STORMWATER REPORT

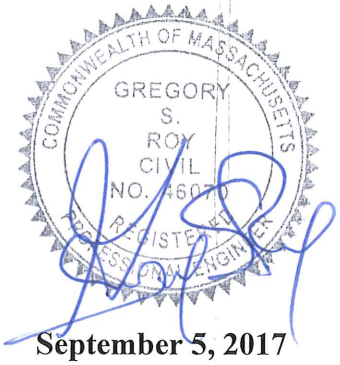
TADMOR

Main Street

BOLTON, MASSACHUSETTS

Prepared For: TADMOR REALTY TRUST
148 PARK STREET
NORTH READING, MA 01864

Prepared By: DUCHARME & DILLIS CIVIL DESIGN GROUP, INC
1092 MAIN STREET
BOLTON, MA 01740



September 5, 2017

4904-H

DUCHARME & DILLIS
Civil Design Group, Inc.
CIVIL ENGINEERS · LAND SURVEYORS · WETLAND CONSULTANTS

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1.0 Project Narrative

1.1 Project Type

The proposed project includes the creation of 11 Farmland and Open Space Planned Residential Development (FOSPRD) lots with associated houses, septic systems, a proposed road with cul-de-sac and a common driveway.

1.2 Purpose and Scope

This report has been prepared to comply with the requirements of the Stormwater Management Standards incorporated in the Massachusetts Wetlands Protection Act Regulations, 310 CMR 10.00. These standards are intended to promote increased groundwater recharge and prevent stormwater discharges from causing or contributing to the pollution of surface waters and ground waters of the Commonwealth. The standards aim to accomplish these goals by encouraging the greater use of low impact development techniques and improving the operation and maintenance of stormwater best management practices.

This report addresses compliance of the proposed development with each of the ten stormwater standards, it provides calculations to support the compliance information, and it provides an Operation and Maintenance Plan and Long Term Pollution Prevention Plan for the stormwater management system.

1.3 Proposed Development

As mentioned, the proposed project is the development of 11 residential houses, a roadway with cul-de-sac and a common driveway. The project is being proposed pursuant to the Farmland and Open Space Planned Residential Development Special Permit.

The proposed road with cul-de-sac will have access off Main Street approximately 850 feet south east of the intersection with Forbush Mill and Green Road. The common driveway will be accessed from the proposed road. The site does not have access for Municipal Water or sewer so on-site wells and septic systems are necessary.

1.4 LID Measures

Care has been taken to lay out the proposed site in a manner that works with existing topography. BMPs such as an infiltration basin and swales are used to manage the stormwater runoff. Stormwater from the impervious areas of the proposed lots are routed via storm drains to an infiltration basin which contains a sediment forebay for pretreatment, located on the southern side of the property. The infiltration basin will be used to promote groundwater recharge and limit the

runoff.

1.5 Site Description

The current property consists of 29 acres of wooded area and 1 acre of roadside brush. The site is located on the corner of Forbush Mill Road and Main Street. The property is adjacent to residential homes along the southern property line and the town DPW building along the northern property line. There is a change in zoning from Residential to Business WCOD along the northern portion of the property.

There are wetlands located on the south east and western side of the property. The Still River wraps around the edge of the property line flowing from the south-east side to the west. The site drains away from Main Street towards the existing wetlands and the Still River.

The Natural Resource Conservation Service (NRCS) soil survey information indicates that the site is underlain by soils classified as belonging to Hydrologic Soil Groups A, B and C.

1.6 Proposed Stormwater Management System

Runoff from the proposed impervious areas will be conveyed and treated through a combination of BMP's and infiltrated to the groundwater. The infiltration will help to recharge the groundwater and ensure that post-development runoff rates will not exceed the pre-development rates. The following is a brief discussion of each conveyance and treatment BMP proposed.

Deep Sump Hooded Catch Basin

Deep sump hooded catch basins are proposed to convey the runoff from the proposed paved areas and roofs to the infiltration basin. These catch basins will discharge to manholes and conventional storm drains.

Infiltration Basin

An infiltration basin will collect runoff from the pavement and roof tops. The basin has been designed to accommodate the runoff associated with the 100-year storm event. Pretreatment is provided using a sediment forebay within the basin.

Stormwater Conveyance Swale

A swale will be used to help convey stormwater from various locations on site to the proposed infiltration basin. A deep sump hooded catch basin installed with a beehive grate will be used as an outlet control structure for the swale. The swale is designed to be two feet deep with a two-foot bottom width. The sides slopes are to

be 3H:1V and they shall be grassed lined. The swale is to be sloped as best as possible towards the specified outlet control structure.

1.7 Methods of Analysis

United States Department of Agriculture Natural Resources Conservation Service (NRCS) soil cover complex methods (TR-20) were employed to compute runoff quantities for the subject property and, where appropriate, adjacent property that drains toward a common discharge point with runoff from the subject site. HydroCAD 10.0 computer software was employed in this hydrologic analysis. A comparison of pre- and post-development runoff quantities at various analysis points downstream around the site was performed to design a stormwater management system that will limit peak rates of runoff from the development to predevelopment levels for 24-hour rainfall events of 2-, 10-, 25- and 100-year return frequencies. Watershed boundaries for existing conditions are depicted on the attached Pre-development Watershed Plan. Post-Developed watershed boundaries are indicated on the Post-development Watershed Plan.

Area impacted by the development drain toward 4 separate areas, including the wetlands. Therefore, four different design points were used in the comparison of pre- and post-developed peak runoff rates.

2.0 Stormwater Standards Compliance

2.1 Standard 1 – Untreated Discharges

The stormwater management system for the proposed development will not result in any new discharges of untreated stormwater to wetland resource areas. Stormwater management structures have been designed such that there is no erosion or scour wetland resource areas or waters of the Commonwealth.

2.2 Standard 2 – Peak Rate Attenuation

The stormwater management system for the proposed development will employ an infiltration basin that has been sized to retain and recharge the runoff related to a 100-year, 24-hour rainfall event.

Hydrologic calculations for existing and proposed site conditions are included in Appendices D and E respectively. Calculations for 24-hour rainfall events of 2-, 10-, 25- and 100-year return frequencies are provided. The following table provides a summary of peak rates of runoff related to each of these storms for each of the four design points. For all rainfall events considered, the proposed stormwater management system will control runoff from the development such that corresponding peak flows at the design point will not exceed pre-development levels.

Table 1: Design Point "Western Wetlands" Peak Runoff Rates

	Pre-Developed	**Post-Developed**
2-year	0.10 cfs	0.08 cfs
10-year	1.70 cfs	1.41 cfs
25-year	3.35 cfs	2.87 cfs
100-year	6.30 cfs	5.60 cfs

Table 2: Design Point "Residential Homes" Peak Runoff Rates

	Pre-Developed	**Post-Developed**
2-year	0.03 cfs	0.03 cfs
10-year	0.82 cfs	0.71 cfs
25-year	2.17 cfs	1.63 cfs
100-year	5.11 cfs	3.70 cfs

Table 3: Design Point "Eastern Wetlands" Peak Runoff Rates

	Pre-Developed	**Post-Developed**
2-year	1.95 cfs	1.92 cfs
10-year	4.46 cfs	4.27 cfs
25-year	5.94 cfs	5.64 cfs

100-year	8.05 cfs	7.60 cfs

Table 4: Design Point "Main/Forbush" Peak Runoff Rates

	Pre-Developed	**Post-Developed**
2-year	2.14 cfs	1.95 cfs
10-year	5.08 cfs	4.65 cfs
25-year	6.83 cfs	6.24 cfs
100-year	9.34 cfs	8.54 cfs

2.3 Standard 3 – Recharge

As discussed in the Introduction, Natural Resource Conservation Service data indicates that the areas within the proposed development consist of soils ranging from Hydrologic Groups A, B and C.

A stormwater infiltration basin has been designed to provide infiltration of the required recharge and water quality volumes. Recharge calculations can be found in Appendix F.

2.4 Standard 4 – Water Quality

A total of 85% TSS removal was achieved using BMPs. As part of the proposed project, infiltration requires a minimum of 44% TSS removal provided prior to discharge. Two TSS calculation sheets have been provided. The sheet with a deep sump catch basin into a sediment forebay shows proper pre-treatment before entering the infiltration basin. The sheet with deep sump catch basin into an infiltration basin shows there is enough TSS removal within the whole system. See Appendix F for detailed calculations.

2.5 Standard 5 – Land Uses with Higher Pollutant Loads

The current and proposed uses of the subject site do not constitute land use with higher potential pollutant load, thus Standard 5 does not apply to the proposed project.

Standard 6 – Critical Areas

The proposed project does not involve a stormwater discharge within or near to any of the areas defined as "Critical Areas" at 314 CMR 9.02 and 310 CMR 10.04.

2.6 Standard 7 – Redevelopment

The project does not qualify for redevelopment provisions.

2.7 Standard 8 – Construction Period Pollution Prevention and Erosion and Sediment Control

Because the project is subject to the filing of an Environmental Protection Agency Notice of Intent (EPA NOI), the Stormwater Pollution Prevention Plan (SWPPP) will be prepared prior to construction. This document will be prepared to satisfy the requirements of the EPA NOI and the Standard 8 Construction Period Pollution prevention and Erosion and Sedimentation Control Plan.

2.8 Standard 9 – Operation and Maintenance Plan

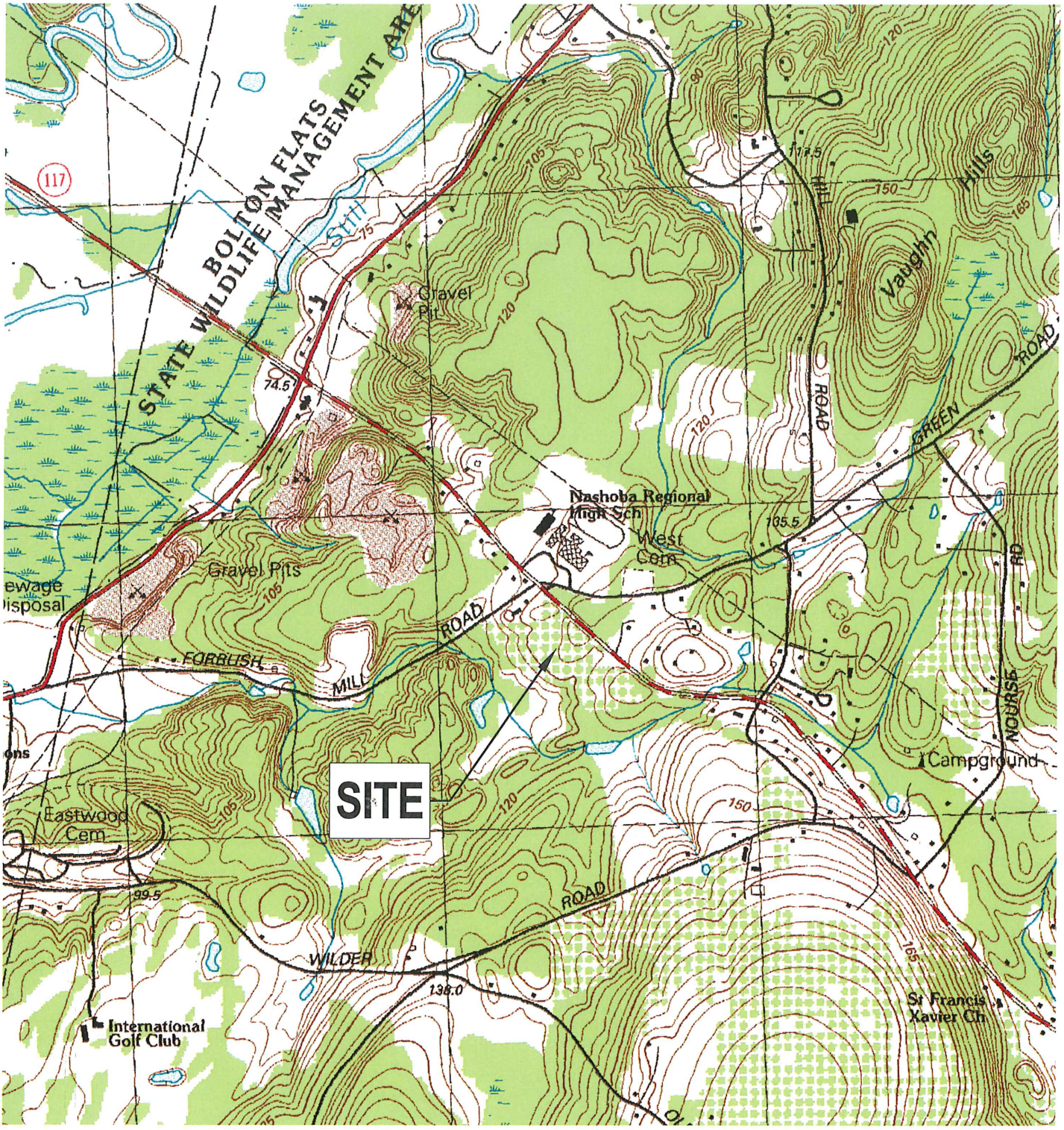
Refer to Appendix H for a complete copy of the Stormwater Operation and Maintenance Plan.

2.9 Standard 10 – Prohibition of Illicit Discharges

An illicit discharge statement will be prepared after approvals are received and prior to construction.

APPENDIX A

Locus Map



LOCUS MAP

Prepared By: Ducharme & Dillis, Civil Design Group, Inc.
1092 Main Street
P.O. Box 428
Bolton, Massachusetts

DATE: SEPTEMBER 2017

Prepared For: TADMOR Realty Trust
148 Park Street
North Reading, Massachusetts

SCALE: 1" = 800'

DUCHARME & DILLIS
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APPENDIX B

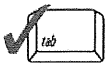
Checklist for Stormwater Report Checklist

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

Checklist for Stormwater Report

A. Introduction

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



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

The Stormwater Report must include:

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

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

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

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

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

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

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

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

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

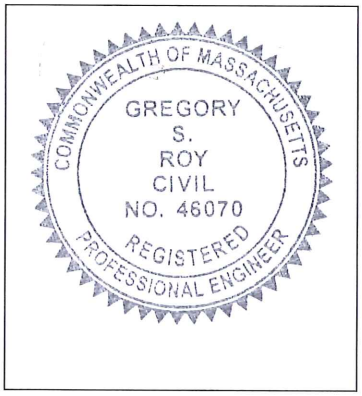
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

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

Registered Professional Engineer's Certification

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

Registered Professional Engineer Block and Signature



Signature and Date 9/5/17

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): Inifltration Basin

Standard 1: No New Untreated Discharges

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

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

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

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

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

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

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

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

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

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

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

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

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

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

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

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

Standard 4: Water Quality

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

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

☒ The ½" or 1" Water Quality Volume or

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

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

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

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

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

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

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

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

☐ All exposure has been eliminated.

