

STORMWATER MANAGEMENT REPORT

SITEC

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Land Use Planning

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STORMWATER MANAGEMENT REPORT DECEMBER 6, 2018

Project: Convenience Store/Gas Station
56 Potomska Street
New Bedford, MA 02740
Assessors Map 31 – Lot 232 &239

Property Owner: ZGA Realty Trust
56 Potomska Street
New Bedford, MA 02740

Zoning District: Industrial B



EXISTING SITE CONDITIONS

The subject property is a 41,035 SF parcel of land located on the southeast corner of Route 18 and Potomska Street in the south end of New Bedford. The property is bordered by Route 18 on the west, Potomska Street on the north, South Front Street on the east, and Marsh Street on the south. There is a one story warehouse/storage building located on the property, an existing convenience store and gas station and there is a parking/pump islands consisting of pavement, gravel, and concrete surfaces in the central, and northern portions of the site.

Access to the property is available via curb cuts onto Potomska and South Front Streets together with a curb cut onto a discontinued portion of Water Street. The property is served by municipal water and sanitary sewer.

Existing drainage on the site consists of overland sheet flow, no drainage structures, with the discharge directed to the municipal drainage system.

PROPOSED RE-DEVELOPMENT

The Applicant, ZGA Realty Trust, is proposing to redevelop and upgrade the property with the demolition of the warehouse and convenience store and the construction of a new 5000 SF store and improved parking and landscape facilities.

The Applicant proposes to construct the new store in the southern portion of the site with a drive thru lane and by pass lane to serve the facility. The westerly pump island will be removed to improve site access from Potomska Street.. The area vacated by the existing building will be rebuilt with new pump islands resulting in a 16 fueling station facility.

The site will be completely reconstructed with a new paved parking lot, drainage improvements, new lighting and added landscaping.

New stormwater water quality and flow mitigation controls will be included in the overall site improvements. Onsite recharge systems (3 new systems) are proposed with (3) new deep sump catch basins.

The drainage for the parking and building roof areas will be divided into three components. Area 1 will drain to a new deep sump catch basin located on the west side of the drive thru bypass lane. Area 2 will intercept surface water from the roof and rear paved surfaces of the site. Area 3 is the parking/drive aisle located on the north and east side of the building.

These basins will be separated from each other in order to minimize the flow to any one system and each basin will discharge the runoff into Cultec recharge chambers.

The recharge systems will consist of Cultec Recharger units, Model #330HD which will be set on a 6" crushed stone bed with a 6" crushed stone overlay. The systems will have a 12" perimeter of crushed stone and all unsuitable soils within 5 feet of the systems and below the systems will be removed and replaced with high quality sand meeting DEP septic system (Title 5) standards.

Prior to the flow being directed into the Cultec chambers, the runoff will pass through Flo Gard Plus catch basin filter inserts. These filters are rated to remove 80% of the total suspended soils (TSS) from the runoff water. An additional 25% TSS removal will occur as a result of the deep sump basins. The Flo Gard units also provide hydrocarbon screening in the 70% to 80% range. The overflow from the new parking lot drainage will be directed into the onsite detention/recharge systems.

The combination of increased landscaped areas and the three recharge systems will result in a significant reduction in stormwater runoff. Each of the systems are designed to store and recharge 100% of the runoff associated with rainfall events up to 4.4 inches. The attached HydroCAD computations demonstrate the effectiveness of the flow mitigation.



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.

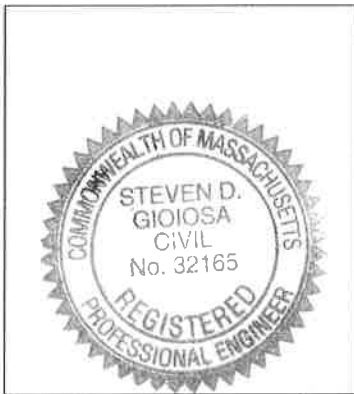
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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

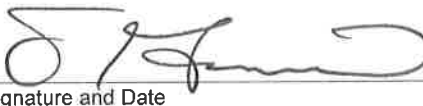
A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

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

12.6.18

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): Roof runoff recharge system

Standard 1: No New Untreated Discharges

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



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - Static
 - Simple Dynamic
 - Dynamic Field¹
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - Site is comprised solely of C and D soils and/or bedrock at the land surface
 - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - Solid Waste Landfill pursuant to 310 CMR 19.000
 - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- 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.

CONSTRUCTION EROSION AND SEDIMENT CONTROL PLAN

**Convenience Store/Gas Station
56 Potomska Street
Map 31 Lot 232 & 239
New Bedford, MA
December 6, 2018**

1. SITE DESCRIPTION:

**APPLICANT: ZGA Realty Trust
56 Potomska Street
New Bedford, MA 02740**

PROJECT NAME AND LOCATION

**Convenience Store/Gas Station
56 Potomska St, New Bedford, MA**

DESCRIPTION: (Purpose and Types of Soil Disturbing Activities)

This project involves the redevelopment of a commercial site with the demolition of the current site improvements and the addition of a new commercial building and associated support systems on a 41,035 SF parcel. The site slopes generally from north to south toward Marsh Street and currently includes 2 buildings, gas pumps, parking/access aisles, and several curb cuts.

Soil disturbing activities will include: the removal of the existing pavement, the removal of the westerly pump island, and the removal of the existing buildings together with general site demolition. New construction will include the closing of 2 curb cuts and the construction of a new building, parking and utilities, and a new stormwater management system. Upon completion of construction, new site lighting and

landscaping will be installed and all disturbed areas will be stabilized.

SEQUENCE OF MAJOR ACTIVITIES

1. Install all erosion and sediment control measures per the enclosed approved plans. The Contractor will implement the use of widely accepted principles for erosion and sediment control during construction.
2. Removal of existing concrete/pavement/brush and topsoil.
3. Installation of electrical conduits, drainage, and retention system.
4. Construct building, canopy, sidewalks, gas systems and parking. Stabilize site with landscaping
5. Construction sequence may vary to minimize disturbance on site.

2. EROSION AND SEDIMENT CONTROLS

In addition to the perimeter controls, erosion control will be accomplished using temporary measures such as tracking entrance, seeding or mulching, spraying of liquid stabilizers or any combination of these measures. Seeds should be applied at a rate of 2 lbs/ 1000 square feet at a depth of ½ inch. Soil netting or covering should be used in extreme conditions.

Only minor stockpiling of soils will be allowed on site. Soil stockpiles will be ringed with hay bales/ silt fencing or covered in extreme conditions(Refer to Plan Sheets 2 and 8)

Maintenance / Inspection Procedures for Erosion and Sediment Controls

- Construction to commence in a phased manner.
- All control measures will be inspected at least once each week and following any storm event of 0.5 inches of precipitation or greater.
- All measures will be maintained in good working order; if repair is necessary, it will be initiated within 24 hours of report.
- Built up sediment will be removed from erosion control when it has reached one-third the height of the fence or bale.
- Silt fence if needed, will be inspected for depth of sediment, tears and to see if fabric is securely attached to the fence posts, are firmly in the ground.

- Any temporary sediment basin used will be inspected for depth of sediment. Any build up of sediment will be removed when it reaches 10% of the design capacity or at the end of project completion.
- Temporary and permanent seeding and planting will be inspected for bare spots, washouts and healthy growth.
- A maintenance and inspection report will be made after each inspection. A copy of the report form to be completed by the inspector and kept on site.
- Construction site supervisor will be responsible for training workers in all inspection and maintenance practices necessary for keeping erosion and sediment controls in good working order.

3. OTHER CONTROLS

Waste Disposal

All waste materials will be disposed of off site in accordance with all applicable local, State, Federal regulations. No construction waste is to be buried on site. All personnel will be instructed regarding the correct procedure for waste disposal. The individual, who manages the day-to-day site operations, will be responsible for seeing that these procedures are followed.

Hazardous Waste

All hazardous waste materials will be disposed of in a manner specified by local, State, Federal regulations and in accordance with any manufactures recommendations.

Sanitary Waste

All sanitary waste will be collected in portable units installed on site. The portable units will be cleaned and emptied by a qualified licensed contractor.

Concrete Waste

All concrete washings will be disposed on in a designated area away from wetlands and any property line. When the concrete hardens it will be removed

from the site.

4. POLLUTION AND SPILL PREVENTION

INVENTORY FOR POLLUTION PREVENTION PLAN

The following substances listed below are expected to be present onsite during construction:

- General construction materials
- Asphalt/concrete
- Paints
- Petroleum based products
- Cleaning solvents

MATERIAL MANAGEMENT PRACTICES

Good Housekeeping Practices

- Store only enough products on site to do the job.
- All materials stored outside will be stored in a neat, orderly manner in the original containers.
- Products will be kept in their original containers with the original manufacture's label.
- Whenever possible, all products will be used up before disposing of the container.
- The site contractor will inspect daily to ensure proper use and disposal of materials onsite.

Product Specific Practices

Petroleum/Fertilizer Products:

- Refueling vehicles will be DOT Certified and have SPCC Plans in place and contain emergency equipment to contain and clean up small spills.
- All on site construction vehicles will be inspected for leaks and receive regular preventative maintenance to reduce the chance of leakage.
- Petroleum products will be stored in tightly sealed containers, which are properly marked.
- All fertilizers will be stored in a dry protected area and only used according to manufacturers recommendations.

Paints:

- All containers will be tightly sealed and stored when not required for use.
- All procedures will be followed to minimize spills and to keep products in the original containers.

Concrete Trucks:

- The site contractor is responsible for designating a safe area, away from abutting property and resource areas, for excess concrete disposal.


SPILL CONTROL PRACTICES

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for Spill Prevention and clean up during construction:

