272 sf 23.96% Impervious Runoff Depth>3.46"
Flow Length=4,100' Tc=210.9 min UI Adjusted CN=66 Runoff=215.65 cfs 76.661 af

Subcatchment 2S: Subcatchment 2S Runoff Area=73,226 sf 100.00% Impervious Runoff Depth>7.33"
Flow Length=447' Tc=6.0 min CN=98 Runoff=13.22 cfs 1.026 af

Subcatchment 3S: Subcatchment 3S Runoff Area=15,373 sf 0.00% Impervious Runoff Depth>3.32"
Flow Length=188' Tc=6.0 min CN=61 Runoff=1.45 cfs 0.098 af

Subcatchment 4S: Subcatchment 4S Runoff Area=16,463 sf 30.33% Impervious Runoff Depth>4.33"
Flow Length=132' Tc=6.0 min CN=70 Runoff=2.01 cfs 0.136 af

Subcatchment 5S: Subcatchment 5S Runoff Area=57,217 sf 73.24% Impervious Runoff Depth>5.71"
Tc=6.0 min CN=82 Runoff=8.89 cfs 0.625 af

Subcatchment 6.1S: Subcatchment 6.1S Runoff Area=12,226 sf 9.09% Impervious Runoff Depth>1.65"
Tc=6.0 min CN=45 Runoff=0.51 cfs 0.039 af

Subcatchment 6.2S: Subcatchment 6.1S Runoff Area=18,325 sf 42.59% Impervious Runoff Depth>4.90"
Flow Length=320' Tc=6.0 min CN=75 Runoff=2.51 cfs 0.172 af

Subcatchment 6S: Subcatchment 6S Runoff Area=47,572 sf 73.37% Impervious Runoff Depth>6.39"
Flow Length=422' Tc=6.1 min CN=88 Runoff=7.99 cfs 0.582 af

Subcatchment 7S: Subcatchment 7S Runoff Area=77,306 sf 90.07% Impervious Runoff Depth>7.01"
Flow Length=401' Tc=6.0 min CN=94 Runoff=13.71 cfs 1.037 af

Subcatchment 8S: Subcatchment 8S Runoff Area=100,813 sf 100.00% Impervious Runoff Depth>7.33"
Flow Length=1,690' Slope=0.0200 '/' Tc=10.2 min CN=98 Runoff=16.05 cfs 1.413 af

Subcatchment 9S: Subcatchment 9S Runoff Area=90,858 sf 100.00% Impervious Runoff Depth>7.33"
Tc=6.0 min CN=98 Runoff=16.40 cfs 1.273 af

Subcatchment 28S: (new Subcat) Runoff=0.00 cfs 0.000 af

Reach DP-1: Design Point 1 Inflow=195.41 cfs 82.391 af
Outflow=195.41 cfs 82.391 af

Pond 3P: Rays Pond Peak Elev=240.42' Storage=281,844 cf Inflow=217.15 cfs 79.347 af
48.0" x 48.0" Box Culvert n=0.012 L=92.0' S=0.0337 '/' Outflow=193.50 cfs 78.710 af

Pond 6P: DMH to Outfall Peak Elev=222.95' Inflow=149.93 cfs 69.209 af
48.0" Round Culvert n=0.012 L=92.0' S=0.0264 '/' Outflow=149.93 cfs 69.209 af

Pond 14P: CB 2 Peak Elev=229.40' Inflow=0.51 cfs 0.039 af
12.0" Round Culvert n=0.012 L=15.0' S=0.0067 '/' Outflow=0.51 cfs 0.039 af

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Type III 24-hr 100-Year Rainfall=8.20"

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Pond 15P: CB Peak Elev=231.90' Inflow=2.51 cfs 0.172 af
12.0" Round Culvert n=0.012 L=11.0' S=0.0091 '/ Outflow=2.51 cfs 0.172 af

Pond 17P: DMH-P1 Peak Elev=227.52' Inflow=45.43 cfs 12.972 af
36.0" Round Culvert n=0.012 L=229.0' S=0.0061 '/ Outflow=45.43 cfs 12.972 af

Pond 18P: DMH-P2 Peak Elev=226.61' Inflow=45.46 cfs 13.010 af
36.0" Round Culvert n=0.012 L=124.0' S=0.0048 '/ Outflow=45.46 cfs 13.010 af

Pond 19P: DMH-P3 Peak Elev=225.72' Inflow=45.56 cfs 13.182 af
36.0" Round Culvert n=0.012 L=290.0' S=0.0048 '/ Outflow=45.56 cfs 13.182 af

Pond 20P: DMH-P4 Peak Elev=224.23' Inflow=45.56 cfs 13.182 af
36.0" Round Culvert n=0.012 L=133.0' S=0.0060 '/ Outflow=45.56 cfs 13.182 af

Pond 24P: On-site Pond Outlet Peak Elev=236.78' Storage=750 cf Inflow=193.50 cfs 78.710 af
Primary=148.25 cfs 65.870 af Secondary=45.35 cfs 12.835 af Outflow=193.59 cfs 78.705 af

Pond 26P: Open-Channel to 48" RCP Peak Elev=234.38' Storage=3,476 cf Inflow=149.20 cfs 68.031 af
48.0" Round Culvert n=0.012 L=717.0' S=0.0158 '/ Outflow=149.33 cfs 68.002 af

Pond 27P: CB 1 Peak Elev=231.74' Inflow=2.01 cfs 0.136 af
12.0" Round Culvert n=0.012 L=7.0' S=0.0143 '/ Outflow=2.01 cfs 0.136 af

Total Runoff Area = 277.770 ac Runoff Volume = 83.062 af Average Runoff Depth = 3.59"
73.53% Pervious = 204.246 ac 26.47% Impervious = 73.524 ac

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Type III 24-hr 100-Year Rainfall=8.20"

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Summary for Subcatchment 1S: Subcatchment 1S

Runoff = 215.65 cfs @ 14.79 hrs, Volume= 76.661 af, Depth> 3.46"
 Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Adj	Description
375,158	30		Woods, Good, HSG A
128,154	54		1/2 acre lots, 25% imp, HSG A
* 159,783	98		Unconnected pavement
4,193,614	55		Woods, Good, HSG B
* 1,749,990	98		Unconnected pavement
3,976,585	70		Woods, Good, HSG C
* 445,547	98		Unconnected pavement
171,335	77		Woods, Good, HSG D
* 390,106	98		Water Surface,
11,590,272	70	66	Weighted Average, UI Adjusted
8,812,808			76.04% Pervious Area
2,777,465			23.96% Impervious Area
2,355,320			84.80% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.7	100	0.0400	0.06		Sheet Flow, Woods: Dense underbrush n= 0.800 P2= 3.36"
50.0	1,500	0.0400	0.50		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
93.2	2,500	0.0320	0.45		Shallow Concentrated Flow, Forest w/Heavy Litter Kv= 2.5 fps
40.0					Direct Entry,
210.9	4,100	Total			

Summary for Subcatchment 2S: Subcatchment 2S

Runoff = 13.22 cfs @ 12.09 hrs, Volume= 1.026 af, Depth> 7.33"
 Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 73,226	98	Paved parking
73,226		100.00% Impervious Area

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Type III 24-hr 100-Year Rainfall=8.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	50	0.0600	4.97		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.1	397	0.0250	3.21		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.3	447	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 3S: Subcatchment 3S

Runoff = 1.45 cfs @ 12.10 hrs, Volume= 0.098 af, Depth> 3.32"
Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
15,373	61	>75% Grass cover, Good, HSG B
15,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	0.99		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
2.2	138	0.0217	1.03		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
3.0	188	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 4S: Subcatchment 4S

Runoff = 2.01 cfs @ 12.09 hrs, Volume= 0.136 af, Depth> 4.33"
Routed to Pond 27P : CB 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
4,994	98	Paved parking
11,469	58	Woods/grass comb., Good, HSG B
16,463	70	Weighted Average
11,469		69.67% Pervious Area
4,994		30.33% Impervious Area

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Type III 24-hr 100-Year Rainfall=8.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	28	0.0710	0.22		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
2.5	21	0.0250	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.5	83	0.0180	2.72		Shallow Concentrated Flow, Paved Kv= 20.3 fps
5.1	132	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 5S: Subcatchment 5S

Runoff = 8.89 cfs @ 12.09 hrs, Volume= 0.625 af, Depth> 5.71"
Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
15,312	39	>75% Grass cover, Good, HSG A
* 41,905	98	Paved parking
57,217	82	Weighted Average
15,312		26.76% Pervious Area
41,905		73.24% Impervious Area

