Stormwater Report
Guzman Lane
80 Hampstead Street
Methuen, Massachusetts

May 6, 2022

Prepared for:
Eddy Guzman
PO Box 656
Lawrence, MA 01842

Prepared By:

1 East River Place
Methuen, MA 01844

Project and Site Description

The Applicant, Eddy Guzman, is proposing to construct a three lot subdivision on an existing 12.6± acre parcel at 80 Hampstead Street. The parcel is on the west side of Hampstead Street in northwest Methuen.

The existing parcel has an existing, vacant dwelling on the east side of the lot, at Hampstead Street, in poor condition, with a paved driveway south of the house. The area immediately around the house and driveway consists of lawn and landscaping. Approximately 27,390 square feet (0.63± acres) of the 12.6 acre parcel is developed, the remaining area of the lot is wooded, a large portion of which is wetland.

The dwelling will be razed and the driveway removed during construction. Construction will include an approximately 763 foot long roadway with appurtenant subsurface utilities including sewer, water electrical, telephone and cable. Drainage of the roadway includes roadway swales discharging to shallow basins while a portion of the road, including the cul-de-sac, will be drained by a closed drainage system discharging to a subsurface detention structure made of precast concrete chambers. The roadway will service three single family lots, and the calculated, proposed disturbed area will be about 2.5± acres of the 12.6 acre parcel (19.6%).

As noted above, a large portion of the parcel consists of wetland areas. Wetlands bisect the parcel west of the proposed work. The wetland areas to the west, which will be well outside of the limits of work, were scaled from record sources (ie State or Local GIS). The wetland Resource areas on the east side of the parcel were flagged by Norse Environmental Services, Inc., and located by an instrument survey conducted by Andover Consultants. These delineated wetland boundaries consist of an "A" series bisecting the parcel north-south. A second series, the "B" series delineate the boundary around an isolated wetland resource. Neither of the wetland areas is proposed to be disturbed by the proposed work.

In addition to the wetland resources on the property, the Natural Heritage Endangered Species Program (NHESP) has delineated that much of the parcel lies within priority habitat, per their online mapping tool. A filing with the NHESP will be made concurrent with filing with the Methuen Conservation Commission. Preliminary contact with the NHESP (NHESP Tracking No.: 00-8252) was made per their species information request procedure and the NHESP has indicated that the Blue-spotted Salamander, an amphibian of Special Concern and Blanding's Turtle, a reptile which is considered threatened may be present at the site.

According to FEMA, there is floodplain on the lot, but not in the area of proposed development. The flood plain was scaled onto the plan from the F.I.R.M. 25009C0068F, dated July 3, 2012 indicating an area, designated as Zone A, an area

where flood elevations were not determined, to show the approximate location of floodplain at the site.

The National Resources Conservation Service (NRCS), surface soils on the Site, per their Web Soil Survey, include Sutton sandy loam (map unit 411), canton loamy sand (map unit 421) Charlton Rock Outcrop sandy loam (map unit 711) ; these soils are classified as Hydrologic Soil Groups (HSG) B (soils having a moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep, to deep, moderately well to well drained soils) Other soils include Freetown Muck (map unit 52) and Pipestone sand (map unit 38, a soil with a high water table). These last two soils comprise the soils in the wetland areas on site.

Existing Drainage Conditions

Under existing conditions, the Site is partially developed at the front of the parcel. Existing area 1 models this area.

Existing area 2 models the woodlands which slope towards Hampstead Street. The combined flow of areas 1 and 2 comprise comparison point 1, the "undeveloped" flow to Hampstead Street.

Existing area 3 is the existing woodland area that discharges to the isolated wetland series "B" then discharges to wetland series A.

Existing Area 4 models the wooded area north of the isolated wetland and Existing Area 5 models the existing wooded area west of the isolated wetland.

The combined flow from the isolated wetland, Existing Area 4 and Existing Area 5 comprise comparison point 2, the "undeveloped" flow westerly to the extensive wetland in that direction, the nearest boundary of which is comprised of the wetland series "A" flags.

Proposed Drainage Conditions

Under developed conditions, the site has been divided up into ten (10) subcatchments in order to model the "post developed" conditions for the proposed work. The post-development drainage conditions were designed in a way to mimic existing drainage patters.

Developed Area 1 consists of a small developed area of the street that is downhill from the low collection areas on the north and south sides of the proposed way and is tributary towards Hampstead Street. This flow is tributary to a small basin which ultimately discharges to Hampstead Street.

Developed Area 2 consists of uncaptured area south of one of the southerly collection area and is tributary to Hampstead Street.

Developed Area 3 consists of developed area which is tributary to the southerly collection area. The southerly collection area has been sized to store up to the 100-year event conservatively ignoring infiltration.

Developed Area 4 consists of uncaptured area northerly of the northerly collection area which is tributary to Hampstead Street

Developed Area 5 consists of area tributary to the northerly collection area. Like the southerly area, the northerly collection area was sized to store up to the 100-year event conservatively ignoring infiltration. The combined flow from Developed Areas 1, 2, 3, 4 and 5 comprise the "developed" flow to Hampstead Street and forms the comparison point for "developed" vs. "undeveloped" flow to Hampstead.

Developed Area 6 consists of developed area in the vicinity of Lot 1 and is uncaptured flow tributary to the west and series "A" wetland.

Developed Area 7 consists of the developed area tributary to the street drains and subsurface detention area, this area includes the paved cul-de-sac. The subsurface detention structure has a perimeter drain to intercept any high ground water to keep the full volume of the basin available for stormwater detention. Run off from area 7 is treated by a Stormceptor unit to remove oil and grit from the stormwater before entering the chamber.

Developed Area 7b consists of developed area that is tributary to the swale around the cul-de-sac. The swales are modeled, lumped together, as a detention swale with a 1.02 in/hr infiltration rate.