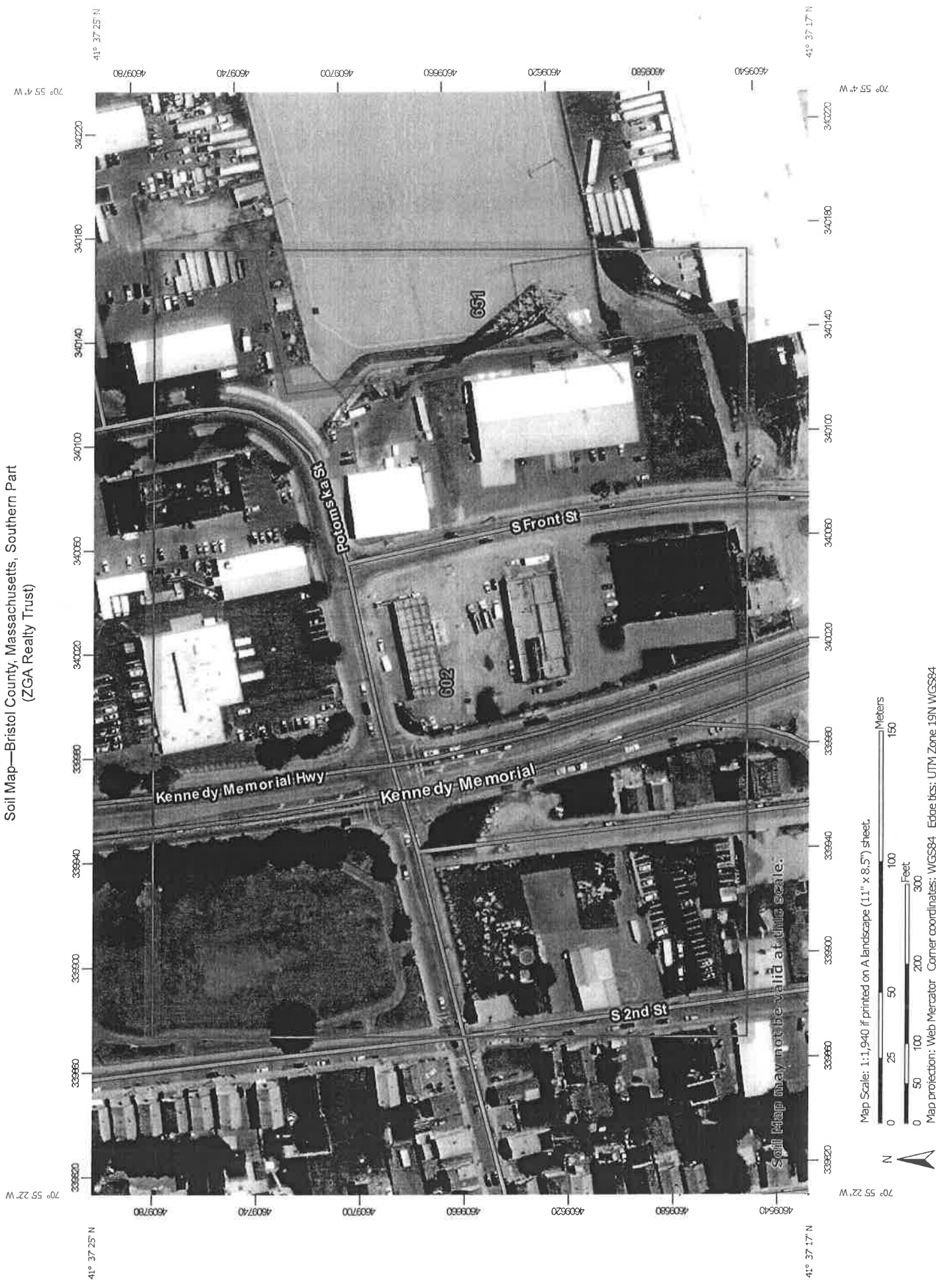
- Manufacturers recommended methods for spill clean up will be clearly posted and site personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- All spills will be cleaned up immediately after discovery.
- If any threat of explosion or life threatening condition, all personnel will evacuate the area to safety and then contact the local fire department for assistance.
- The spill area will be ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- The site contractor responsible for day-to-day operations will be the spill prevention and clean up coordinator. He will designate at least three other site personnel who will receive spill prevention and cleanup training. These individuals will each become responsible for a particular phase of prevention and cleanup. The names of the responsible personnel will be posted in the material storage area in the office trailer onsite.

NPDES Construction Permit Storm Water Pollution Prevention Plan

This Construction Erosion and Sedimentation Control Plan will also be used for the NPDES Construction Permit Storm Water Pollution Prevention Plan.

STORM WATER POLLUTION PREVENTION PLAN CERTIFICATION		
<p>I certify under the penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or person directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.</p>		
<p>Signed: </p>		
<p>Steven D. Gioiosa, President SITEC, Inc.</p>		
CONTRACTOR'S CERTIFICATION		
<p>I certify under penalty of law that I understand the terms and conditions of the general National Pollutant discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.</p>		
Signature	For	Responsible for
<hr/> <hr/>		
Date		

Soil Map—Bristol County, Massachusetts, Southern Part
(ZGA Realty Trust)



Soil Map may not be valid at this scale.

Map Scale: 1:1,940 if printed on A landscape (11" x 8.5") sheet.



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

MAP LEGEND

- Area of Interest (AOI)
 - Area of Interest (AOI)
 - Soil Map Unit Polygons
 - Soil Map Unit Lines
 - Soil Map Unit Points
- Special Point Features
 - Blowout
 - Borrow Pit
 - Clay Spot
 - Closed Depression
 - Gravel Pit
 - Gravelly Spot
 - Landfill
 - Lava Flow
 - Marsh or swamp
 - Mine or Quarry
 - Miscellaneous Water
 - Perennial Water
 - Rock Outcrop
 - Saline Spot
 - Sandy Spot
 - Severely Eroded Spot
 - Sinkhole
 - Slide or Slip
 - Sodic Spot
- Water Features
 - Streams and Canals
- Transportation
 - Rails
 - Interstate Highways
 - US Routes
 - Major Roads
 - Local Roads
- Background
 - Aerial Photography
- Soils
 - Spoil Area
 - Stony Spot
 - Very Stony Spot
 - Wet Spot
 - Other
 - Special Line Features

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: Bristol County, Massachusetts, Southern Part
Survey Area Data: Version 12, Sep 7, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Jul 3, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
602	Urban land	15.2	88.9%
651	Udorthents, smoothed	1.9	11.1%
Totals for Area of Interest		17.1	100.0%



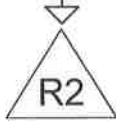
Catch Basin #1



Recharge Basin 1



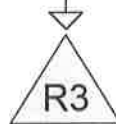
Catch Basin #2



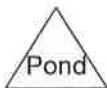
Recharge Basin 2



Catch Basin #3



Recharge Basin 3



ZGA Potomska Street

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 01164 © 2012 HydroCAD Software Solutions LLC

Type III 24-hr 2 Year Storm Rainfall=3.40"

Printed 11/14/2018

Page 2

Summary for Subcatchment CB1: Catch Basin #1

Runoff = 0.53 cfs @ 12.14 hrs, Volume= 0.045 af, Depth> 2.96"

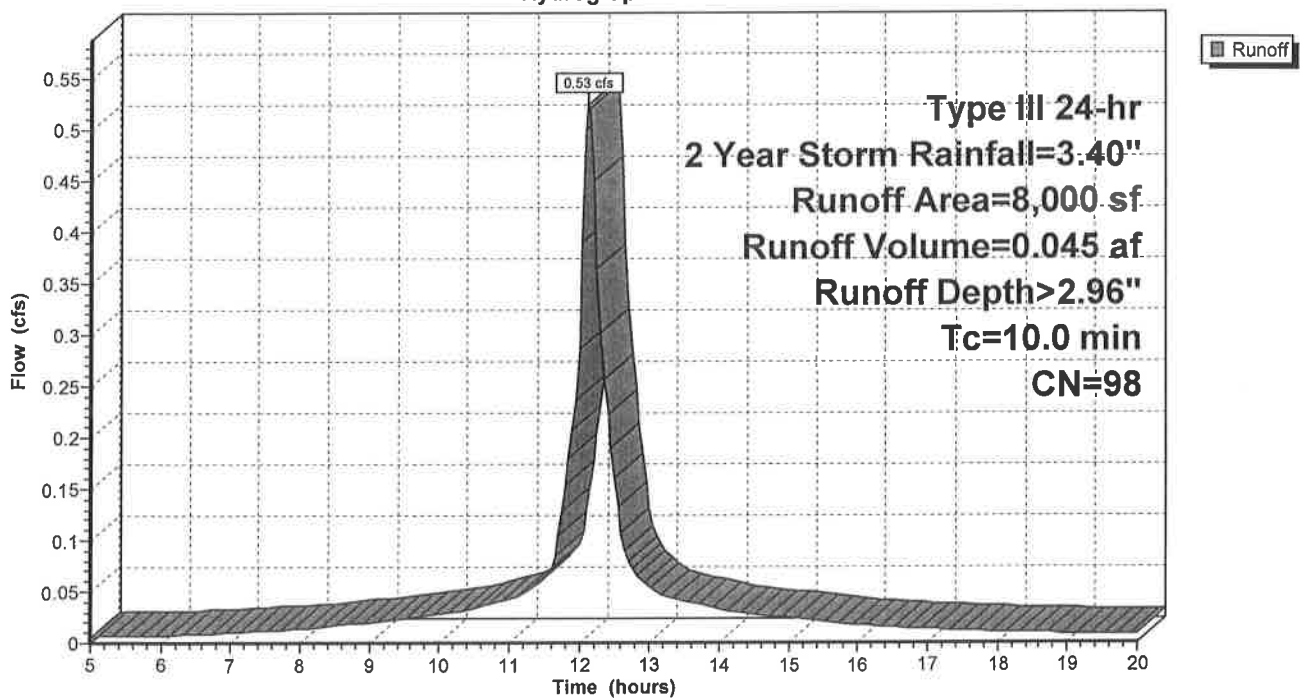
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.40"

Area (sf)	CN	Description
* 8,000	98	Impervious
8,000		100.00% Impervious Area

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

Subcatchment CB1: Catch Basin #1

Hydrograph



ZGA Potomska Street

Prepared by {enter your company name here}

HydroCAD® 10.00 s/n 01164 © 2012 HydroCAD Software Solutions LLC

Type III 24-hr 2 Year Storm Rainfall=3.40"

Printed 11/14/2018

Page 3

Summary for Subcatchment CB2: Catch Basin #2

Runoff = 0.51 cfs @ 12.14 hrs, Volume= 0.044 af, Depth> 2.96"

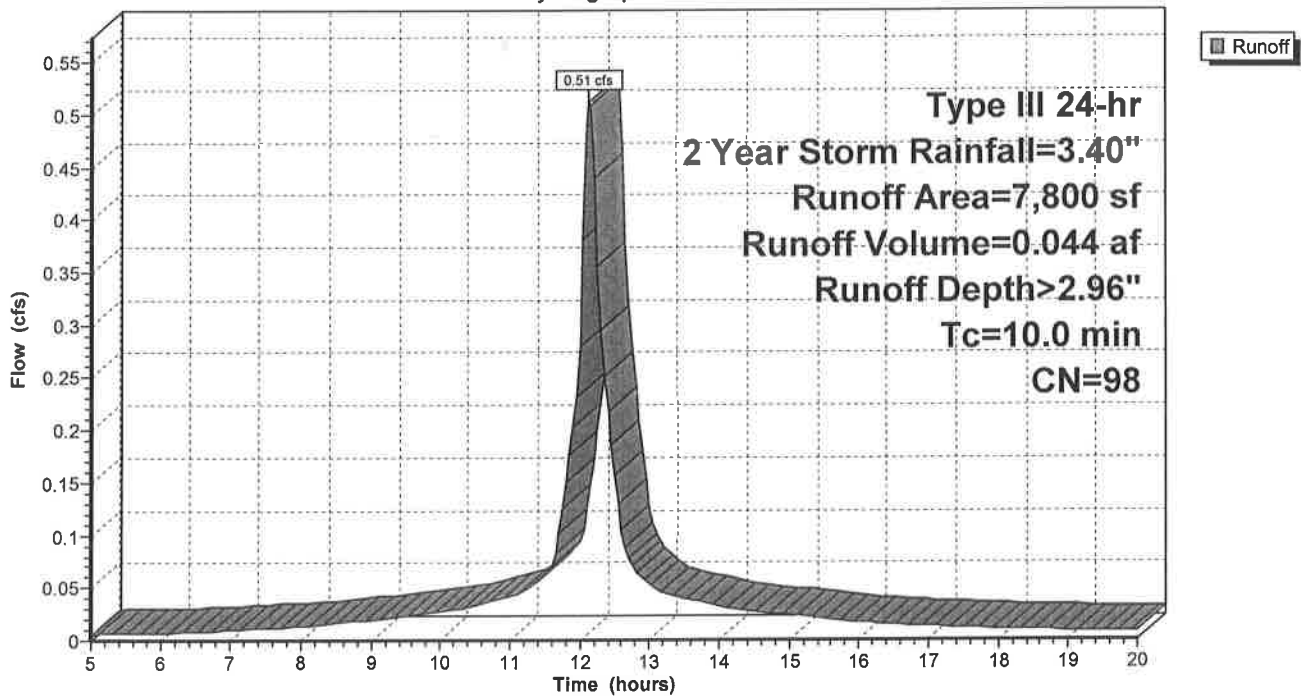
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 Year Storm Rainfall=3.40"

Area (sf)	CN	Description
* 7,800	98	Impervious
7,800		100.00% Impervious Area

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

Subcatchment CB2: Catch Basin #2

Hydrograph



Summary for Subcatchment CB3: Catch Basin #3

Runoff = 0.51 cfs @ 12.14 hrs, Volume= 0.044 af, Depth> 2.96"