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

Summary for Subcatchment 6.1S: Subcatchment 6.1S

Runoff = 0.51 cfs @ 12.11 hrs, Volume= 0.039 af, Depth> 1.65"
Routed to Pond 14P : CB 2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 1,111	98	Paved parking
10,811	39	>75% Grass cover, Good, HSG A
304	61	>75% Grass cover, Good, HSG B
12,226	45	Weighted Average
11,115		90.91% Pervious Area
1,111		9.09% Impervious Area

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

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Type III 24-hr 100-Year Rainfall=8.20"

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Summary for Subcatchment 6.2S: Subcatchment 6.1S

Runoff = 2.51 cfs @ 12.09 hrs, Volume= 0.172 af, Depth> 4.90"
 Routed to Pond 15P : CB

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 7,804	98	Paved parking
9,373	61	>75% Grass cover, Good, HSG B
1,148	39	>75% Grass cover, Good, HSG A
18,325	75	Weighted Average
10,521		57.41% Pervious Area
7,804		42.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0375	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
0.1	7	0.0610	1.73		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
1.5	240	0.0170	2.65		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.1	23	0.0808	5.77		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.0	320	Total			

Summary for Subcatchment 6S: Subcatchment 6S

Runoff = 7.99 cfs @ 12.09 hrs, Volume= 0.582 af, Depth> 6.39"
 Routed to Pond 6P : DMH to Outfall

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 34,904	98	Paved parking
12,668	61	>75% Grass cover, Good, HSG B
47,572	88	Weighted Average
12,668		26.63% Pervious Area
34,904		73.37% Impervious Area

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Type III 24-hr 100-Year Rainfall=8.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.0400	0.20		Sheet Flow, Grass: Short n= 0.150 P2= 3.36"
1.2	222	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.7	150	0.0330	3.69		Shallow Concentrated Flow, Paved Kv= 20.3 fps
6.1	422	Total			

Summary for Subcatchment 7S: Subcatchment 7S

Runoff = 13.71 cfs @ 12.09 hrs, Volume= 1.037 af, Depth> 7.01"
Routed to Pond 26P : Open-Channel to 48" RCP

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
7,673	61	>75% Grass cover, Good, HSG B
* 69,633	98	Paved parking
77,306	94	Weighted Average
7,673		9.93% Pervious Area
69,633		90.07% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.0100	0.93		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
1.9	351	0.0220	3.01		Shallow Concentrated Flow, Paved Kv= 20.3 fps
2.8	401	Total, Increased to minimum Tc = 6.0 min			

Summary for Subcatchment 8S: Subcatchment 8S

Runoff = 16.05 cfs @ 12.14 hrs, Volume= 1.413 af, Depth> 7.33"
Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 100,813	98	Paved roads w/curbs & sewers
100,813		100.00% Impervious Area

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Type III 24-hr 100-Year Rainfall=8.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.23		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.36"
9.5	1,640	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
10.2	1,690	Total			

Summary for Subcatchment 9S: Subcatchment 9S

Runoff = 16.40 cfs @ 12.09 hrs, Volume= 1.273 af, Depth> 7.33"
Routed to Pond 3P : Rays Pond

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Area (sf)	CN	Description
* 46,046	98	Unconnected pavement
* 44,812	98	Unconnected pavement
90,858	98	Weighted Average
90,858		100.00% Impervious Area
90,858		100.00% Unconnected

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

Summary for Subcatchment 28S: (new Subcat)

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.20"

Summary for Reach DP-1: Design Point 1

Inflow Area = 277.770 ac, 26.47% Impervious, Inflow Depth > 3.56" for 100-Year event
Inflow = 195.41 cfs @ 15.60 hrs, Volume= 82.391 af
Outflow = 195.41 cfs @ 15.60 hrs, Volume= 82.391 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Pond 3P: Rays Pond

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth > 3.52" for 100-Year event
Inflow = 217.15 cfs @ 14.78 hrs, Volume= 79.347 af
Outflow = 193.50 cfs @ 15.64 hrs, Volume= 78.710 af, Atten= 11%, Lag= 51.0 min
Primary = 193.50 cfs @ 15.64 hrs, Volume= 78.710 af
Routed to Pond 24P : On-site Pond Outlet

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Type III 24-hr 100-Year Rainfall=8.20"

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Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 240.42' @ 15.64 hrs Surf.Area= 170,595 sf Storage= 281,844 cf

Plug-Flow detention time= 16.5 min calculated for 78.709 af (99% of inflow)
 Center-of-Mass det. time= 14.4 min (953.0 - 938.6)

Volume	Invert	Avail.Storage	Storage Description			
#1	234.00'	856,184 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
234.00	629	119.0	0	0	629	
236.00	21,382	1,103.0	17,119	17,119	96,325	
238.00	45,969	1,385.0	65,802	82,920	152,213	
240.00	100,000	2,000.0	142,513	225,433	317,910	
242.00	600,977	5,627.0	630,750	856,184	2,519,285	

Device	Routing	Invert	Outlet Devices
#1	Primary	234.30'	48.0" W x 48.0" H Box Culvert L= 92.0' Box, headwall w/3 rounded edges, Ke= 0.200 Inlet / Outlet Invert= 234.30' / 231.20' S= 0.0337 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 16.00 sf

Primary OutFlow Max=193.49 cfs @ 15.64 hrs HW=240.42' (Free Discharge)

↑**1=Culvert** (Inlet Controls 193.49 cfs @ 12.09 fps)

Summary for Pond 6P: DMH to Outfall

Inflow Area = 276.690 ac, 26.46% Impervious, Inflow Depth > 3.00" for 100-Year event
 Inflow = 149.93 cfs @ 15.60 hrs, Volume= 69.209 af
 Outflow = 149.93 cfs @ 15.60 hrs, Volume= 69.209 af, Atten= 0%, Lag= 0.0 min
 Primary = 149.93 cfs @ 15.60 hrs, Volume= 69.209 af
 Routed to Reach DP-1 : Design Point 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 222.95' @ 15.60 hrs
 Flood Elev= 228.92'

Device	Routing	Invert	Outlet Devices
#1	Primary	217.02'	48.0" Round Culvert L= 92.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 217.02' / 214.59' S= 0.0264 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 12.57 sf

Primary OutFlow Max=149.93 cfs @ 15.60 hrs HW=222.95' (Free Discharge)

↑**1=Culvert** (Inlet Controls 149.93 cfs @ 11.93 fps)

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Type III 24-hr 100-Year Rainfall=8.20"

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Summary for Pond 14P: CB 2

Inflow Area = 0.281 ac, 9.09% Impervious, Inflow Depth > 1.65" for 100-Year event
Inflow = 0.51 cfs @ 12.11 hrs, Volume= 0.039 af
Outflow = 0.51 cfs @ 12.11 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.0 min
Primary = 0.51 cfs @ 12.11 hrs, Volume= 0.039 af
Routed to Pond 18P : DMH-P2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 229.40' @ 12.11 hrs
Flood Elev= 234.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	229.00'	12.0" Round Culvert L= 15.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 229.00' / 228.90' S= 0.0067 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=0.50 cfs @ 12.11 hrs HW=229.39' (Free Discharge)
↑1=Culvert (Barrel Controls 0.50 cfs @ 2.60 fps)

Summary for Pond 15P: CB

Inflow Area = 0.421 ac, 42.59% Impervious, Inflow Depth > 4.90" for 100-Year event
Inflow = 2.51 cfs @ 12.09 hrs, Volume= 0.172 af
Outflow = 2.51 cfs @ 12.09 hrs, Volume= 0.172 af, Atten= 0%, Lag= 0.0 min
Primary = 2.51 cfs @ 12.09 hrs, Volume= 0.172 af
Routed to Pond 19P : DMH-P3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 231.90' @ 12.09 hrs
Flood Elev= 235.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	230.90'	12.0" Round Culvert L= 11.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 230.90' / 230.80' S= 0.0091 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=2.46 cfs @ 12.09 hrs HW=231.89' (Free Discharge)
↑1=Culvert (Barrel Controls 2.46 cfs @ 3.95 fps)

Summary for Pond 17P: DMH-P1

Inflow Area = 0.378 ac, 30.33% Impervious, Inflow Depth > 11.87" for 100-Year event
Inflow = 45.43 cfs @ 15.65 hrs, Volume= 12.972 af
Outflow = 45.43 cfs @ 15.65 hrs, Volume= 12.972 af, Atten= 0%, Lag= 0.0 min
Primary = 45.43 cfs @ 15.65 hrs, Volume= 12.972 af
Routed to Pond 18P : DMH-P2