Developed Area 8 is the developed area around Lot 3 which is tributary to the isolated wetland area. The isolated wetland area is drained by a proposed 15 inch culvert which discharges northerly similar to the existing condition. The "undeveloped" vs. "developed" flows and storage elevation for the isolated wetland are comparable.

Developed Area 9 consists of "developed" area at Lot 2 and is uncaptured by the proposed drainage features and is tributary, via overland flow, westerly the wetland. The combined flow from Developed Areas 6, 7, 7b, 8 and 9 flow to wetland series "A" and forms the comparison point for "developed" vs. "undeveloped" flow to this wetland.

Regulatory Compliance & Peak Rate Attenuation

The project, which will include the construction of three detached single-family dwellings, is not required to meet the Massachusetts Stormwater Management Standards. The proposed drainage system has been designed to meet the drainage design standards in the City's Subdivision Rules and Regulations, including post development versus predevelopment flows up to and including the 100-year storm event.

Existing drainage and grading patterns were maintained to the maximum extent possible. Low impact development stormwater management techniques have been incorporated into the design including roadside ("country") drainage swales, limiting the proposed limit of clearing and reducing pavement width. These practices are focused at decentralizing stormwater management at the site and incorporating smaller stormwater management techniques into the design that will reduce peak runoff rates, maximizing groundwater recharge and treating for water quality.

The rainfall-runoff response of the Site under existing and proposed conditions was analyzed for storm events with recurrence intervals of 2, 10, 25 and 100-years. The results of the analysis, as summarized in the Table below, indicate that there is no increase in peak discharge rates between the existing and proposed conditions with the exception of 2-year storm where the rate is a minimal 0.1 cfs which discharges westerly to the extensive wetland resource to the west, the increase due largely to the conversion of wooded areas to lawn.

Computations and supporting information regarding the HydroCAD modeling are included in the Appendix.

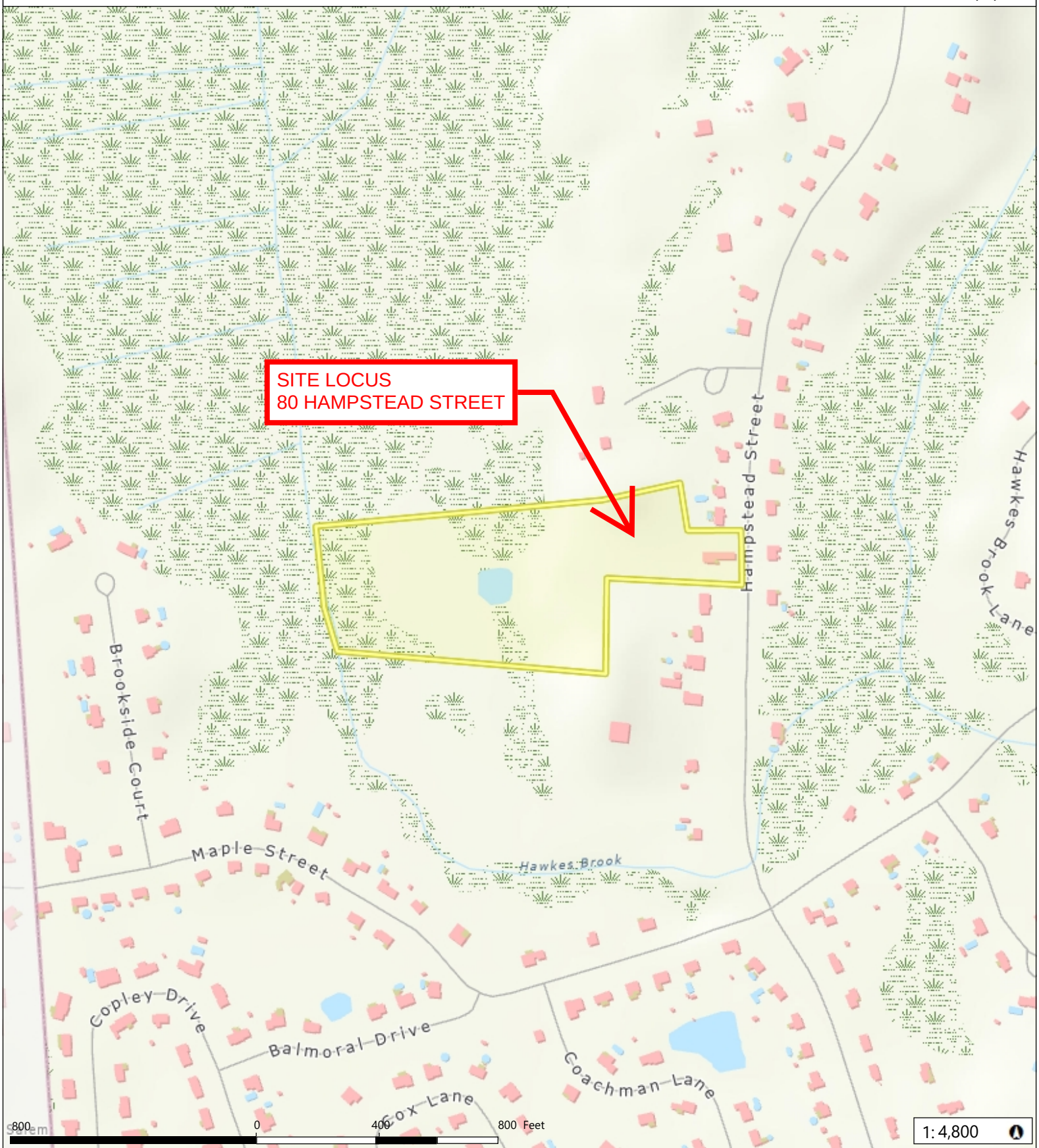
Peak Discharge Rates Table (cfs*)