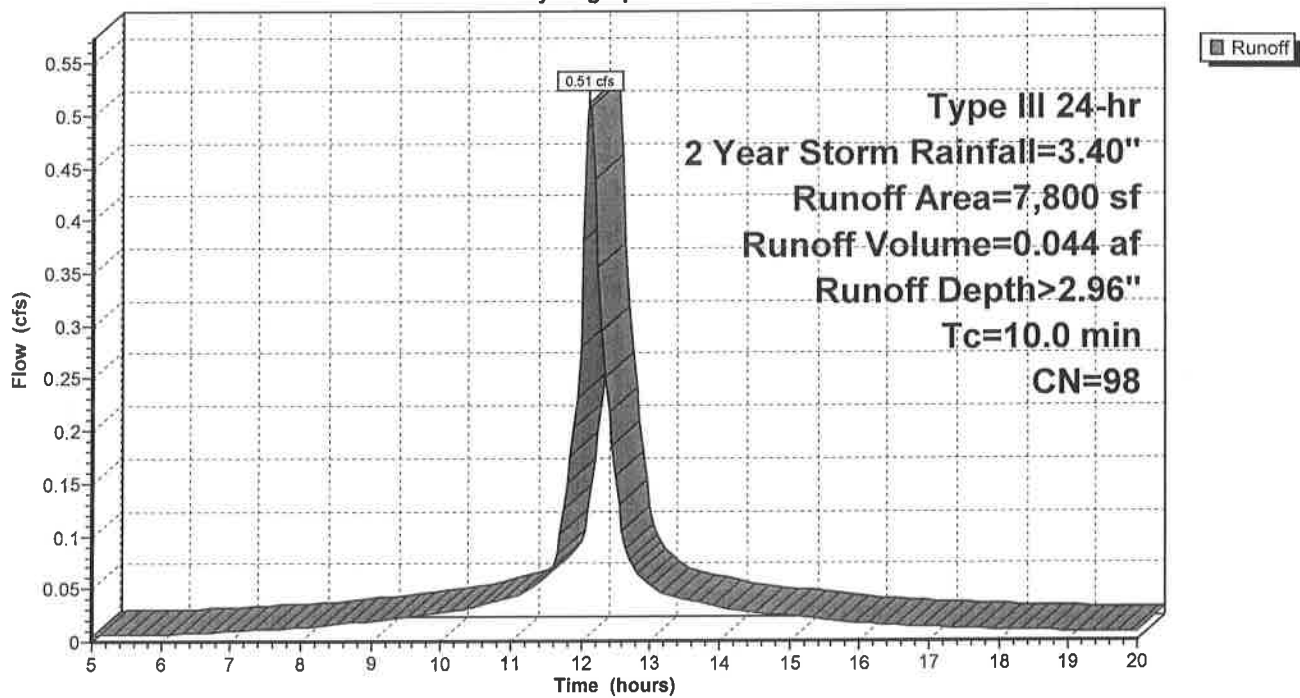
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2 Year Storm Rainfall=3.40"

Area (sf)	CN	Description
* 7,800	98	Impervious
7,800		100.00% Impervious Area

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

Subcatchment CB3: Catch Basin #3

Hydrograph



Summary for Pond R1: Recharge Basin 1

Inflow Area = 0.184 ac, 100.00% Impervious, Inflow Depth > 2.96" for 2 Year Storm event
 Inflow = 0.53 cfs @ 12.14 hrs, Volume= 0.045 af
 Outflow = 0.03 cfs @ 10.35 hrs, Volume= 0.030 af, Atten= 94%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 10.35 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.10' @ 14.26 hrs Surf.Area= 0 sf Storage= 962 cf

Plug-Flow detention time= 157.3 min calculated for 0.030 af (67% of inflow)
 Center-of-Mass det. time= 86.5 min (827.5 - 741.0)

Volume	Invert	Avail.Storage	Storage Description
#1	2.00'	1,458 cf	Custom Stage Data Listed below

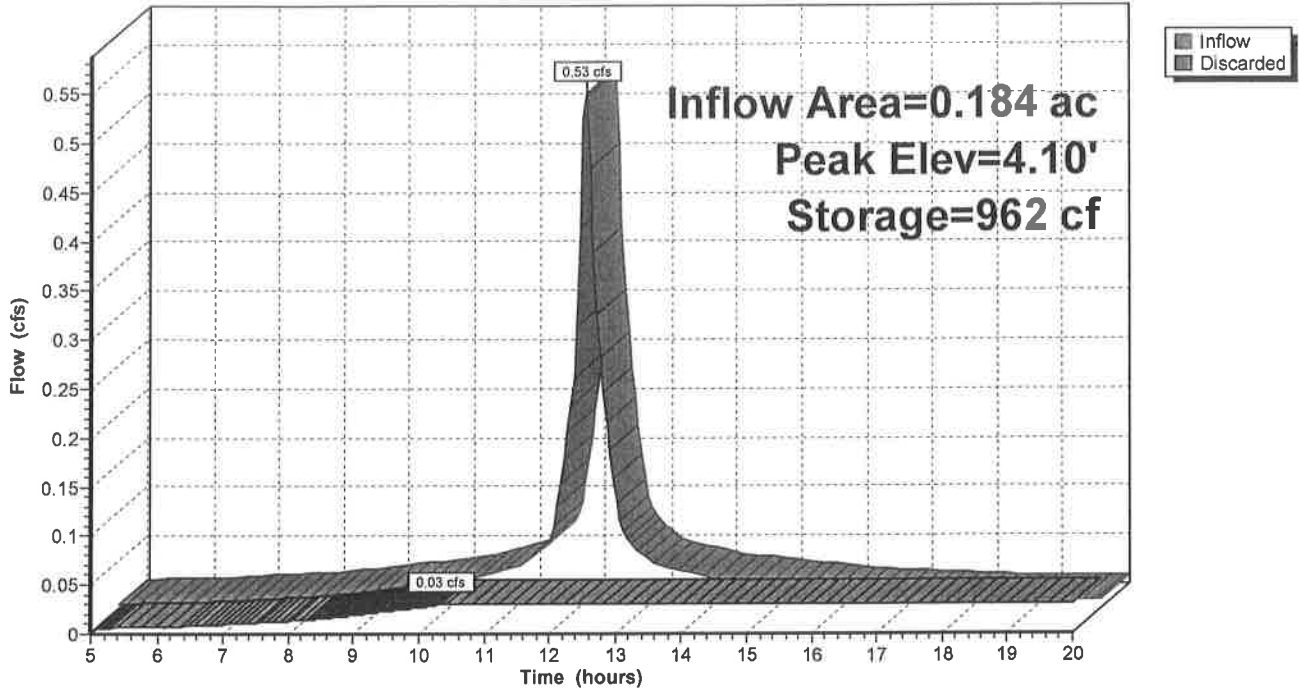
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2.00	0	0
2.50	130	130
3.00	271	401
3.50	263	664
4.00	253	917
4.50	227	1,144
5.04	184	1,328
5.54	130	1,458

Device	Routing	Invert	Outlet Devices
#1	Discarded	2.00'	0.03 cfs Exfiltration at all elevations

Discarded OutFlow Max=0.03 cfs @ 10.35 hrs HW=2.04' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.03 cfs)