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

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

Standard 6: Critical Areas

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

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

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

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

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

Checklist for Stormwater Report

Checklist (continued)

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

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

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

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

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

Standard 9: Operation and Maintenance Plan

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

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

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

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

Standard 10: Prohibition of Illicit Discharges

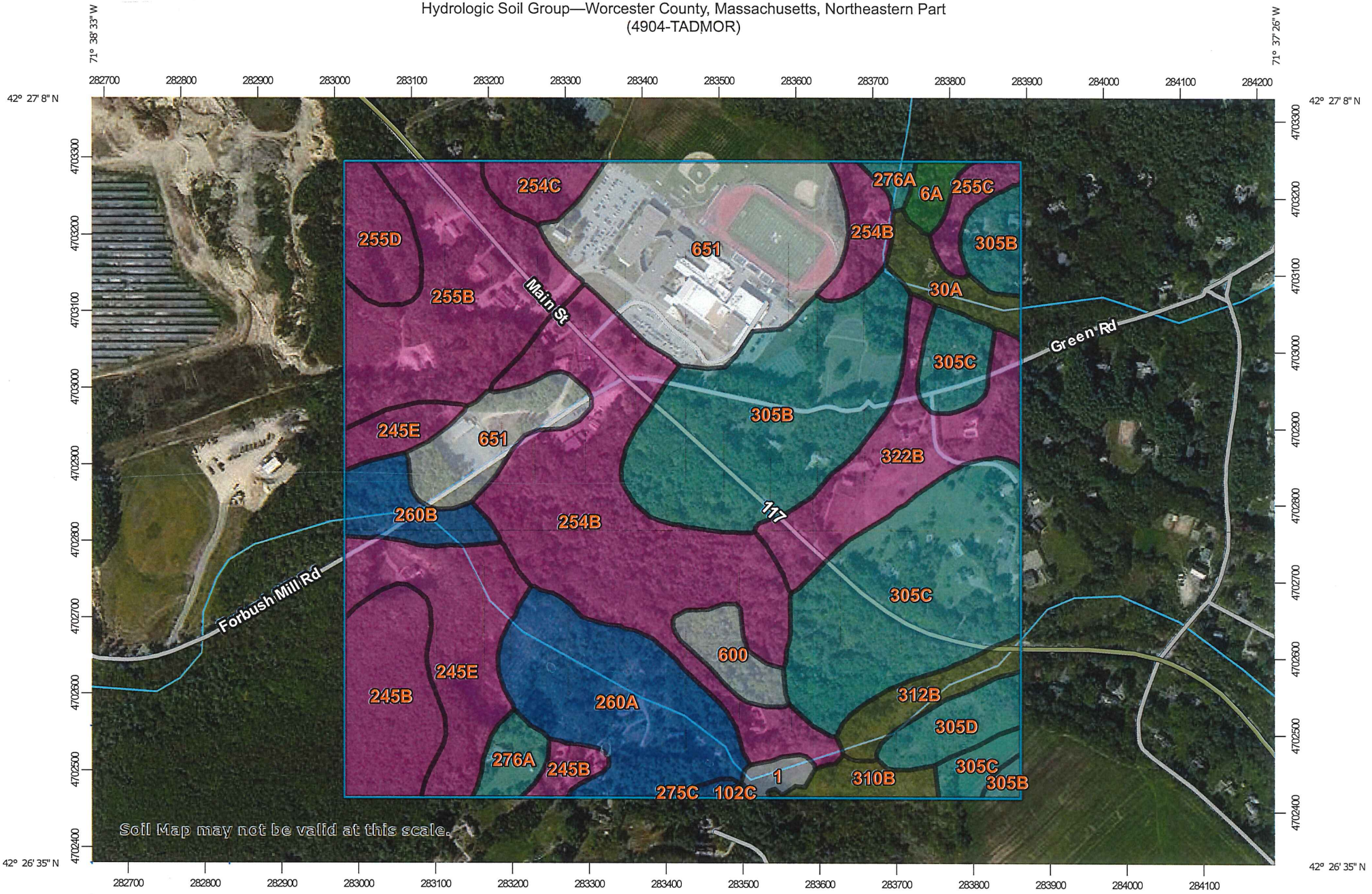
☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

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

APPENDIX C

NRCS Soils Data



Map Scale: 1:7,030 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 300 600 1200 1800

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil 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 1:20,000.

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: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 11, Sep 14, 2016

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

Date(s) aerial images were photographed: Sep 12, 2014—Sep 28, 2014

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

Hydrologic Soil Group— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part (MA613)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
1	Water		0.9	0.5%
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	A/D	1.2	0.7%
30A	Raynham silt loam, 0 to 3 percent slopes	C/D	2.6	1.5%
102C	Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes	B	0.1	0.1%
245B	Hinckley loamy sand, 3 to 8 percent slopes	A	8.8	4.9%
245E	Hinckley loamy sand, 25 to 35 percent slopes	A	11.4	6.3%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	26.6	14.6%
254C	Merrimac fine sandy loam, 8 to 15 percent slopes	A	2.2	1.2%
255B	Windsor loamy sand, 3 to 8 percent slopes	A	15.3	8.4%
255C	Windsor loamy sand, 8 to 15 percent slopes	A	1.7	0.9%
255D	Windsor loamy sand, 15 to 25 percent slopes	A	3.7	2.0%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	B	13.1	7.2%
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	B	3.5	1.9%
275C	Agawam fine sandy loam, 8 to 15 percent slopes	B	0.3	0.2%
276A	Ninigret fine sandy loam, 0 to 3 percent slopes	C	2.5	1.4%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	C	21.4	11.8%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	C	21.4	11.8%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	C	3.2	1.7%

Hydrologic Soil Group— Summary by Map Unit — Worcester County, Massachusetts, Northeastern Part (MA613)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C/D	2.0	1.1%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	C/D	3.0	1.6%
322B	Poquonock loamy sand, 3 to 8 percent slopes	A	10.0	5.5%
600	Pits, gravel		2.5	1.4%
651	Udorthents, smoothed		24.1	13.3%
Totals for Area of Interest			**181.4**	**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

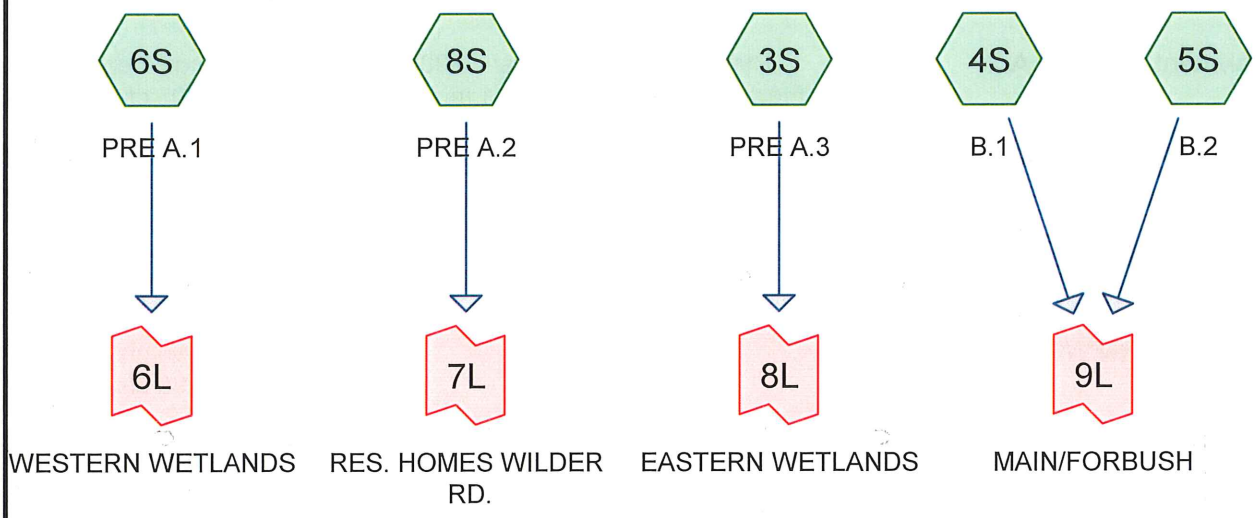
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX D

Existing Conditions – Hydrologic Calculations



Subcat Reach Pond Link

Routing Diagram for 4904 PRE
Prepared by Microsoft, Printed 8/7/2017
HydroCAD® 10.00-17 s/n 03590 © 2016 HydroCAD Software Solutions LLC

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 3S: PRE A.3 Runoff Area=153,325 sf 0.00% Impervious Runoff Depth>0.92"
Flow Length=372' Tc=17.0 min CN=73 Runoff=1.95 cfs 0.269 af

Subcatchment 4S: B.1 Runoff Area=118,280 sf 38.52% Impervious Runoff Depth>0.82"
Flow Length=268' Tc=9.8 min CN=71 Runoff=1.53 cfs 0.185 af

Subcatchment 5S: B.2 Runoff Area=58,673 sf 0.00% Impervious Runoff Depth>0.97"
Flow Length=220' Tc=19.4 min CN=74 Runoff=0.76 cfs 0.109 af

Subcatchment 6S: PRE A.1 Runoff Area=438,000 sf 1.24% Impervious Runoff Depth>0.11"
Flow Length=1,065' Tc=27.9 min CN=50 Runoff=0.10 cfs 0.090 af

Subcatchment 8S: PRE A.2 Runoff Area=623,373 sf 0.00% Impervious Runoff Depth>0.02"
Flow Length=798' Tc=23.1 min CN=44 Runoff=0.03 cfs 0.027 af

Link 6L: WESTERN WETLANDS Inflow=0.10 cfs 0.090 af
Primary=0.10 cfs 0.090 af

Link 7L: RES. HOMES WILDER RD. Inflow=0.03 cfs 0.027 af
Primary=0.03 cfs 0.027 af

Link 8L: EASTERN WETLANDS Inflow=1.95 cfs 0.269 af
Primary=1.95 cfs 0.269 af

Link 9L: MAIN/FORBUSH Inflow=2.14 cfs 0.294 af
Primary=2.14 cfs 0.294 af

Total Runoff Area = 31.948 ac Runoff Volume = 0.680 af Average Runoff Depth = 0.26"
96.34% Pervious = 30.777 ac 3.66% Impervious = 1.171 ac

Summary for Subcatchment 3S: PRE A.3

Runoff = 1.95 cfs @ 18.26 hrs, Volume= 0.269 af, Depth> 0.92"

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 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
153,325	73	Woods, Fair, HSG C
153,325		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
4.5	322	0.0560	1.18		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	372	Total			

Summary for Subcatchment 4S: B.1

Runoff = 1.53 cfs @ 18.16 hrs, Volume= 0.185 af, Depth> 0.82"

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 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
34,397	36	Woods, Fair, HSG A
17,635	73	Woods, Fair, HSG C
5,424	48	Brush, Poor, HSG A
15,263	77	Brush, Poor, HSG C
3,329	98	Unconnected roofs, HSG A
42,232	98	Paved parking, HSG A
118,280	71	Weighted Average
72,719		61.48% Pervious Area
45,561		38.52% Impervious Area
3,329		7.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0600	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.1	95	0.0840	1.45		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	123	0.0490	3.56		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.8	268	Total			

Summary for Subcatchment 5S: B.2

Runoff = 0.76 cfs @ 18.29 hrs, Volume= 0.109 af, Depth> 0.97"

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 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
44,000	73	Woods, Fair, HSG C
421	48	Brush, Poor, HSG A
14,252	77	Brush, Poor, HSG C
58,673	74	Weighted Average
58,673		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	170	0.0380	0.97		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.4	220	Total			

Summary for Subcatchment 6S: PRE A.1

Runoff = 0.10 cfs @ 20.75 hrs, Volume= 0.090 af, Depth> 0.11"

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 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
258,794	36	Woods, Fair, HSG A
40,450	60	Woods, Fair, HSG B
133,324	73	Woods, Fair, HSG C
1,880	98	Unconnected roofs, HSG A
3,552	98	Paved parking, HSG A
438,000	50	Weighted Average
432,568		98.76% Pervious Area
5,432		1.24% Impervious Area
1,880		34.61% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
15.4	1,015	0.0483	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.9	1,065	Total			

Summary for Subcatchment 8S: PRE A.2

Runoff = 0.03 cfs @ 25.79 hrs, Volume= 0.027 af, Depth> 0.02"

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 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
492,266	36	Woods, Fair, HSG A
121,524	73	Woods, Fair, HSG C
7,184	48	Brush, Poor, HSG A
2,399	77	Brush, Poor, HSG C
623,373	44	Weighted Average
623,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
10.6	748	0.0550	1.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.1	798	Total			

Summary for Link 6L: WESTERN WETLANDS

Inflow Area = 10.055 ac, 1.24% Impervious, Inflow Depth > 0.11" for 2-YR event
Inflow = 0.10 cfs @ 20.75 hrs, Volume= 0.090 af
Primary = 0.10 cfs @ 20.75 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 7L: RES. HOMES WILDER RD.

Inflow Area = 14.311 ac, 0.00% Impervious, Inflow Depth > 0.02" for 2-YR event
Inflow = 0.03 cfs @ 25.79 hrs, Volume= 0.027 af
Primary = 0.03 cfs @ 25.79 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 8L: EASTERN WETLANDS

Inflow Area = 3.520 ac, 0.00% Impervious, Inflow Depth > 0.92" for 2-YR event
Inflow = 1.95 cfs @ 18.26 hrs, Volume= 0.269 af
Primary = 1.95 cfs @ 18.26 hrs, Volume= 0.269 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 9L: MAIN/FORBUSH

Inflow Area = 4.062 ac, 25.75% Impervious, Inflow Depth > 0.87" for 2-YR event
Inflow = 2.14 cfs @ 18.19 hrs, Volume= 0.294 af
Primary = 2.14 cfs @ 18.19 hrs, Volume= 0.294 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

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 3S: PRE A.3 Runoff Area=153,325 sf 0.00% Impervious Runoff Depth>1.97"
Flow Length=372' Tc=17.0 min CN=73 Runoff=4.46 cfs 0.577 af

Subcatchment 4S: B.1 Runoff Area=118,280 sf 38.52% Impervious Runoff Depth>1.82"
Flow Length=268' Tc=9.8 min CN=71 Runoff=3.69 cfs 0.411 af

Subcatchment 5S: B.2 Runoff Area=58,673 sf 0.00% Impervious Runoff Depth>2.04"
Flow Length=220' Tc=19.4 min CN=74 Runoff=1.70 cfs 0.229 af

Subcatchment 6S: PRE A.1 Runoff Area=438,000 sf 1.24% Impervious Runoff Depth>0.53"
Flow Length=1,065' Tc=27.9 min CN=50 Runoff=1.70 cfs 0.446 af

Subcatchment 8S: PRE A.2 Runoff Area=623,373 sf 0.00% Impervious Runoff Depth>0.28"
Flow Length=798' Tc=23.1 min CN=44 Runoff=0.82 cfs 0.338 af

Link 6L: WESTERN WETLANDS Inflow=1.70 cfs 0.446 af
Primary=1.70 cfs 0.446 af

Link 7L: RES. HOMES WILDER RD. Inflow=0.82 cfs 0.338 af
Primary=0.82 cfs 0.338 af