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

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Type III 24-hr 100-Year Rainfall=8.20"

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Peak Elev= 227.52' @ 15.65 hrs

Flood Elev= 233.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	224.50'	36.0" Round Culvert L= 229.0' RCP, rounded edge headwall, Ke= 0.100 Inlet / Outlet Invert= 224.50' / 223.10' S= 0.0061 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=45.43 cfs @ 15.65 hrs HW=227.52' (Free Discharge)

←1=Culvert (Barrel Controls 45.43 cfs @ 7.94 fps)

Summary for Pond 18P: DMH-P2

Inflow Area = 0.659 ac, 21.28% Impervious, Inflow Depth >237.05" for 100-Year event
 Inflow = 45.46 cfs @ 15.65 hrs, Volume= 13.010 af
 Outflow = 45.46 cfs @ 15.65 hrs, Volume= 13.010 af, Atten= 0%, Lag= 0.0 min
 Primary = 45.46 cfs @ 15.65 hrs, Volume= 13.010 af
 Routed to Pond 19P : DMH-P3

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 226.61' @ 15.65 hrs

Flood Elev= 234.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	223.00'	36.0" Round Culvert L= 124.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 223.00' / 222.40' S= 0.0048 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=45.47 cfs @ 15.65 hrs HW=226.61' (Free Discharge)

←1=Culvert (Barrel Controls 45.47 cfs @ 6.77 fps)

Summary for Pond 19P: DMH-P3

Inflow Area = 1.079 ac, 29.58% Impervious, Inflow Depth >146.56" for 100-Year event
 Inflow = 45.56 cfs @ 15.65 hrs, Volume= 13.182 af
 Outflow = 45.56 cfs @ 15.65 hrs, Volume= 13.182 af, Atten= 0%, Lag= 0.0 min
 Primary = 45.56 cfs @ 15.65 hrs, Volume= 13.182 af
 Routed to Pond 20P : DMH-P4

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 225.72' @ 15.65 hrs

Flood Elev= 234.30'

Device	Routing	Invert	Outlet Devices
#1	Primary	222.30'	36.0" Round Culvert L= 290.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 222.30' / 220.90' S= 0.0048 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

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Type III 24-hr 100-Year Rainfall=8.20"

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Primary OutFlow Max=45.58 cfs @ 15.65 hrs HW=225.72' (Free Discharge)

↑1=Culvert (Barrel Controls 45.58 cfs @ 7.09 fps)

Summary for Pond 20P: DMH-P4

Inflow Area = 1.079 ac, 29.58% Impervious, Inflow Depth >146.56" for 100-Year event
Inflow = 45.56 cfs @ 15.65 hrs, Volume= 13.182 af
Outflow = 45.56 cfs @ 15.65 hrs, Volume= 13.182 af, Atten= 0%, Lag= 0.0 min
Primary = 45.56 cfs @ 15.65 hrs, Volume= 13.182 af
Routed to Reach DP-1 : Design Point 1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 224.23' @ 15.65 hrs
Flood Elev= 229.50'

Device	Routing	Invert	Outlet Devices
#1	Primary	220.80'	36.0" Round Culvert L= 133.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 220.80' / 220.00' S= 0.0060 ' / Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 7.07 sf

Primary OutFlow Max=45.56 cfs @ 15.65 hrs HW=224.23' (Free Discharge)

↑1=Culvert (Barrel Controls 45.56 cfs @ 7.07 fps)

Summary for Pond 24P: On-site Pond Outlet

Inflow Area = 270.476 ac, 25.20% Impervious, Inflow Depth > 3.49" for 100-Year event
Inflow = 193.50 cfs @ 15.64 hrs, Volume= 78.710 af
Outflow = 193.59 cfs @ 15.65 hrs, Volume= 78.705 af, Atten= 0%, Lag= 0.8 min
Primary = 148.25 cfs @ 15.65 hrs, Volume= 65.870 af
Routed to Pond 26P : Open-Channel to 48" RCP
Secondary = 45.35 cfs @ 15.65 hrs, Volume= 12.835 af
Routed to Pond 17P : DMH-P1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 236.78' @ 15.65 hrs Surf.Area= 561 sf Storage= 750 cf
Flood Elev= 234.80' Surf.Area= 509 sf Storage= 643 cf

Plug-Flow detention time= 0.1 min calculated for 78.444 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (953.1 - 953.0)

Volume	Invert	Avail.Storage	Storage Description
#1	230.00'	750 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

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Type III 24-hr 100-Year Rainfall=8.20"

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Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
230.00	1	0	0
232.00	16	17	17
233.00	143	80	97
234.00	301	222	319
235.00	561	431	750

Device	Routing	Invert	Outlet Devices
#1	Primary	230.98'	48.0" W x 48.0" H Box Box Culvert-48" L= 41.3' Box, 10-30° wingwalls, square crown, Ke= 0.500 Inlet / Outlet Invert= 230.98' / 230.35' S= 0.0153 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 16.00 sf
#2	Secondary	233.50'	36.0" Round Culvert L= 127.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 233.50' / 226.80' S= 0.0528 '/ Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 7.07 sf

Primary OutFlow Max=148.24 cfs @ 15.65 hrs HW=236.78' (Free Discharge)

↑**1=Box Culvert-48"** (Inlet Controls 148.24 cfs @ 9.27 fps)

Secondary OutFlow Max=45.35 cfs @ 15.65 hrs HW=236.78' (Free Discharge)

↑**2=Culvert** (Inlet Controls 45.35 cfs @ 6.42 fps)

Summary for Pond 26P: Open-Channel to 48" RCP

Inflow Area = 274.285 ac, 26.05% Impervious, Inflow Depth > 2.98" for 100-Year event
 Inflow = 149.20 cfs @ 15.64 hrs, Volume= 68.031 af
 Outflow = 149.33 cfs @ 15.60 hrs, Volume= 68.002 af, Atten= 0%, Lag= 0.0 min
 Primary = 149.33 cfs @ 15.60 hrs, Volume= 68.002 af
 Routed to Pond 6P : DMH to Outfall

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 234.38' @ 15.60 hrs Surf.Area= 2,421 sf Storage= 3,476 cf
 Flood Elev= 231.90' Surf.Area= 2,335 sf Storage= 3,238 cf

Plug-Flow detention time= 0.4 min calculated for 67.776 af (100% of inflow)
 Center-of-Mass det. time= 0.3 min (948.0 - 947.7)

Volume	Invert	Avail.Storage	Storage Description
#1	228.00'	3,476 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
228.00	1	0	0
229.00	35	18	18
230.00	670	353	371
231.00	1,560	1,115	1,486
232.00	2,421	1,991	3,476

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Type III 24-hr 100-Year Rainfall=8.20"

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Device	Routing	Invert	Outlet Devices
#1	Primary	228.48'	48.0" Round RCP_Round 48" L= 717.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 228.48' / 217.12' S= 0.0158 '/ Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 12.57 sf

Primary OutFlow Max=149.33 cfs @ 15.60 hrs HW=234.38' (Free Discharge)

↑1=RCP_Round 48" (Inlet Controls 149.33 cfs @ 11.88 fps)

Summary for Pond 27P: CB 1

Inflow Area = 0.378 ac, 30.33% Impervious, Inflow Depth > 4.33" for 100-Year event
 Inflow = 2.01 cfs @ 12.09 hrs, Volume= 0.136 af
 Outflow = 2.01 cfs @ 12.09 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min
 Primary = 2.01 cfs @ 12.09 hrs, Volume= 0.136 af
 Routed to Pond 17P : DMH-P1

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 231.74' @ 12.09 hrs

Flood Elev= 234.65'

Device	Routing	Invert	Outlet Devices
#1	Primary	230.90'	12.0" Round Culvert L= 7.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 230.90' / 230.80' S= 0.0143 '/ Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 0.79 sf

Primary OutFlow Max=1.98 cfs @ 12.09 hrs HW=231.73' (Free Discharge)

↑1=Culvert (Barrel Controls 1.98 cfs @ 3.82 fps)

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APPENDIX E

CONSTRUCTION PERIOD EROSION AND SEDIMENTATION CONTROL PLAN

Garelick Farms Stormwater Improvements
Franklin, MA

September 2025

Prepared for:

Dandreo Brothers General Contractors

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Section 1

Introduction

Stormwater runoff from construction activities can have a significant impact on water quality. As stormwater flows over a construction site, it can pick up pollutants like sediment, debris, and chemicals and transport these to a nearby storm sewer system or directly to a river, lake, or coastal water. Polluted stormwater runoff can harm or kill fish and other wildlife. Sedimentation can destroy aquatic habitat, and high volumes of runoff can cause stream bank erosion. Debris can clog waterways and potentially reach the ocean where it can kill marine wildlife and impact habitat.