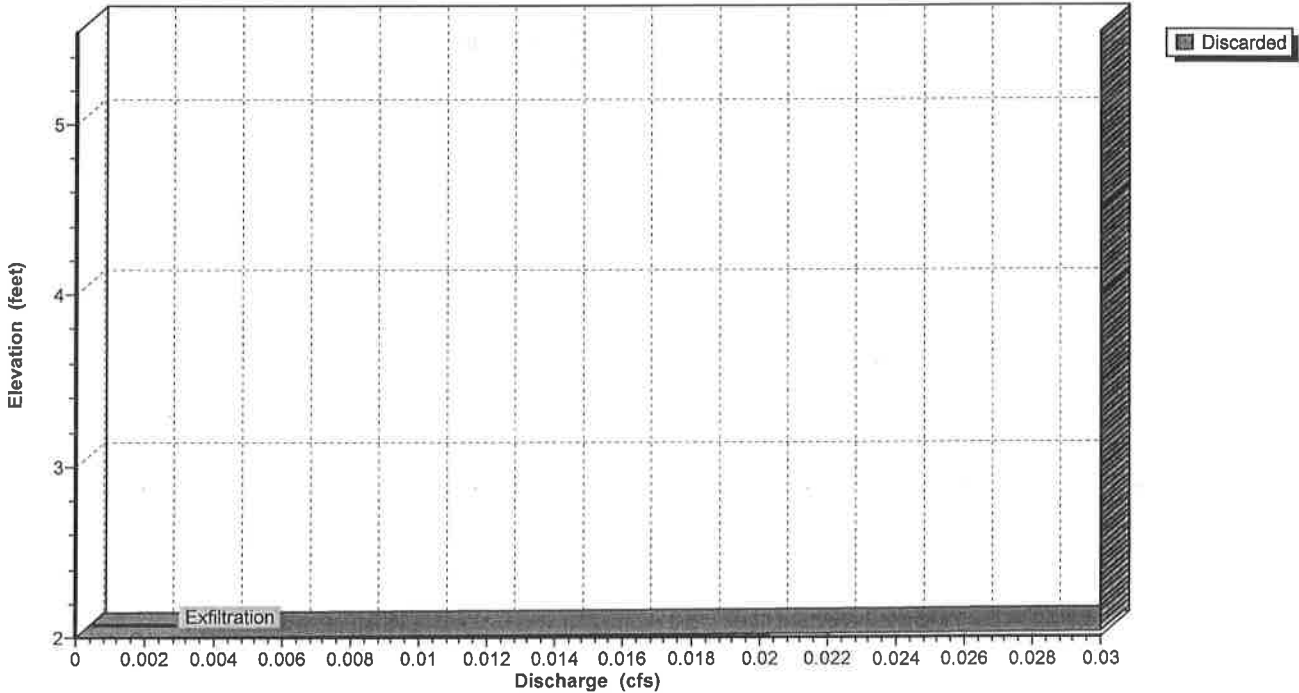
Pond R1: Recharge Basin 1

Hydrograph



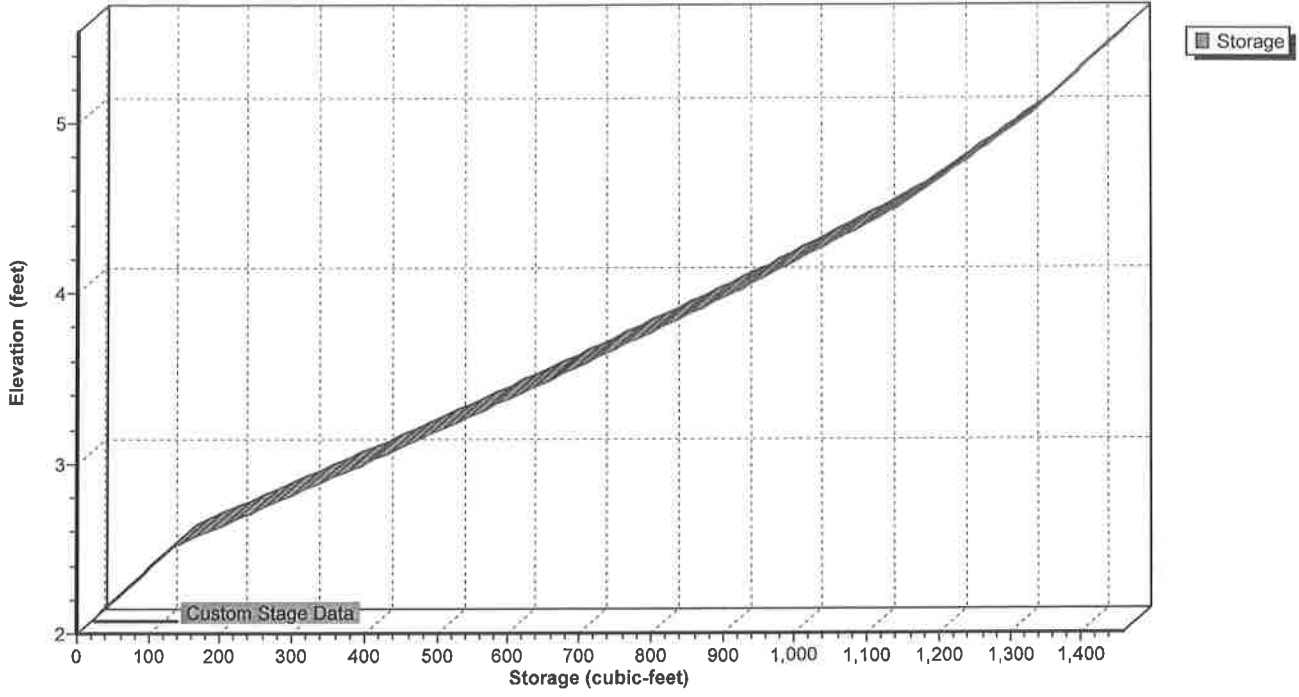
Pond R1: Recharge Basin 1

Stage-Discharge



Pond R1: Recharge Basin 1

Stage-Area-Storage



Summary for Pond R2: Recharge Basin 2

Inflow Area = 0.179 ac, 100.00% Impervious, Inflow Depth > 2.96" for 2 Year Storm event
 Inflow = 0.51 cfs @ 12.14 hrs, Volume= 0.044 af
 Outflow = 0.03 cfs @ 10.40 hrs, Volume= 0.030 af, Atten= 94%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 10.40 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.02' @ 14.17 hrs Surf.Area= 0 sf Storage= 928 cf

Plug-Flow detention time= 158.4 min calculated for 0.030 af (68% of inflow)
 Center-of-Mass det. time= 88.2 min (829.2 - 741.0)

Volume	Invert	Avail.Storage	Storage Description
#1	2.00'	1,458 cf	Custom Stage Data Listed below

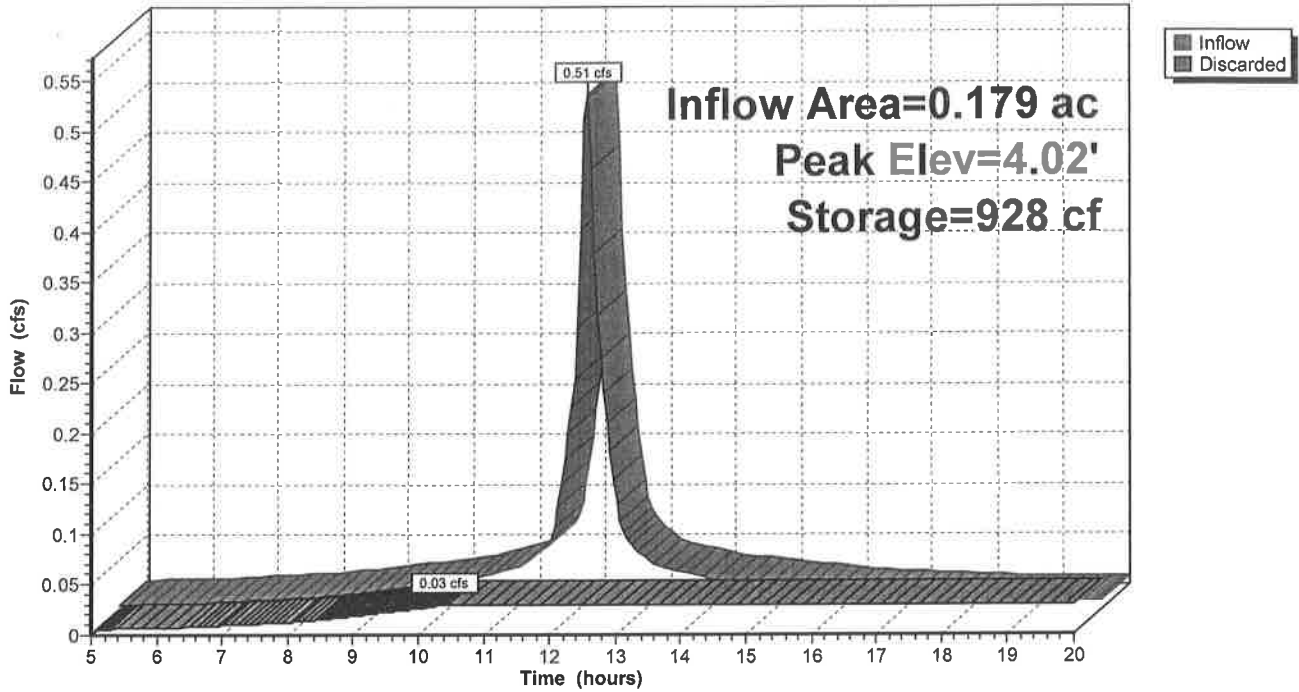
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2.00	0	0
2.50	130	130
3.00	271	401
3.50	263	664
4.00	253	917
4.50	227	1,144
5.08	184	1,328
5.58	130	1,458

Device	Routing	Invert	Outlet Devices
#1	Discarded	2.00'	0.03 cfs Exfiltration at all elevations

Discarded OutFlow Max=0.03 cfs @ 10.40 hrs HW=2.04' (Free Discharge)
 ↑ 1=Exfiltration (Exfiltration Controls 0.03 cfs)

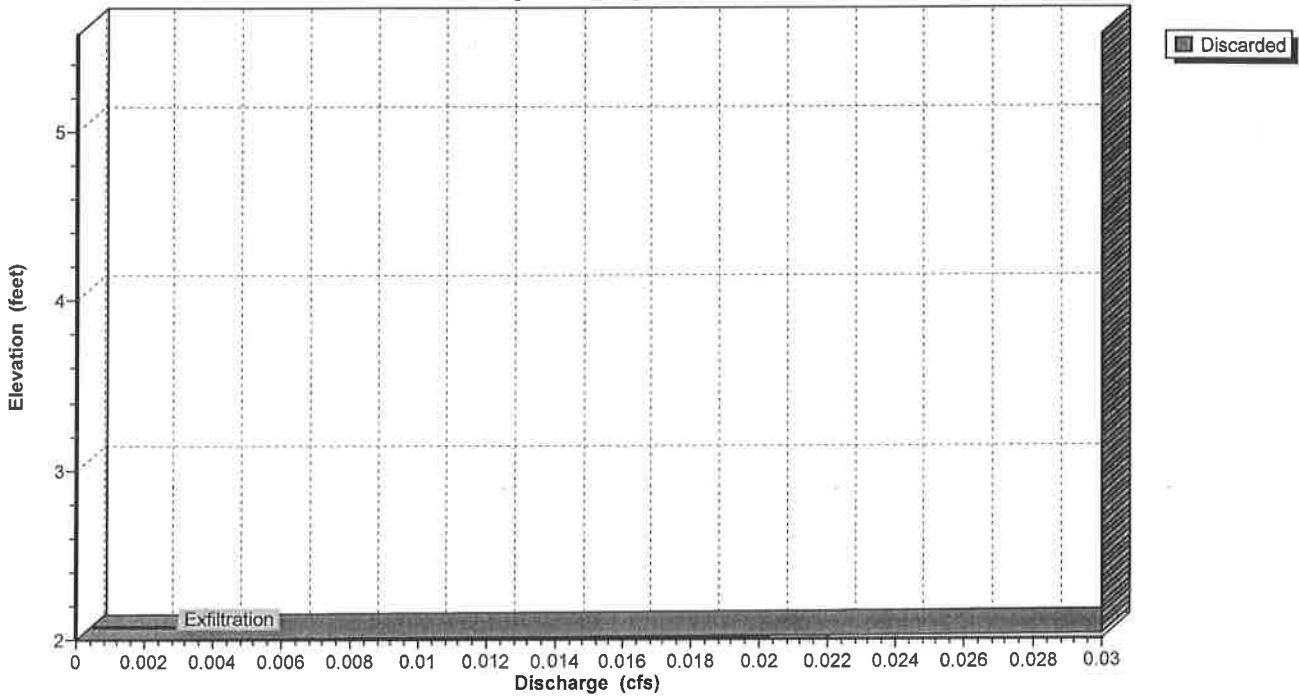
Pond R2: Recharge Basin 2

Hydrograph



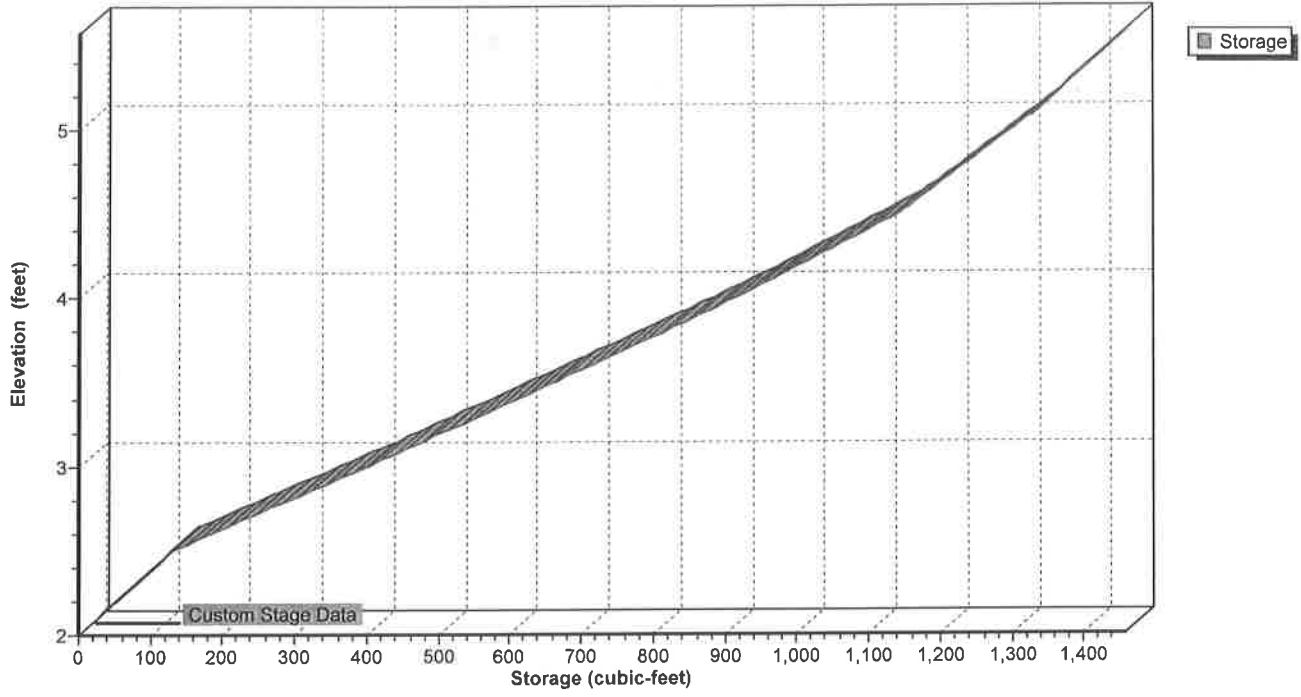
Pond R2: Recharge Basin 2

Stage-Discharge



Pond R2: Recharge Basin 2

Stage-Area-Storage



ZGA Potomska Street

Type III 24-hr 2 Year Storm Rainfall=3.40"

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Summary for Pond R3: Recharge Basin 3