Link 8L: EASTERN WETLANDS Inflow=4.46 cfs 0.577 af
Primary=4.46 cfs 0.577 af

Link 9L: MAIN/FORBUSH Inflow=5.08 cfs 0.640 af
Primary=5.08 cfs 0.640 af

Total Runoff Area = 31.948 ac Runoff Volume = 2.001 af Average Runoff Depth = 0.75"
96.34% Pervious = 30.777 ac 3.66% Impervious = 1.171 ac

Summary for Subcatchment 3S: PRE A.3

Runoff = 4.46 cfs @ 18.25 hrs, Volume= 0.577 af, Depth> 1.97"

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 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
153,325	73	Woods, Fair, HSG C
153,325		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
4.5	322	0.0560	1.18		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	372	Total			

Summary for Subcatchment 4S: B.1

Runoff = 3.69 cfs @ 18.15 hrs, Volume= 0.411 af, Depth> 1.82"

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 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
34,397	36	Woods, Fair, HSG A
17,635	73	Woods, Fair, HSG C
5,424	48	Brush, Poor, HSG A
15,263	77	Brush, Poor, HSG C
3,329	98	Unconnected roofs, HSG A
42,232	98	Paved parking, HSG A
118,280	71	Weighted Average
72,719		61.48% Pervious Area
45,561		38.52% Impervious Area
3,329		7.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0600	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.1	95	0.0840	1.45		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	123	0.0490	3.56		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.8	268	Total			

Summary for Subcatchment 5S: B.2

Runoff = 1.70 cfs @ 18.28 hrs, Volume= 0.229 af, Depth> 2.04"

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 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
44,000	73	Woods, Fair, HSG C
421	48	Brush, Poor, HSG A
14,252	77	Brush, Poor, HSG C
58,673	74	Weighted Average
58,673		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	170	0.0380	0.97		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.4	220	Total			

Summary for Subcatchment 6S: PRE A.1

Runoff = 1.70 cfs @ 18.64 hrs, Volume= 0.446 af, Depth> 0.53"

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 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
258,794	36	Woods, Fair, HSG A
40,450	60	Woods, Fair, HSG B
133,324	73	Woods, Fair, HSG C
1,880	98	Unconnected roofs, HSG A
3,552	98	Paved parking, HSG A
438,000	50	Weighted Average
432,568		98.76% Pervious Area
5,432		1.24% Impervious Area
1,880		34.61% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
15.4	1,015	0.0483	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.9	1,065	Total			

Summary for Subcatchment 8S: PRE A.2

Runoff = 0.82 cfs @ 18.79 hrs, Volume= 0.338 af, Depth> 0.28"

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 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
492,266	36	Woods, Fair, HSG A
121,524	73	Woods, Fair, HSG C
7,184	48	Brush, Poor, HSG A
2,399	77	Brush, Poor, HSG C
623,373	44	Weighted Average
623,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
10.6	748	0.0550	1.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.1	798	Total			

Summary for Link 6L: WESTERN WETLANDS

Inflow Area = 10.055 ac, 1.24% Impervious, Inflow Depth > 0.53" for 10YR event
Inflow = 1.70 cfs @ 18.64 hrs, Volume= 0.446 af
Primary = 1.70 cfs @ 18.64 hrs, Volume= 0.446 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 7L: RES. HOMES WILDER RD.

Inflow Area = 14.311 ac, 0.00% Impervious, Inflow Depth > 0.28" for 10YR event
Inflow = 0.82 cfs @ 18.79 hrs, Volume= 0.338 af
Primary = 0.82 cfs @ 18.79 hrs, Volume= 0.338 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 8L: EASTERN WETLANDS

Inflow Area = 3.520 ac, 0.00% Impervious, Inflow Depth > 1.97" for 10YR event
Inflow = 4.46 cfs @ 18.25 hrs, Volume= 0.577 af
Primary = 4.46 cfs @ 18.25 hrs, Volume= 0.577 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 9L: MAIN/FORBUSH

Inflow Area = 4.062 ac, 25.75% Impervious, Inflow Depth > 1.89" for 10YR event
Inflow = 5.08 cfs @ 18.17 hrs, Volume= 0.640 af
Primary = 5.08 cfs @ 18.17 hrs, Volume= 0.640 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

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 3S: PRE A.3 Runoff Area=153,325 sf 0.00% Impervious Runoff Depth>2.59"
Flow Length=372' Tc=17.0 min CN=73 Runoff=5.94 cfs 0.760 af

Subcatchment 4S: B.1 Runoff Area=118,280 sf 38.52% Impervious Runoff Depth>2.42"
Flow Length=268' Tc=9.8 min CN=71 Runoff=4.98 cfs 0.548 af

Subcatchment 5S: B.2 Runoff Area=58,673 sf 0.00% Impervious Runoff Depth>2.68"
Flow Length=220' Tc=19.4 min CN=74 Runoff=2.25 cfs 0.301 af

Subcatchment 6S: PRE A.1 Runoff Area=438,000 sf 1.24% Impervious Runoff Depth>0.86"
Flow Length=1,065' Tc=27.9 min CN=50 Runoff=3.35 cfs 0.718 af

Subcatchment 8S: PRE A.2 Runoff Area=623,373 sf 0.00% Impervious Runoff Depth>0.52"
Flow Length=798' Tc=23.1 min CN=44 Runoff=2.17 cfs 0.620 af

Link 6L: WESTERN WETLANDS Inflow=3.35 cfs 0.718 af
Primary=3.35 cfs 0.718 af

Link 7L: RES. HOMES WILDER RD. Inflow=2.17 cfs 0.620 af
Primary=2.17 cfs 0.620 af

Link 8L: EASTERN WETLANDS Inflow=5.94 cfs 0.760 af
Primary=5.94 cfs 0.760 af

Link 9L: MAIN/FORBUSH Inflow=6.83 cfs 0.849 af
Primary=6.83 cfs 0.849 af

Total Runoff Area = 31.948 ac Runoff Volume = 2.947 af Average Runoff Depth = 1.11"
96.34% Pervious = 30.777 ac 3.66% Impervious = 1.171 ac

Summary for Subcatchment 3S: PRE A.3

Runoff = 5.94 cfs @ 18.24 hrs, Volume= 0.760 af, Depth> 2.59"

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 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
153,325	73	Woods, Fair, HSG C
153,325		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
4.5	322	0.0560	1.18		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	372	Total			

Summary for Subcatchment 4S: B.1

Runoff = 4.98 cfs @ 18.15 hrs, Volume= 0.548 af, Depth> 2.42"

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 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
34,397	36	Woods, Fair, HSG A
17,635	73	Woods, Fair, HSG C
5,424	48	Brush, Poor, HSG A
15,263	77	Brush, Poor, HSG C
3,329	98	Unconnected roofs, HSG A
42,232	98	Paved parking, HSG A
118,280	71	Weighted Average
72,719		61.48% Pervious Area
45,561		38.52% Impervious Area
3,329		7.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0600	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.1	95	0.0840	1.45		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	123	0.0490	3.56		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.8	268	Total			

Summary for Subcatchment 5S: B.2

Runoff = 2.25 cfs @ 18.27 hrs, Volume= 0.301 af, Depth> 2.68"

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 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
44,000	73	Woods, Fair, HSG C
421	48	Brush, Poor, HSG A
14,252	77	Brush, Poor, HSG C
58,673	74	Weighted Average
58,673		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	170	0.0380	0.97		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.4	220	Total			

Summary for Subcatchment 6S: PRE A.1

Runoff = 3.35 cfs @ 18.51 hrs, Volume= 0.718 af, Depth> 0.86"

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 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
258,794	36	Woods, Fair, HSG A
40,450	60	Woods, Fair, HSG B
133,324	73	Woods, Fair, HSG C
1,880	98	Unconnected roofs, HSG A
3,552	98	Paved parking, HSG A
438,000	50	Weighted Average
432,568		98.76% Pervious Area
5,432		1.24% Impervious Area
1,880		34.61% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
15.4	1,015	0.0483	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.9	1,065	Total			

Summary for Subcatchment 8S: PRE A.2

Runoff = 2.17 cfs @ 18.65 hrs, Volume= 0.620 af, Depth> 0.52"

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 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
492,266	36	Woods, Fair, HSG A
121,524	73	Woods, Fair, HSG C
7,184	48	Brush, Poor, HSG A
2,399	77	Brush, Poor, HSG C
623,373	44	Weighted Average
623,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
10.6	748	0.0550	1.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.1	798	Total			

Summary for Link 6L: WESTERN WETLANDS

Inflow Area = 10.055 ac, 1.24% Impervious, Inflow Depth > 0.86" for 25YR event
Inflow = 3.35 cfs @ 18.51 hrs, Volume= 0.718 af
Primary = 3.35 cfs @ 18.51 hrs, Volume= 0.718 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 7L: RES. HOMES WILDER RD.

Inflow Area = 14.311 ac, 0.00% Impervious, Inflow Depth > 0.52" for 25YR event
Inflow = 2.17 cfs @ 18.65 hrs, Volume= 0.620 af
Primary = 2.17 cfs @ 18.65 hrs, Volume= 0.620 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 8L: EASTERN WETLANDS

Inflow Area = 3.520 ac, 0.00% Impervious, Inflow Depth > 2.59" for 25YR event
Inflow = 5.94 cfs @ 18.24 hrs, Volume= 0.760 af
Primary = 5.94 cfs @ 18.24 hrs, Volume= 0.760 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 9L: MAIN/FORBUSH

Inflow Area = 4.062 ac, 25.75% Impervious, Inflow Depth > 2.51" for 25YR event
Inflow = 6.83 cfs @ 18.17 hrs, Volume= 0.849 af
Primary = 6.83 cfs @ 18.17 hrs, Volume= 0.849 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

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 3S: PRE A.3 Runoff Area=153,325 sf 0.00% Impervious Runoff Depth>3.50"
Flow Length=372' Tc=17.0 min CN=73 Runoff=8.05 cfs 1.027 af

Subcatchment 4S: B.1 Runoff Area=118,280 sf 38.52% Impervious Runoff Depth>3.30"
Flow Length=268' Tc=9.8 min CN=71 Runoff=6.84 cfs 0.747 af

Subcatchment 5S: B.2 Runoff Area=58,673 sf 0.00% Impervious Runoff Depth>3.60"
Flow Length=220' Tc=19.4 min CN=74 Runoff=3.03 cfs 0.404 af

Subcatchment 6S: PRE A.1 Runoff Area=438,000 sf 1.24% Impervious Runoff Depth>1.39"
Flow Length=1,065' Tc=27.9 min CN=50 Runoff=6.30 cfs 1.163 af

Subcatchment 8S: PRE A.2 Runoff Area=623,373 sf 0.00% Impervious Runoff Depth>0.93"
Flow Length=798' Tc=23.1 min CN=44 Runoff=5.11 cfs 1.112 af

Link 6L: WESTERN WETLANDS Inflow=6.30 cfs 1.163 af
Primary=6.30 cfs 1.163 af

Link 7L: RES. HOMES WILDER RD. Inflow=5.11 cfs 1.112 af
Primary=5.11 cfs 1.112 af

Link 8L: EASTERN WETLANDS Inflow=8.05 cfs 1.027 af
Primary=8.05 cfs 1.027 af

Link 9L: MAIN/FORBUSH Inflow=9.34 cfs 1.152 af
Primary=9.34 cfs 1.152 af

Total Runoff Area = 31.948 ac Runoff Volume = 4.454 af Average Runoff Depth = 1.67"
96.34% Pervious = 30.777 ac 3.66% Impervious = 1.171 ac

Summary for Subcatchment 3S: PRE A.3

Runoff = 8.05 cfs @ 18.24 hrs, Volume= 1.027 af, Depth> 3.50"

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 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
153,325	73	Woods, Fair, HSG C
153,325		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
4.5	322	0.0560	1.18		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
17.0	372	Total			

Summary for Subcatchment 4S: B.1

Runoff = 6.84 cfs @ 18.15 hrs, Volume= 0.747 af, Depth> 3.30"

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 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
34,397	36	Woods, Fair, HSG A
17,635	73	Woods, Fair, HSG C
5,424	48	Brush, Poor, HSG A
15,263	77	Brush, Poor, HSG C
3,329	98	Unconnected roofs, HSG A
42,232	98	Paved parking, HSG A
118,280	71	Weighted Average
72,719		61.48% Pervious Area
45,561		38.52% Impervious Area
3,329		7.31% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0600	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.1	95	0.0840	1.45		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.6	123	0.0490	3.56		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.8	268	Total			

Summary for Subcatchment 5S: B.2

Runoff = 3.03 cfs @ 18.27 hrs, Volume= 0.404 af, Depth> 3.60"

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 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
44,000	73	Woods, Fair, HSG C
421	48	Brush, Poor, HSG A
14,252	77	Brush, Poor, HSG C
58,673	74	Weighted Average
58,673		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.5	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
2.9	170	0.0380	0.97		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.4	220	Total			

Summary for Subcatchment 6S: PRE A.1

Runoff = 6.30 cfs @ 18.46 hrs, Volume= 1.163 af, Depth> 1.39"

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 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
258,794	36	Woods, Fair, HSG A
40,450	60	Woods, Fair, HSG B
133,324	73	Woods, Fair, HSG C
1,880	98	Unconnected roofs, HSG A
3,552	98	Paved parking, HSG A
438,000	50	Weighted Average
432,568		98.76% Pervious Area
5,432		1.24% Impervious Area
1,880		34.61% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
15.4	1,015	0.0483	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.9	1,065	Total			

Summary for Subcatchment 8S: PRE A.2

Runoff = 5.11 cfs @ 18.45 hrs, Volume= 1.112 af, Depth> 0.93"

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 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
492,266	36	Woods, Fair, HSG A
121,524	73	Woods, Fair, HSG C
7,184	48	Brush, Poor, HSG A
2,399	77	Brush, Poor, HSG C
623,373	44	Weighted Average
623,373		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
10.6	748	0.0550	1.17		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
23.1	798	Total			

Summary for Link 6L: WESTERN WETLANDS

Inflow Area = 10.055 ac, 1.24% Impervious, Inflow Depth > 1.39" for 100YR event
Inflow = 6.30 cfs @ 18.46 hrs, Volume= 1.163 af
Primary = 6.30 cfs @ 18.46 hrs, Volume= 1.163 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 7L: RES. HOMES WILDER RD.