Standard 8 of the Massachusetts Stormwater Standards requires:

“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”.

The following Erosion and Sediment Control Plan (ESCP) identifies the requirements to comply with Standard 8.

Section 2 Project Information

2.1 Plan Contents

This ESCP was developed for the Garelick Farms Stormwater Improvements Project in Franklin, Massachusetts. This ESCP provides permit-related information to satisfy the requirements of Standard 8 of the Massachusetts Stormwater Handbook.

2.2 Project/ Site Information

Project Name and Address

Project/Site Name:	Garelick Farms Stormwater Improvements
Project Street/Location:	1199 West Central Street
City:	Franklin
State:	Massachusetts
ZIP Code:	02038
County or Similar Subdivision:	Norfolk

2.3 Nature of the Construction Activity

General Description of Project

The project will be performed within the eastern portion of the Garelick Farms property throughout the paved areas to install a 36" diameter stormwater pipe with associated manholes to convey stormwater from the southern portion of the site where flooding regularly occurs to the northeastern wetland located on the site. Two catch basins will be removed with existing piping abandoned and replaced. The two catch basins will be replaced and connected to the new stormwater system.

Size of Construction Project

Total size of the property: 52 acres

Total area expected to be disturbed by the construction activities: 0.5 acres

The maximum area expected to be disturbed at any one time (in acres): 0.5 acres

TABLE 2-4

Pollutant-Generating Activities

Pollutant-Generating Activity	Pollutants or Pollutant Constituents (that could be discharged if exposed to stormwater)
Site work	Soil particles and fines
Paving and construction areas	Petroleum, concrete, vehicle fluids, paints, solvents
Concrete construction	Concrete

Pollutant-Generating Activity	Pollutants or Pollutant Constituents (that could be discharged if exposed to stormwater)
Pavement marking	Paint
Solid waste storage	Construction debris, trash
Equipment use	Hydraulic Oils/fluids
Equipment use	Antifreeze/coolant
Portable toilets	Sewage
Staging areas	Sediment, gasoline, fuel oil, concrete, vehicle fluids, paints, solvents, fertilizers, adhesives, antifreeze/coolant, hydraulic oil/fluid, etc.

2.4 Sequence and Estimated Dates of Construction Activities

The following is an anticipated construction sequence identifying the major components of construction for the project.

2.4.1 Construction Sequence

Estimated Start Date of Construction Activities for this Phase	November 2025
Estimated End Date of Construction Activities for this Phase	April 2025
Estimated Date(s) of Application of Stabilization Measures for Areas of the Site Required to be Stabilized	March-April 2025
Estimated Date(s) when Stormwater Controls will be Removed	April 2025

2.5 Allowable Non-Stormwater Discharges

Water from non-stormwater sources are allowed when properly managed. The following identifies discharge sources anticipated with the project.

TABLE 2-5

List of Allowable Non-Stormwater Discharges Present at the Site

Type of Allowable Non-Stormwater Discharge	Likely to be Present at Your Site?	Location on Site
Discharges from emergency fire-fighting activities	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Fire hydrants on site
Fire hydrant flushings	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Landscape irrigation	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Vegetated areas on site

Waters used to wash vehicles and equipment ¹	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Water used to control dust	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Potable water including uncontaminated water line flushings	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
External building wash down, provided soaps, solvents, and detergents are not used, and external surfaces do not contain hazardous substances (e.g. see Appendix A) (e.g. paint or caulk containing PCBs)	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Pavement wash waters ²	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Uncontaminated air conditioning or compressor condensate	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Uncontaminated, non-turbid discharges of ground water or spring water	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Foundation or footing drains ³	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
Construction dewatering water ⁴	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Throughout site, from excavated trenches*

¹provided that there is no discharge of soaps, solvents, or detergents used for such purposes

²provided spills or leaks of toxic or hazardous substances have not occurred (unless all spill material has been removed) and where soaps, solvents, and detergents are not used. You are prohibited from directing pavement wash waters directly into any water of the U.S., storm drain inlet, or stormwater conveyance, unless the conveyance is connected to a sediment basin, sediment trap, or similarly effective control;

³where flows are not contaminated with process materials such as solvents or contaminated ground water

⁴discharged in accordance with applicable regulations

* **No** untreated or contaminated groundwater will be discharged to wetlands or waterways. Excess water will be discharged overland in upland areas and allowed to naturally infiltrate in well-drained soils, or discharged to wetlands or streams only after passing through filtration sacks or similar devices.

2.6 Site Maps

Site plans have been prepared which provide the Contractor will the minimum requirements for the prevention of erosion and sedimentation due to construction impacts. Erosion controls are depicted on the site plans, provided under separate cover. The site plans provide locations of perimeter erosion controls, inlet controls, and construction-period stormwater management features such as sediment traps.

Section 3

Erosion and Sediment Controls

The Contractor must implement erosion and sediment controls in accordance with the following requirements to minimize the discharge of pollutants in stormwater from construction activities. This project also includes site specific controls and permit conditions which may take precedent and are not included in the following descriptions. The Contractor shall also comply with the requirements in the project's permits.

3.1 Perimeter Controls

Provide perimeter controls to prevent sediment from entering and compromising the adjacent storm drain system.

General

Roadways and storm drainage components adjacent to the proposed project area will be protected by a row of erosion control barriers. The erosion control barriers consist of straw wattles or mulch-filled tubes (e.g. compost filter tubes/socks) placed in a fashion that restricts the contractor(s) to the areas necessary to conduct the work and will generally define the limits of work. The locations of these barriers are shown on the project drawings.

Specific Perimeter Controls

Perimeter Control Description

- Perimeter controls include the installation of a straw wattle or mulch log barrier around the perimeter of the site. Perform work in accordance with the ESCP.

Installation

- Temporary erosion control measures shall be installed prior to the start of any earth disturbing activities.
- Erosion control barriers shall not be removed until their removal is approved by the Engineer.

Maintenance Requirements

- The contractor(s) will be required to maintain a reserve supply of erosion control barriers on-site to make repairs, as necessary.
- Perimeter control shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. They shall be repaired if there are any signs of erosion or sedimentation below them, and any repairs shall be made immediately. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water behind them, sediment barriers shall be replaced with a temporary check dam.
- Should the fabric on a barrier decompose or become ineffective prior to the end of the expected usable life and the barrier still is necessary, the fabric shall be replaced promptly.
- Sediment deposits should be removed after each storm event. They must be removed when deposits reach approximated 1/3 the height of the barrier.

At the conclusion of the project, the erosion control barriers will be removed and properly disposed off-site following the stabilization of disturbed areas.

3.2 Sediment Track-Out

General

It is the Contractor's responsibility to take measures to prevent tracking of sediment from the project site. It is also the Contractor's responsibility to take measures to prevent tracking of sediment from any staging and material storage area. A stone tracking pad and street sweeping apparatus shall be used as necessary to minimize the track-out of sediment onto adjacent streets, other paved areas, and sidewalks from vehicles exiting the construction site.

Specific Track-Out Controls

Track-Out Controls Description

- Stone aggregate tracking pad
- Street sweeping

Installation

- Sediment track out controls to be installed by the Contractor include a stone aggregate tracking pad with an underlying geotextile fabric. The pad shall be constructed in accordance with the ESCP.

Maintenance Requirements

- The site exit shall be maintained in a condition which will prevent tracking of sediment onto public right-of-way. When washing is required, it shall be done in an area stabilized with aggregate which drains into a sediment trapping controls.
- If sediment is tracked out from the site to the surface of off-site streets, other paved areas, and sidewalks, the Contractor shall remove the deposited sediment by the end of the same work day in which the track-out occurs.

3.3 Stockpiled Sediment or Soil

General

Temporary soil stockpiles shall be surrounded by hay bales or silt fence and shall be stabilized by covering or temporary erosion control seeding. Stockpiles are to be located as far as possible from any surface water.

Specific Stockpile Controls

Description

- Temporary stockpiles of excavated soil may be present at the site as construction progresses.

Installation

- Install a sediment barrier consisting of silt fencing or straw bales along downgradient perimeter areas of stockpiles.