Inflow Area = 0.179 ac, 100.00% Impervious, Inflow Depth > 2.96" for 2 Year Storm event
 Inflow = 0.51 cfs @ 12.14 hrs, Volume= 0.044 af
 Outflow = 0.03 cfs @ 10.40 hrs, Volume= 0.030 af, Atten= 94%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 10.40 hrs, Volume= 0.030 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 3.52' @ 14.17 hrs Surf.Area= 0 sf Storage= 927 cf

Plug-Flow detention time= 158.3 min calculated for 0.030 af (68% of inflow)
 Center-of-Mass det. time= 88.2 min (829.2 - 741.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1.50'	1,458 cf	Custom Stage Data Listed below

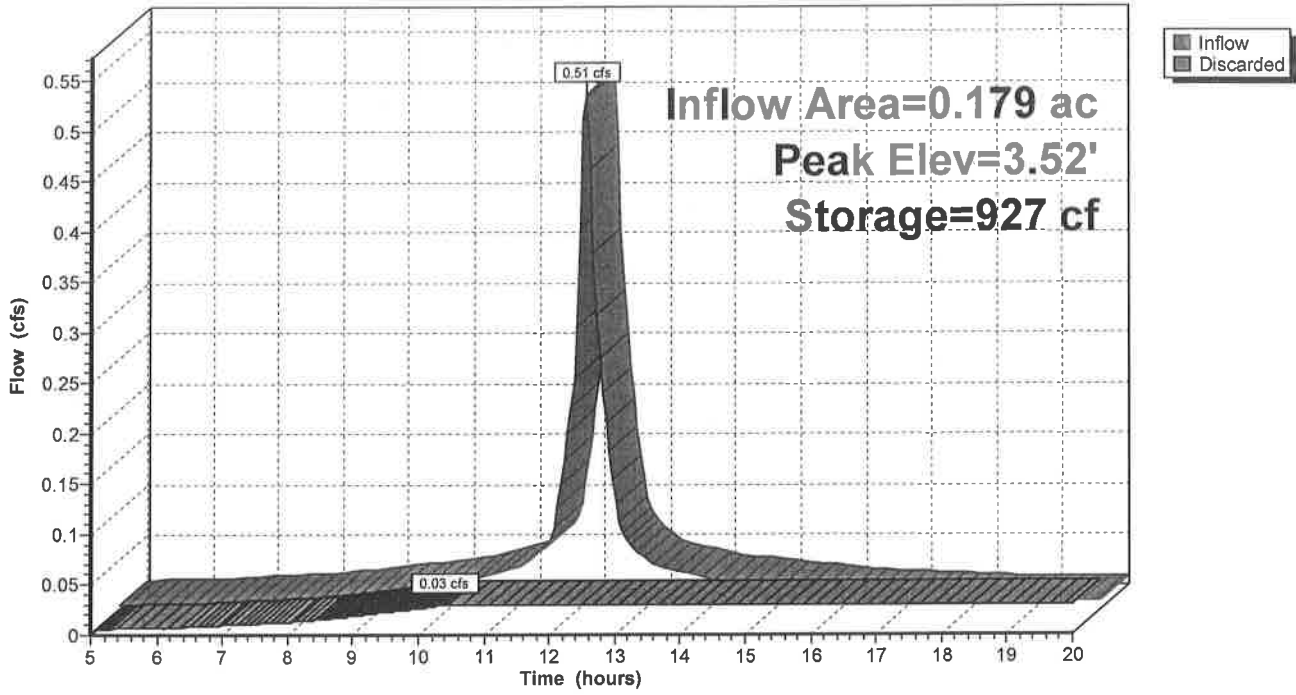
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.50	0	0
2.00	130	130
2.50	271	401
3.00	263	664
3.50	253	917
4.00	227	1,144
4.54	184	1,328
5.04	130	1,458

Device	Routing	Invert	Outlet Devices
#1	Discarded	1.50'	0.03 cfs Exfiltration at all elevations

Discarded OutFlow Max=0.03 cfs @ 10.40 hrs HW=1.54' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

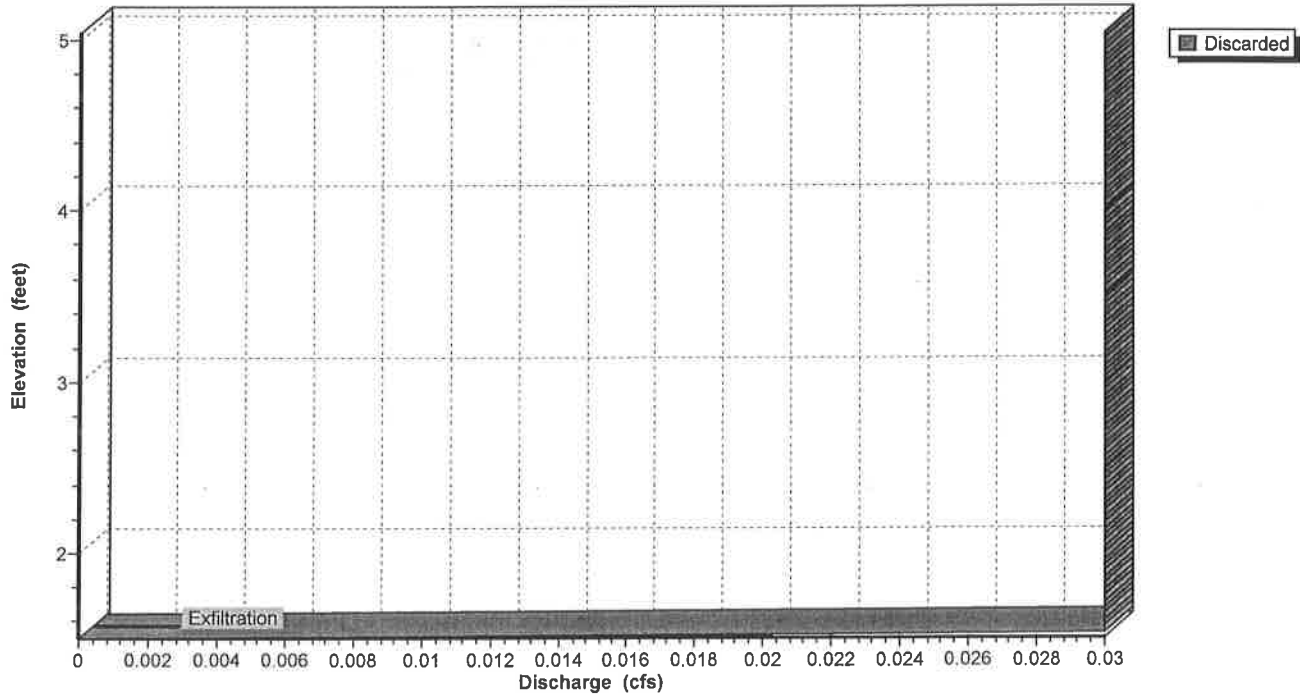
Pond R3: Recharge Basin 3

Hydrograph



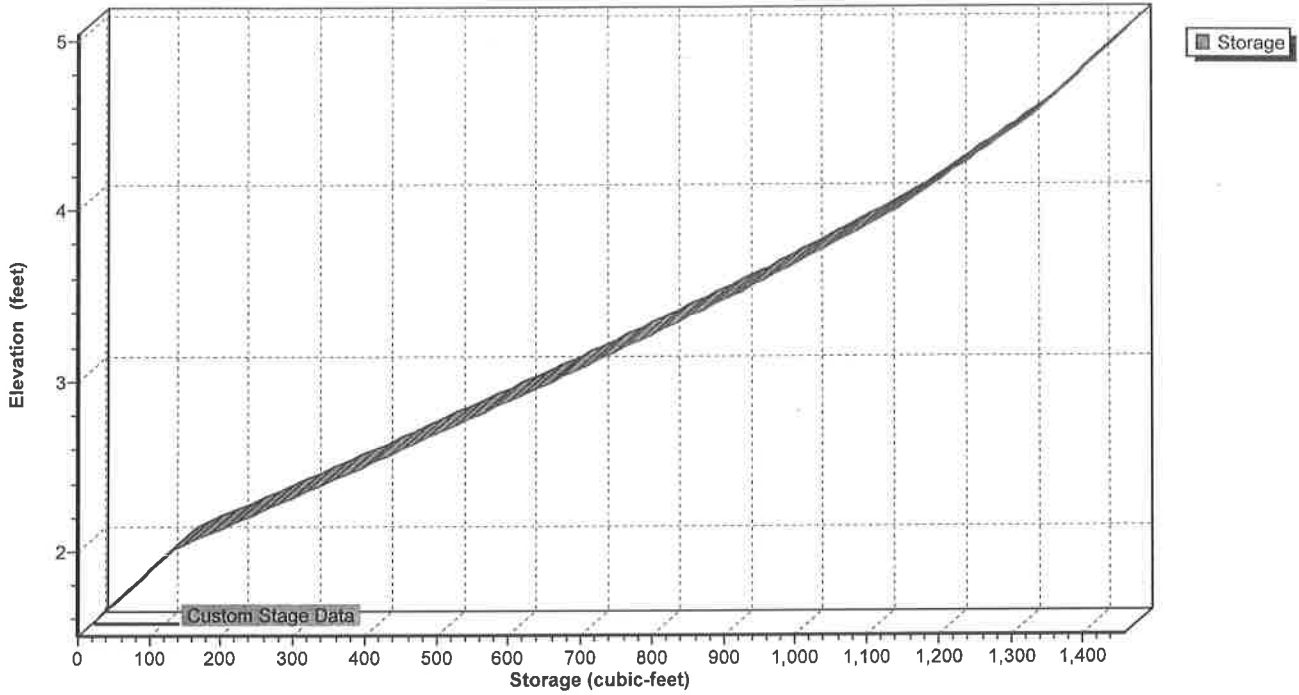
Pond R3: Recharge Basin 3

Stage-Discharge



Pond R3: Recharge Basin 3

Stage-Area-Storage



ZGA Potomska Street

Type III 24-hr 5 Year Storm Rainfall=4.40"

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Summary for Subcatchment CB1: Catch Basin #1

Runoff = 0.68 cfs @ 12.14 hrs, Volume= 0.059 af, Depth> 3.87"

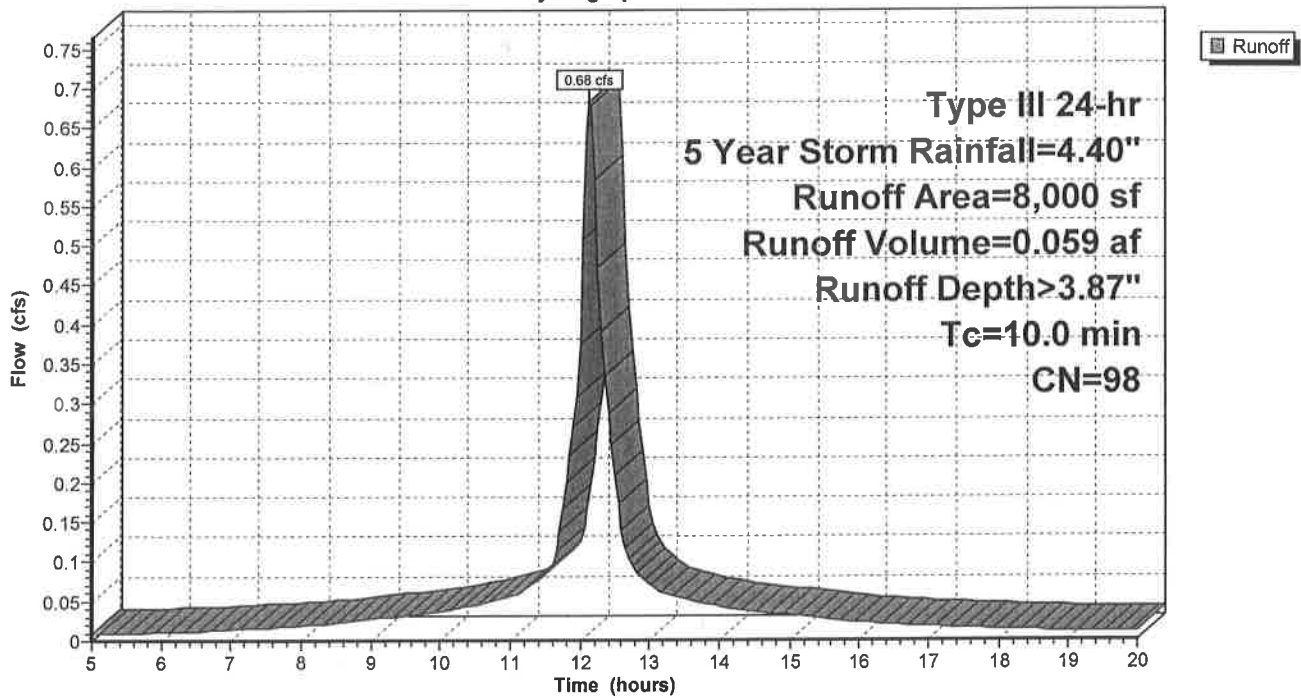
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5 Year Storm Rainfall=4.40"