Inflow Area = 14.311 ac, 0.00% Impervious, Inflow Depth > 0.93" for 100YR event
Inflow = 5.11 cfs @ 18.45 hrs, Volume= 1.112 af
Primary = 5.11 cfs @ 18.45 hrs, Volume= 1.112 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

Summary for Link 8L: EASTERN WETLANDS

Inflow Area = 3.520 ac, 0.00% Impervious, Inflow Depth > 3.50" for 100YR event
Inflow = 8.05 cfs @ 18.24 hrs, Volume= 1.027 af
Primary = 8.05 cfs @ 18.24 hrs, Volume= 1.027 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

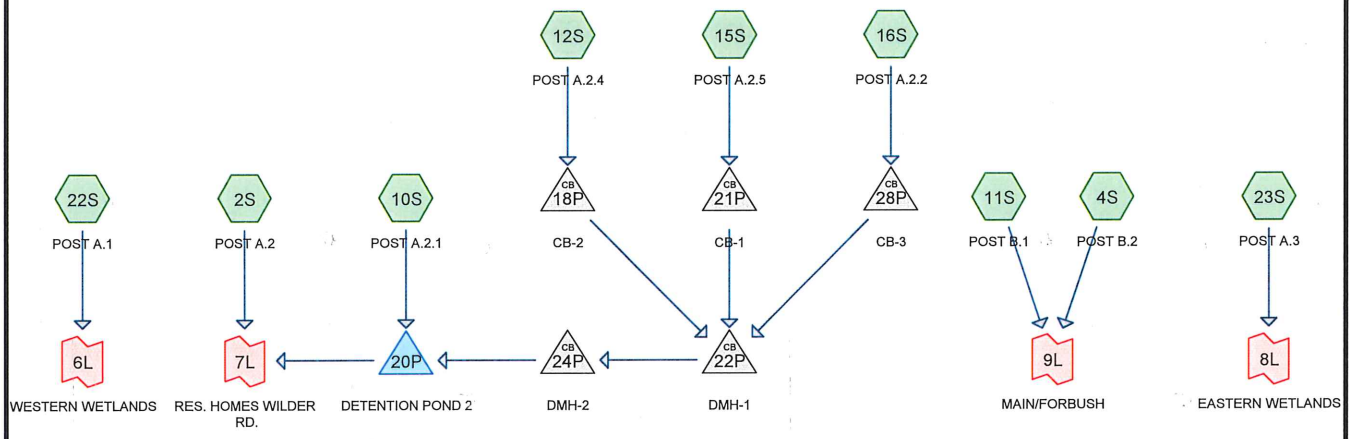
Summary for Link 9L: MAIN/FORBUSH

Inflow Area = 4.062 ac, 25.75% Impervious, Inflow Depth > 3.40" for 100YR event
Inflow = 9.34 cfs @ 18.17 hrs, Volume= 1.152 af
Primary = 9.34 cfs @ 18.17 hrs, Volume= 1.152 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.05 hrs

APPENDIX E

Proposed Conditions – Hydrologic Calculations



Subcat Reach Pond Link

Routing Diagram for 4904 POST_DEFINITIVE
Prepared by Microsoft, Printed 9/13/2017
HydroCAD® 10.00-17 s/n 03590 © 2016 HydroCAD Software Solutions LLC

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 2S: POST A.2 Runoff Area=333,173 sf 8.66% Impervious Runoff Depth=0.05"
Flow Length=553' Tc=19.5 min CN=46 Runoff=0.03 cfs 0.029 af

Subcatchment 4S: POST B.2 Runoff Area=48,172 sf 0.00% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=74 Runoff=0.84 cfs 0.090 af

Subcatchment 10S: POST A.2.1 Runoff Area=185,493 sf 5.08% Impervious Runoff Depth=0.07"
Flow Length=452' Tc=9.7 min CN=48 Runoff=0.03 cfs 0.026 af

Subcatchment 11S: POST B.1 Runoff Area=118,280 sf 38.52% Impervious Runoff Depth=0.82"
Flow Length=402' Tc=15.1 min CN=71 Runoff=1.34 cfs 0.185 af

Subcatchment 12S: POST A.2.4 Runoff Area=63,034 sf 29.43% Impervious Runoff Depth=0.72"
Flow Length=415' Tc=15.2 min CN=69 Runoff=0.61 cfs 0.087 af

Subcatchment 15S: POST A.2.5 Runoff Area=18,984 sf 52.68% Impervious Runoff Depth=0.77"
Flow Length=219' Tc=7.0 min CN=70 Runoff=0.24 cfs 0.028 af

Subcatchment 16S: POST A.2.2 Runoff Area=71,298 sf 26.72% Impervious Runoff Depth=0.87"
Flow Length=685' Tc=11.9 min CN=72 Runoff=0.94 cfs 0.118 af

Subcatchment 22S: POST A.1 Runoff Area=423,321 sf 2.08% Impervious Runoff Depth=0.09"
Flow Length=1,065' Tc=27.9 min CN=49 Runoff=0.08 cfs 0.074 af

Subcatchment 23S: POST A.3 Runoff Area=129,917 sf 1.99% Impervious Runoff Depth=0.97"
Flow Length=320' Tc=13.2 min CN=74 Runoff=1.92 cfs 0.242 af

Pond 18P: CB-2 Peak Elev=392.25' Inflow=0.61 cfs 0.087 af
12.0" Round Culvert n=0.013 L=3.0' S=0.0333 '/' Outflow=0.61 cfs 0.087 af

Pond 20P: DETENTION POND 2 Peak Elev=383.68' Storage=5,624 cf Inflow=1.73 cfs 0.260 af
Discarded=0.12 cfs 0.260 af Primary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.260 af

Pond 21P: CB-1 Peak Elev=392.07' Inflow=0.24 cfs 0.028 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/' Outflow=0.24 cfs 0.028 af

Pond 22P: DMH-1 Peak Elev=392.11' Inflow=1.73 cfs 0.234 af
24.0" Round Culvert n=0.013 L=106.0' S=0.0217 '/' Outflow=1.73 cfs 0.234 af

Pond 24P: DMH-2 Peak Elev=389.71' Inflow=1.73 cfs 0.234 af
24.0" Round Culvert n=0.013 L=261.0' S=0.0065 '/' Outflow=1.73 cfs 0.234 af

Pond 28P: CB-3 Peak Elev=397.57' Inflow=0.94 cfs 0.118 af
12.0" Round Culvert n=0.013 L=209.0' S=0.0254 '/' Outflow=0.94 cfs 0.118 af

Link 6L: WESTERN WETLANDS Inflow=0.08 cfs 0.074 af
Primary=0.08 cfs 0.074 af

Link 7L: RES. HOMES WILDER RD. Inflow=0.03 cfs 0.029 af
Primary=0.03 cfs 0.029 af

Link 8L: EASTERN WETLANDS Inflow=1.92 cfs 0.242 af
Primary=1.92 cfs 0.242 af

Link 9L: MAIN/FORBUSH Inflow=1.95 cfs 0.275 af
Primary=1.95 cfs 0.275 af

Total Runoff Area = 31.948 ac Runoff Volume = 0.879 af Average Runoff Depth = 0.33"
89.74% Pervious = 28.670 ac 10.26% Impervious = 3.279 ac

Summary for Subcatchment 2S: POST A.2

Runoff = 0.03 cfs @ 23.09 hrs, Volume= 0.029 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
149,914	36	Woods, Fair, HSG A
29,201	73	Woods, Fair, HSG C
118,453	39	>75% Grass cover, Good, HSG A
6,767	74	>75% Grass cover, Good, HSG C
12,244	98	Roofs, HSG A
773	98	Roofs, HSG C
15,821	98	Paved parking, HSG A
333,173	46	Weighted Average
304,335		91.34% Pervious Area
28,838		8.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
7.0	503	0.0580	1.20		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.5	553	Total			

Summary for Subcatchment 4S: POST B.2

Runoff = 0.84 cfs @ 18.11 hrs, Volume= 0.090 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
33,530	73	Woods, Fair, HSG C
366	48	Brush, Poor, HSG A
14,276	77	Brush, Poor, HSG C
48,172	74	Weighted Average
48,172		100.00% Pervious Area

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

Summary for Subcatchment 10S: POST A.2.1

Runoff = 0.03 cfs @ 22.13 hrs, Volume= 0.026 af, Depth= 0.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
71,213	36	Woods, Fair, HSG A
17,946	73	Woods, Fair, HSG C
67,111	39	>75% Grass cover, Good, HSG A
19,798	74	>75% Grass cover, Good, HSG C
4,208	98	Roofs, HSG A
2,081	98	Roofs, HSG C
1,935	98	Paved parking, HSG A
1,201	98	Paved parking, HSG C
185,493	48	Weighted Average
176,068		94.92% Pervious Area
9,425		5.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.6	61	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	341	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.7	452	Total			

Summary for Subcatchment 11S: POST B.1

Runoff = 1.34 cfs @ 18.24 hrs, Volume= 0.185 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
34,397	36	Woods, Fair, HSG A
17,635	73	Woods, Fair, HSG C
5,424	48	Brush, Poor, HSG A
15,263	77	Brush, Poor, HSG C
3,329	98	Roofs, HSG A
42,232	98	Paved parking, HSG A
118,280	71	Weighted Average
72,719		61.48% Pervious Area
45,561		38.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.9	148	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	204	0.0540	4.72		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	402	Total			

Summary for Subcatchment 12S: POST A.2.4

Runoff = 0.61 cfs @ 18.24 hrs, Volume= 0.087 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
11,277	73	Woods, Fair, HSG C
21,898	39	>75% Grass cover, Good, HSG A
10,586	74	>75% Grass cover, Good, HSG C
724	77	Brush, Poor, HSG C
1,410	98	Roofs, HSG A
1,348	98	Roofs, HSG C
11,325	98	Paved parking, HSG A
4,466	98	Paved parking, HSG C
63,034	69	Weighted Average
44,485		70.57% Pervious Area
18,549		29.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.6	123	0.0650	1.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.1	242	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.2	415	Total			

Summary for Subcatchment 15S: POST A.2.5

Runoff = 0.24 cfs @ 18.12 hrs, Volume= 0.028 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
8,984	39	>75% Grass cover, Good, HSG A
9,169	98	Paved parking, HSG A
831	98	Paved parking, HSG C
18,984	70	Weighted Average
8,984		47.32% Pervious Area
10,000		52.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0800	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
3.7	169	0.0120	0.77		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.0	219	Total			

Summary for Subcatchment 16S: POST A.2.2

Runoff = 0.94 cfs @ 18.19 hrs, Volume= 0.118 af, Depth= 0.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
2,082	36	Woods, Fair, HSG A
4,338	73	Woods, Fair, HSG C
7,244	48	Brush, Poor, HSG A
9,217	39	>75% Grass cover, Good, HSG A
29,363	74	>75% Grass cover, Good, HSG C
3,936	98	Roofs, HSG C
4,549	98	Paved parking, HSG A
10,569	98	Paved parking, HSG C
71,298	72	Weighted Average
52,244		73.28% Pervious Area
19,054		26.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
4.4	635	0.0260	2.42		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.9	685	Total			

Summary for Subcatchment 22S: POST A.1

Runoff = 0.08 cfs @ 21.01 hrs, Volume= 0.074 af, Depth= 0.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
240,957	36	Woods, Fair, HSG A
40,450	60	Woods, Fair, HSG B
106,846	73	Woods, Fair, HSG C
22,485	39	>75% Grass cover, Good, HSG A
3,766	74	>75% Grass cover, Good, HSG C
3,222	98	Roofs, HSG A
1,284	98	Roofs, HSG C
4,311	98	Paved parking, HSG A
423,321	49	Weighted Average
414,504		97.92% Pervious Area
8,817		2.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
15.4	1,015	0.0483	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.9	1,065	Total			

Summary for Subcatchment 23S: POST A.3

Runoff = 1.92 cfs @ 18.20 hrs, Volume= 0.242 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 2-YR Rainfall=3.10"

Area (sf)	CN	Description
116,225	73	Woods, Fair, HSG C
11,111	74	>75% Grass cover, Good, HSG C
1,337	98	Roofs, HSG C
1,244	98	Paved parking, HSG C
129,917	74	Weighted Average
127,336		98.01% Pervious Area
2,581		1.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.7	270	0.0590	1.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.2	320	Total			

Summary for Pond 18P: CB-2

Inflow Area = 1.447 ac, 29.43% Impervious, Inflow Depth = 0.72" for 2-YR event
Inflow = 0.61 cfs @ 18.24 hrs, Volume= 0.087 af
Outflow = 0.61 cfs @ 18.24 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min
Primary = 0.61 cfs @ 18.24 hrs, Volume= 0.087 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.25' @ 18.24 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.80'	**12.0" Round Culvert** L= 3.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.80' / 391.70' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.60 cfs @ 18.24 hrs HW=392.25' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.60 cfs @ 2.59 fps)

Summary for Pond 20P: DETENTION POND 2

Inflow Area = 7.778 ac, 16.83% Impervious, Inflow Depth = 0.40" for 2-YR event
Inflow = 1.73 cfs @ 18.20 hrs, Volume= 0.260 af
Outflow = 0.12 cfs @ 24.52 hrs, Volume= 0.260 af, Atten= 93%, Lag= 379.2 min
Discarded = 0.12 cfs @ 24.52 hrs, Volume= 0.260 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 383.68' @ 24.52 hrs Surf.Area= 4,609 sf Storage= 5,624 cf
Flood Elev= 390.00' Surf.Area= 11,581 sf Storage= 33,411 cf

Plug-Flow detention time= 604.4 min calculated for 0.260 af (100% of inflow)
Center-of-Mass det. time= 604.7 min (1,949.0 - 1,344.3)

Volume	Invert	Avail.Storage	Storage Description
#1	382.00'	33,411 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)
382.00	2,229	233.2	0	0	2,229
384.00	5,160	380.0	7,187	7,187	9,419
386.00	10,387	497.0	15,245	22,432	17,631
387.00	11,581	512.0	10,979	33,411	18,937

Device	Routing	Invert	Outlet Devices
#1	Discarded	382.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 370.00'
#2	Primary	386.50'	**20.0' long x 17.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.12 cfs @ 24.52 hrs HW=383.68' (Free Discharge)
↑**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=382.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 21P: CB-1

Inflow Area = 0.436 ac, 52.68% Impervious, Inflow Depth = 0.77" for 2-YR event
Inflow = 0.24 cfs @ 18.12 hrs, Volume= 0.028 af
Outflow = 0.24 cfs @ 18.12 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.0 min
Primary = 0.24 cfs @ 18.12 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.07' @ 18.12 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.80'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.80' / 391.70' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 18.12 hrs HW=392.07' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.24 cfs @ 1.39 fps)

Summary for Pond 22P: DMH-1

Inflow Area = 3.520 ac, 31.05% Impervious, Inflow Depth = 0.80" for 2-YR event
Inflow = 1.73 cfs @ 18.20 hrs, Volume= 0.234 af
Outflow = 1.73 cfs @ 18.20 hrs, Volume= 0.234 af, Atten= 0%, Lag= 0.0 min
Primary = 1.73 cfs @ 18.20 hrs, Volume= 0.234 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.11' @ 18.20 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.50'	**24.0" Round Culvert** L= 106.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.50' / 389.20' S= 0.0217 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=1.73 cfs @ 18.20 hrs HW=392.11' (Free Discharge)
↑**1=Culvert** (Inlet Controls 1.73 cfs @ 2.11 fps)

Summary for Pond 24P: DMH-2

Inflow Area = 3.520 ac, 31.05% Impervious, Inflow Depth = 0.80" for 2-YR event
Inflow = 1.73 cfs @ 18.20 hrs, Volume= 0.234 af
Outflow = 1.73 cfs @ 18.20 hrs, Volume= 0.234 af, Atten= 0%, Lag= 0.0 min
Primary = 1.73 cfs @ 18.20 hrs, Volume= 0.234 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 389.71' @ 18.20 hrs
Flood Elev= 396.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	389.10'	**24.0" Round Culvert** L= 261.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 389.10' / 387.40' S= 0.0065 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=1.72 cfs @ 18.20 hrs HW=389.71' (Free Discharge)
↑**1=Culvert** (Inlet Controls 1.72 cfs @ 2.11 fps)

Summary for Pond 28P: CB-3

Inflow Area = 1.637 ac, 26.72% Impervious, Inflow Depth = 0.87" for 2-YR event
Inflow = 0.94 cfs @ 18.19 hrs, Volume= 0.118 af
Outflow = 0.94 cfs @ 18.19 hrs, Volume= 0.118 af, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 18.19 hrs, Volume= 0.118 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 397.57' @ 18.19 hrs
Flood Elev= 401.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	397.00'	**12.0" Round Culvert** L= 209.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 397.00' / 391.70' S= 0.0254 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.93 cfs @ 18.19 hrs HW=397.57' (Free Discharge)
↑**1=Culvert** (Inlet Controls 0.93 cfs @ 2.03 fps)

Summary for Link 6L: WESTERN WETLANDS

Inflow Area = 9.718 ac, 2.08% Impervious, Inflow Depth = 0.09" for 2-YR event
Inflow = 0.08 cfs @ 21.01 hrs, Volume= 0.074 af
Primary = 0.08 cfs @ 21.01 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 7L: RES. HOMES WILDER RD.