- For piles that will be unused for 14 or more days, temporary stabilization with erosion control seeding shall be used if perimeter controls and/or temporary covering are not sufficient to prevent sediment migration.

Maintenance Requirements

- Do not hose down or sweep soil or sediment accumulated on pavement or other impervious surfaces into any stormwater conveyance (unless connected to a sediment basin, sediment trap, or similarly effective control), storm drain inlet, or surface water.

3.4 Minimize Dust

General

The Contactor shall be responsible for the control of dust throughout the construction period. Dust control methods shall include, but be not limited to, sprinkling water or calcium chloride on exposed areas, covering loaded dump trucks leaving the site, and temporary mulching exposed soil areas. Dust control measures shall be utilized to prevent the migration of dust from the site to abutting areas.

Specific Dust Controls

Description

- Prevent dust from becoming a nuisance or hazard. During construction, excavated material and open or stripped areas are to be policed and controlled to prevent spreading of the material.
- Dust control measures shall be utilized to prevent the migration of dust from the site to abutting areas.
- Ensure that the existing equipment, facilities, and occupied space adjacent to or nearby areas of the work do not come in contact with dust or debris as a result of concrete demolition, excavation or surface preparation.

Installation

- Dust control methods shall include, but be not limited to, sprinkling water on exposed areas, using calcium chloride, covering loaded dump trucks leaving the site, and temporary mulching.
- Use a mechanical street sweeper daily.

Maintenance Requirements

- During the work on-site, daily all paved road and driveway surfaces shall be scraped and broomed free of excavated materials on a daily basis. Prior to sweeping, or as needed during the work day, the surfaces shall be hosed down or otherwise treated to eliminate active or potential dust conditions and the natural road or wearing surface shall be exposed.

3.5 Minimize the Disturbance of Steep Slopes

General

All slopes greater than 15% during the regular construction season are to have slope stabilization measures. This applies to all slopes greater than 8% after October 1st.

Specific Steep Slope Controls

- Where slopes greater than 3:1 will be created, synthetic erosion control fabric is to be utilized in these areas to prevent erosion until permanent vegetation is established.

3.6 Topsoil/Loam Areas**General**

All areas not to be paved or otherwise treated shall receive 4-inch loam and seed. The salvaging of existing loam and topsoil is not anticipated due to the urban nature of the site.

Specific Topsoil/Loam Area Controls

Description

- Erosion of topsoil/ loam areas will be controlled by providing temporary and permanent grass cover.
- Where slopes greater than 3:1 will be created, synthetic erosion control fabric will be utilized to prevent erosion until permanent vegetation is established.

Installation

- Temporary vegetative cover shall be provided to stabilize the site in areas where additional construction activity will not occur for more than 14 calendar days.

Maintenance Requirements

- Seeding shall be inspected periodically and at a minimum 95% of the soil surface should be covered by vegetation. If any evidence of erosion is apparent, repairs shall be made and additional measures shall be used to prevent further erosion.
- Straw mulch, wood fiber mulch, or erosion control blankets shall be applied immediately after seeding.

3.7 Soil Compaction**General**

In areas where final vegetative stabilization is proposed, the Contractor shall prevent excessive compaction by:

- Restricting vehicle and equipment use in these locations to avoid excessive soil compaction; or
- Prior to seeding or planting areas of exposed soil that have been compacted, use techniques that aerates the soils resulting in conditions that will support vegetative growth.

3.8 Storm Drain Inlets**General**

Provide catch basin inlet protection as per construction drawings and specifications in all catch basins within the vicinity of the earth disturbing activities to protect the

stormwater management system from high sediment loads and high velocities, while disturbance due to construction is occurring in the drainage area.

Specific Storm Drain Inlet Controls

Description

- Storm Drain Inlet Controls include the installation of Silt Sacks
- Refer to the ESCP for inlet control locations.

Installation

- Refer to manufacturer recommended specifications and installation instructions.

Maintenance Requirements

- Silt sacks shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. They shall be repaired or replaced as needed immediately.
- Sediment deposits should be removed after each storm event. They must be cleaned when deposits reach approximated 1/3 the height of the barrier.
- The Contractor shall remove the deposited sediment and make any repairs by the end of the same work day in which the sediment is observed or by the end of the next work day if observation occurs on a non-work day.

3.9 Sediment Traps

General

Permanent sediment basins are not proposed as part of the final stormwater management system, however, temporary sediment basins or sediment traps may be used during construction to retain runoff and settle out particles prior to discharge from the site.

Specific Sediment Basin/Sediment Trap Controls

Description

- Temporary sediment basins or sediment traps may be excavations or bermed detention areas on site with stabilized discharges.

Installation

- As required due to site conditions and activities.

Maintenance Requirements

- Contractor shall periodically remove sediments and dispose of them in an appropriate location. Discharge locations shall be inspected regularly and stabilized as necessary.

3.10 Dewatering Practices

General

Dewatering is anticipated for this project. Standard dewatering measures will be employed. No untreated groundwater will be discharged to wetlands or waterways. Excess water will be discharged overland in upgradient areas and allowed to naturally infiltrate or discharged to the drainage system only after passing through filtration sacks or similar devices.

Specific Dewatering Practices

Dewatering Practice Description

- Provide, operate and maintain adequate pumping, diversion and drainage facilities in accordance with the approved dewatering plan to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground. Locate dewatering system components so that they do not interfere with construction under this or other contracts.
- Install erosion/sedimentation controls for velocity dissipation at point discharges onto non-paved surfaces.

Installation

- Install sand and gravel, or crushed stone, filters in conjunction with sumps, well points, and/or deep wells to prevent the migration of fines from the existing soil during the dewatering operation.
- Transport pumped or drained water without interference to other work, damage to pavement, other surfaces, or property. Pump water through a silt filter bag prior to discharge to grade or drainage system.
- Do not discharge water into any separated sanitary sewer system.

Maintenance Requirements

- Repair any damage resulting from the failure of the dewatering operations and any damage resulting from the failure to maintain all the areas of work in a suitable dry condition.
- Take actions necessary to ensure that dewatering discharges comply with permits applicable to the Project. Dispose of water from the trenches and excavations in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.

3.11 Site Stabilization

General

Initiate site stabilization measures immediately whenever earth-disturbing activities have permanently ceased or will be temporarily suspended on any portion of the site for more than 14 days.

Complete the stabilization activities within 14 days after the permanent or temporary cessation of earth-disturbing activities. Temporary paving of disturbed areas of existing roads should be completed at a minimum at the end of each week.

Use the following stabilization practices to protect exposed soil from erosion and prevent sediment movement.

3.11.1 Seeding

Installation

- When construction has temporarily or permanently ceased, seeding shall occur immediately in accordance with the project specifications.

Maintenance Requirements

- Periodic inspections shall occur once a week and after every rainstorm of 0.25 inches or greater until a minimum of 70% of the soil surface is covered by vegetation.

3.11.2 Mulching

Installation

- When construction has temporarily or permanently ceased, mulching shall occur immediately, as required, for erosion control while vegetation is being established.

Maintenance Requirements

- Periodic inspections shall occur once a week and after every rainstorm 0.25 inches or greater.

3.11.3 Erosion Control Mats or Blankets

Installation

- When construction has temporarily or permanently ceased, erosion control blanket installation shall occur immediately on slopes greater than 3:1, or as required, for erosion control while vegetation is being established.

Maintenance Requirements

- Periodic inspections shall occur once a week and after every rainstorm 0.25 inches or greater.

Section 4 Pollution Prevention Standards

A clean and orderly construction site will reduce the opportunity for pollutants to enter the stormwater runoff stream. The following identifies sources of pollution anticipated on a typical construction site and preventative measures to avoid pollution.

4.1 Potential Sources of Pollution

TABLE 4-1

Construction Site Pollutants

Pollutant-Generating Activity	Pollutants or Pollutant Constituents	Location on Site
Site work	Soil particals and fines	Where disturbance is proposed
Paving and construction areas	Petroleum, concrete, vehicle fluids, paints, solvents	Where paving and construction is proposed
Disinfection of water mains	Chlorine, dechlorination chemicals	Where water mains are proposed
Concrete construction	Concrete	Where concrete is proposed
Pavement marking	Paint	Where pavement markings are proposed
Solid waste storage	Construction debris, trash	In dumpster locations
Fertilizing	Fertilizers	In areas of proposed seeding
Equipment use	Hydraulic Oils/fluids	Leaks/broken hoses from equipment
Equipment use	Antifreeze/coolant	Leaks/broken hoses from equipment
Portable toilets	Sewage	Where portable toilets are located
Staging areas	Sediment, gasoline, fuel oil, concrete, vehicle fluids, paints, solvents, fertilizers, adhesives, antifreeze/coolant, hydraulic oil/fluid, etc.	