Area (sf)	CN	Description
* 8,000	98	Impervious
8,000		100.00% Impervious Area

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

Subcatchment CB1: Catch Basin #1

Hydrograph



Summary for Subcatchment CB2: Catch Basin #2

Runoff = 0.67 cfs @ 12.14 hrs, Volume= 0.058 af, Depth> 3.87"

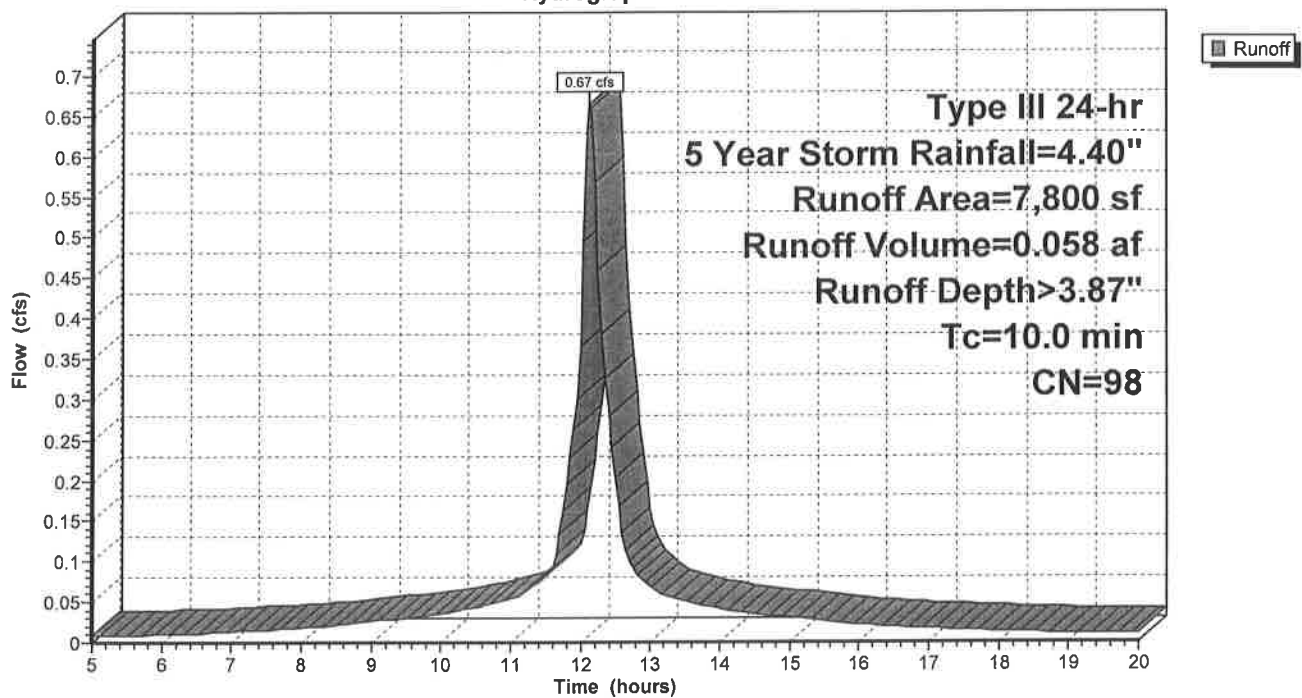
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 5 Year Storm Rainfall=4.40"

Area (sf)	CN	Description
* 7,800	98	Impervious
7,800		100.00% Impervious Area

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

Subcatchment CB2: Catch Basin #2

Hydrograph



Summary for Subcatchment CB3: Catch Basin #3

Runoff = 0.67 cfs @ 12.14 hrs, Volume= 0.058 af, Depth> 3.87"

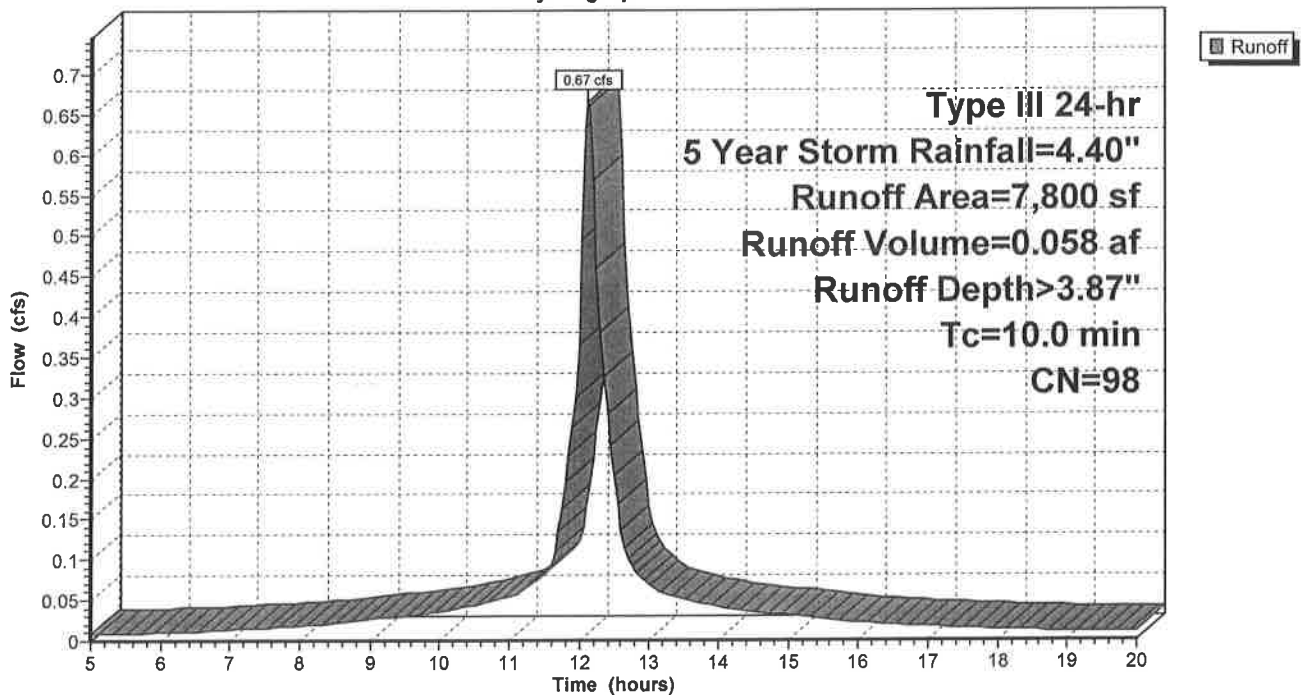
Runoff by SCS TR-20 method, UH=SCS, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 5 Year Storm Rainfall=4.40"

Area (sf)	CN	Description
* 7,800	98	Impervious
7,800		100.00% Impervious Area

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

Subcatchment CB3: Catch Basin #3

Hydrograph



Summary for Pond R1: Recharge Basin 1

Inflow Area = 0.184 ac, 100.00% Impervious, Inflow Depth > 3.87" for 5 Year Storm event
 Inflow = 0.68 cfs @ 12.14 hrs, Volume= 0.059 af
 Outflow = 0.03 cfs @ 9.40 hrs, Volume= 0.032 af, Atten= 96%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 9.40 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 5.36' @ 15.21 hrs Surf.Area= 0 sf Storage= 1,412 cf

Plug-Flow detention time= 157.3 min calculated for 0.032 af (54% of inflow)
 Center-of-Mass det. time= 68.2 min (807.1 - 738.9)

Volume	Invert	Avail.Storage	Storage Description
#1	2.00'	1,458 cf	Custom Stage Data Listed below

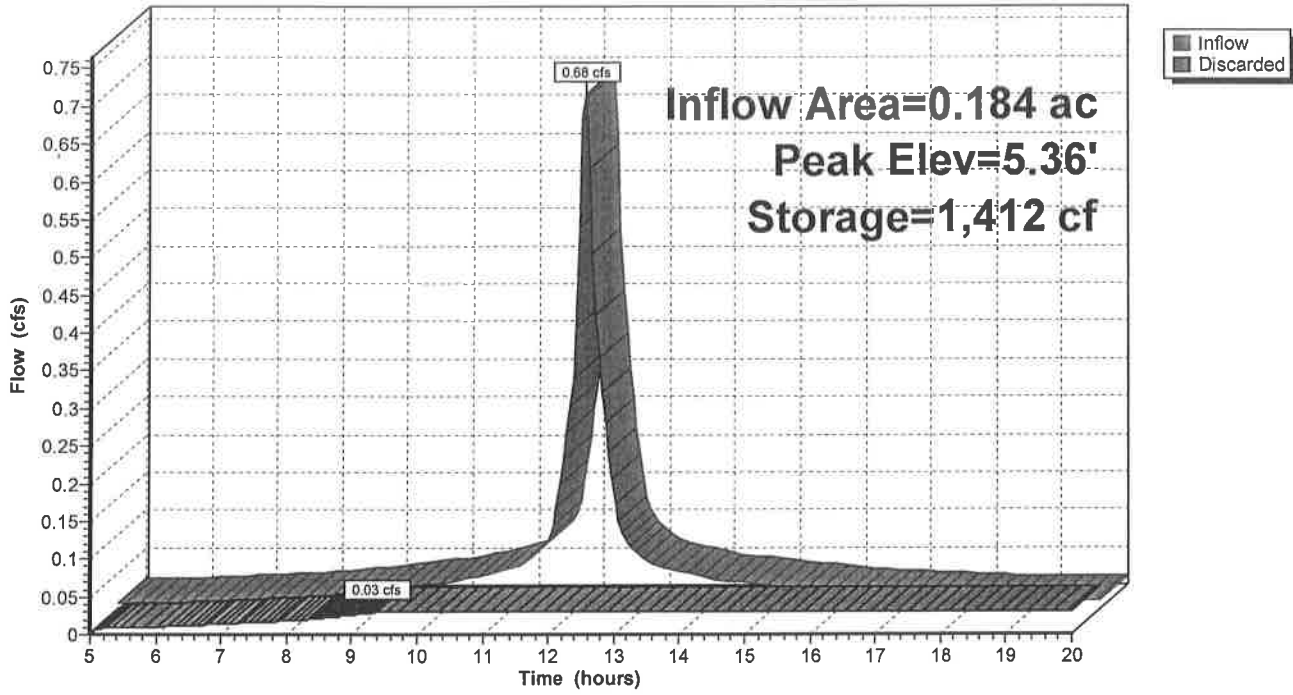
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2.00	0	0
2.50	130	130
3.00	271	401
3.50	263	664
4.00	253	917
4.50	227	1,144
5.04	184	1,328
5.54	130	1,458