Inflow Area = 15.427 ac, 12.78% Impervious, Inflow Depth = 0.02" for 2-YR event
Inflow = 0.03 cfs @ 23.09 hrs, Volume= 0.029 af
Primary = 0.03 cfs @ 23.09 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 8L: EASTERN WETLANDS

Inflow Area = 2.982 ac, 1.99% Impervious, Inflow Depth = 0.97" for 2-YR event
Inflow = 1.92 cfs @ 18.20 hrs, Volume= 0.242 af
Primary = 1.92 cfs @ 18.20 hrs, Volume= 0.242 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 9L: MAIN/FORBUSH

Inflow Area = 3.821 ac, 27.37% Impervious, Inflow Depth = 0.86" for 2-YR event
Inflow = 1.95 cfs @ 18.18 hrs, Volume= 0.275 af
Primary = 1.95 cfs @ 18.18 hrs, Volume= 0.275 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 2S: POST A.2 Runoff Area=333,173 sf 8.66% Impervious Runoff Depth=0.36"
Flow Length=553' Tc=19.5 min CN=46 Runoff=0.71 cfs 0.231 af

Subcatchment 4S: POST B.2 Runoff Area=48,172 sf 0.00% Impervious Runoff Depth=2.05"
Tc=6.0 min CN=74 Runoff=1.87 cfs 0.189 af

Subcatchment 10S: POST A.2.1 Runoff Area=185,493 sf 5.08% Impervious Runoff Depth=0.45"
Flow Length=452' Tc=9.7 min CN=48 Runoff=0.60 cfs 0.158 af

Subcatchment 11S: POST B.1 Runoff Area=118,280 sf 38.52% Impervious Runoff Depth=1.82"
Flow Length=402' Tc=15.1 min CN=71 Runoff=3.27 cfs 0.412 af

Subcatchment 12S: POST A.2.4 Runoff Area=63,034 sf 29.43% Impervious Runoff Depth=1.67"
Flow Length=415' Tc=15.2 min CN=69 Runoff=1.58 cfs 0.202 af

Subcatchment 15S: POST A.2.5 Runoff Area=18,984 sf 52.68% Impervious Runoff Depth=1.74"
Flow Length=219' Tc=7.0 min CN=70 Runoff=0.60 cfs 0.063 af

Subcatchment 16S: POST A.2.2 Runoff Area=71,298 sf 26.72% Impervious Runoff Depth=1.89"
Flow Length=685' Tc=11.9 min CN=72 Runoff=2.21 cfs 0.258 af

Subcatchment 22S: POST A.1 Runoff Area=423,321 sf 2.08% Impervious Runoff Depth=0.49"
Flow Length=1,065' Tc=27.9 min CN=49 Runoff=1.41 cfs 0.397 af

Subcatchment 23S: POST A.3 Runoff Area=129,917 sf 1.99% Impervious Runoff Depth=2.05"
Flow Length=320' Tc=13.2 min CN=74 Runoff=4.27 cfs 0.509 af

Pond 18P: CB-2 Peak Elev=392.61' Inflow=1.58 cfs 0.202 af
12.0" Round Culvert n=0.013 L=3.0' S=0.0333 '/' Outflow=1.58 cfs 0.202 af

Pond 20P: DETENTION POND 2 Peak Elev=385.49' Storage=17,516 cf Inflow=4.76 cfs 0.682 af
Discarded=0.24 cfs 0.682 af Primary=0.00 cfs 0.000 af Outflow=0.24 cfs 0.682 af

Pond 21P: CB-1 Peak Elev=392.26' Inflow=0.60 cfs 0.063 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/' Outflow=0.60 cfs 0.063 af

Pond 22P: DMH-1 Peak Elev=392.50' Inflow=4.24 cfs 0.523 af
24.0" Round Culvert n=0.013 L=106.0' S=0.0217 '/' Outflow=4.24 cfs 0.523 af

Pond 24P: DMH-2 Peak Elev=390.10' Inflow=4.24 cfs 0.523 af
24.0" Round Culvert n=0.013 L=261.0' S=0.0065 '/' Outflow=4.24 cfs 0.523 af

Pond 28P: CB-3 Peak Elev=398.05' Inflow=2.21 cfs 0.258 af
12.0" Round Culvert n=0.013 L=209.0' S=0.0254 '/' Outflow=2.21 cfs 0.258 af

Link 6L: WESTERN WETLANDS Inflow=1.41 cfs 0.397 af
Primary=1.41 cfs 0.397 af

Link 7L: RES. HOMES WILDER RD. Inflow=0.71 cfs 0.231 af
Primary=0.71 cfs 0.231 af

Link 8L: EASTERN WETLANDS Inflow=4.27 cfs 0.509 af
Primary=4.27 cfs 0.509 af

Link 9L: MAIN/FORBUSH Inflow=4.65 cfs 0.600 af
Primary=4.65 cfs 0.600 af

Total Runoff Area = 31.948 ac Runoff Volume = 2.420 af Average Runoff Depth = 0.91"
89.74% Pervious = 28.670 ac 10.26% Impervious = 3.279 ac

Summary for Subcatchment 2S: POST A.2

Runoff = 0.71 cfs @ 18.66 hrs, Volume= 0.231 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
149,914	36	Woods, Fair, HSG A
29,201	73	Woods, Fair, HSG C
118,453	39	>75% Grass cover, Good, HSG A
6,767	74	>75% Grass cover, Good, HSG C
12,244	98	Roofs, HSG A
773	98	Roofs, HSG C
15,821	98	Paved parking, HSG A
333,173	46	Weighted Average
304,335		91.34% Pervious Area
28,838		8.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
7.0	503	0.0580	1.20		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.5	553	Total			

Summary for Subcatchment 4S: POST B.2

Runoff = 1.87 cfs @ 18.10 hrs, Volume= 0.189 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
33,530	73	Woods, Fair, HSG C
366	48	Brush, Poor, HSG A
14,276	77	Brush, Poor, HSG C
48,172	74	Weighted Average
48,172		100.00% Pervious Area

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

Summary for Subcatchment 10S: POST A.2.1

Runoff = 0.60 cfs @ 18.43 hrs, Volume= 0.158 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
71,213	36	Woods, Fair, HSG A
17,946	73	Woods, Fair, HSG C
67,111	39	>75% Grass cover, Good, HSG A
19,798	74	>75% Grass cover, Good, HSG C
4,208	98	Roofs, HSG A
2,081	98	Roofs, HSG C
1,935	98	Paved parking, HSG A
1,201	98	Paved parking, HSG C
185,493	48	Weighted Average
176,068		94.92% Pervious Area
9,425		5.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.6	61	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	341	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.7	452	Total			

Summary for Subcatchment 11S: POST B.1

Runoff = 3.27 cfs @ 18.22 hrs, Volume= 0.412 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
34,397	36	Woods, Fair, HSG A
17,635	73	Woods, Fair, HSG C
5,424	48	Brush, Poor, HSG A
15,263	77	Brush, Poor, HSG C
3,329	98	Roofs, HSG A
42,232	98	Paved parking, HSG A
118,280	71	Weighted Average
72,719		61.48% Pervious Area
45,561		38.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.9	148	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	204	0.0540	4.72		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	402	Total			

Summary for Subcatchment 12S: POST A.2.4

Runoff = 1.58 cfs @ 18.22 hrs, Volume= 0.202 af, Depth= 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
11,277	73	Woods, Fair, HSG C
21,898	39	>75% Grass cover, Good, HSG A
10,586	74	>75% Grass cover, Good, HSG C
724	77	Brush, Poor, HSG C
1,410	98	Roofs, HSG A
1,348	98	Roofs, HSG C
11,325	98	Paved parking, HSG A
4,466	98	Paved parking, HSG C
63,034	69	Weighted Average
44,485		70.57% Pervious Area
18,549		29.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.6	123	0.0650	1.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.1	242	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.2	415	Total			

Summary for Subcatchment 15S: POST A.2.5

Runoff = 0.60 cfs @ 18.11 hrs, Volume= 0.063 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
8,984	39	>75% Grass cover, Good, HSG A
9,169	98	Paved parking, HSG A
831	98	Paved parking, HSG C
18,984	70	Weighted Average
8,984		47.32% Pervious Area
10,000		52.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0800	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
3.7	169	0.0120	0.77		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.0	219	Total			

Summary for Subcatchment 16S: POST A.2.2

Runoff = 2.21 cfs @ 18.18 hrs, Volume= 0.258 af, Depth= 1.89"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
2,082	36	Woods, Fair, HSG A
4,338	73	Woods, Fair, HSG C
7,244	48	Brush, Poor, HSG A
9,217	39	>75% Grass cover, Good, HSG A
29,363	74	>75% Grass cover, Good, HSG C
3,936	98	Roofs, HSG C
4,549	98	Paved parking, HSG A
10,569	98	Paved parking, HSG C
71,298	72	Weighted Average
52,244		73.28% Pervious Area
19,054		26.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
4.4	635	0.0260	2.42		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.9	685	Total			

Summary for Subcatchment 22S: POST A.1

Runoff = 1.41 cfs @ 18.68 hrs, Volume= 0.397 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
240,957	36	Woods, Fair, HSG A
40,450	60	Woods, Fair, HSG B
106,846	73	Woods, Fair, HSG C
22,485	39	>75% Grass cover, Good, HSG A
3,766	74	>75% Grass cover, Good, HSG C
3,222	98	Roofs, HSG A
1,284	98	Roofs, HSG C
4,311	98	Paved parking, HSG A
423,321	49	Weighted Average
414,504		97.92% Pervious Area
8,817		2.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
15.4	1,015	0.0483	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.9	1,065	Total			

Summary for Subcatchment 23S: POST A.3

Runoff = 4.27 cfs @ 18.19 hrs, Volume= 0.509 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 10YR Rainfall=4.60"

Area (sf)	CN	Description
116,225	73	Woods, Fair, HSG C
11,111	74	>75% Grass cover, Good, HSG C
1,337	98	Roofs, HSG C
1,244	98	Paved parking, HSG C
129,917	74	Weighted Average
127,336		98.01% Pervious Area
2,581		1.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.7	270	0.0590	1.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.2	320	Total			

Summary for Pond 18P: CB-2

Inflow Area = 1.447 ac, 29.43% Impervious, Inflow Depth = 1.67" for 10YR event
Inflow = 1.58 cfs @ 18.22 hrs, Volume= 0.202 af
Outflow = 1.58 cfs @ 18.22 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.0 min
Primary = 1.58 cfs @ 18.22 hrs, Volume= 0.202 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.61' @ 18.22 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.80'	**12.0" Round Culvert** L= 3.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.80' / 391.70' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.56 cfs @ 18.22 hrs HW=392.61' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 1.56 cfs @ 3.13 fps)

Summary for Pond 20P: DETENTION POND 2

Inflow Area = 7.778 ac, 16.83% Impervious, Inflow Depth = 1.05" for 10YR event
Inflow = 4.76 cfs @ 18.20 hrs, Volume= 0.682 af
Outflow = 0.24 cfs @ 25.57 hrs, Volume= 0.682 af, Atten= 95%, Lag= 442.2 min
Discarded = 0.24 cfs @ 25.57 hrs, Volume= 0.682 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 385.49' @ 25.57 hrs Surf.Area= 8,880 sf Storage= 17,516 cf
Flood Elev= 390.00' Surf.Area= 11,581 sf Storage= 33,411 cf

Plug-Flow detention time= 969.7 min calculated for 0.681 af (100% of inflow)
Center-of-Mass det. time= 970.3 min (2,279.9 - 1,309.7)

Volume	Invert	Avail.Storage	Storage Description
#1	382.00'	33,411 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)
382.00	2,229	233.2	0	0	2,229
384.00	5,160	380.0	7,187	7,187	9,419
386.00	10,387	497.0	15,245	22,432	17,631
387.00	11,581	512.0	10,979	33,411	18,937

Device	Routing	Invert	Outlet Devices
#1	Discarded	382.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 370.00'
#2	Primary	386.50'	**20.0' long x 17.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.24 cfs @ 25.57 hrs HW=385.49' (Free Discharge)
↑**1=Exfiltration** (Controls 0.24 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=382.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 21P: CB-1

Inflow Area = 0.436 ac, 52.68% Impervious, Inflow Depth = 1.74" for 10YR event
Inflow = 0.60 cfs @ 18.11 hrs, Volume= 0.063 af
Outflow = 0.60 cfs @ 18.11 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min
Primary = 0.60 cfs @ 18.11 hrs, Volume= 0.063 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.26' @ 18.11 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.80'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.80' / 391.70' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.59 cfs @ 18.11 hrs HW=392.25' (Free Discharge)
↑**1=Culvert** (Barrel Controls 0.59 cfs @ 2.54 fps)

Summary for Pond 22P: DMH-1

Inflow Area = 3.520 ac, 31.05% Impervious, Inflow Depth = 1.78" for 10YR event
Inflow = 4.24 cfs @ 18.19 hrs, Volume= 0.523 af
Outflow = 4.24 cfs @ 18.19 hrs, Volume= 0.523 af, Atten= 0%, Lag= 0.0 min
Primary = 4.24 cfs @ 18.19 hrs, Volume= 0.523 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.50' @ 18.19 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.50'	**24.0" Round Culvert** L= 106.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.50' / 389.20' S= 0.0217 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.20 cfs @ 18.19 hrs HW=392.50' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 4.20 cfs @ 2.68 fps)

Summary for Pond 24P: DMH-2

Inflow Area = 3.520 ac, 31.05% Impervious, Inflow Depth = 1.78" for 10YR event
Inflow = 4.24 cfs @ 18.19 hrs, Volume= 0.523 af
Outflow = 4.24 cfs @ 18.19 hrs, Volume= 0.523 af, Atten= 0%, Lag= 0.0 min
Primary = 4.24 cfs @ 18.19 hrs, Volume= 0.523 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 390.10' @ 18.19 hrs
Flood Elev= 396.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	389.10'	**24.0" Round Culvert** L= 261.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 389.10' / 387.40' S= 0.0065 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=4.20 cfs @ 18.19 hrs HW=390.10' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 4.20 cfs @ 2.68 fps)

Summary for Pond 28P: CB-3

Inflow Area = 1.637 ac, 26.72% Impervious, Inflow Depth = 1.89" for 10YR event
Inflow = 2.21 cfs @ 18.18 hrs, Volume= 0.258 af
Outflow = 2.21 cfs @ 18.18 hrs, Volume= 0.258 af, Atten= 0%, Lag= 0.0 min
Primary = 2.21 cfs @ 18.18 hrs, Volume= 0.258 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 398.05' @ 18.18 hrs
Flood Elev= 401.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	397.00'	**12.0" Round Culvert** L= 209.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 397.00' / 391.70' S= 0.0254 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.18 cfs @ 18.18 hrs HW=398.03' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 2.18 cfs @ 2.78 fps)

Summary for Link 6L: WESTERN WETLANDS

Inflow Area = 9.718 ac, 2.08% Impervious, Inflow Depth = 0.49" for 10YR event
Inflow = 1.41 cfs @ 18.68 hrs, Volume= 0.397 af
Primary = 1.41 cfs @ 18.68 hrs, Volume= 0.397 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 7L: RES. HOMES WILDER RD.