Design Point	*2-year*	*10-year*	*25-year*	*100-year*
Design Point: Hampstead St (Sum 1)				
Existing	0.3	1.7	2.8	4.8
Proposed	0.1	0.5	1.2	1.9
Design Point: Wetland Series a (Sum 2)				
Existing	0.3	2.7	4.9	9.0
Proposed	0.4	2.4	4.4	7.6

Figure 1: Site Locus Map

City of Methuen

05/09/2022



Data Sources: Produced by Merrimack Valley Planning Commission (MVPC) using data provided by the City of Methuen & MassIT/MassGIS. MVPC AND THE CITY OF METHUEN MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, CONCERNING THE ACCURACY, COMPLETENESS, RELIABILITY, OR SUITABILITY OF THESE DATA. THE CITY OF METHUEN AND MVPC DOES NOT ASSUME ANY LIABILITY ASSOCIATED WITH THE USE OR MISUSE OF THIS INFORMATION.

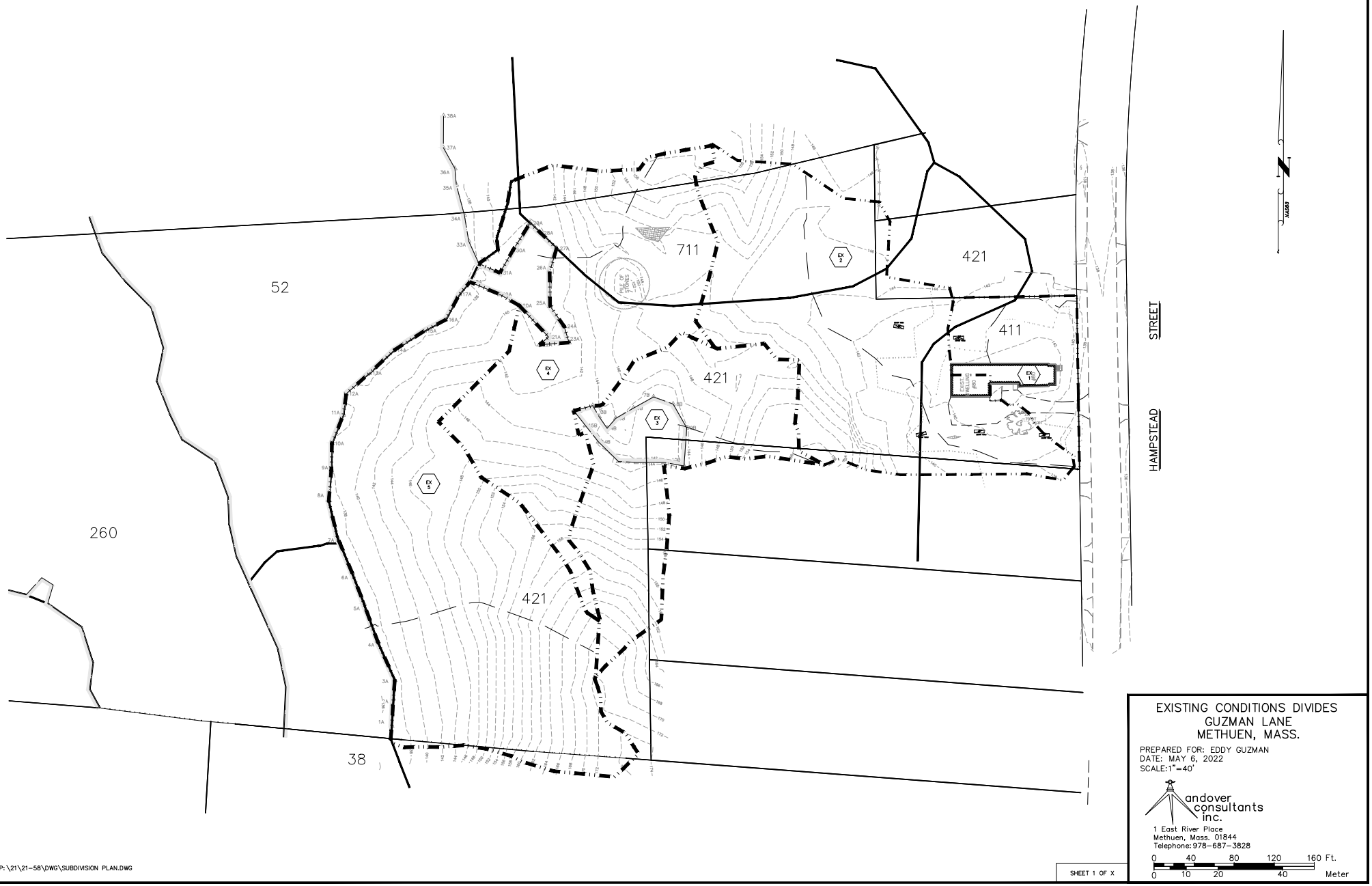
CITY OF METHUEN MASSACHUSETTS INCORPORATED 1726

Legend

Municipal Boundary
Interstate
Wetlands
Building
Major Road
MVPC_Hillshade
Deck
Local Road
Rail Line
Pool
Hydrographic Features
Roads
Streams

Projection: NAD_1983_StatePlane_Massachusetts_Mainland_FIPS_2001

Figure 2: Existing Drainage Areas



EXISTING CONDITIONS DIVIDES
GUZMAN LANE
METHUEN, MASS.

