

STORMWATER MANAGEMENT REPORT

for the:

Gulls View Apartments

Borough of Keyport
Monmouth County, New Jersey

Prepared By:

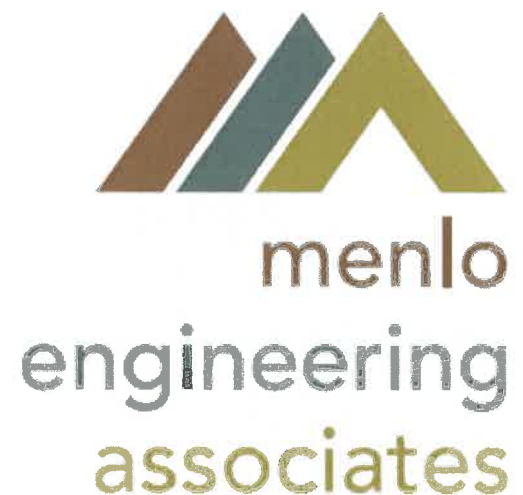
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Under the Immediate Supervision of:



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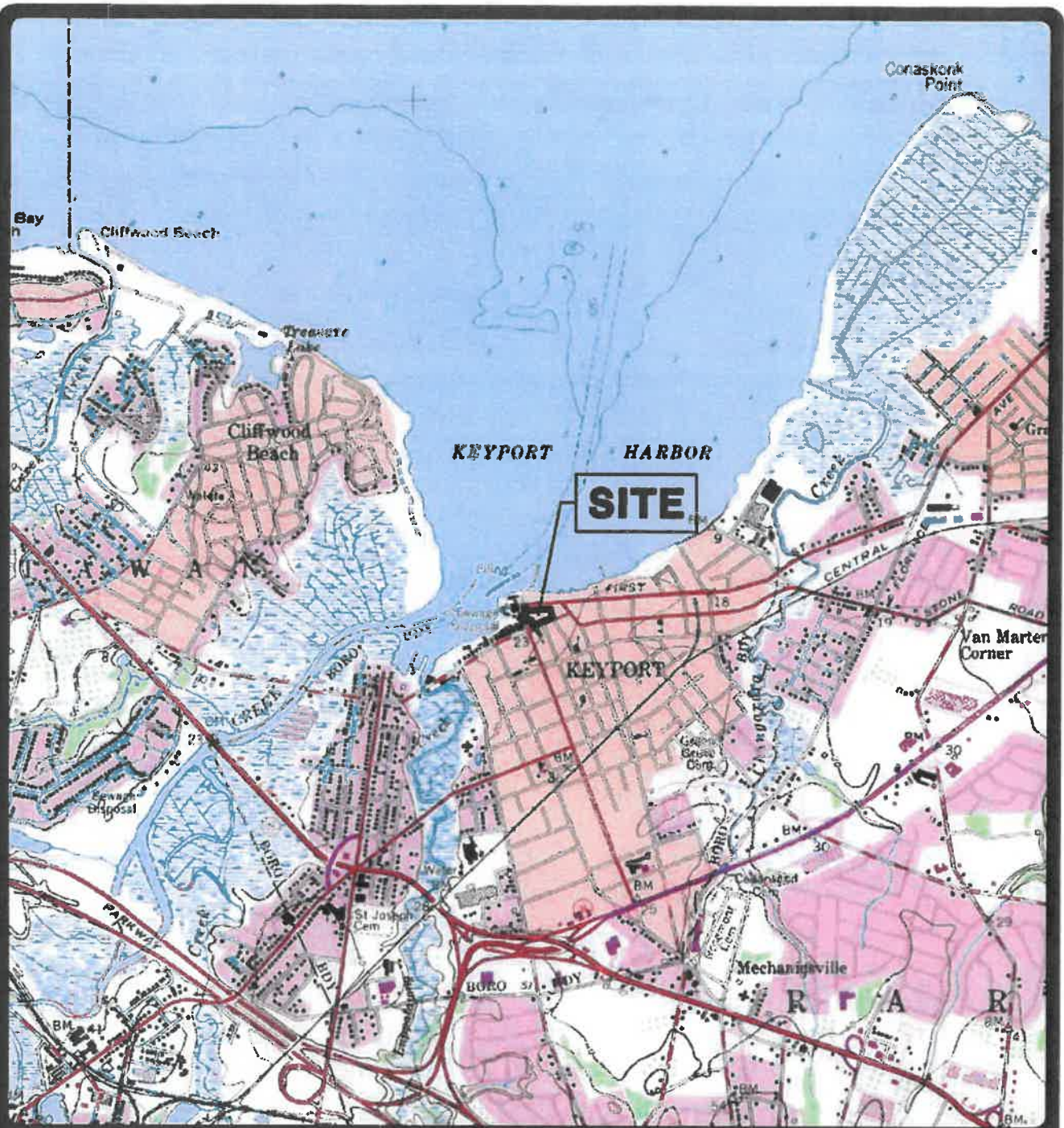
GSO/nf
MEA # 2017.080.01
Dated: April 3, 2018
Revised: June 18, 2021



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U.S.G.S. MAP

Quad Name: Keyport
Borough of Keyport
Monmouth County

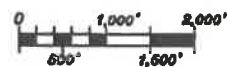


BLOCK
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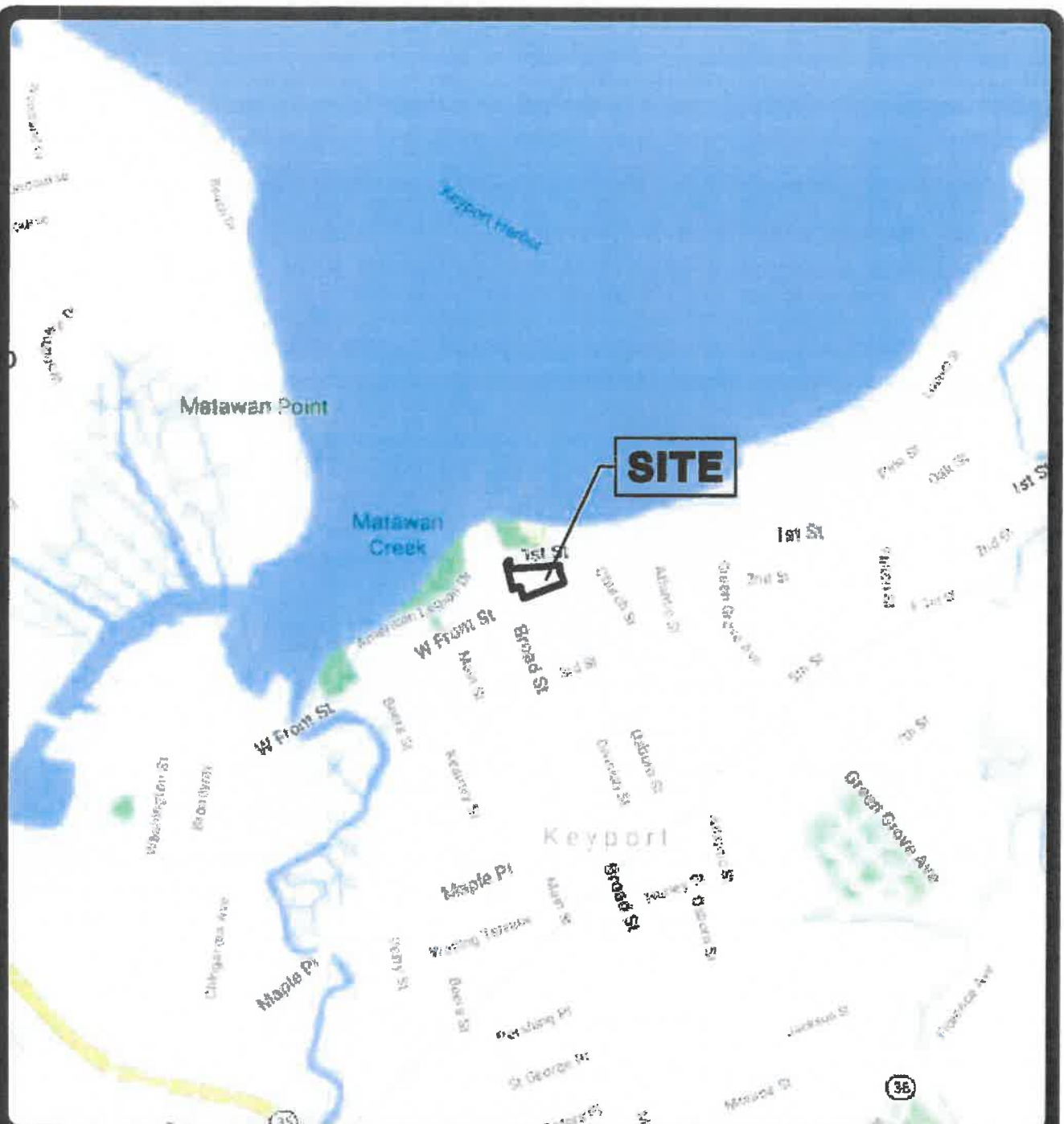
LOT
1.02