4.2 Spill Prevention and Response

- Manufacturer’s recommended methods for cleanup will be clearly posted and site personnel will be made aware of the procedures and the location of the information and clean up supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage areas on site. Equipment and materials will include but not be limited to

brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, sawdust and plastic or metal trash containers specifically for this purpose.

- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with hazardous substances.
- Spills of toxic or hazardous material will be reported to the appropriate state or local government agency regardless of size.
- The Spill Prevention Plan will be adjusted to include measures to prevent this type of spill from recurring and how to cleanup the spill if it recurs. A description of the spill, its cause and the cleanup measures will be included.
- The site superintendent responsible for day to day operations will be the Spill Response Coordinator (SRC). The SRC is responsible for decisive actions in the event of a spill at the facility. The SRC will supervise efforts to provide immediate containment of the spill to prevent a more difficult cleanup situation. Cleanup crews will utilize proper spill cleanup materials and employ safe work practices.

4.2.1 Federal and State Spill Notification

In accordance with 310 CMR 40.0333, the SRC shall notify the Massachusetts Department of Environmental Protection (Central Region) - (508)-792-7650, the Local Emergency Planning Committee (LEPC) and any other authorities or agencies within two hours if an accident or other type of incident results in a release to:

- Land
 - 10 Gallons for more Oils (PCB<500 ppm)
 - 1 Gallon or more Oils (PCB ≥500 ppm)
- Waterways
 - Any quantity of Oils
- Or, triggers the exposure to toxic chemical levels as listed in 301 CMR 40.1600, Revised Massachusetts Contingency Plan

The SRC shall notify the National Response Center (NRC) at **(800) 424-8802** where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.3.4c and established under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, occurs during a 24-hour period.

In either event, the SRC will work with state and federal agencies to ensure that all appropriate forms and reports are submitted in a timely manner.

- Note: Trigger volumes for other chemical spills vary. Contact the DEP or a Licensed Site Professional (LSP) for specific guidance on reporting thresholds and requirements for other chemicals.

4.2.2 Local Notification

The following local agencies will be called to provide emergency assistance at the facility on the judgment of the SRC:

TABLE 4-2

Emergency Assistance Notification

Fire Department 911 or (508) 528-2323	Police Department 911 or (508) 528-1212
Hospital: Milford Regional Medical Center (508) 473-1190	Department of Public Works: (508) 553-5500

4.3 Fueling and Maintenance of Equipment or Vehicles

General

Efforts shall be made to perform equipment/vehicle fueling and maintenance off-site. If fueling and/or maintenance of equipment or vehicles is performed on site, the following pollution prevention practices must be provided.

Specific Pollution Prevention Practices

- Site contractor/project manager shall provide an onsite vehicle fueling and maintenance area that is clean and dry.
- If possible keep area covered.
- Keep a spill kit at the fueling and maintenance area.
- Vehicles shall be inspected regularly for leaks and damage.
- Use drip pans, drip cloths or absorbent pads when replacing spent fluid.

4.4 Washing of Equipment and Vehicles

General

Efforts shall be made to perform equipment/vehicle washing and maintenance off-site. If washing of equipment and vehicles is performed on site, the following pollution prevention practices must be provided to minimize the discharge of pollutants.

Specific Pollution Prevention Practices

- Site contractor/project manager shall provide a proper washing area.
- Discharges from washing areas shall be infiltrated or diverted into sanitary sewer system unless no soaps or detergents are used.
- If soaps, detergents or solvents are stored onsite over must be provided to prevent these detergents from coming into contact with rainwater.

4.5 Storage, Handling, and Disposal of Construction Products, Materials, and Wastes

4.5.1 Building Products

- Site contractor/project manager shall designate a waste collection area on the site that does not receive a substantial amount of runoff from upland areas and does not drain directly to a water body.
- Ensure that containers have lids so they can be covered before periods of rain, and keep containers in a covered area whenever possible.
- Schedule waste collection to prevent the containers from overflowing.
- Clean up spills immediately. For hazardous materials, follow cleanup instructions on the package. Use an absorbent material such as sawdust or kitty litter to contain the spill.
- During the demolition phase of construction, provide extra containers and schedule more frequent pickups.
- Collect, remove, and dispose of all construction site wastes at authorized disposal areas.

4.5.2 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscaping Materials

- Store new and used materials in a neat, orderly manner in their appropriate containers in a covered area. If storage in a covered area is not possible, the materials shall be covered with polyethylene or polypropylene sheeting to protect them from the elements.
- Storage area should include precautions to contain any potential spills.
- Immediately contain and clean up any spills with absorbent materials.

4.5.3 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

- Store new and used petroleum products for vehicles in a neat, orderly manner in their appropriate containers in a covered area. If storage in a covered area is not possible, the materials shall be covered with polyethylene or polypropylene sheeting to protect them from the elements.
- Storage area should include precautions to contain any potential spills.
- Immediately contain and clean up any spills with absorbent material.
- Have equipment available in fuel storage areas and in vehicles to contain and clean up any spills that occur.

4.5.4 Hazardous or Toxic Waste

- Store new and used materials in a neat, orderly manner in their appropriate containers in a covered area. If storage in a covered area is not possible, the materials shall be covered with polyethylene or polypropylene sheeting to protect them from the elements.
- Storage areas should include precautions to contain any potential spills.

- Immediately contain and clean up any spills with absorbent materials.
- Have equipment available in fuel storage areas and in vehicles to contain and clean up any spills that occur.
- To prevent leaks, empty and clean hazardous waste containers before disposing of them.
- Never remove the original product label from the container because it contains important safety information. Follow the manufacturer's recommended method of disposal, which should be printed on the label.
- Never mix excess products when disposing of them, unless specifically recommended by the manufacturer.

4.5.5 Construction and Domestic Waste

- All materials shall be collected and stored in securely lidded receptacles, no construction waste materials will be buried. Clean up immediately if containers overflow.

4.5.6 Sanitary Waste

- Portable sanitary units will be provided throughout the course of the project for use by the site contractor/project manager's employees. A licensed sanitary waste management contractor will regularly collect all sanitary waste from the portable units. Position portable toilets so that they are secure and will not be tipped or knocked over.

4.6 Washing of Applicators and Containers used for Paint, Concrete or Other Materials

- The contractors should be encouraged where possible, to use washout facilities at their own plant or dispatch facility from stucco, paint, concrete, form release oils, curing compounds, and other construction materials.
- If washout of these materials is done on site:
 - Direct all washwater into a leak-proof container or leak-proof pit. The container or pit must be designed so that no overflows can occur due to inadequate sizing or precipitation.
 - Handle washout or cleanout wastes as follows:
 - Do not dump liquid wastes in the storm sewers
 - Dispose of liquid wastes in accordance with applicable regulations
 - Remove and dispose of hardened concrete waste consistent with your handling of other construction wastes in Section 5.5.
 - Attempts should be made to locate washout area as far away as possible from surface waters and stormwater inlets or conveyances, and to the extent practicable, designate areas to be used for these activities and conduct such activities only in these areas.
- Inspect washout facilities daily to detect leaks or tears and to identify when materials need to be removed.

4.7 Fertilizers

If fertilizers are to be used on site, the following requirements shall be followed:

- Store new and used materials in a neat, orderly manner in their appropriate containers in a covered area. If storage in a covered area is not possible, the materials shall be covered with polyethylene or polypropylene sheeting to protect them from the elements.
- Storage area should include precautions to contain any potential spills.
- Immediately contain and clean up any spills with absorbent materials.
- Apply at a rate and in amounts consistent with manufacturer's specifications, or document departures from the manufacturer's specifications.
- Apply at the appropriate time of year for the site, and preferably timed to coincide as closely as possible to the period of maximum vegetation uptake and growth
- Avoid applying before heavy rains that could cause excessive nutrients to be discharged
- Never apply to frozen ground
- Never apply to stormwater conveyance channels with flowing water
- Follow all federal, state, tribal, and local requirements regarding fertilizer application.

Tighe&Bond

APPENDIX F

**LONG-TERM POLLUTION PREVENTION AND
STORMWATER MANAGEMENT SYSTEM
OPERATION AND MAINTENANCE PLAN**

Garelick Farms Stormwater Improvements
Franklin, MA

September 2025

Prepared for:

Dandreo Brothers General Contractors

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Section 1

Introduction and Purpose

The following Long-Term Pollution Prevention and Stormwater Operations and Maintenance (O&M) Plan has been prepared for the stormwater management system at the proposed Garelick Farms Stormwater Improvements project in Franklin, MA. The purpose of the plan is to provide guidance and procedures for proper pollution prevention and stormwater management system maintenance following construction completion.