PREPARED FOR: EDDY GUZMAN
DATE: MAY 6, 2022
SCALE:1"=40'

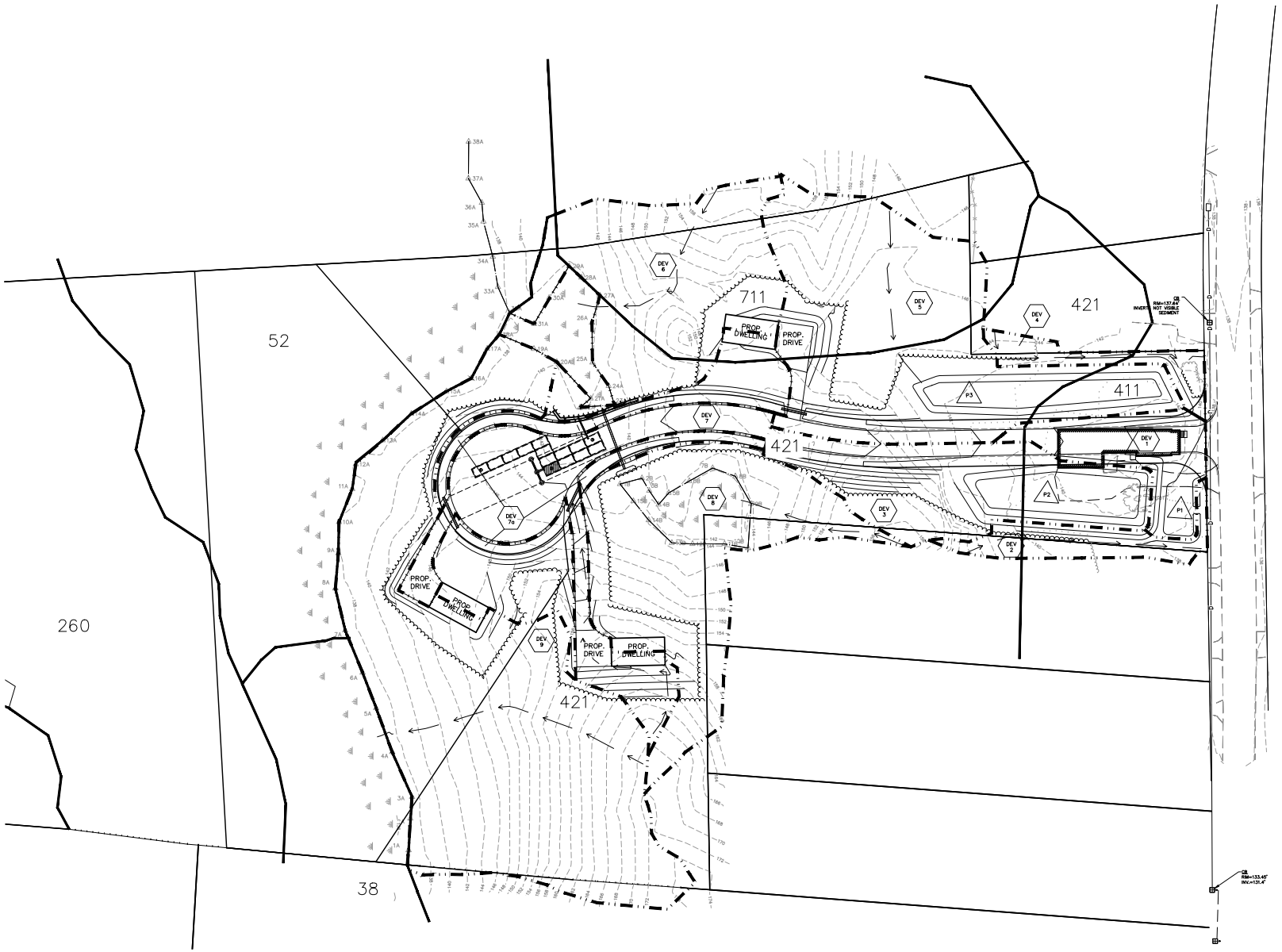
andover consultants inc.
1 East River Place
Methuen, Mass. 01844
Telephone: 978-687-3828

0 40 80 120 160 Ft.
0 10 20 40 Meter

SHEET 1 OF X

P:\21\21-58\DWG\SUBDIVISION PLAN.DWG

Figure 3: Proposed Drainage Areas



DEVELOPED CONDITIONS DIVIDES
GUZMAN LANE
METHUEN, MASS.

PREPARED FOR: EDDY GUZMAN
DATE: MAY 6, 2022
SCALE: 1"=40'

andover consultants inc.
1 East River Place
Methuen, Mass. 01844
Telephone: 978-687-3828