MENLO ENGINEERING ASSOCIATES, INC.
261 CLEVELAND AVENUE
HIGHLAND PARK, NJ 08904
(732) 848-8585

State Plane Coordinates:
N: 584,175.25 ft.
E: 580,071.52 ft.



Scale: 1"=2,000±ft Job # 2017.080



ROAD MAP

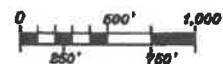
*Borough of Keyport
Monmouth County*



BLOCK
80

LOT
1.02

MENLO ENGINEERING ASSOCIATES, INC.
261 CLEVELAND AVENUE
HIGHLAND PARK, NJ 08904
(732) 846-8585



Scale: 1"=1,000±ft Job # 2017.080

INTRODUCTION

This report analyzes the stormwater drainage conditions that will occur as a result of the parking addition and proposed units for Gulls View Apartments, within the Borough of Keyport, Monmouth County, New Jersey. The subject site is more specifically defined as Block 80, Lot 1.02. Said lot is shown on the USGS and Site Location maps provided within this report and shall hereby be referenced as "the Site". The site consists of approximately 1.45 acres and is bounded by Broad Street to the west and Front Street to the south. This Stormwater Management Report is based on a proposal to build additional parking and proposed units above the new parking and existing building that discharges to a tidal system.

The scope of this report includes the following:

- Runoff Quantity Analysis
- Water Quality Analysis
- Groundwater Recharge Analysis

The primary design constraints for this project are based on the Borough of Keyport Land Use Ordinances and the New Jersey Department of Environmental Protection (NJDEP) Rules and Regulations.

The purpose of this report is to demonstrate that the proposed stormwater management system will adequately convey stormwater runoff and to assist Engineers at the Municipal, County, and State levels in evaluating the drainage calculations and considerations incorporated in the design as shown on the plans submitted. The report supplements, and should be reviewed in conjunction with, the project development plans prepared by Menlo Engineering Associates, Inc. This office will readily respond to questions and requests for additional calculations or verification of the proposed design by Municipal, County, or State Engineers, and will be responsive to their suggestions and modifications to the design in conformance to the applicable codes in the interest of land use control consistent with environmental protection.

CRITERIA

In the hydraulic designs involved in this project, the drainage areas have been determined by electronic digitizer from the U.S.G.S. Quadrangle map, topographic survey prepared by Control Layouts, Inc. and field observations to determine off-site and on-site areas. The Soil Conservation Service Soil Survey maps are used for hydrological soil group classification.

STORMWATER MANAGEMENT PLAN & DESIGN

The guidelines for hydraulic design, as prepared by the Freehold Soil Conservation District, the Borough of Keyport and the New Jersey Department of Environmental Protection have been utilized for the drainage design of this project.

The site is depicted as Urban Land (UR). Per the U.S. Department of Agriculture National Resources Conservation Service, said soils belong to hydrologic soil group (HSG) "D" and have a high runoff potential. Additional information on these soil types is contained in the Appendix A of this report.

The stormwater management facilities for the proposed development have been designed to maintain the natural, existing drainage patterns to the fullest extent possible and to meet the governing agencies' requirements.

Summary of the Runoff Quantity Analysis:

In accordance with NJDEP standards, since runoff from the site discharges to tidal wetlands, and is not significant enough to increase flood damages below points of discharge, stormwater runoff quantity analysis is not required. See Pre- and Post-Development Conditions in Appendix B.

Roof runoff has been taken into consideration due to the proposed building addition. Run-off will be reduced through an infiltration trench with a perforated pipe. The trench drain's storage volume has been calculated. In addition, the capacity of the pipe to which it will drain to has been calculated. See Appendix C & D.

Run-Off Summary:

	Pre- Development	Post- Development	Infiltration Trench (Exfiltration)	Post- Development w/o Infiltration Trench
100-YR	10.0	10.3	2.0	8.3
25-YR	8.4	8.7	1.8	6.9
10-YR	7.2	7.5	1.6	5.9
2-YR	5.2	5.4	1.0	4.4

Summary of the Water Quality Analysis:

Due to the proposed development, there is a total increase of 6.9% in impervious coverage and 11% in building coverage. The increase in impervious coverage is largely due to an increase in building coverage, of which the roof is an unconnected impervious area. Runoff from said area will sheet flow onto adjacent pervious areas, where a portion of the impervious runoff will be given a second opportunity to infiltrate into the soil, in accordance with NJDEP standards.

Summary of the Groundwater Recharge Analysis:

In accordance with NJDEP standards, the groundwater recharge can be met by demonstrating that the average volume of precipitation that is annually recharged to the groundwater at a major land development site under pre-developed conditions will be maintained following site development. See Groundwater Recharge in Appendix C.

Conclusion:

The proposed stormwater management system for proposed parking addition and units has been designed with provisions for safe and efficient control of stormwater runoff in a manner which will not adversely affect the existing drainage patterns found in the surrounding areas. It is the opinion of this office that the proposed development will not have any negative impacts on the drainage characteristics of the site, or the immediately surrounding areas. Further, it is the opinion of this office, that the proposed development will be in compliance with all applicable stormwater management regulations as established by the NJDEP and Borough of Keyport.