The proposed project has been designed in compliance with the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Handbook and the Town of Franklin Stormwater Regulations to maintain or improve stormwater runoff quality and quantity. The stormwater management system components shall be maintained as recommended in the Massachusetts Stormwater Handbook.

Section 2 Responsible Parties

Garelick Farms is responsible for maintaining and servicing the existing facility and the proposed stormwater management facilities post construction. The property is owned by Garelick Farms. During construction, the contractor will be responsible for stormwater management system maintenance.

Property Owner:

Garelick Farms
1199 West Central Street
Franklin, MA 02038

Owner Signature, date:

Maintenance Contact:

Alejandro Osorio
Sr. Mgr. Engineering
1199 West Central St
Franklin, MA 02038
Cell: (857)-243-4625

Maintenance Contact
Signature, date:

Section 3

Long Term Pollution Prevention Plan

3.1 Good Housekeeping

The goal of the good housekeeping policy is to keep the site in a clean and orderly condition. A disorderly site can lead to improper materials management and can reduce the efficiency of any response to potential pollution problems.

The following good housekeeping measures will be followed at the site to aid in pollution prevention:

- Promptly clean and remove any spills or contamination from vehicles or other services.
- Perform preventative maintenance on the structural components of the stormwater system.
- Properly dispose of refuse.

3.2 Potential Sources of Pollution

The following sources of pollution are anticipated as part of the long-term use of the project.

Pollutant-Generating Activity	Pollutants or Pollutant Constituents (that could be discharged if exposed to stormwater)
Vehicular Access	Petroleum, concrete, vehicle fluids, paints, solvents
Solid waste storage	Construction debris, trash
Landscaping Activities	Fertilizers, pesticides, herbicides
Equipment use	Hydraulic oils, fluids, antifreeze, coolant

3.3 General Spill Prevention and Response

In the event of a spill, the following procedures shall be followed by the Maintenance Contact or their authorized representative:

- Manufacturer's recommended methods for cleanup will be clearly posted and facility personnel will be made aware of the procedures and the location of the information and clean up supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage areas at the facility. Equipment and materials will include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, kitty litter, sand, sawdust and plastic or metal trash containers specifically for this purpose.
- All spills will be cleaned up immediately after discovery.

- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with hazardous substances.
- Spills of toxic or hazardous material will be reported to the appropriate state or local government agency regardless of size.
- The Spill Prevention Plan will be adjusted to include measures to prevent this type of spill from recurring and how to cleanup the spill if it recurs. A description of the spill, its cause and the cleanup measures will be included.
- The Maintenance Contact is responsible for day to day operations will be the spill prevention and cleanup coordinator.

3.3.1 Federal and State Spill Notification

In accordance with 310 CMR 40.0333, the Maintenance Contact shall notify the Massachusetts Department of Environmental Protection (Central Region) – (508) 792-7650 the Local Emergency Planning Committee (LEPC) (if applicable) and any other authorities or agencies within two hours if an accident or other type of incident results in a release to:

- land
 - 10 Gallons for more Oils (PCB<500 ppm)
 - 1 Gallon or more Oils (PCB ≥500 ppm)
- waterways
 - Any quantity of Oils
- Or, triggers the exposure to toxic chemical levels as listed in 301 CMR 40.1600, Revised Massachusetts Contingency Plan (MPC)

The Maintenance Contact shall notify the National Response Center (NRC) at **(800) 424-8802** where a leak, spill, or other release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity consistent with Part 2.3.3.4c and established under either 40 CFR Part 110, 40 CFR Part 117, or 40 CFR Part 302, occurs during a 24-hour period.

In either event, the Maintenance Contact will work with state and federal agencies to ensure that all appropriate forms and reports are submitted in a timely manner.

- Note: Trigger volumes for other chemical spills vary. Contact the MassDEP or a Licensed Site Professional (LSP) for specific guidance on reporting thresholds and requirements for other chemicals.

3.3.2 Local Notification

The following local agencies will be called to provide emergency assistance at the facility on the judgment of the Maintenance Contact:

Fire Department 911 or (508) 528-2323	Police Department 911 or (508) 528-1212
Hospital: Milford Regional Medical Center	Department of Public Works: (508) 553-5500

(508) 473-1190	
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3.3.3 Fueling and Maintenance of Equipment or Vehicles

Efforts shall be made to perform equipment/vehicle fueling, washing, and maintenance off-site to avoid spills. If fueling and/or maintenance of equipment of vehicles is performed on site, the following pollution prevention practices must be provided.

3.4 Storage, Handling, and Disposal of Materials and Wastes

The following procedures shall be followed throughout the facility when storing, handling and disposing of various materials.

3.4.1 Pesticides, Herbicides, Insecticides, Fertilizers, and Landscaping Materials

- Store new and used materials in a neat, orderly manner in their appropriate containers in a covered area. If storage in a covered area is not possible, the materials shall be covered with polyethylene or polypropylene sheeting to protect them from the elements.
- Storage area should include precautions to contain any potential spills.
- Immediately contain and clean up any spills with absorbent materials.
- Apply at a rate and in amounts consistent with manufacturer's specifications, or document departures from the manufacturer's specifications.
- Apply at the appropriate time of year for the site, and preferably timed to coincide as closely as possible to the period of maximum vegetation uptake and growth
- Avoid applying before heavy rains that could cause excessive nutrients to be discharged
- Never apply to frozen ground
- Never apply to stormwater conveyance channels with flowing water
- Follow all federal, state, tribal, and local requirements regarding fertilizer application.

3.4.2 Diesel Fuel, Oil, Hydraulic Fluids, Other Petroleum Products, and Other Chemicals

- Store new and used petroleum products for vehicles in a neat, orderly manner in their appropriate containers in a covered area. If storage in a covered area is not possible, the materials shall be covered with polyethylene or polypropylene sheeting to protect them from the elements.
- Storage area should include precautions to contain any potential spills.
- Immediately contain and clean up any spills with absorbent material.
- Have equipment available in fuel storage areas and in vehicles to contain and clean up any spills that occur.

3.4.3 Hazardous or Toxic Waste

- Store new and used materials in a neat, orderly manner in their appropriate containers in a covered area. If storage in a covered area is not possible, the materials shall be covered with polyethylene or polypropylene sheeting to protect them from the elements.
- Storage areas should include precautions to contain any potential spills.
- Immediately contain and clean up any spills with absorbent materials.
- Have equipment available in fuel storage areas and in vehicles to contain and clean up any spills that occur.
- To prevent leaks, empty and clean hazardous waste containers before disposing of them.
- Never remove the original product label from the container because it contains important safety information. Follow the manufacturer's recommended method of disposal, which should be printed on the label.
- Never mix excess products when disposing of them, unless specifically recommended by the manufacturer.

3.4.4 Domestic Waste

- Site property manager shall designate a waste collection area on the site that does not receive a substantial amount of runoff from upland areas and does not drain directly to a water body.
- Ensure that containers have lids so they can be covered before periods of rain and keep containers in a covered area whenever possible.
- Schedule waste collection to prevent the containers from overfilling.
- Clean up spills immediately. For hazardous materials, follow cleanup instructions on the package. Use an absorbent material such as sawdust or kitty litter to contain the spill.

Section 4

Stormwater Management System

The on-site stormwater management system is comprised of a series of deep-sump catch basins, manholes, proprietary water quality units, and a stormwater outfall. In general, runoff from the proposed project area, including building rooftops, paved and unpaved parking areas, is collected and piped to the stormwater outfall at the northeastern wetland.

See the attached Figure 1 in Appendix A for the location of the various described components of the Stormwater Management System.

4.1 Inspections

Inspections will be performed in accordance with the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Handbook. Figure 1, provided in Appendix A, identifies the location of each BMP to be inspected and maintained as described in this Section. All inspections should be logged using the Inspection Forms provided in Section 5.

The following stormwater management system features will be evaluated during each inspection:

4.1.1 Vegetated Surfaces

Inspection Frequency: Bi-annually in Summer and Winter

Special Inspection Event(s): Spring Snow Melt

All vegetative surfaces will be observed to identify locations of settlement, erosion and other impacts from the proposed stormwater redevelopment. Areas of settlement and erosion that may result in a discharge of sediment into Waters of the Commonwealth shall be repaired and restored to a vegetated condition.