Inflow Area = 15.427 ac, 12.78% Impervious, Inflow Depth = 0.18" for 10YR event
Inflow = 0.71 cfs @ 18.66 hrs, Volume= 0.231 af
Primary = 0.71 cfs @ 18.66 hrs, Volume= 0.231 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 8L: EASTERN WETLANDS

Inflow Area = 2.982 ac, 1.99% Impervious, Inflow Depth = 2.05" for 10YR event
Inflow = 4.27 cfs @ 18.19 hrs, Volume= 0.509 af
Primary = 4.27 cfs @ 18.19 hrs, Volume= 0.509 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 9L: MAIN/FORBUSH

Inflow Area = 3.821 ac, 27.37% Impervious, Inflow Depth = 1.89" for 10YR event
Inflow = 4.65 cfs @ 18.17 hrs, Volume= 0.600 af
Primary = 4.65 cfs @ 18.17 hrs, Volume= 0.600 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 2S: POST A.2 Runoff Area=333,173 sf 8.66% Impervious Runoff Depth=0.63"
Flow Length=553' Tc=19.5 min CN=46 Runoff=1.63 cfs 0.401 af

Subcatchment 4S: POST B.2 Runoff Area=48,172 sf 0.00% Impervious Runoff Depth=2.69"
Tc=6.0 min CN=74 Runoff=2.47 cfs 0.248 af

Subcatchment 10S: POST A.2.1 Runoff Area=185,493 sf 5.08% Impervious Runoff Depth=0.74"
Flow Length=452' Tc=9.7 min CN=48 Runoff=1.50 cfs 0.264 af

Subcatchment 11S: POST B.1 Runoff Area=118,280 sf 38.52% Impervious Runoff Depth=2.42"
Flow Length=402' Tc=15.1 min CN=71 Runoff=4.42 cfs 0.548 af

Subcatchment 12S: POST A.2.4 Runoff Area=63,034 sf 29.43% Impervious Runoff Depth=2.25"
Flow Length=415' Tc=15.2 min CN=69 Runoff=2.17 cfs 0.272 af

Subcatchment 15S: POST A.2.5 Runoff Area=18,984 sf 52.68% Impervious Runoff Depth=2.34"
Flow Length=219' Tc=7.0 min CN=70 Runoff=0.82 cfs 0.085 af

Subcatchment 16S: POST A.2.2 Runoff Area=71,298 sf 26.72% Impervious Runoff Depth=2.51"
Flow Length=685' Tc=11.9 min CN=72 Runoff=2.96 cfs 0.342 af

Subcatchment 22S: POST A.1 Runoff Area=423,321 sf 2.08% Impervious Runoff Depth=0.80"
Flow Length=1,065' Tc=27.9 min CN=49 Runoff=2.87 cfs 0.650 af

Subcatchment 23S: POST A.3 Runoff Area=129,917 sf 1.99% Impervious Runoff Depth=2.69"
Flow Length=320' Tc=13.2 min CN=74 Runoff=5.64 cfs 0.668 af

Pond 18P: CB-2 Peak Elev=392.83' Inflow=2.17 cfs 0.272 af
12.0" Round Culvert n=0.013 L=3.0' S=0.0333 '/' Outflow=2.17 cfs 0.272 af

Pond 20P: DETENTION POND 2 Peak Elev=386.34' Storage=26,028 cf Inflow=7.23 cfs 0.963 af
Discarded=0.30 cfs 0.926 af Primary=0.00 cfs 0.000 af Outflow=0.30 cfs 0.926 af

Pond 21P: CB-1 Peak Elev=392.35' Inflow=0.82 cfs 0.085 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/' Outflow=0.82 cfs 0.085 af

Pond 22P: DMH-1 Peak Elev=392.69' Inflow=5.75 cfs 0.699 af
24.0" Round Culvert n=0.013 L=106.0' S=0.0217 '/' Outflow=5.75 cfs 0.699 af

Pond 24P: DMH-2 Peak Elev=390.29' Inflow=5.75 cfs 0.699 af
24.0" Round Culvert n=0.013 L=261.0' S=0.0065 '/' Outflow=5.75 cfs 0.699 af

Pond 28P: CB-3 Peak Elev=398.48' Inflow=2.96 cfs 0.342 af
12.0" Round Culvert n=0.013 L=209.0' S=0.0254 '/' Outflow=2.96 cfs 0.342 af

Link 6L: WESTERN WETLANDS Inflow=2.87 cfs 0.650 af
Primary=2.87 cfs 0.650 af

Link 7L: RES. HOMES WILDER RD. Inflow=1.63 cfs 0.401 af
Primary=1.63 cfs 0.401 af

Link 8L: EASTERN WETLANDS Inflow=5.64 cfs 0.668 af
Primary=5.64 cfs 0.668 af

Link 9L: MAIN/FORBUSH Inflow=6.24 cfs 0.796 af
Primary=6.24 cfs 0.796 af

Total Runoff Area = 31.948 ac Runoff Volume = 3.478 af Average Runoff Depth = 1.31"
89.74% Pervious = 28.670 ac 10.26% Impervious = 3.279 ac

Summary for Subcatchment 2S: POST A.2

Runoff = 1.63 cfs @ 18.48 hrs, Volume= 0.401 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
149,914	36	Woods, Fair, HSG A
29,201	73	Woods, Fair, HSG C
118,453	39	>75% Grass cover, Good, HSG A
6,767	74	>75% Grass cover, Good, HSG C
12,244	98	Roofs, HSG A
773	98	Roofs, HSG C
15,821	98	Paved parking, HSG A
333,173	46	Weighted Average
304,335		91.34% Pervious Area
28,838		8.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
7.0	503	0.0580	1.20		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.5	553	Total			

Summary for Subcatchment 4S: POST B.2

Runoff = 2.47 cfs @ 18.10 hrs, Volume= 0.248 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
33,530	73	Woods, Fair, HSG C
366	48	Brush, Poor, HSG A
14,276	77	Brush, Poor, HSG C
48,172	74	Weighted Average
48,172		100.00% Pervious Area

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

Summary for Subcatchment 10S: POST A.2.1

Runoff = 1.50 cfs @ 18.20 hrs, Volume= 0.264 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
71,213	36	Woods, Fair, HSG A
17,946	73	Woods, Fair, HSG C
67,111	39	>75% Grass cover, Good, HSG A
19,798	74	>75% Grass cover, Good, HSG C
4,208	98	Roofs, HSG A
2,081	98	Roofs, HSG C
1,935	98	Paved parking, HSG A
1,201	98	Paved parking, HSG C
185,493	48	Weighted Average
176,068		94.92% Pervious Area
9,425		5.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.6	61	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	341	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.7	452	Total			

Summary for Subcatchment 11S: POST B.1

Runoff = 4.42 cfs @ 18.22 hrs, Volume= 0.548 af, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
34,397	36	Woods, Fair, HSG A
17,635	73	Woods, Fair, HSG C
5,424	48	Brush, Poor, HSG A
15,263	77	Brush, Poor, HSG C
3,329	98	Roofs, HSG A
42,232	98	Paved parking, HSG A
118,280	71	Weighted Average
72,719		61.48% Pervious Area
45,561		38.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.9	148	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	204	0.0540	4.72		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	402	Total			

Summary for Subcatchment 12S: POST A.2.4

Runoff = 2.17 cfs @ 18.22 hrs, Volume= 0.272 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
11,277	73	Woods, Fair, HSG C
21,898	39	>75% Grass cover, Good, HSG A
10,586	74	>75% Grass cover, Good, HSG C
724	77	Brush, Poor, HSG C
1,410	98	Roofs, HSG A
1,348	98	Roofs, HSG C
11,325	98	Paved parking, HSG A
4,466	98	Paved parking, HSG C
63,034	69	Weighted Average
44,485		70.57% Pervious Area
18,549		29.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.6	123	0.0650	1.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.1	242	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.2	415	Total			

Summary for Subcatchment 15S: POST A.2.5

Runoff = 0.82 cfs @ 18.11 hrs, Volume= 0.085 af, Depth= 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
8,984	39	>75% Grass cover, Good, HSG A
9,169	98	Paved parking, HSG A
831	98	Paved parking, HSG C
18,984	70	Weighted Average
8,984		47.32% Pervious Area
10,000		52.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0800	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
3.7	169	0.0120	0.77		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.0	219	Total			

Summary for Subcatchment 16S: POST A.2.2

Runoff = 2.96 cfs @ 18.18 hrs, Volume= 0.342 af, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
2,082	36	Woods, Fair, HSG A
4,338	73	Woods, Fair, HSG C
7,244	48	Brush, Poor, HSG A
9,217	39	>75% Grass cover, Good, HSG A
29,363	74	>75% Grass cover, Good, HSG C
3,936	98	Roofs, HSG C
4,549	98	Paved parking, HSG A
10,569	98	Paved parking, HSG C
71,298	72	Weighted Average
52,244		73.28% Pervious Area
19,054		26.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
4.4	635	0.0260	2.42		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.9	685	Total			

Summary for Subcatchment 22S: POST A.1

Runoff = 2.87 cfs @ 18.54 hrs, Volume= 0.650 af, Depth= 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
240,957	36	Woods, Fair, HSG A
40,450	60	Woods, Fair, HSG B
106,846	73	Woods, Fair, HSG C
22,485	39	>75% Grass cover, Good, HSG A
3,766	74	>75% Grass cover, Good, HSG C
3,222	98	Roofs, HSG A
1,284	98	Roofs, HSG C
4,311	98	Paved parking, HSG A
423,321	49	Weighted Average
414,504		97.92% Pervious Area
8,817		2.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
15.4	1,015	0.0483	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.9	1,065	Total			

Summary for Subcatchment 23S: POST A.3

Runoff = 5.64 cfs @ 18.19 hrs, Volume= 0.668 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 25YR Rainfall=5.40"

Area (sf)	CN	Description
116,225	73	Woods, Fair, HSG C
11,111	74	>75% Grass cover, Good, HSG C
1,337	98	Roofs, HSG C
1,244	98	Paved parking, HSG C
129,917	74	Weighted Average
127,336		98.01% Pervious Area
2,581		1.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.7	270	0.0590	1.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.2	320	Total			

Summary for Pond 18P: CB-2

Inflow Area = 1.447 ac, 29.43% Impervious, Inflow Depth = 2.25" for 25YR event
Inflow = 2.17 cfs @ 18.22 hrs, Volume= 0.272 af
Outflow = 2.17 cfs @ 18.22 hrs, Volume= 0.272 af, Atten= 0%, Lag= 0.0 min
Primary = 2.17 cfs @ 18.22 hrs, Volume= 0.272 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.83' @ 18.22 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.80'	**12.0" Round Culvert** L= 3.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.80' / 391.70' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.14 cfs @ 18.22 hrs HW=392.81' (Free Discharge)
↑**1=Culvert** (Inlet Controls 2.14 cfs @ 2.73 fps)

Summary for Pond 20P: DETENTION POND 2

Inflow Area = 7.778 ac, 16.83% Impervious, Inflow Depth = 1.49" for 25YR event
Inflow = 7.23 cfs @ 18.19 hrs, Volume= 0.963 af
Outflow = 0.30 cfs @ 26.01 hrs, Volume= 0.926 af, Atten= 96%, Lag= 469.7 min
Discarded = 0.30 cfs @ 26.01 hrs, Volume= 0.926 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 386.34' @ 26.01 hrs Surf.Area= 10,785 sf Storage= 26,028 cf
Flood Elev= 390.00' Surf.Area= 11,581 sf Storage= 33,411 cf

Plug-Flow detention time= 1,074.0 min calculated for 0.926 af (96% of inflow)
Center-of-Mass det. time= 1,044.1 min (2,339.9 - 1,295.9)

Volume	Invert	Avail.Storage	Storage Description
#1	382.00'	33,411 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)
382.00	2,229	233.2	0	0	2,229
384.00	5,160	380.0	7,187	7,187	9,419
386.00	10,387	497.0	15,245	22,432	17,631
387.00	11,581	512.0	10,979	33,411	18,937

Device	Routing	Invert	Outlet Devices
#1	Discarded	382.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 370.00'
#2	Primary	386.50'	**20.0' long x 17.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.30 cfs @ 26.01 hrs HW=386.34' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.30 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=382.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 21P: CB-1

Inflow Area = 0.436 ac, 52.68% Impervious, Inflow Depth = 2.34" for 25YR event
Inflow = 0.82 cfs @ 18.11 hrs, Volume= 0.085 af
Outflow = 0.82 cfs @ 18.11 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 18.11 hrs, Volume= 0.085 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.35' @ 18.11 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.80'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.80' / 391.70' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=0.81 cfs @ 18.11 hrs HW=392.34' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 0.81 cfs @ 2.69 fps)

Summary for Pond 22P: DMH-1

Inflow Area = 3.520 ac, 31.05% Impervious, Inflow Depth = 2.38" for 25YR event
Inflow = 5.75 cfs @ 18.18 hrs, Volume= 0.699 af
Outflow = 5.75 cfs @ 18.18 hrs, Volume= 0.699 af, Atten= 0%, Lag= 0.0 min
Primary = 5.75 cfs @ 18.18 hrs, Volume= 0.699 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.69' @ 18.18 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.50'	**24.0" Round Culvert** L= 106.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.50' / 389.20' S= 0.0217 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.69 cfs @ 18.18 hrs HW=392.69' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.69 cfs @ 2.93 fps)

Summary for Pond 24P: DMH-2

Inflow Area = 3.520 ac, 31.05% Impervious, Inflow Depth = 2.38" for 25YR event
Inflow = 5.75 cfs @ 18.18 hrs, Volume= 0.699 af
Outflow = 5.75 cfs @ 18.18 hrs, Volume= 0.699 af, Atten= 0%, Lag= 0.0 min
Primary = 5.75 cfs @ 18.18 hrs, Volume= 0.699 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 390.29' @ 18.18 hrs
Flood Elev= 396.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	389.10'	**24.0" Round Culvert** L= 261.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 389.10' / 387.40' S= 0.0065 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=5.69 cfs @ 18.18 hrs HW=390.29' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 5.69 cfs @ 2.93 fps)

Summary for Pond 28P: CB-3

Inflow Area = 1.637 ac, 26.72% Impervious, Inflow Depth = 2.51" for 25YR event
Inflow = 2.96 cfs @ 18.18 hrs, Volume= 0.342 af
Outflow = 2.96 cfs @ 18.18 hrs, Volume= 0.342 af, Atten= 0%, Lag= 0.0 min
Primary = 2.96 cfs @ 18.18 hrs, Volume= 0.342 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 398.48' @ 18.18 hrs
Flood Elev= 401.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	397.00'	**12.0" Round Culvert** L= 209.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 397.00' / 391.70' S= 0.0254 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=2.92 cfs @ 18.18 hrs HW=398.46' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 2.92 cfs @ 3.72 fps)

Summary for Link 6L: WESTERN WETLANDS

Inflow Area = 9.718 ac, 2.08% Impervious, Inflow Depth = 0.80" for 25YR event
Inflow = 2.87 cfs @ 18.54 hrs, Volume= 0.650 af
Primary = 2.87 cfs @ 18.54 hrs, Volume= 0.650 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 7L: RES. HOMES WILDER RD.