APPENDIX A: SOILS INFORMATION



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

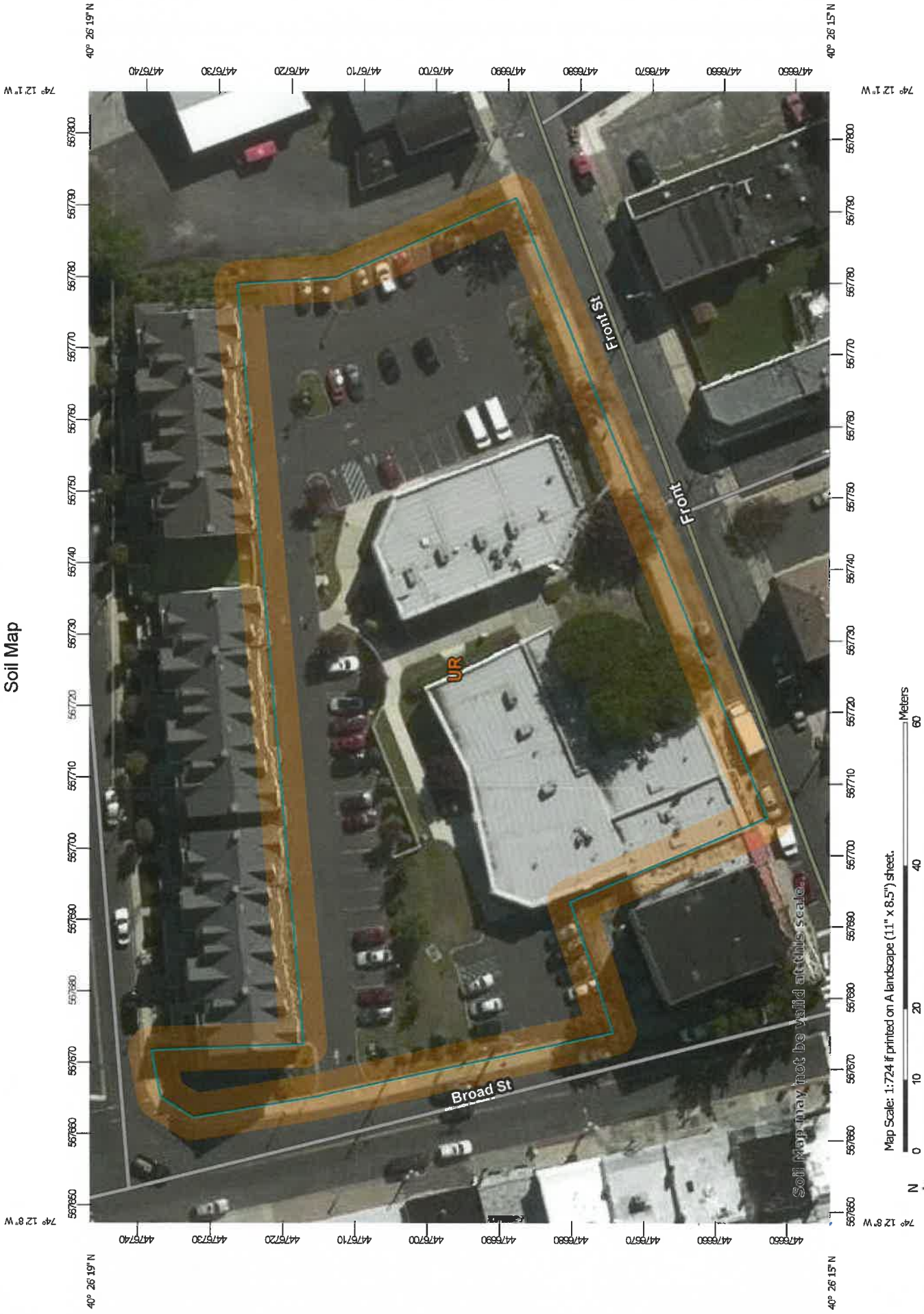
Custom Soil Resource Report for **Monmouth County, New Jersey**



Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



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
Area of Interest (AOI)	Area of Interest (AOI)	Soil Map Unit Polygons	Soil Map Unit Lines	Soil Map Unit Points	Special Point Features	Water Features	Streams and Canals	Transportation	Rails	Interstate Highways	US Routes	Major Roads	Local Roads	Background	Aerial Photography									

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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: [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: Monmouth County, New Jersey
Survey Area Data: Version 11, Oct 6, 2017

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

Date(s) aerial images were photographed: Aug 25, 2014—Sep 23, 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
UR	Urban land	1.5	100.0%
Totals for Area of Interest		1.5	100.0%

Soil Information for Urban Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Water Features

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

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 four hydrologic soil groups are:

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

Custom Soil Resource Report

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.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff—Monmouth County, New Jersey			
Map symbol and soil name	Pct. of map unit	Surface Runoff	Hydrologic Soil Group
UR—Urban land			
Urban land	95	Very high	—

APPENDIX B: PRE/POST DEVELOPMENT CONDITIONS

PRE-DEVELOPMENT DRAINAGE CONDITION

I. Total Drainage Area: 1.45 Acres

II. Soil Groups/Types: UR -Urban Land Type
C

III. Time of Concentration: 10 Minutes

IV Rainfall Intensity:

<u>Storm</u>	<u>Rainfall(in.)</u>
100-YR	8.00
25-YR	6.70
10-YR	5.80
2-YR	4.20
1-YR	3.20

V. Weighted 'c' Calulation:

<u>Land Use</u>	<u>Area</u>	<u>% of Cover</u>	<u>C Value</u>	<u>Total</u>
Impervious	1.05 Acres	0.72	0.99	0.72
Gravel	0.00 Acres	0.00	0.84	0.00
Grass	0.40 Acres	0.28	0.51	0.14
Woods	0.00 Acres	0.00	0.45	0.00
Weighted 'c':				0.86

VI. $Q=ciA$

$Q=$	c	I	A	$=$	Q
$Q_{100}=$	0.86	8.00	1.45	$=$	10.0
$Q_{25}=$	0.86	6.70	1.45	$=$	8.4
$Q_{10}=$	0.86	5.80	1.45	$=$	7.2
$Q_2=$	0.86	4.20	1.45	$=$	5.2

POST DEVELOPMENT RUNOFF CONDITION

I. Total Drainage Area: 1.45 Acres

II. Soil Groups/Types: UR -Urban Land Type
C

III. Time of Concentration: 10 Minutes

IV Rainfall Intensity:

<u>Storm</u>	<u>Rainfall(in.)</u>
100-YR	8.00
25-YR	6.70
10-YR	5.80
2-YR	4.20
1-YR	3.20

V. Weighted 'c' Calulation:

<u>Land Use</u>	<u>Area</u>	<u>% of Cover</u>	<u>C Value</u>	<u>Total</u>
Impervious	1.16 Acres	0.80	0.99	0.79
Gravel	0.00 Acres	0.00	0.84	0.00
Grass	0.29 Acres	0.20	0.51	0.10
Woods	0.00 Acres	0.00	0.45	0.00
Weighted 'c':				0.89

VI. $Q=ciA$

$Q=$	c	I	A	$=$	Q
$Q_{100}=$	0.89	8.00	1.45	$=$	10.3
$Q_{25}=$	0.89	6.70	1.45	$=$	8.7
$Q_{10}=$	0.89	5.80	1.45	$=$	7.5
$Q_2=$	0.89	4.20	1.45	$=$	5.4

APPENDIX C: ANNUAL GROUNDWATER RECHARGE ANALYSIS

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓
 MONMOUTH CO., KEYPORT BORO
 Average Annual P (in) 44.9
 Climatic Factor 1.44

Project Name: Behar Apartments
 Description: -
 Analysis Date: 02/09/18

Pre-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.4	Open space	Urban Land*	0.0	-
2	1.05	Impervious areas	Urban Land*	0.0	-
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.5			Total Annual Recharge (in) 0.0	Total Annual Recharge (cu.ft) -

Post-Developed Conditions					
Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	0.29	Open space	Urban Land*	0.0	-
2	1.16	Impervious areas	Urban Land*	0.0	-
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	1.5			Total Annual Recharge (in) 0.0	Total Annual Recharge (cu.ft) -