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0 10 20 40 Meter

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SHEET 1 OF X

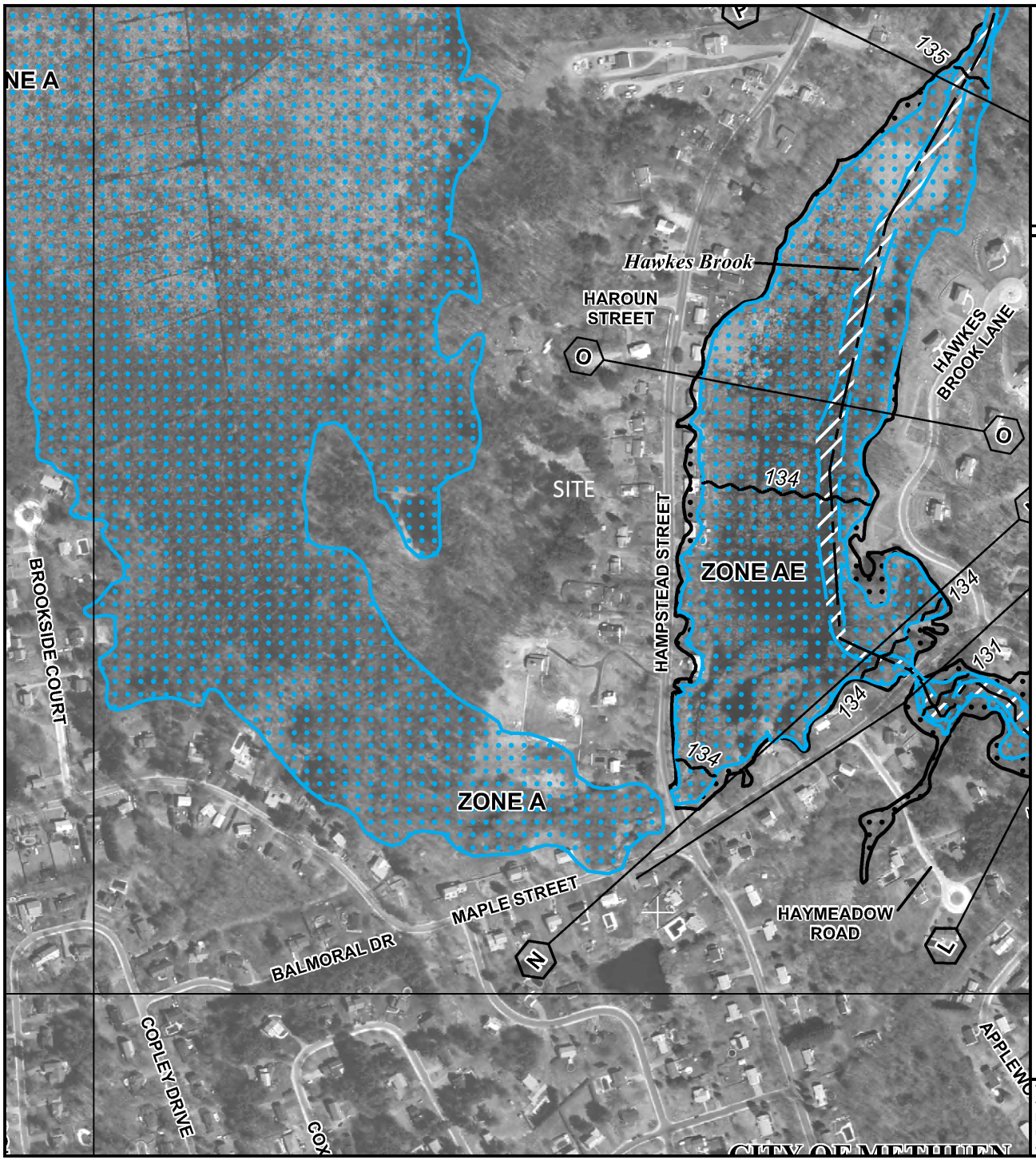
Appendix

Flood map

Web Soil Survey map

Soil Test Pit Data

Habitat Map



MAP SCALE 1" = 500'

250 0 500 1000 FEE

150 0 150 300 M

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0068F

FIRM

FLOOD INSURANCE RATE MAP

ESSEX COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)

PANEL 68 OF 600

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HAVERHILL, CITY OF	250085	0068	F
METHUEN, CITY OF	250093	0068	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 25009C0068F

EFFECTIVE DATE JULY 3, 2012

Federal Emergency Management Agency

Soil Map—Essex County, Massachusetts, Northern Part

Map Scale: 1:3,510 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Essex County, Massachusetts, Northern Part
Survey Area Data: Version 17, Sep 2, 2021

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

Date(s) aerial images were photographed: Aug 13, 2020—Sep 15, 2020

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
6A	Scarboro mucky fine sandy loam, 0 to 3 percent slopes	4.5	7.1%
32A	Wareham loamy sand, 0 to 3 percent slopes	1.2	1.9%
38A	Pipestone loamy sand, 0 to 3 percent slopes	8.2	13.0%
51A	Swansea muck, 0 to 1 percent slopes	2.7	4.3%
52A	Freetown muck, 0 to 1 percent slopes	21.7	34.6%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	0.0	0.0%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	0.1	0.2%
260B	Sudbury fine sandy loam, 3 to 8 percent slopes	3.9	6.3%
316B	Scituate fine sandy loam, 3 to 8 percent slopes, very stony	1.4	2.3%
411B	Sutton fine sandy loam, 0 to 8 percent slopes, very stony	6.1	9.8%
420B	Canton fine sandy loam, 3 to 8 percent slopes	2.2	3.5%
420C	Canton fine sandy loam, 8 to 15 percent slopes	1.5	2.4%
421B	Canton fine sandy loam, 0 to 8 percent slopes, very stony	0.2	0.4%
421C	Canton fine sandy loam, 8 to 15 percent slopes, very stony	3.8	6.0%
421D	Canton fine sandy loam, 15 to 25 percent slopes, very stony	2.2	3.6%
711B	Charlton-Rock outcrop-Hollis complex, 3 to 8 percent slopes	2.9	4.7%
Totals for Area of Interest		**62.8**	**100.0%**

SOIL TEST PIT LOG

Deep Observation Hole Number: TP-1 Ground elevation:141.1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-12	A	10YR 3/2				SL			gran/ mass	fri	
12-20	B1	10YR 4/6				SL		some	mass	fri	
20-36	B2	10YR 6/8				SL		some	mass	fri	
36-80	C	2.5Y 6/3	36”			FSL			mass	fri	

Soil Evaluator James Fairweather Date of test 11-11-21

Additional Notes:

Many large roots in B1, fine roots to 36”, ESHWT 36” with many redox concentrations and depletions below 36”. No observed water in hole to 80 inches. Nestled stones or possible refusal at bottom.