Inflow Area = 15.427 ac, 12.78% Impervious, Inflow Depth = 0.31" for 25YR event
Inflow = 1.63 cfs @ 18.48 hrs, Volume= 0.401 af
Primary = 1.63 cfs @ 18.48 hrs, Volume= 0.401 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 8L: EASTERN WETLANDS

Inflow Area = 2.982 ac, 1.99% Impervious, Inflow Depth = 2.69" for 25YR event
Inflow = 5.64 cfs @ 18.19 hrs, Volume= 0.668 af
Primary = 5.64 cfs @ 18.19 hrs, Volume= 0.668 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 9L: MAIN/FORBUSH

Inflow Area = 3.821 ac, 27.37% Impervious, Inflow Depth = 2.50" for 25YR event
Inflow = 6.24 cfs @ 18.17 hrs, Volume= 0.796 af
Primary = 6.24 cfs @ 18.17 hrs, Volume= 0.796 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 2S: POST A.2 Runoff Area=333,173 sf 8.66% Impervious Runoff Depth=1.08"
Flow Length=553' Tc=19.5 min CN=46 Runoff=3.70 cfs 0.692 af

Subcatchment 4S: POST B.2 Runoff Area=48,172 sf 0.00% Impervious Runoff Depth=3.61"
Tc=6.0 min CN=74 Runoff=3.32 cfs 0.333 af

Subcatchment 10S: POST A.2.1 Runoff Area=185,493 sf 5.08% Impervious Runoff Depth=1.24"
Flow Length=452' Tc=9.7 min CN=48 Runoff=3.17 cfs 0.439 af

Subcatchment 11S: POST B.1 Runoff Area=118,280 sf 38.52% Impervious Runoff Depth=3.31"
Flow Length=402' Tc=15.1 min CN=71 Runoff=6.08 cfs 0.748 af

Subcatchment 12S: POST A.2.4 Runoff Area=63,034 sf 29.43% Impervious Runoff Depth=3.11"
Flow Length=415' Tc=15.2 min CN=69 Runoff=3.03 cfs 0.375 af

Subcatchment 15S: POST A.2.5 Runoff Area=18,984 sf 52.68% Impervious Runoff Depth=3.21"
Flow Length=219' Tc=7.0 min CN=70 Runoff=1.14 cfs 0.116 af

Subcatchment 16S: POST A.2.2 Runoff Area=71,298 sf 26.72% Impervious Runoff Depth=3.41"
Flow Length=685' Tc=11.9 min CN=72 Runoff=4.05 cfs 0.465 af

Subcatchment 22S: POST A.1 Runoff Area=423,321 sf 2.08% Impervious Runoff Depth=1.32"
Flow Length=1,065' Tc=27.9 min CN=49 Runoff=5.60 cfs 1.066 af

Subcatchment 23S: POST A.3 Runoff Area=129,917 sf 1.99% Impervious Runoff Depth=3.61"
Flow Length=320' Tc=13.2 min CN=74 Runoff=7.60 cfs 0.897 af

Pond 18P: CB-2 Peak Elev=393.33' Inflow=3.03 cfs 0.375 af
12.0" Round Culvert n=0.013 L=3.0' S=0.0333 '/' Outflow=3.03 cfs 0.375 af

Pond 20P: DETENTION POND 2 Peak Elev=386.58' Storage=28,662 cf Inflow=11.08 cfs 1.395 af
Discarded=0.31 cfs 1.020 af Primary=1.31 cfs 0.317 af Outflow=1.62 cfs 1.337 af

Pond 21P: CB-1 Peak Elev=392.47' Inflow=1.14 cfs 0.116 af
12.0" Round Culvert n=0.013 L=5.0' S=0.0200 '/' Outflow=1.14 cfs 0.116 af

Pond 22P: DMH-1 Peak Elev=392.95' Inflow=7.93 cfs 0.956 af
24.0" Round Culvert n=0.013 L=106.0' S=0.0217 '/' Outflow=7.93 cfs 0.956 af

Pond 24P: DMH-2 Peak Elev=390.55' Inflow=7.93 cfs 0.956 af
24.0" Round Culvert n=0.013 L=261.0' S=0.0065 '/' Outflow=7.93 cfs 0.956 af

Pond 28P: CB-3 Peak Elev=399.34' Inflow=4.05 cfs 0.465 af
12.0" Round Culvert n=0.013 L=209.0' S=0.0254 '/' Outflow=4.05 cfs 0.465 af

Link 6L: WESTERN WETLANDS Inflow=5.60 cfs 1.066 af
Primary=5.60 cfs 1.066 af

Link 7L: RES. HOMES WILDER RD.

Inflow=3.70 cfs 1.008 af
Primary=3.70 cfs 1.008 af

Link 8L: EASTERN WETLANDS

Inflow=7.60 cfs 0.897 af
Primary=7.60 cfs 0.897 af

Link 9L: MAIN/FORBUSH

Inflow=8.54 cfs 1.081 af
Primary=8.54 cfs 1.081 af

Total Runoff Area = 31.948 ac Runoff Volume = 5.131 af Average Runoff Depth = 1.93"
89.74% Pervious = 28.670 ac 10.26% Impervious = 3.279 ac

Summary for Subcatchment 2S: POST A.2

Runoff = 3.70 cfs @ 18.35 hrs, Volume= 0.692 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
149,914	36	Woods, Fair, HSG A
29,201	73	Woods, Fair, HSG C
118,453	39	>75% Grass cover, Good, HSG A
6,767	74	>75% Grass cover, Good, HSG C
12,244	98	Roofs, HSG A
773	98	Roofs, HSG C
15,821	98	Paved parking, HSG A
333,173	46	Weighted Average
304,335		91.34% Pervious Area
28,838		8.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
7.0	503	0.0580	1.20		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.5	553	Total			

Summary for Subcatchment 4S: POST B.2

Runoff = 3.32 cfs @ 18.10 hrs, Volume= 0.333 af, Depth= 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
33,530	73	Woods, Fair, HSG C
366	48	Brush, Poor, HSG A
14,276	77	Brush, Poor, HSG C
48,172	74	Weighted Average
48,172		100.00% Pervious Area

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

Summary for Subcatchment 10S: POST A.2.1

Runoff = 3.17 cfs @ 18.17 hrs, Volume= 0.439 af, Depth= 1.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
71,213	36	Woods, Fair, HSG A
17,946	73	Woods, Fair, HSG C
67,111	39	>75% Grass cover, Good, HSG A
19,798	74	>75% Grass cover, Good, HSG C
4,208	98	Roofs, HSG A
2,081	98	Roofs, HSG C
1,935	98	Paved parking, HSG A
1,201	98	Paved parking, HSG C
185,493	48	Weighted Average
176,068		94.92% Pervious Area
9,425		5.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	50	0.0200	0.15		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.6	61	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.4	341	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
9.7	452	Total			

Summary for Subcatchment 11S: POST B.1

Runoff = 6.08 cfs @ 18.22 hrs, Volume= 0.748 af, Depth= 3.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
34,397	36	Woods, Fair, HSG A
17,635	73	Woods, Fair, HSG C
5,424	48	Brush, Poor, HSG A
15,263	77	Brush, Poor, HSG C
3,329	98	Roofs, HSG A
42,232	98	Paved parking, HSG A
118,280	71	Weighted Average
72,719		61.48% Pervious Area
45,561		38.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.9	148	0.0680	1.30		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.7	204	0.0540	4.72		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.1	402	Total			

Summary for Subcatchment 12S: POST A.2.4

Runoff = 3.03 cfs @ 18.22 hrs, Volume= 0.375 af, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
11,277	73	Woods, Fair, HSG C
21,898	39	>75% Grass cover, Good, HSG A
10,586	74	>75% Grass cover, Good, HSG C
724	77	Brush, Poor, HSG C
1,410	98	Roofs, HSG A
1,348	98	Roofs, HSG C
11,325	98	Paved parking, HSG A
4,466	98	Paved parking, HSG C
63,034	69	Weighted Average
44,485		70.57% Pervious Area
18,549		29.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.6	123	0.0650	1.27		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.1	242	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.2	415	Total			

Summary for Subcatchment 15S: POST A.2.5

Runoff = 1.14 cfs @ 18.11 hrs, Volume= 0.116 af, Depth= 3.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
8,984	39	>75% Grass cover, Good, HSG A
9,169	98	Paved parking, HSG A
831	98	Paved parking, HSG C
18,984	70	Weighted Average
8,984		47.32% Pervious Area
10,000		52.68% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.3	50	0.0800	0.25		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
3.7	169	0.0120	0.77		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.0	219	Total			

Summary for Subcatchment 16S: POST A.2.2

Runoff = 4.05 cfs @ 18.17 hrs, Volume= 0.465 af, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
2,082	36	Woods, Fair, HSG A
4,338	73	Woods, Fair, HSG C
7,244	48	Brush, Poor, HSG A
9,217	39	>75% Grass cover, Good, HSG A
29,363	74	>75% Grass cover, Good, HSG C
3,936	98	Roofs, HSG C
4,549	98	Paved parking, HSG A
10,569	98	Paved parking, HSG C
71,298	72	Weighted Average
52,244		73.28% Pervious Area
19,054		26.72% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
4.4	635	0.0260	2.42		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.9	685	Total			

Summary for Subcatchment 22S: POST A.1

Runoff = 5.60 cfs @ 18.47 hrs, Volume= 1.066 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
240,957	36	Woods, Fair, HSG A
40,450	60	Woods, Fair, HSG B
106,846	73	Woods, Fair, HSG C
22,485	39	>75% Grass cover, Good, HSG A
3,766	74	>75% Grass cover, Good, HSG C
3,222	98	Roofs, HSG A
1,284	98	Roofs, HSG C
4,311	98	Paved parking, HSG A
423,321	49	Weighted Average
414,504		97.92% Pervious Area
8,817		2.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.5	50	0.0200	0.07		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
15.4	1,015	0.0483	1.10		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
27.9	1,065	Total			

Summary for Subcatchment 23S: POST A.3

Runoff = 7.60 cfs @ 18.19 hrs, Volume= 0.897 af, Depth= 3.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 36.00 hrs 100YR Rainfall=6.50"

Area (sf)	CN	Description
116,225	73	Woods, Fair, HSG C
11,111	74	>75% Grass cover, Good, HSG C
1,337	98	Roofs, HSG C
1,244	98	Paved parking, HSG C
129,917	74	Weighted Average
127,336		98.01% Pervious Area
2,581		1.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0400	0.09		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
3.7	270	0.0590	1.21		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
13.2	320	Total			

Summary for Pond 18P: CB-2

Inflow Area = 1.447 ac, 29.43% Impervious, Inflow Depth = 3.11" for 100YR event
Inflow = 3.03 cfs @ 18.22 hrs, Volume= 0.375 af
Outflow = 3.03 cfs @ 18.22 hrs, Volume= 0.375 af, Atten= 0%, Lag= 0.0 min
Primary = 3.03 cfs @ 18.22 hrs, Volume= 0.375 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 393.33' @ 18.22 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.80'	**12.0" Round Culvert** L= 3.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.80' / 391.70' S= 0.0333 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.00 cfs @ 18.22 hrs HW=393.31' (Free Discharge)
↑**1=Culvert** (Inlet Controls 3.00 cfs @ 3.82 fps)

Summary for Pond 20P: DETENTION POND 2

Inflow Area = 7.778 ac, 16.83% Impervious, Inflow Depth = 2.15" for 100YR event
Inflow = 11.08 cfs @ 18.18 hrs, Volume= 1.395 af
Outflow = 1.62 cfs @ 19.39 hrs, Volume= 1.337 af, Atten= 85%, Lag= 72.6 min
Discarded = 0.31 cfs @ 19.39 hrs, Volume= 1.020 af
Primary = 1.31 cfs @ 19.39 hrs, Volume= 0.317 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 386.58' @ 19.39 hrs Surf.Area= 11,072 sf Storage= 28,662 cf
Flood Elev= 390.00' Surf.Area= 11,581 sf Storage= 33,411 cf

Plug-Flow detention time= 852.5 min calculated for 1.336 af (96% of inflow)
Center-of-Mass det. time= 819.2 min (2,100.3 - 1,281.0)

Volume	Invert	Avail.Storage	Storage Description
#1	382.00'	33,411 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)
382.00	2,229	233.2	0	0	2,229
384.00	5,160	380.0	7,187	7,187	9,419
386.00	10,387	497.0	15,245	22,432	17,631
387.00	11,581	512.0	10,979	33,411	18,937

Device	Routing	Invert	Outlet Devices
#1	Discarded	382.00'	**1.020 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 370.00'
#2	Primary	386.50'	**20.0' long x 17.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.31 cfs @ 19.39 hrs HW=386.58' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.31 cfs)

Primary OutFlow Max=1.23 cfs @ 19.39 hrs HW=386.58' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 1.23 cfs @ 0.76 fps)

Summary for Pond 21P: CB-1

Inflow Area = 0.436 ac, 52.68% Impervious, Inflow Depth = 3.21" for 100YR event
Inflow = 1.14 cfs @ 18.11 hrs, Volume= 0.116 af
Outflow = 1.14 cfs @ 18.11 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.0 min
Primary = 1.14 cfs @ 18.11 hrs, Volume= 0.116 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.47' @ 18.11 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.80'	**12.0" Round Culvert** L= 5.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.80' / 391.70' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=1.12 cfs @ 18.11 hrs HW=392.46' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 1.12 cfs @ 2.88 fps)