Annual Recharge Requirements Calculation ↓

% of Pre-Developed Annual Recharge to Preserve =				100%	Total Impervious Area (sq.ft)
Post-Development Annual Recharge Deficit=				0	(cubic feet)
Recharge Efficiency Parameters Calculations (area averages)					
RWC= 0.00	(in)	DRWC= 0.00	(in)		
ERWC = 0.00	(in)	EDRWC= 0.00	(in)		
Total Annual Recharge to Preserve =				50	530

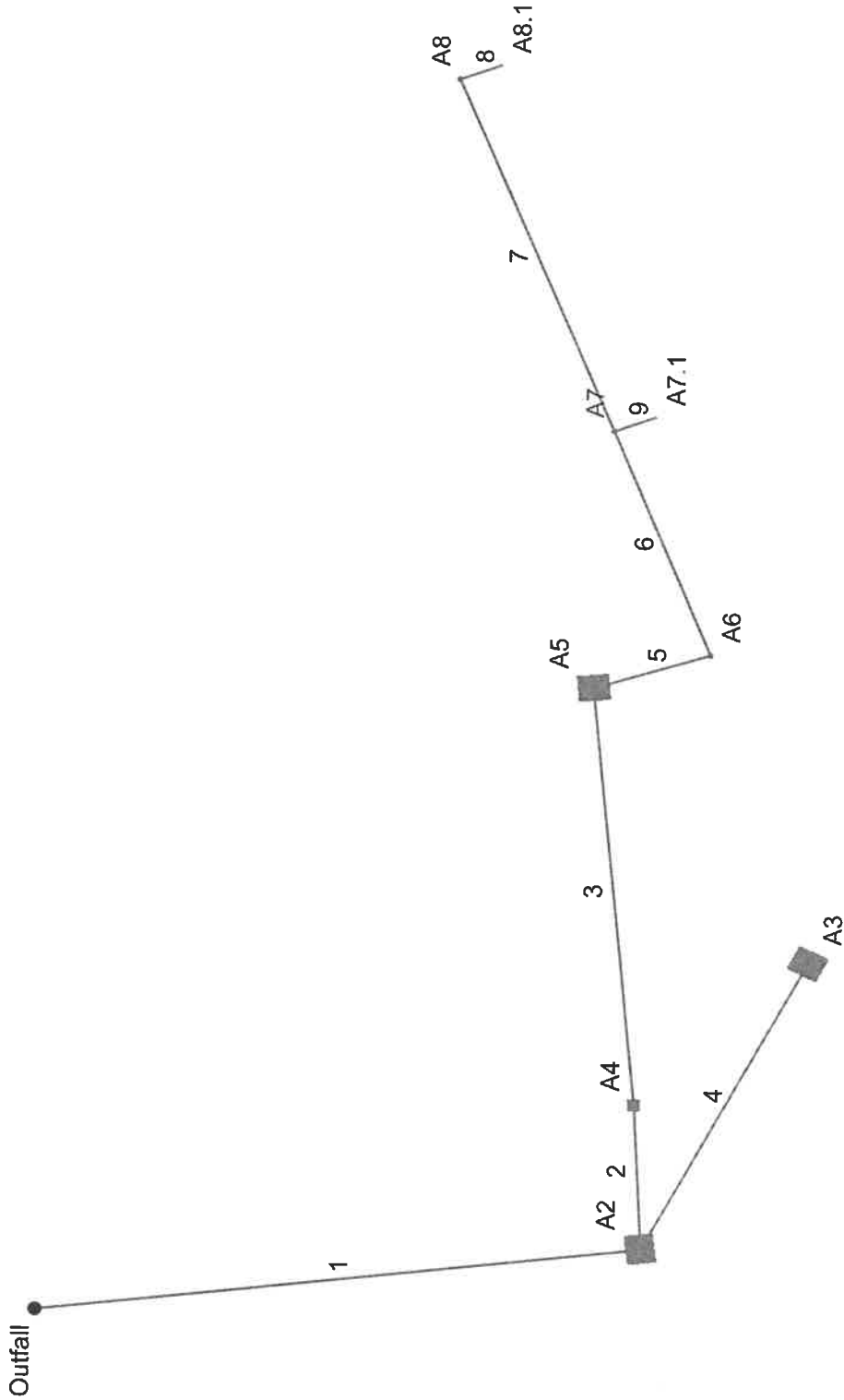
Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

Project Name		Description		Analysis Date		BMP or LID Type	
Behar Apartments				02/09/18			
Recharge BMP Input Parameters				Root Zone Water Capacity Calculated Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
BMP Area	ABMP	6556.0	sq.ft	Empty Portion of RWC under Post-D	ERWC	0.00	in
BMP Effective Depth, this is the design variable	dBMP	2.5	in	Natural Recharge			
Upper level of the BMP surface (negative if above ground)	dBMPu	-5.2	in	ERWC Modified to consider dEXC	EDRWC	0.00	in
Depth of lower surface of BMP, must be >= dBMPu	dEXC	0.0	in	Empty Portion of RWC under Infiltr. BMP	RERWC	0.00	in
Post-development Land Segment Location of BMP	SegBMP	0	unitless				
Input Zero if Location is distributed or undetermined							
Recharge Design Parameters				Recharge Design Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
Inches of Runoff to capture				Inches of Runoff to capture	Qdesign	0.34	in
Inches of Rainfall to capture				Inches of Rainfall to capture	Pdesign	0.44	in
Recharge Provided Avg. over Imp. Area				Recharge Provided Avg. over Imp. Area		18.5	in
Runoff Captured Avg. over imp. Area				Runoff Captured Avg. over imp. Area		18.5	in
BMP Calculated Size Parameters				BMP Calculated Size Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
ABMP/Aimp		0.13	unitless	ABMP/Aimp		0.13	unitless
BMP Volume		1,410	cu.ft	BMP Volume		1,410	cu.ft
System Performance Calculated Parameters				System Performance Calculated Parameters			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
Annual BMP Recharge Volume		77,862	cu.ft	Annual BMP Recharge Volume		77,862	cu.ft
Avg BMP Recharge Efficiency		100.0%		Avg BMP Recharge Efficiency		100.0%	
%Rainfall became Runoff		77.7%	%	%Rainfall became Runoff		77.7%	%
%Runoff Infiltrated		53.0%	%	%Runoff Infiltrated		53.0%	%
%Runoff Recharged		53.0%	%	%Runoff Recharged		53.0%	%
%Rainfall Recharged		41.2%	%	%Rainfall Recharged		41.2%	%
Parameters from Annual Recharge Worksheet				Parameters from Annual Recharge Worksheet			
Parameter	Symbol	Value	Unit	Parameter	Symbol	Value	Unit
Post-D Deficit Recharge (or desired recharge volume)	Vdef	-	cu.ft	Post-D Deficit Recharge (or desired recharge volume)	Vdef	-	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	50,530	sq.ft	Post-D Impervious Area (or target Impervious Area)	Aimp	50,530	sq.ft
Root Zone Water Capacity	RWC	0.00	in	Root Zone Water Capacity	RWC	0.00	in
RWC Modified to consider dEXC	DRWC	0.00	in	RWC Modified to consider dEXC	DRWC	0.00	in
Climatic Factor	C-factor	1.44	no units	Climatic Factor	C-factor	1.44	no units
Average Annual P	Pavg	44.9	in	Average Annual P	Pavg	44.9	in
Recharge Requirement over Imp. Area	dr	0.0	in	Recharge Requirement over Imp. Area	dr	0.0	in
How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP. To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration click the "Default Vdef & Aimp" button.							
Calculation Check Messages				Calculation Check Messages			
Volume Balance--> Solve Problem to satisfy Annual Recharge				Volume Balance--> Solve Problem to satisfy Annual Recharge			
dBMP Check--> OK				dBMP Check--> OK			
dEXC Check--> OK				dEXC Check--> OK			
BMP Location--> Location is selected as distributed or undetermined				BMP Location--> Location is selected as distributed or undetermined			
Other Notes				Other Notes			
Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensitive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.							