SOIL TEST PIT LOG

Deep Observation Hole Number: TP-2 Ground elevation:141.2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8	A	10YR 3/2				SL			mass	fri	
8-10	E	2.5Y 7/2				S			sg	loose	
10-16	FILL	varigated				SL		few	mass	fri	
16-20	Ab	10YR 2/2				SL		few	mass	fri	
20-26	B1	10YR 5/6				SL			mass	fri	
26-42	B2	10YR 6/8	36”			SL			mass	fri	
42-70	C	2.5Y 5/4				SL&G			mass	fri	

Soil Evaluator James Fairweather Date of test 11-11-21

Additional Notes:

Many large roots to 20”, fine roots to 36”, ESHWT 36” with many redox concentrations and few depletions below 36”, no observed water in hole to 70 inches. Few angular/sub-angular cobbles in B horizons

SOIL TEST PIT LOG

Deep Observation Hole Number: TP-3 Ground elevation:139.5

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-10	A	10YR 3/2				SL			gran/ mass	fri	
10-20	B1	10YR 5/6				SL			mass	fri	
20-26	B2	10YR 5/4				SL			mass	fri	
26-82	C	2.5Y 6/3	26”			FSL			mass	fri	

Soil Evaluator James Fairweather Date of test 11-11-21

Additional Notes:

ESHWT 26” with many redox concentrations and depletions below 26”, standing water in hole at 72”. Small cobbles in B horizons, small angular, sub-angular boulders at 40” and below, nestled at bottom possible refusal.

SOIL TEST PIT LOG

Deep Observation Hole Number: TP-4 Ground elevation:139.7

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-16	A	10YR 3/2				SL			mass	fri	
16-22	B	10YR 5/6				SL		many	mass	fri	
22-36	BC	10YR 6/8	32”			SL & G			mass	fri	
36-80	C	2.5Y 5/4				SL & G		some	mass	fri	

Soil Evaluator James Fairweather Date of test 11-11-21

Additional Notes:

ESHWT 32” with many concentrations and few deletions below 32”, standing water in hole at 80”. Sub-angular, small boulders at 38” and below.

SOIL TEST PIT LOG

Deep Observation Hole Number: TP-5 Ground elevation:139.0

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color- Moist (Munsell)	Redoximorphic			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-10	A	10YR 3/3				SL			mass	fri	
10-20	B1	10YR 4/4				SL		many	mass	fri	
20-32	B2	10YR 5/6				SL		many	mass	fri	
32-80	C	2.5Y 4/4	36”			SL & G		many	mass	fri	

Soil Evaluator James Fairweather Date of test 11-11-21

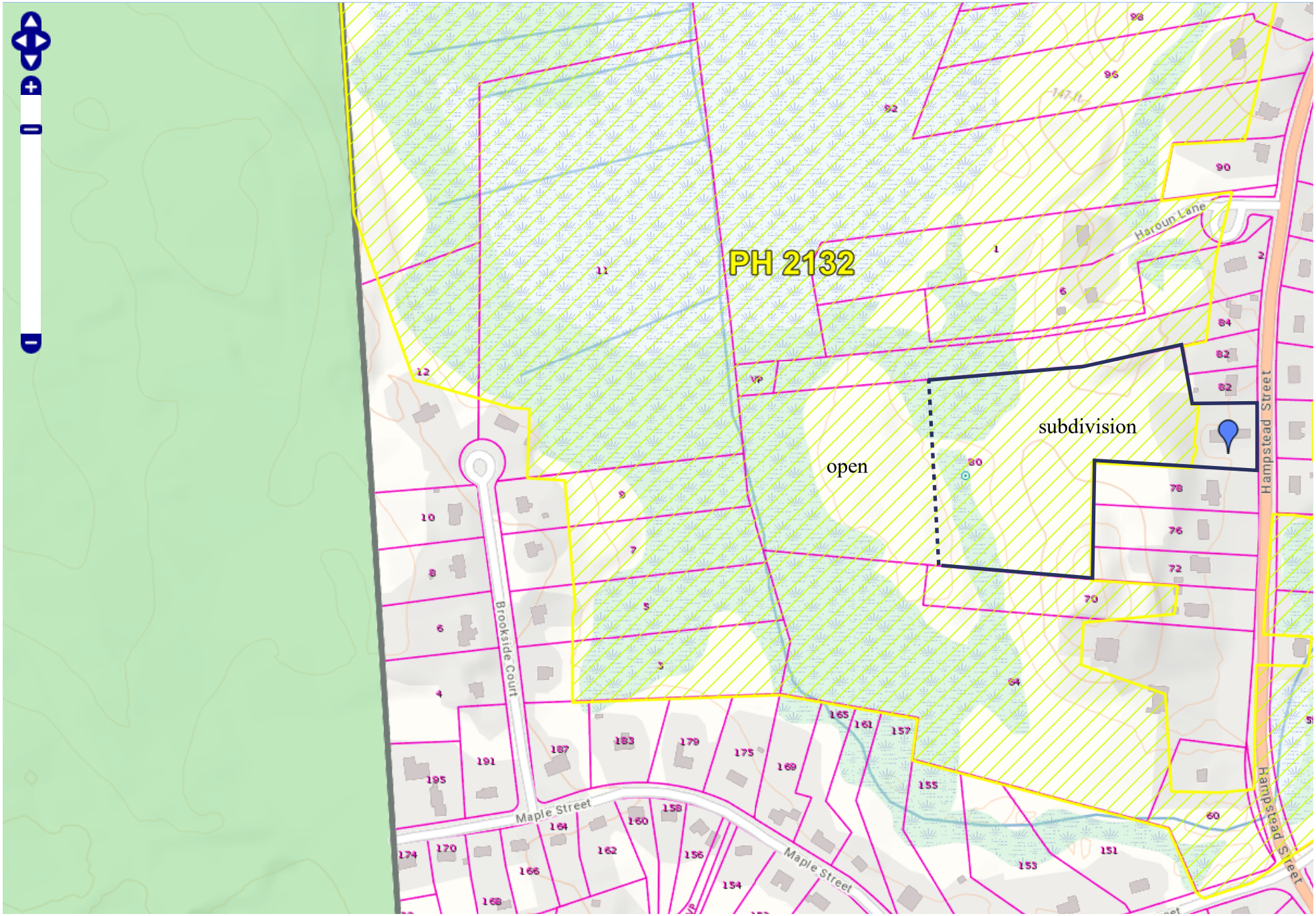
Additional Notes:

Fine roots to 36”. ESHWT 36” with many redox concentrations and deletions below 36”. No observed water in hole to 80”. Many cobbles and small boulders (sub-angular) below A horizon.