Device	Routing	Invert	Outlet Devices
#1	Discarded	2.00'	0.03 cfs Exfiltration at all elevations

Discarded OutFlow Max=0.03 cfs @ 9.40 hrs HW=2.04' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

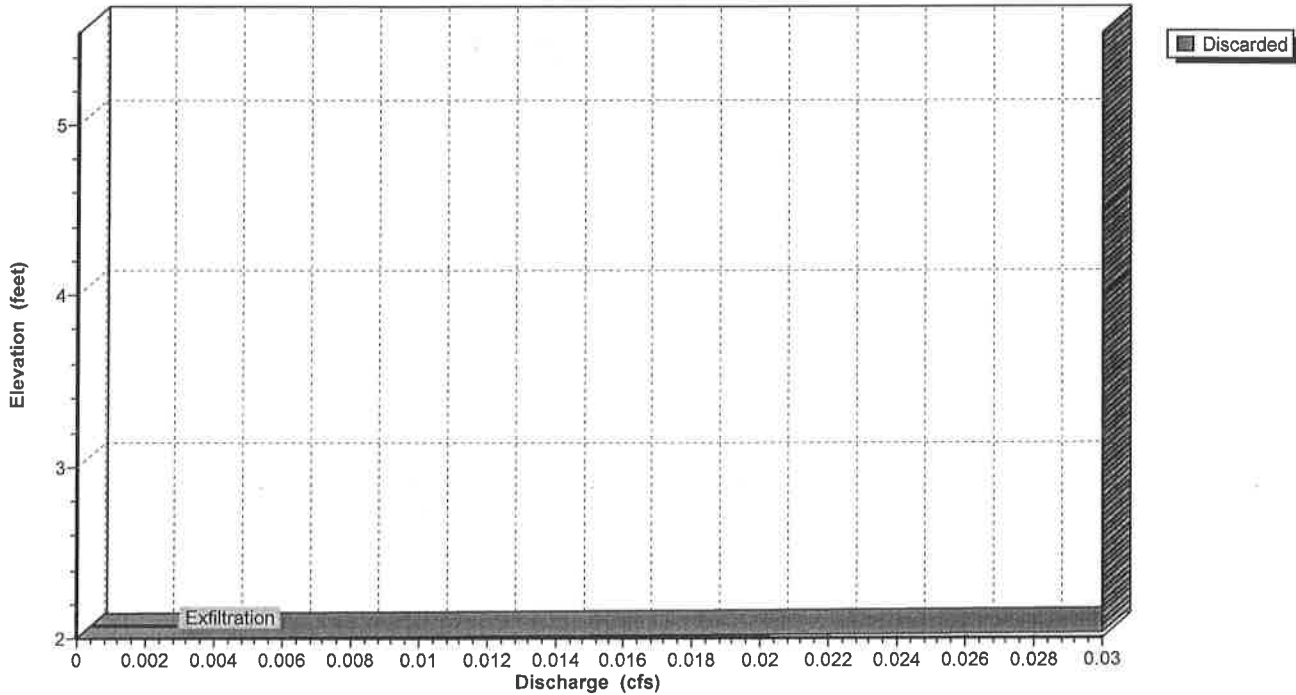
Pond R1: Recharge Basin 1

Hydrograph



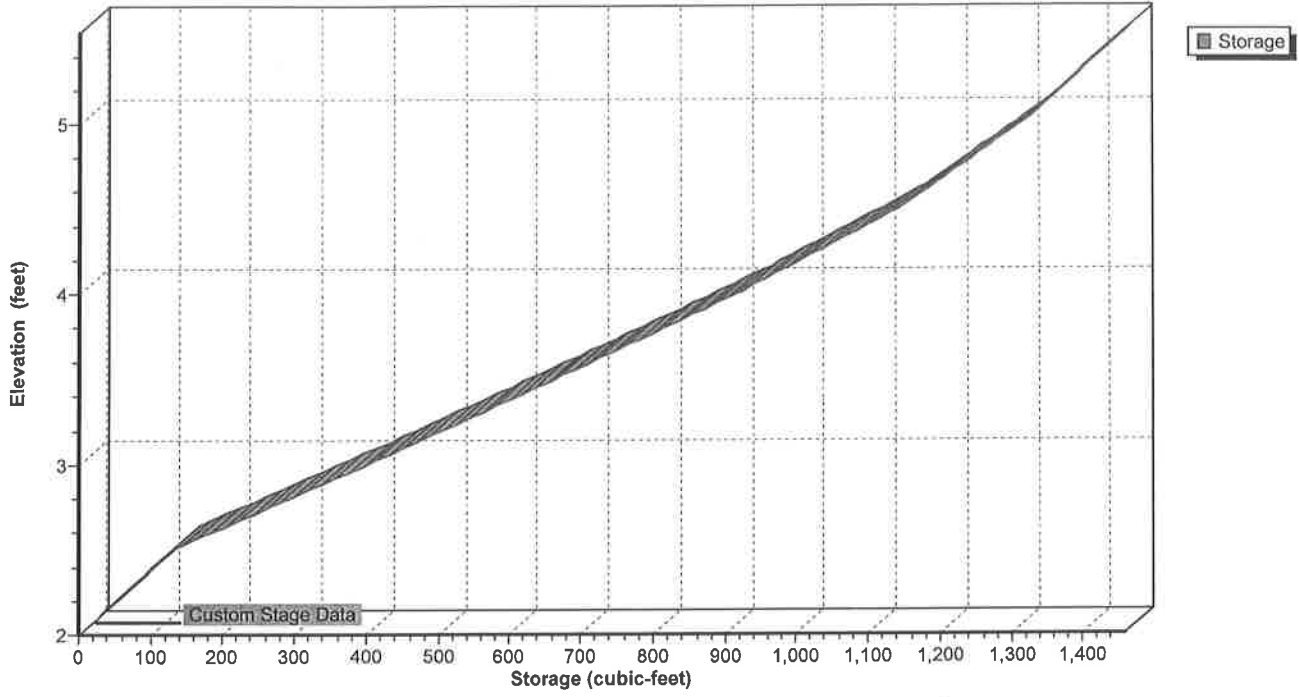
Pond R1: Recharge Basin 1

Stage-Discharge



Pond R1: Recharge Basin 1

Stage-Area-Storage



Summary for Pond R2: Recharge Basin 2

Inflow Area = 0.179 ac, 100.00% Impervious, Inflow Depth > 3.87" for 5 Year Storm event
 Inflow = 0.67 cfs @ 12.14 hrs, Volume= 0.058 af
 Outflow = 0.03 cfs @ 9.50 hrs, Volume= 0.032 af, Atten= 95%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 9.50 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 5.21' @ 15.12 hrs Surf.Area= 0 sf Storage= 1,361 cf

Plug-Flow detention time= 157.2 min calculated for 0.032 af (55% of inflow)
 Center-of-Mass det. time= 69.8 min (808.7 - 738.9)

Volume	Invert	Avail.Storage	Storage Description
#1	2.00'	1,458 cf	Custom Stage Data Listed below

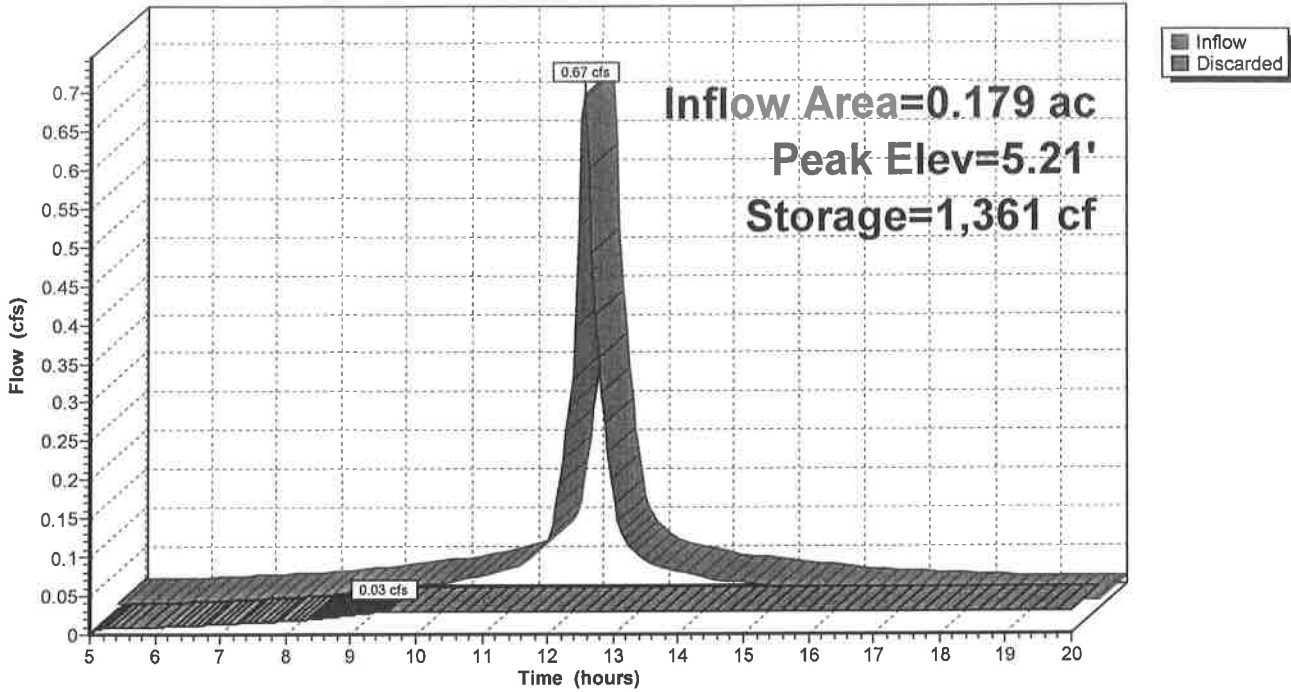
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
2.00	0	0
2.50	130	130
3.00	271	401
3.50	263	664
4.00	253	917
4.50	227	1,144
5.08	184	1,328
5.58	130	1,458

Device	Routing	Invert	Outlet Devices
#1	Discarded	2.00'	0.03 cfs Exfiltration at all elevations

Discarded OutFlow Max=0.03 cfs @ 9.50 hrs HW=2.04' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