APPENDIX D: PIPE CALCULATIONS

Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



Pipe Calc

Line No.	Inlet ID	Line ID	Gnd/Rim El Up	Line Length	Dmg Area	Runoff Coeff	Inlet Time	i Inlet	Incr Q	Total Area	Tc	i Sys	Total Runoff	Known Q	Flow Rate	Capac Full	Line Size	Line Slope	Vel Ave	Invert Up	Invert Dn	n-val Pipe
1	A2	P2	13.31	74.788	0.03	0.51	10.0	6.73	0.10	0.41	13.3	5.89	2.31	0.00	2.31	11.95	15	3.42	3.91	11.22	8.66	0.013
2	A4	P3	17.00	20.217	0.00	0.00	0.0	0.00	0.00	0.26	13.0	5.95	1.53	0.00	1.53	6.42	15	0.99	3.60	11.57	11.37	0.013
3	A5	P18	15.30	58.883	0.00	0.00	0.0	0.00	0.00	0.26	11.2	6.39	1.64	0.00	1.64	20.63	24	0.49	3.50	11.96	11.67	0.010
4	A3	P1	18.98	45.206	0.12	0.99	10.0	6.73	0.80	0.12	10.0	6.73	0.80	0.00	0.80	11.72	15	3.30	2.18	12.76	11.27	0.013
5	A6	P17	17.50	15.108	0.00	0.00	0.0	0.00	0.00	0.26	11.1	6.42	1.65	0.00	1.65	4.61	12	0.99	2.10	10.11	9.96	0.010
6	A7	P13	14.50	33.577	0.00	0.00	0.0	0.00	0.00	0.26	10.8	6.49	1.67	0.00	1.67	4.66	12	1.01	2.13	10.45	10.11	0.010
7	A8	P12	13.20	52.814	0.00	0.00	0.0	0.00	0.00	0.13	10.0	6.72	0.86	0.00	0.86	4.64	12	1.00	1.10	11.08	10.55	0.010
8	A8.1	P9	11.98	5.452	0.13	0.99	10.0	6.73	0.87	0.13	10.0	6.73	0.87	0.00	0.87	1.50	8	0.92	2.48	11.06	11.01	0.010
9	A7.1	P16	11.35	5.444	0.13	0.99	10.0	6.73	0.87	0.13	10.0	6.73	0.87	0.00	0.87	1.50	8	0.92	2.48	10.60	10.55	0.010

Project File: LINE-A.stm

Number of lines: 9

Date: 12/18/2019

NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs. ; ** Critical depth

APPENDIX E: TRENCH CALCULATIONS

2017.080-Behar Apartments-TrenchTrench Drain
NJ-DEP 2-Year Duration=10 min, Inten=4.20 in/hr

Prepared by Menlo Engineering Associates, Inc.

Printed 12/19/2019

HydroCAD® 10.00-24 s/n 01129 © 2018 HydroCAD Software Solutions LLC

Summary for Pond 2P: Pipe

Inflow Area = 0.250 ac, 100.00% Impervious, Inflow Depth = 0.70" for 2-Year event
 Inflow = 1.04 cfs @ 0.00 hrs, Volume= 0.015 af
 Outflow = 1.17 cfs @ 0.01 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.6 min
 Discarded = 1.17 cfs @ 0.01 hrs, Volume= 0.015 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 8.70' @ 0.01 hrs Surf.Area= 0.005 ac Storage= 0.000 af

Plug-Flow detention time= 0.2 min calculated for 0.015 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (4.9 - 4.8)

Volume	Invert	Avail.Storage	Storage Description
#1	11.67'	0.004 af	24.0" Round Pipe Storage L= 59.0' S= 0.0050 '/
#2	8.67'	0.033 af	4.00'W x 59.00'L x 6.00'H Prismatic
		0.037 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	8.67'	2.00 cfs Exfiltration at all elevations
#2	Primary	11.57'	15.0" Round RCP_Round 15" L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 11.57' / 11.37' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=2.00 cfs @ 0.01 hrs HW=8.70' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 2.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=8.69' (Free Discharge)
 ↳2=RCP_Round 15" (Controls 0.00 cfs)

2017.080-Behar Apartments-Trench

NJ-DEP 2-Year Duration=10 min, Inten=4.20 in/hr

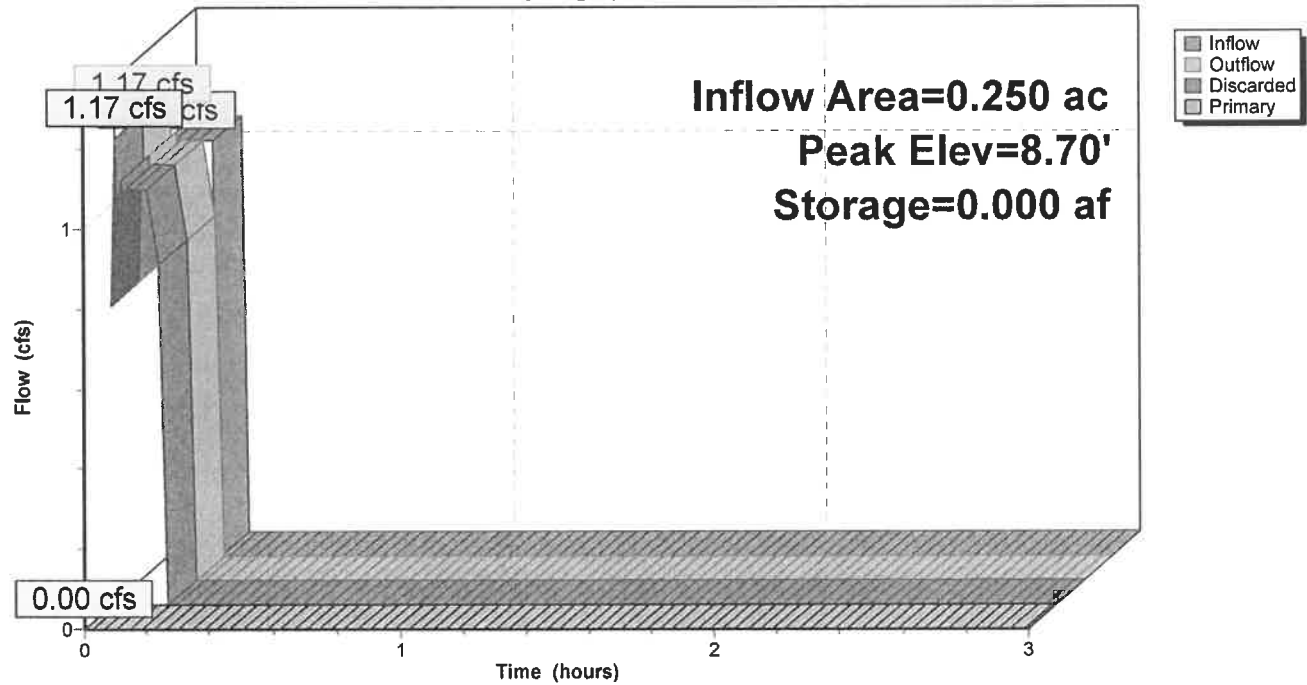
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Pond 2P: Pipe