Summary for Pond 22P: DMH-1

Inflow Area = 3.520 ac, 31.05% Impervious, Inflow Depth = 3.26" for 100YR event
Inflow = 7.93 cfs @ 18.18 hrs, Volume= 0.956 af
Outflow = 7.93 cfs @ 18.18 hrs, Volume= 0.956 af, Atten= 0%, Lag= 0.0 min
Primary = 7.93 cfs @ 18.18 hrs, Volume= 0.956 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 392.95' @ 18.18 hrs
Flood Elev= 395.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	391.50'	**24.0" Round Culvert** L= 106.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 391.50' / 389.20' S= 0.0217 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=7.84 cfs @ 18.18 hrs HW=392.94' (Free Discharge)
└**1=Culvert** (Inlet Controls 7.84 cfs @ 3.23 fps)

Summary for Pond 24P: DMH-2

Inflow Area = 3.520 ac, 31.05% Impervious, Inflow Depth = 3.26" for 100YR event
Inflow = 7.93 cfs @ 18.18 hrs, Volume= 0.956 af
Outflow = 7.93 cfs @ 18.18 hrs, Volume= 0.956 af, Atten= 0%, Lag= 0.0 min
Primary = 7.93 cfs @ 18.18 hrs, Volume= 0.956 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 390.55' @ 18.18 hrs
Flood Elev= 396.90'

Device	Routing	Invert	Outlet Devices
#1	Primary	389.10'	**24.0" Round Culvert** L= 261.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 389.10' / 387.40' S= 0.0065 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=7.84 cfs @ 18.18 hrs HW=390.54' (Free Discharge)
└**1=Culvert** (Inlet Controls 7.84 cfs @ 3.23 fps)

Summary for Pond 28P: CB-3

Inflow Area = 1.637 ac, 26.72% Impervious, Inflow Depth = 3.41" for 100YR event
Inflow = 4.05 cfs @ 18.17 hrs, Volume= 0.465 af
Outflow = 4.05 cfs @ 18.17 hrs, Volume= 0.465 af, Atten= 0%, Lag= 0.0 min
Primary = 4.05 cfs @ 18.17 hrs, Volume= 0.465 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 399.34' @ 18.17 hrs
Flood Elev= 401.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	397.00'	**12.0" Round Culvert** L= 209.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 397.00' / 391.70' S= 0.0254 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=3.99 cfs @ 18.17 hrs HW=399.28' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.99 cfs @ 5.08 fps)

Summary for Link 6L: WESTERN WETLANDS

Inflow Area = 9.718 ac, 2.08% Impervious, Inflow Depth = 1.32" for 100YR event
Inflow = 5.60 cfs @ 18.47 hrs, Volume= 1.066 af
Primary = 5.60 cfs @ 18.47 hrs, Volume= 1.066 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 7L: RES. HOMES WILDER RD.

Inflow Area = 15.427 ac, 12.78% Impervious, Inflow Depth = 0.78" for 100YR event
Inflow = 3.70 cfs @ 18.35 hrs, Volume= 1.008 af
Primary = 3.70 cfs @ 18.35 hrs, Volume= 1.008 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 8L: EASTERN WETLANDS

Inflow Area = 2.982 ac, 1.99% Impervious, Inflow Depth = 3.61" for 100YR event
Inflow = 7.60 cfs @ 18.19 hrs, Volume= 0.897 af
Primary = 7.60 cfs @ 18.19 hrs, Volume= 0.897 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link 9L: MAIN/FORBUSH

Inflow Area = 3.821 ac, 27.37% Impervious, Inflow Depth = 3.39" for 100YR event
Inflow = 8.54 cfs @ 18.17 hrs, Volume= 1.081 af
Primary = 8.54 cfs @ 18.17 hrs, Volume= 1.081 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

APPENDIX F

Recharge Volume / Water Quality Volume / TSS Removal Calculations

TADMOR
Bolton, MA

September 5, 2017
4904-H

Stormwater Recharge & Water Quality Calculations

Infiltration Basin

Impervious Area tabulation:

Hydrologic Soil Group	Impervious Area (Ac)	Target Depth (F)	Recharge Volume (Rv) Ac-feet
A	2.611	0.6	0.131
C	0.667	0.25	0.014

Total Recharge Volume Required (Rv) = 0.144 Ac-ft

Total Recharge Volume Required (Rv) = 6,292 C.ft

$$R_v = F \; x \; Impervious \; Area$$

Table 2.3.2: Recharge Target Depth by Hydrologic Soil Group

NRCS Hydrologic Soil Group	Approx. Soil Texture	Target Depth Factor (F)
A	sand	0.6 inch
B	loam	0.35 inch
C	silty loam	0.25 inch
D	clay	0.1 inch

Capture Area Adjustment:

$$R_v adj = \frac{A_p}{A_t} x R_v$$

Rvaj = Adjusted recharge volume required
Ap = Impervious area captured by pond (1.309 Ac)
At = Total impervious area (1.918 Ac)
Rv = Recharge volume required

Adjusted Recharge Volume Required = 9,219 C.ft
Total Recharge Volume Provided (Rv) = 20,349 C.ft

1 inch depth
Zone II discharges
IWPA discharges
Critical Area
Runoff from LUHPPL
Infiltration rate >2.4 inches/hour
1/2 inch depth
Discharge to other ares
8 inch
9 inch
10 inch
11 inch

Water Quality Calculation:

Water Quality Depth = 1 in
Required Water Quality Volume = 9,478 C.ft.

$$V_{WQ} = D_{WQ}(ft) x \; Imp. Area \; (ft^2)$$

To elev. of water in pond during 100 yr storm

Proposed Infiltration Area Calculations:

Bottom Surface Area (A): 2,229.00 SF

Drawdown Calculations:

Soil Texture: 3 Sandy Loam

Rawls Rate: 1.02 in/hr

Drawdown: 33.21 hr

Drawdown is less than 72 Hours as Required

$$Drawdown = \frac{R_V}{(Rawls \; Rate)(Bottom \; Area)}$$

Table 2.3.3: 1982 Rawls Rates

Texture Class	NRCS Hydrologic Soil Group	Infiltration Rate
1 Sand	A	8.27 in/hr
2 Loamy Sand	A	2.41 in/hr
3 Sandy Loam	B	1.02 in/hr
4 Loam	B	0.52 in/hr
5 Silt Loam	C	0.27 in/hr
6 Sandy Clay Loam	C	0.17 in/hr
7 Clay Loam	D	0.09 in/hr
8 Silty Clay Loam	D	0.06 in/hr
9 Sandy Clay	D	0.05 in/hr
10 Silty Clay	D	0.04 in/hr
11 Clay	D	0.02 in/hr

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

TSS Removal Calculation Worksheet

Location: Impervious Areas

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Infiltration Basin	**0.80**	**0.75**	**0.60**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**
	0.00	**0.15**	**0.00**	**0.15**

Total TSS Removal = **85%**

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

Project: **TADMOR**
Prepared By: **JPL**
Date: **11-Aug-17**

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

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

TSS Removal Calculation Worksheet

Location: Impervious Areas-Pretreament

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	**0.25**	**1.00**	**0.25**	**0.75**
Sediment Forebay	**0.25**	**0.75**	**0.19**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**
	0.00	**0.56**	**0.00**	**0.56**

Total TSS Removal = **44%**

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

Project: **TADMOR**
Prepared By: **JPL**
Date: **11-Aug-17**

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

APPENDIX G

Operation and Maintenance Plan

STORMWATER OPERATION & MAINTENANCE MANUAL

TADMOR

MAIN STREET

BOLTON, MASSACHUSETTS

Prepared For: **TADMOR REALTY TRUST**
148 PARK STREET
NORTH READING, MA 01864

Prepared By: **DUCHARME & DILLIS CIVIL DESIGN GROUP, INC.**
1092 MAIN STREET
BOLTON, MA 01740

September 5, 2017

4904-H

DUCHARME & DILLIS
Civil Design Group, Inc.
CIVIL ENGINEERS • LAND SURVEYORS • WETLAND CONSULTANTS

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1.1 Overview of Drainage System
1.2 Routine Operation & Maintenance Tasks
1.3 O&M Schedule

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Appendix B – Stormwater Management System Owners/Operators

1.0 Project Narrative

Proposed Stormwater Management System

The proposed stormwater management system was designed to reduce the peak rate of stormwater leaving the site, promote groundwater recharge, and increase the water quality. Runoff from the proposed development will be conveyed and treated through deep sump hooded catch basins, sediment forebays and an above ground infiltration area before infiltrating to the groundwater. The proposed stormwater management system has been designed to reduce the peak rate of the stormwater leaving the property.

Deep Sump Hooded Catch Basins

Deep sump hooded catch basins are proposed to convey the runoff from the proposed paved areas and roofs to the infiltration basin. These catch basins will discharge to manholes and conventional storm drains.

Infiltration Basin

An infiltration basin will collect runoff from the pavement and roof tops. The basin has been designed to accommodate the runoff associated with the 100-year storm event. Pretreatment is provided using a sediment forebay within the basin.

Stormwater Conveyance Swale

A swale will be used to help convey stormwater from various locations on site to the proposed infiltration basin. A deep sump hooded catch basin installed with a beehive grate will be used as an outlet control structure for the swale. The swale is designed to be two feet deep with a two-foot bottom width. The sides slopes are to be 3H:1V and they shall be grassed lined. The swale is to be sloped as best as possible towards the specified outlet control structure.

1.1 Operation & Maintenance Tasks

The following activities should be performed routinely to allow for proper functioning of the stormwater system. The following are guidelines referring to each major component of the stormwater management system.

1.1.1 *Drain Manholes and Catch Basins*

Manholes and catch basins shall be inspected semi-annually for signs of wear, settling, cracking or other fatigue. Manhole and catch basins castings should be inspected for signs of root intrusion, or significant water infiltration. Manhole and catch basin sumps should be checked for silt /sediment buildup and cleaned as necessary. Cleaning should be performed by vacuum truck. Manholes and catch basins should be

resealed as required and outlets should be inspected incidentally with all structure inspections. Evidence of debris intrusion or excessive siltation or sedimentation could result in the need to clean a storm drain line. Flushing or jetting should be performed as required.

1.1.2 *Sediment forebay*

A sediment forebay is required as a pretreatment device prior to discharging stormwater to the infiltration basin. It will provide pretreatment by slowing stormwater runoff and increasing settlement of the sediment. The sediment forebay should be inspected monthly and cleaned of accumulated sediment on a quarterly basis

1.1.3 *Infiltration Basin*

The infiltration basin should be monitored and maintained regularly to ensure no obstructions in the system are present. The basin should be monitored for the buildup of sedimentation. If the depth of sedimentation begins to impair the basins ability to infiltrate water, the basin will need to be cleaned out. Other maintenance will include checking the inlets and outlet for debris.

1.1.4 Storm Drain Lines

Storm drain lines should be inspected during the manhole and catch basin inspection process. Evidence of debris intrusion or excessive siltation or sedimentation could result in the need to clean a storm drain line. Flushing or jetting should be performed as required.

1.2 O&M Schedule

	O&M Task	Monthly	Quarterly	Spring	Fall	2-years	As-required
1.	**Manholes and Catch Basins**						
	Inspect Rims			x			
	Inspect inside/inlet and outlet pipes					x	
	Remove sediment					x	x
2.	**Sediment forebay**						
	Inspected	x					
	Remove Debris			x			
	Remove Silt/Sediment					x	x
3.	**Infiltration Basin**						
	Inspection						x
	Clean						x
4.	**Storm Drain Lines**						
	Inspection					x	
	Clean Sediment					x	x

APPENDIX A

Drainage Site Plans

Full size copies of the final drainage plan will be included in the final O&M report. For review, reduced size plans have been included.

APPENDIX B

Stormwater Management System Owners/Operators

1.	Stormwater Management System Owners:	TBD
2.	Current and future operators:	TBD
3.	Emergency contact information:	TBD
4.	Change of trustee:	TBD
5.	Financial Responsible Party:	TBD
6.	Routine Maintenance:	TBD
7.	O&M activities:	TBD
8.	Record keeping	TBD

APPENDIX H

Long Term Pollution Prevention Plan

LONG TERM POLUTION PREVENTION PLAN

TADMOR

MAIN STREET

BOLTON, MASSACHUSETTS

Prepared For: **TADMOR REALTY TRUST**
148 PARK STREET
NORTH READING, MA 01864

Prepared By: **DUCHARME & DILLIS CIVIL DESIGN GROUP, INC.**
1092 MAIN STREET
BOLTON, MA 01740

September 5, 2017

4904-H

DUCHARME & DILLIS
Civil Design Group, Inc.
CIVIL ENGINEERS · LAND SURVEYORS · WETLAND CONSULTANTS

1.0 Summary

This Long-Term Pollution Prevention Plan (LTPPP) has been prepared by Ducharme & Dillis Civil Design Group, Inc. pursuant to the Massachusetts Stormwater Regulations. The proposed project consists of the development of 11 residential homes, a new road and a common driveway on a parcel of land in Bolton, Massachusetts.

The layout of the development has been carefully planned to minimize disturbance to the existing land and natural features. The stormwater management system has been designed in accordance with the Massachusetts Stormwater Regulations to provide pretreatment of the stormwater prior to discharge to the resource areas.

2.0 Spill Prevention Plan

No hazardous materials other than normal and common household items are expected to be stored on site after the construction period has ended (refer to the Stormwater Pollution Prevention Plan for details pertaining to spill prevention during construction).

It is expected that normal DEP notification procedures would be triggered for major spills such as home heating oil or propane and natural gas leaks.

3.0 Stormwater System O&M

A Stormwater Operation & Maintenance plan has been prepared for the proposed stormwater management system. Refer to this document for details pertaining to the required inspections, routine maintenance and operation details.

Implementation of the stormwater operation and maintenance plan is critical for the site to function as designed, and for the protection of the downstream areas from the potential for scour and erosion.

Special care should be paid to the protection and maintenance of the proposed catch basins that support the drainage system. Refer to the O&M Plan for specific instructions.

4.0 Snow/Salt Management

4.1 Snow Plowing

The proposed road and common driveway will be paved to accommodate the expected traffic. Snow plowing will be performed by a private contractor in accordance with commercial parking lot standards.

4.2 Street Sweeping

Street sweeping will be included with existing schedule for the Town of Bolton.

4.3 Salting/Deicing

Salting of the pavement areas will take place during the winter months only when necessary. Salting will be performed by the same private contractor that is expected to snow plot. No salt for deicing will be stored on site.

5.0 Waste Management

5.1 Septic Systems

On-site septic systems will be designed for each dwelling in accordance with Title 5 and local regulations. Each system will be maintained by the associated home owner.

On-site portable restrooms will be used during construction. The portable restrooms will be cleaned and maintained on a regular basis and disposal will be performed weekly or as required with a private or public waste removal company. All portable restrooms will be removed after construction.

5.2 Solid Waste

Dumpsters will be used for waste management during construction. It is expected that the disposal will contract directly with a private or public waste removal company. All dumpsters will be removed after construction.

6.0 Lawn Maintenance

All lawn and landscaped maintenance on the individual lots will be performed by the associated home owners. All lawn and landscaped maintenance around the proposed road will be performed by the town. Fertilizers, herbicides and pesticides used for lawn care will be applied per the manufacturers recommendations and will be stored off site.