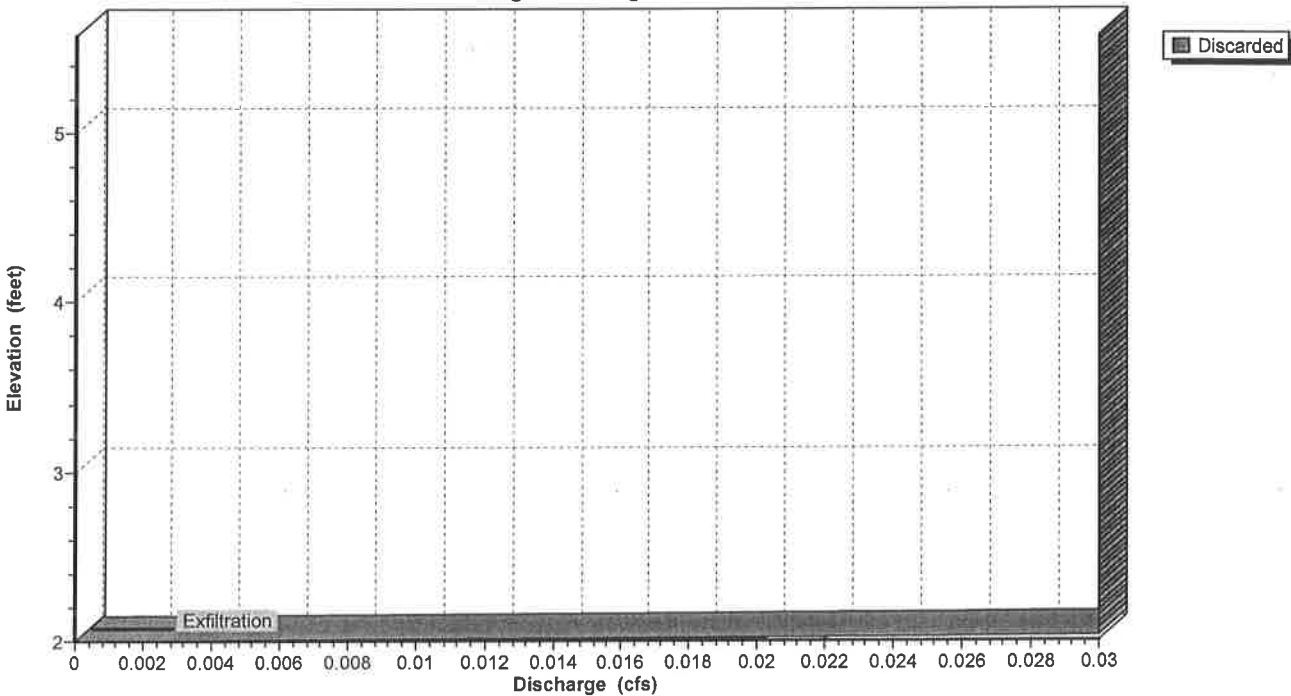
Pond R2: Recharge Basin 2

Hydrograph



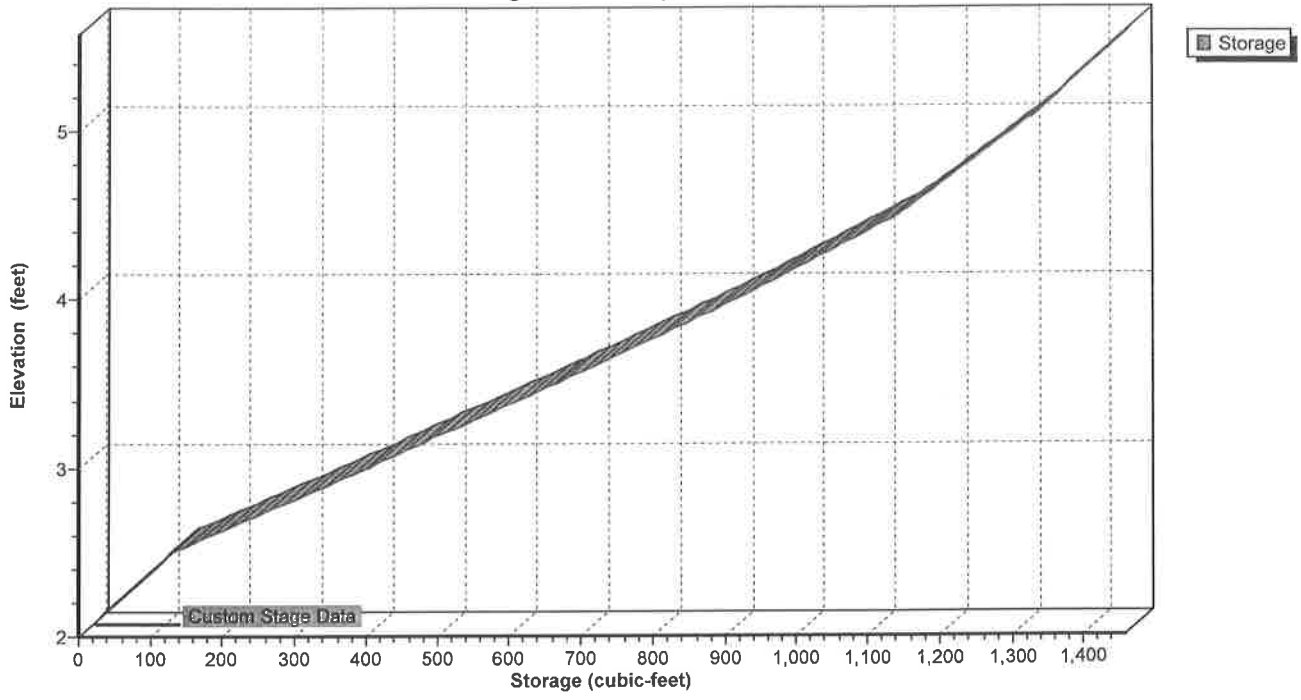
Pond R2: Recharge Basin 2

Stage-Discharge



Pond R2: Recharge Basin 2

Stage-Area-Storage



Summary for Pond R3: Recharge Basin 3

Inflow Area = 0.179 ac, 100.00% Impervious, Inflow Depth > 3.87" for 5 Year Storm event
 Inflow = 0.67 cfs @ 12.14 hrs, Volume= 0.058 af
 Outflow = 0.03 cfs @ 9.50 hrs, Volume= 0.032 af, Atten= 95%, Lag= 0.0 min
 Discarded = 0.03 cfs @ 9.50 hrs, Volume= 0.032 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 4.67' @ 15.12 hrs Surf.Area= 0 sf Storage= 1,361 cf

Plug-Flow detention time= 156.1 min calculated for 0.032 af (55% of inflow)
 Center-of-Mass det. time= 69.8 min (808.6 - 738.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1.50'	1,458 cf	Custom Stage Data Listed below

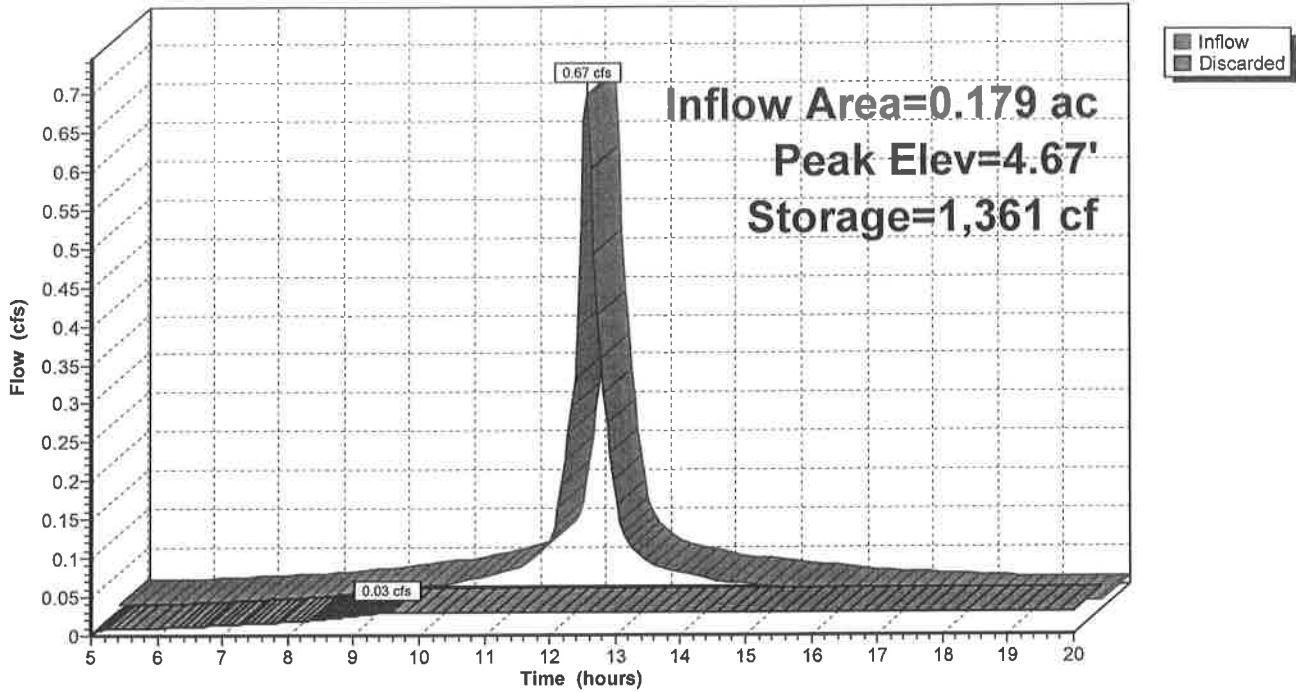
Elevation (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1.50	0	0
2.00	130	130
2.50	271	401
3.00	263	664
3.50	253	917
4.00	227	1,144
4.54	184	1,328
5.04	130	1,458

Device	Routing	Invert	Outlet Devices
#1	Discarded	1.50'	0.03 cfs Exfiltration at all elevations

Discarded OutFlow Max=0.03 cfs @ 9.50 hrs HW=1.54' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

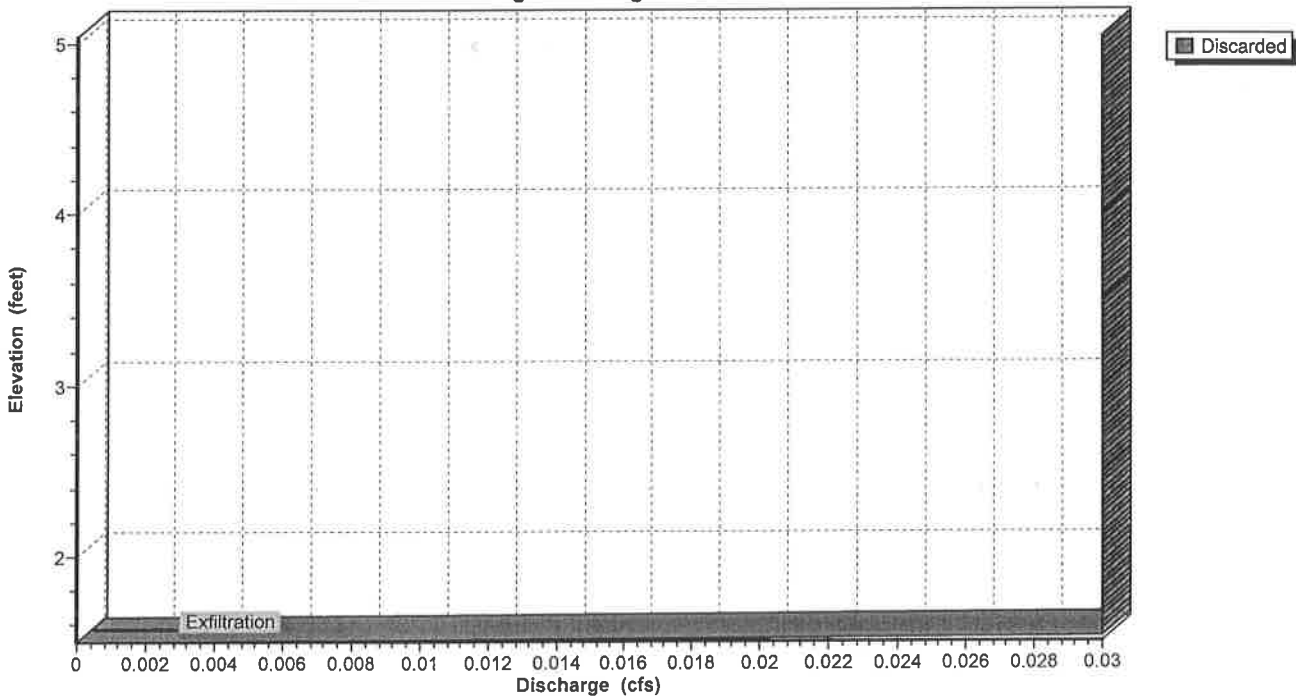
Pond R3: Recharge Basin 3

Hydrograph



Pond R3: Recharge Basin 3

Stage-Discharge



Pond R3: Recharge Basin 3

Stage-Area-Storage