Hydrograph



Hydrograph for Pond 2P: Pipe

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	1.04	0.000	8.69	0.74	0.74	0.00
0.10	1.04	0.000	8.70	1.04	1.04	0.00
0.20	0.00	0.000	8.67	0.00	0.00	0.00
0.30	0.00	0.000	8.67	0.00	0.00	0.00
0.40	0.00	0.000	8.67	0.00	0.00	0.00
0.50	0.00	0.000	8.67	0.00	0.00	0.00
0.60	0.00	0.000	8.67	0.00	0.00	0.00
0.70	0.00	0.000	8.67	0.00	0.00	0.00
0.80	0.00	0.000	8.67	0.00	0.00	0.00
0.90	0.00	0.000	8.67	0.00	0.00	0.00
1.00	0.00	0.000	8.67	0.00	0.00	0.00
1.10	0.00	0.000	8.67	0.00	0.00	0.00
1.20	0.00	0.000	8.67	0.00	0.00	0.00
1.30	0.00	0.000	8.67	0.00	0.00	0.00
1.40	0.00	0.000	8.67	0.00	0.00	0.00
1.50	0.00	0.000	8.67	0.00	0.00	0.00
1.60	0.00	0.000	8.67	0.00	0.00	0.00
1.70	0.00	0.000	8.67	0.00	0.00	0.00
1.80	0.00	0.000	8.67	0.00	0.00	0.00
1.90	0.00	0.000	8.67	0.00	0.00	0.00
2.00	0.00	0.000	8.67	0.00	0.00	0.00
2.10	0.00	0.000	8.67	0.00	0.00	0.00
2.20	0.00	0.000	8.67	0.00	0.00	0.00
2.30	0.00	0.000	8.67	0.00	0.00	0.00
2.40	0.00	0.000	8.67	0.00	0.00	0.00
2.50	0.00	0.000	8.67	0.00	0.00	0.00
2.60	0.00	0.000	8.67	0.00	0.00	0.00
2.70	0.00	0.000	8.67	0.00	0.00	0.00
2.80	0.00	0.000	8.67	0.00	0.00	0.00
2.90	0.00	0.000	8.67	0.00	0.00	0.00
3.00	0.00	0.000	8.67	0.00	0.00	0.00

2017.080-Behar Apartments-Trench

NJ-DEP 10-Year Duration=10 min, Inten=5.80 in/hr

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Summary for Pond 2P: Pipe

Inflow Area = 0.250 ac, 100.00% Impervious, Inflow Depth = 0.97" for 10-Year event
 Inflow = 1.43 cfs @ 0.00 hrs, Volume= 0.020 af
 Outflow = 1.61 cfs @ 0.01 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.6 min
 Discarded = 1.61 cfs @ 0.01 hrs, Volume= 0.020 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 8.72' @ 0.01 hrs Surf.Area= 0.005 ac Storage= 0.000 af

Plug-Flow detention time= 0.2 min calculated for 0.020 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (4.9 - 4.8)

Volume	Invert	Avail.Storage	Storage Description
#1	11.67'	0.004 af	24.0" Round Pipe Storage L= 59.0' S= 0.0050 '/
#2	8.67'	0.033 af	4.00'W x 59.00'L x 6.00'H Prismatic
		0.037 af	Total Available Storage

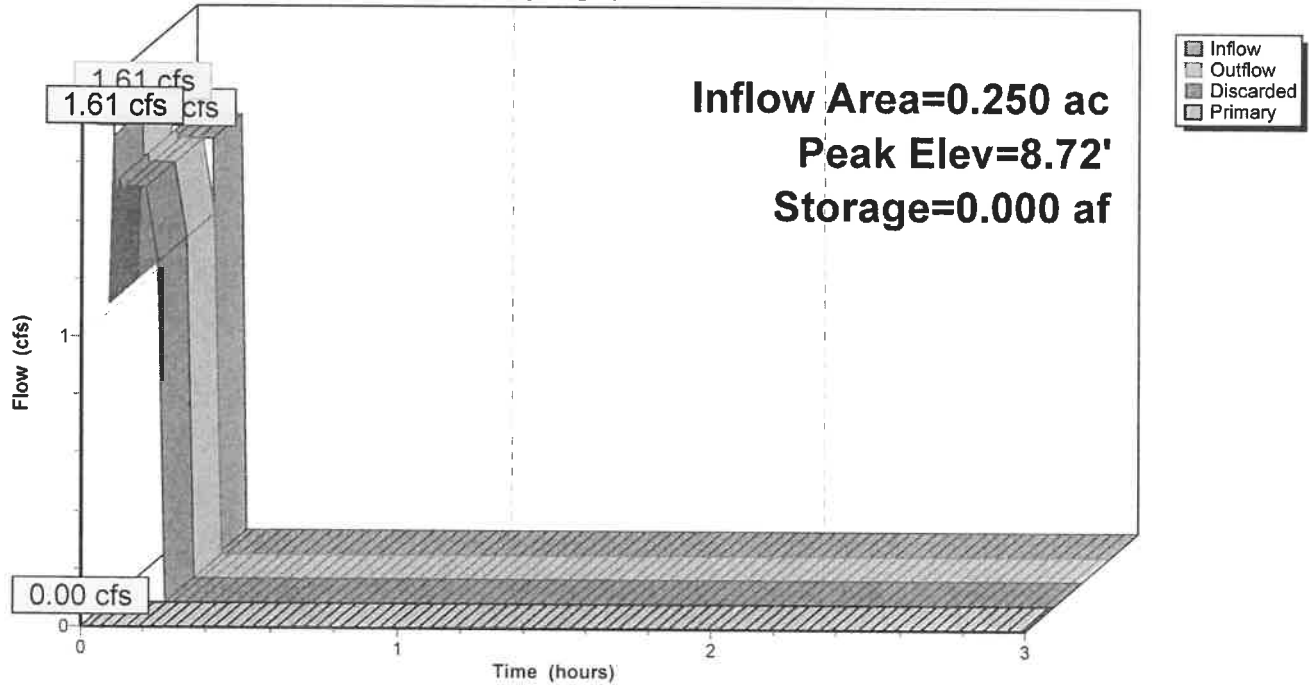
Device	Routing	Invert	Outlet Devices
#1	Discarded	8.67'	2.00 cfs Exfiltration at all elevations
#2	Primary	11.57'	15.0" Round RCP_Round 15" L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 11.57' / 11.37' S= 0.0100 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=2.00 cfs @ 0.01 hrs HW=8.72' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 2.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=8.70' (Free Discharge)
 ↳2=RCP_Round 15" (Controls 0.00 cfs)