4.1.2 Driveway and Walkway Sweeping

Inspection Frequency: Quarterly

Special Inspection Event(s): Spring Snow Melt

All pavement surfaces should be inspected annually for deterioration or spalling. Additionally, the pavement surface should be regularly monitored to make sure it drains properly after storms. Cleanings should be conducted on a quarterly basis to prevent clogging. For best management practices, high-efficiency vacuum sweeping machines should be used to clean and maintain the surface.

4.1.3 Deep-Sump, Hooded Catch Basins

Inspection Frequency: Quarterly

Special Inspection Event(s): Rainfall greater than 0.5 inches

Deep sump catch basins should be inspected at least four times per year. The Visual inspection should ascertain that the catch basin is functioning properly (i.e. no blockages or obstructions to the outlet and/or hood) and to measure the amount of solid materials that have accumulated in the sump. This can be done with a calibrated dipstick, tape measure or other measuring instrument so that the depth of deposition in the sump can be tracked. Inspections should be completed visually from the ground level. If further investigation is warranted that requires entering the structure, all applicable Confined Space Entry safety regulations and procedures must be followed per 29 CFR 1910.146. Deep sump catch basins should be cleaned four times per year or whenever the depth of the sediment is greater than or equal to one half the depth from the bottom of the invert of the lowest pipe in the basin. Cleanings should also be conducted at the end of the foliage and snow-removal seasons. Clamshell buckets can be used to remove sediment. However, vacuum trucks will remove more trapped sediment, are more expedient, and are less likely to damage hoods on outlet pipes. Disposal of sediment removed from catch basins must be disposed of in accordance with local, state and federal requirements.

4.1.4 Culverts and Stone End Protection (Outfalls)

Inspection Frequency: Bi-annually

Special Inspection Event(s): Rainfall greater than 0.5 inches

System outfalls should be inspected twice a year as well as after every major storm, for slope integrity, soil moisture, vegetated health, soil stability, soil compaction, soil erosion, ponding and sediment accumulation. If the rip rap has been displaced, undermined or damaged, it should be replaced immediately. The channel immediately below the outlet should be checked to see that erosion is not occurring. The downstream channel will be kept clear of obstructions, such as fallen trees, debris, leaves and sediment that could change flow patterns and/or tail water depths in pipes. Repairs must be carried out immediately to avoid additional damage to the outlet protection apron.

Section 5 Operation and Maintenance Log Form

Date: _____

Person conducting Inspection: _____

Reason for Inspection (Routine / Significant Rainfall): _____

Stormwater Management System Components:

Vegetated Surface

Component inspected during this inspection _____

Any Repair Necessary _____

Other Comments _____

Driveway and Walkway Sweeping

Component inspected during this inspection _____

Any Repair Necessary _____

Other Comments _____

Deep-Sump Hooded Catch Basins

Component inspected during this inspection _____

Any Repair Necessary _____

Other Comments _____

Culvert and Stone End Protection

Component inspected during this inspection _____

Any Repair Necessary _____

Other Comments _____

Section 6

Snow Management & De-Icing

Snow removal will occur throughout the facility. Snow storage should not be in or adjacent to wetland areas nor block drainage to surface inlets (e.g. catch basins).

Applications of chemical de-icing may be applied along with sand for the roads, main entrances, stop sign areas, and sidewalks. Apply only as needed using minimum quantities. Small quantities of deicers may be mixed with sand or sprayed on hard to maintain areas.

Sweep or clean up accumulated sand, sidewalks, steps, and roads as soon as possible after the road surface clears.

Section 7 Estimated O&M Budget

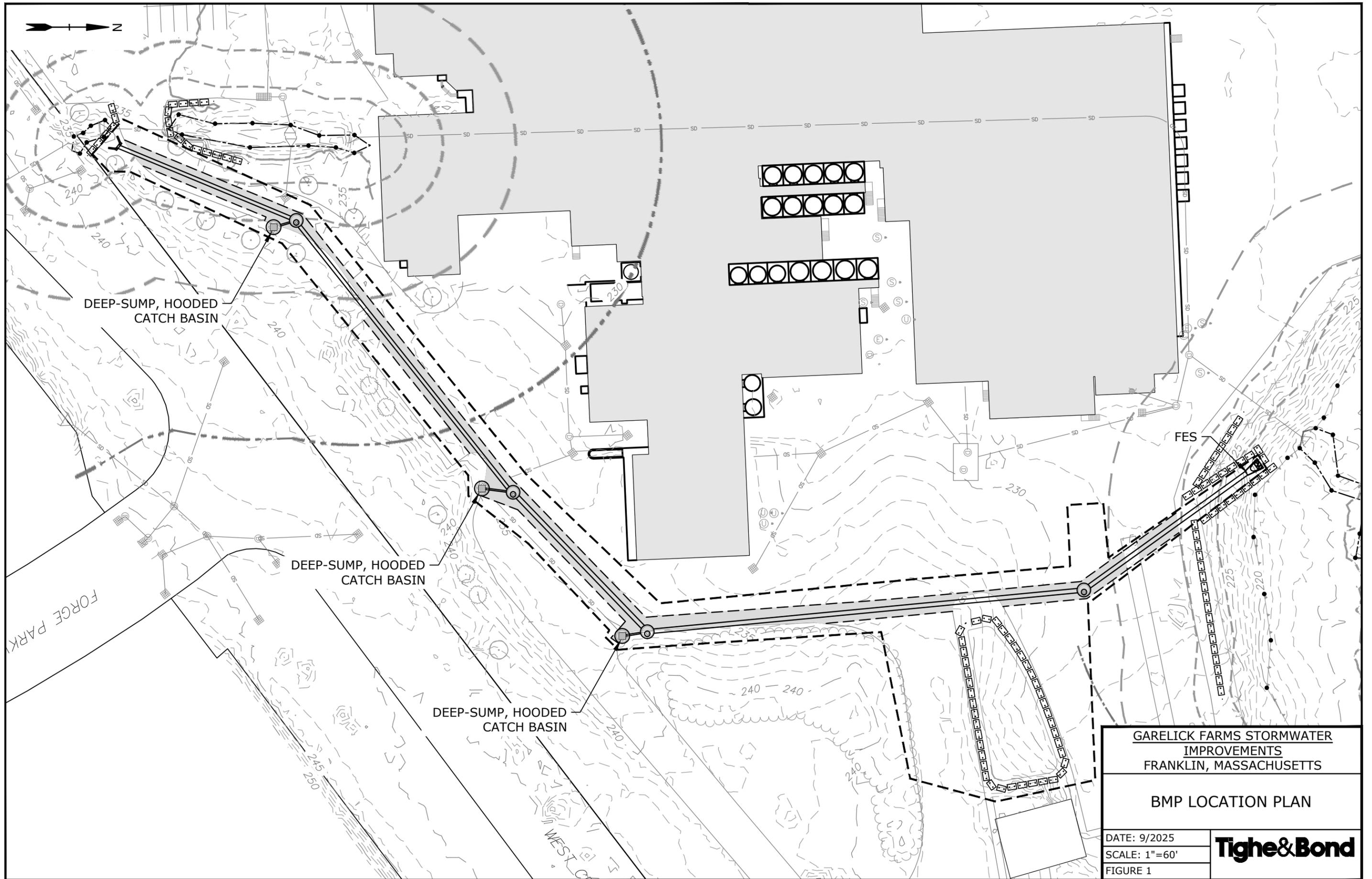
The following estimated O&M Budget includes the inspections and maintenance activities previously described on an annual basis.

Maintenance Component	Quantity	Frequency (per year)	Unit Cost	Annual Cost
Vegetated Surfaces	-	4	\$100	\$400
Street Sweeping	-	4	\$500	\$2,000
Catch Basin Inspection	3	4	\$250	\$3,000
Catch Basin Sediment Removal	3	2	\$1,000	\$6,000
System Outfalls	1	2	\$250	\$500
Total Annual Estimated Budget				\$11,900

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APPENDIX A

Figure 1 – BMP Location Plan



DEEP-SUMP, HOODED
CATCH BASIN

DEEP-SUMP, HOODED
CATCH BASIN

DEEP-SUMP, HOODED
CATCH BASIN

FES

GARELICK FARMS STORMWATER
IMPROVEMENTS
FRANKLIN, MASSACHUSETTS

BMP LOCATION PLAN

DATE: 9/2025
SCALE: 1"=60'
FIGURE 1

Tighe & Bond