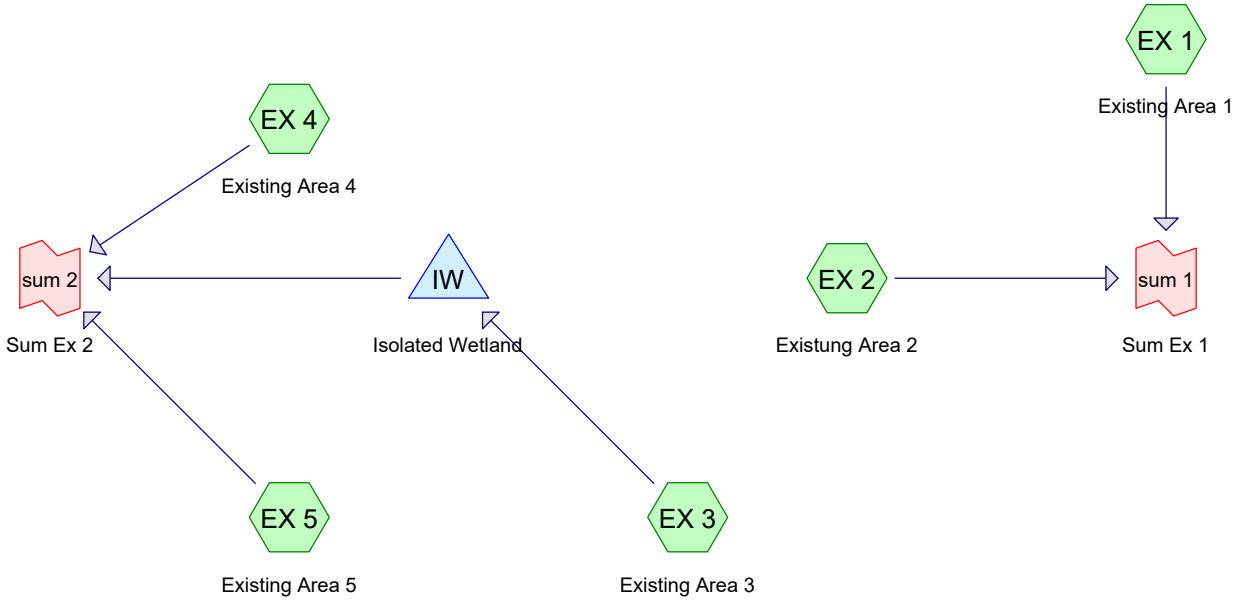
OLIVER: MassGIS's Online Mapping Tool

80 hampstead , 01844

Zoom to a town



HydroCAD Analysis: Existing Conditions



Subcat Reach Pond Link

Routing Diagram for 21-58 Existing
Prepared by Andover Consultants, Inc., Printed 5/9/2022

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
17,218	61	>75% Grass cover, Good, HSG B (EX 1, EX 2)
5,546	98	Impervious, HSG B (EX 1, EX 2)
213,169	55	Woods, Good, HSG B (EX 2, EX 3, EX 4, EX 5)
4,781	83	Woods, wetland, HSG D (EX 3)
5,784	58	Woods/grass comb., Good, HSG B (EX 1)
246,498	**57**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
241,717	HSG B	EX 1, EX 2, EX 3, EX 4, EX 5
0	HSG C	
4,781	HSG D	EX 3
0	Other	
246,498		**TOTAL AREA**

Summary for Subcatchment EX 1: Existing Area 1

Runoff = 0.2 cfs @ 12.10 hrs, Volume= 838 cf, Depth= 0.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

	Area (sf)	CN	Description
*	3,057	98	Impervious, HSG B
	5,784	58	Woods/grass comb., Good, HSG B
	5,516	61	>75% Grass cover, Good, HSG B
	14,357	68	Weighted Average
	11,300		78.71% Pervious Area
	3,057		21.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0260	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.5	92	0.0330	2.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.6	142	Total			

Summary for Subcatchment EX 2: Existung Area 2

Runoff = 0.2 cfs @ 12.39 hrs, Volume= 1,658 cf, Depth= 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

	Area (sf)	CN	Description
*	2,489	98	Impervious, HSG B
	11,702	61	>75% Grass cover, Good, HSG B
	47,893	55	Woods, Good, HSG B
	62,084	58	Weighted Average
	59,595		95.99% Pervious Area
	2,489		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	164	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.0	248	0.0160	2.04		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.7	462	Total			

Summary for Subcatchment EX 3: Existing Area 3

Runoff = 0.1 cfs @ 12.31 hrs, Volume= 1,067 cf, Depth= 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

	Area (sf)	CN	Description
	31,571	55	Woods, Good, HSG B
*	4,781	83	Woods, wetland, HSG D
	36,352	59	Weighted Average
	36,352		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.3	96	0.1400	6.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	146	Total			

Summary for Subcatchment EX 4: Existing Area 4

Runoff = 0.1 cfs @ 12.36 hrs, Volume= 1,058 cf, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