Pond 2P: Pipe

Hydrograph



Hydrograph for Pond 2P: Pipe

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	1.43	0.000	8.70	1.03	1.03	0.00
0.10	1.43	0.000	8.71	1.43	1.43	0.00
0.20	0.00	0.000	8.67	0.00	0.00	0.00
0.30	0.00	0.000	8.67	0.00	0.00	0.00
0.40	0.00	0.000	8.67	0.00	0.00	0.00
0.50	0.00	0.000	8.67	0.00	0.00	0.00
0.60	0.00	0.000	8.67	0.00	0.00	0.00
0.70	0.00	0.000	8.67	0.00	0.00	0.00
0.80	0.00	0.000	8.67	0.00	0.00	0.00
0.90	0.00	0.000	8.67	0.00	0.00	0.00
1.00	0.00	0.000	8.67	0.00	0.00	0.00
1.10	0.00	0.000	8.67	0.00	0.00	0.00
1.20	0.00	0.000	8.67	0.00	0.00	0.00
1.30	0.00	0.000	8.67	0.00	0.00	0.00
1.40	0.00	0.000	8.67	0.00	0.00	0.00
1.50	0.00	0.000	8.67	0.00	0.00	0.00
1.60	0.00	0.000	8.67	0.00	0.00	0.00
1.70	0.00	0.000	8.67	0.00	0.00	0.00
1.80	0.00	0.000	8.67	0.00	0.00	0.00
1.90	0.00	0.000	8.67	0.00	0.00	0.00
2.00	0.00	0.000	8.67	0.00	0.00	0.00
2.10	0.00	0.000	8.67	0.00	0.00	0.00
2.20	0.00	0.000	8.67	0.00	0.00	0.00
2.30	0.00	0.000	8.67	0.00	0.00	0.00
2.40	0.00	0.000	8.67	0.00	0.00	0.00
2.50	0.00	0.000	8.67	0.00	0.00	0.00
2.60	0.00	0.000	8.67	0.00	0.00	0.00
2.70	0.00	0.000	8.67	0.00	0.00	0.00
2.80	0.00	0.000	8.67	0.00	0.00	0.00
2.90	0.00	0.000	8.67	0.00	0.00	0.00
3.00	0.00	0.000	8.67	0.00	0.00	0.00

2017.080-Behar Apartments-TrenchTrench Drain
NJ-DEP 25-Year Duration=10 min, Inten=6.70 in/hr

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Summary for Pond 2P: Pipe

Inflow Area = 0.250 ac, 100.00% Impervious, Inflow Depth = 1.12" for 25-Year event
 Inflow = 1.66 cfs @ 0.00 hrs, Volume= 0.023 af
 Outflow = 1.86 cfs @ 0.01 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.6 min
 Discarded = 1.86 cfs @ 0.01 hrs, Volume= 0.023 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 8.73' @ 0.01 hrs Surf.Area= 0.005 ac Storage= 0.000 af

Plug-Flow detention time= 0.2 min calculated for 0.023 af (100% of inflow)
 Center-of-Mass det. time= 0.1 min (4.9 - 4.8)

Volume	Invert	Avail.Storage	Storage Description
#1	11.67'	0.004 af	24.0" Round Pipe Storage L= 59.0' S= 0.0050 '/
#2	8.67'	0.033 af	4.00'W x 59.00'L x 6.00'H Prismatic
		0.037 af	Total Available Storage

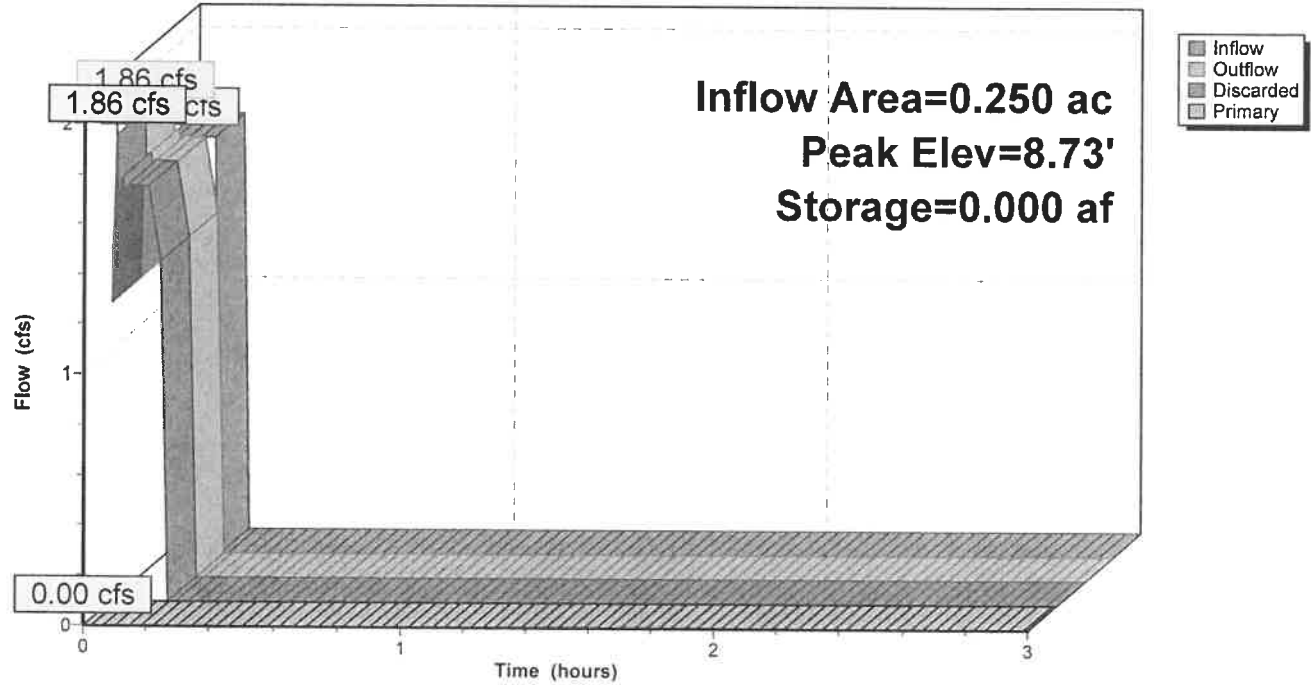
Device	Routing	Invert	Outlet Devices
#1	Discarded	8.67'	2.00 cfs Exfiltration at all elevations
#2	Primary	11.57'	15.0" Round RCP_Round 15" L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 11.57' / 11.37' S= 0.0100 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=2.00 cfs @ 0.01 hrs HW=8.73' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 2.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=8.71' (Free Discharge)
 ↳2=RCP_Round 15" (Controls 0.00 cfs)

Pond 2P: Pipe

Hydrograph



Hydrograph for Pond 2P: Pipe

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	1.66	0.000	8.71	1.19	1.19	0.00
0.10	1.66	0.000	8.72	1.66	1.66	0.00
0.20	0.00	0.000	8.67	0.00	0.00	0.00
0.30	0.00	0.000	8.67	0.00	0.00	0.00
0.40	0.00	0.000	8.67	0.00	0.00	0.00
0.50	0.00	0.000	8.67	0.00	0.00	0.00
0.60	0.00	0.000	8.67	0.00	0.00	0.00
0.70	0.00	0.000	8.67	0.00	0.00	0.00
0.80	0.00	0.000	8.67	0.00	0.00	0.00
0.90	0.00	0.000	8.67	0.00	0.00	0.00
1.00	0.00	0.000	8.67	0.00	0.00	0.00
1.10	0.00	0.000	8.67	0.00	0.00	0.00
1.20	0.00	0.000	8.67	0.00	0.00	0.00
1.30	0.00	0.000	8.67	0.00	0.00	0.00
1.40	0.00	0.000	8.67	0.00	0.00	0.00
1.50	0.00	0.000	8.67	0.00	0.00	0.00
1.60	0.00	0.000	8.67	0.00	0.00	0.00
1.70	0.00	0.000	8.67	0.00	0.00	0.00
1.80	0.00	0.000	8.67	0.00	0.00	0.00
1.90	0.00	0.000	8.67	0.00	0.00	0.00
2.00	0.00	0.000	8.67	0.00	0.00	0.00
2.10	0.00	0.000	8.67	0.00	0.00	0.00
2.20	0.00	0.000	8.67	0.00	0.00	0.00
2.30	0.00	0.000	8.67	0.00	0.00	0.00
2.40	0.00	0.000	8.67	0.00	0.00	0.00
2.50	0.00	0.000	8.67	0.00	0.00	0.00
2.60	0.00	0.000	8.67	0.00	0.00	0.00
2.70	0.00	0.000	8.67	0.00	0.00	0.00
2.80	0.00	0.000	8.67	0.00	0.00	0.00
2.90	0.00	0.000	8.67	0.00	0.00	0.00
3.00	0.00	0.000	8.67	0.00	0.00	0.00

Summary for Pond 2P: Pipe

Inflow Area = 0.250 ac, 100.00% Impervious, Inflow Depth = 1.33" for 100-Year event
 Inflow = 1.98 cfs @ 0.00 hrs, Volume= 0.028 af
 Outflow = 2.00 cfs @ 0.01 hrs, Volume= 0.028 af, Atten= 0%, Lag= 0.6 min
 Discarded = 2.00 cfs @ 0.01 hrs, Volume= 0.028 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-3.00 hrs, dt= 0.01 hrs
 Peak Elev= 8.75' @ 0.01 hrs Surf.Area= 0.005 ac Storage= 0.000 af

Plug-Flow detention time= 0.2 min calculated for 0.028 af (99% of inflow)
 Center-of-Mass det. time= 0.2 min (5.0 - 4.8)

Volume	Invert	Avail.Storage	Storage Description
#1	11.67'	0.004 af	24.0" Round Pipe Storage L= 59.0' S= 0.0050 '/'
#2	8.67'	0.033 af	4.00'W x 59.00'L x 6.00'H Prismatic
		0.037 af	Total Available Storage

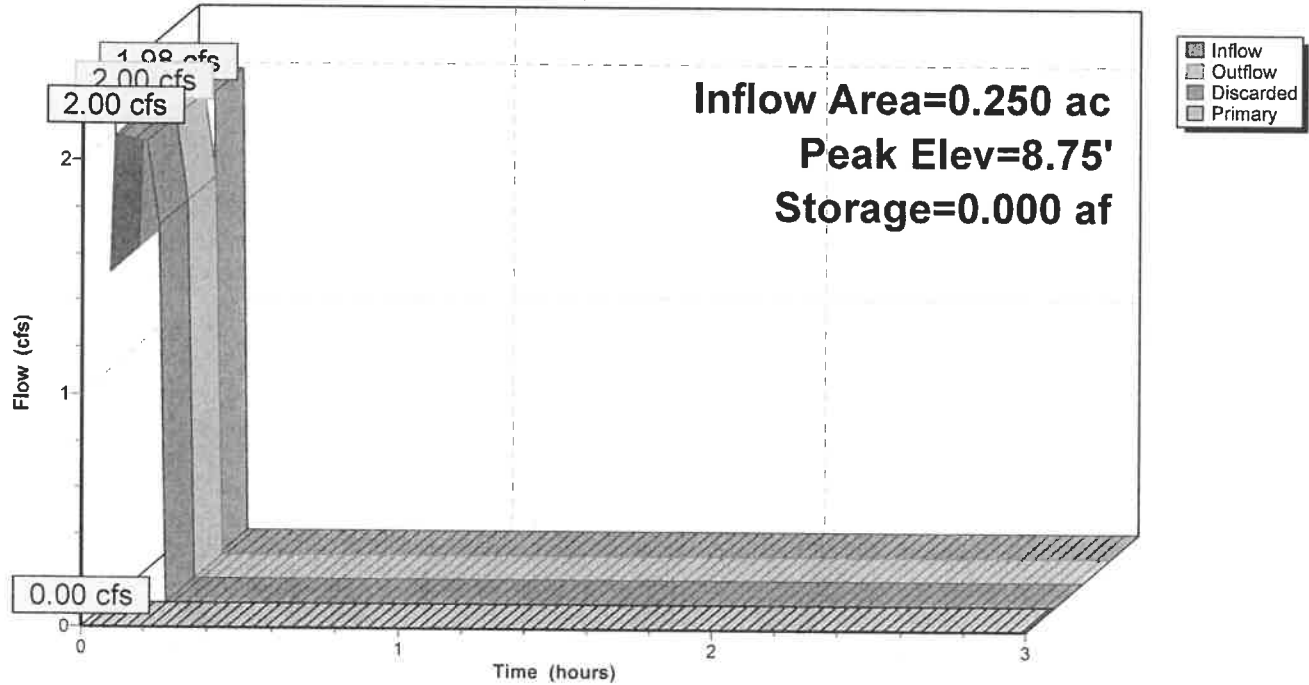
Device	Routing	Invert	Outlet Devices
#1	Discarded	8.67'	2.00 cfs Exfiltration at all elevations
#2	Primary	11.57'	15.0" Round RCP_Round 15" L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 11.57' / 11.37' S= 0.0100 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf

Discarded OutFlow Max=2.00 cfs @ 0.01 hrs HW=8.75' (Free Discharge)
 ↳ **1=Exfiltration** (Exfiltration Controls 2.00 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=8.71' (Free Discharge)
 ↳ **2=RCP_Round 15"** (Controls 0.00 cfs)

Pond 2P: Pipe

Hydrograph



Hydrograph for Pond 2P: Pipe

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	1.98	0.000	8.71	1.42	1.42	0.00
0.10	1.98	0.000	8.73	1.98	1.98	0.00
0.20	0.00	0.000	8.67	0.00	0.00	0.00
0.30	0.00	0.000	8.67	0.00	0.00	0.00
0.40	0.00	0.000	8.67	0.00	0.00	0.00
0.50	0.00	0.000	8.67	0.00	0.00	0.00
0.60	0.00	0.000	8.67	0.00	0.00	0.00
0.70	0.00	0.000	8.67	0.00	0.00	0.00
0.80	0.00	0.000	8.67	0.00	0.00	0.00
0.90	0.00	0.000	8.67	0.00	0.00	0.00
1.00	0.00	0.000	8.67	0.00	0.00	0.00
1.10	0.00	0.000	8.67	0.00	0.00	0.00
1.20	0.00	0.000	8.67	0.00	0.00	0.00
1.30	0.00	0.000	8.67	0.00	0.00	0.00
1.40	0.00	0.000	8.67	0.00	0.00	0.00
1.50	0.00	0.000	8.67	0.00	0.00	0.00
1.60	0.00	0.000	8.67	0.00	0.00	0.00
1.70	0.00	0.000	8.67	0.00	0.00	0.00
1.80	0.00	0.000	8.67	0.00	0.00	0.00
1.90	0.00	0.000	8.67	0.00	0.00	0.00
2.00	0.00	0.000	8.67	0.00	0.00	0.00
2.10	0.00	0.000	8.67	0.00	0.00	0.00
2.20	0.00	0.000	8.67	0.00	0.00	0.00
2.30	0.00	0.000	8.67	0.00	0.00	0.00
2.40	0.00	0.000	8.67	0.00	0.00	0.00
2.50	0.00	0.000	8.67	0.00	0.00	0.00
2.60	0.00	0.000	8.67	0.00	0.00	0.00
2.70	0.00	0.000	8.67	0.00	0.00	0.00
2.80	0.00	0.000	8.67	0.00	0.00	0.00
2.90	0.00	0.000	8.67	0.00	0.00	0.00
3.00	0.00	0.000	8.67	0.00	0.00	0.00