Area (sf)	CN	Description
54,404	55	Woods, Good, HSG B
54,404		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1050	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	136	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.9	186	Total			

Summary for Subcatchment EX 5: Existing Area 5

Runoff = 0.2 cfs @ 12.35 hrs, Volume= 1,543 cf, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

Area (sf)	CN	Description
79,301	55	Woods, Good, HSG B
79,301		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1400	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	69	0.1800	6.83		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	124	0.1200	5.58		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	243	Total			

Summary for Pond IW: Isolated Wetland

Inflow Area = 36,352 sf, 0.00% Impervious, Inflow Depth = 0.35" for 2-Yr event
Inflow = 0.1 cfs @ 12.31 hrs, Volume= 1,067 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 141.63' @ 24.66 hrs Surf.Area= 2,640 sf Storage= 1,067 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	141.20'	5,614 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)
141.20	2,288	230.0	0	0	2,288
142.00	2,958	273.0	2,093	2,093	4,021
143.00	4,116	346.0	3,521	5,614	7,630

Device	Routing	Invert	Outlet Devices
#1	Primary	142.50'	**16.0' long x 16.0' 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

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=141.20' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link sum 1: Sum Ex 1

Inflow Area = 76,441 sf, 7.26% Impervious, Inflow Depth = 0.39" for 2-Yr event
Inflow = 0.3 cfs @ 12.31 hrs, Volume= 2,495 cf
Primary = 0.3 cfs @ 12.31 hrs, Volume= 2,495 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Link sum 2: Sum Ex 2

Inflow Area = 170,057 sf, 0.00% Impervious, Inflow Depth = 0.18" for 2-Yr event
Inflow = 0.3 cfs @ 12.35 hrs, Volume= 2,601 cf
Primary = 0.3 cfs @ 12.35 hrs, Volume= 2,601 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Subcatchment EX 1: Existing Area 1

Runoff = 0.7 cfs @ 12.09 hrs, Volume= 2,215 cf, Depth= 1.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

	Area (sf)	CN	Description
*	3,057	98	Impervious, HSG B
	5,784	58	Woods/grass comb., Good, HSG B
	5,516	61	>75% Grass cover, Good, HSG B
	14,357	68	Weighted Average
	11,300		78.71% Pervious Area
	3,057		21.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0260	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.5	92	0.0330	2.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.6	142	Total			

Summary for Subcatchment EX 2: Existung Area 2

Runoff = 1.3 cfs @ 12.22 hrs, Volume= 5,933 cf, Depth= 1.15"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

	Area (sf)	CN	Description
*	2,489	98	Impervious, HSG B
	11,702	61	>75% Grass cover, Good, HSG B
	47,893	55	Woods, Good, HSG B
	62,084	58	Weighted Average
	59,595		95.99% Pervious Area
	2,489		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	164	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.0	248	0.0160	2.04		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.7	462	Total			

Summary for Subcatchment EX 3: Existing Area 3

Runoff = 0.9 cfs @ 12.18 hrs, Volume= 3,671 cf, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

	Area (sf)	CN	Description
	31,571	55	Woods, Good, HSG B
*	4,781	83	Woods, wetland, HSG D
	36,352	59	Weighted Average
	36,352		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.3	96	0.1400	6.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	146	Total			

Summary for Subcatchment EX 4: Existing Area 4

Runoff = 1.1 cfs @ 12.12 hrs, Volume= 4,353 cf, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

Area (sf)	CN	Description
54,404	55	Woods, Good, HSG B
54,404		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1050	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	136	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.9	186	Total			

Summary for Subcatchment EX 5: Existing Area 5

Runoff = 1.6 cfs @ 12.11 hrs, Volume= 6,345 cf, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

Area (sf)	CN	Description
79,301	55	Woods, Good, HSG B
79,301		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1400	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	69	0.1800	6.83		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	124	0.1200	5.58		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	243	Total			

Summary for Pond IW: Isolated Wetland

Inflow Area = 36,352 sf, 0.00% Impervious, Inflow Depth = 1.21" for 10-Yr event
Inflow = 0.9 cfs @ 12.18 hrs, Volume= 3,671 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 142.49' @ 24.66 hrs Surf.Area= 3,501 sf Storage= 3,671 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	141.20'	5,614 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)
141.20	2,288	230.0	0	0	2,288
142.00	2,958	273.0	2,093	2,093	4,021
143.00	4,116	346.0	3,521	5,614	7,630

Device	Routing	Invert	Outlet Devices
#1	Primary	142.50'	**16.0' long x 16.0' 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

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=141.20' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Link sum 1: Sum Ex 1

Inflow Area = 76,441 sf, 7.26% Impervious, Inflow Depth = 1.28" for 10-Yr event
Inflow = 1.7 cfs @ 12.19 hrs, Volume= 8,148 cf
Primary = 1.7 cfs @ 12.19 hrs, Volume= 8,148 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Link sum 2: Sum Ex 2

Inflow Area = 170,057 sf, 0.00% Impervious, Inflow Depth = 0.75" for 10-Yr event
Inflow = 2.7 cfs @ 12.12 hrs, Volume= 10,698 cf
Primary = 2.7 cfs @ 12.12 hrs, Volume= 10,698 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Subcatchment EX 1: Existing Area 1

Runoff = 1.0 cfs @ 12.09 hrs, Volume= 3,228 cf, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

	Area (sf)	CN	Description
*	3,057	98	Impervious, HSG B
	5,784	58	Woods/grass comb., Good, HSG B
	5,516	61	>75% Grass cover, Good, HSG B
	14,357	68	Weighted Average
	11,300		78.71% Pervious Area
	3,057		21.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0260	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.5	92	0.0330	2.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.6	142	Total			

Summary for Subcatchment EX 2: Existung Area 2

Runoff = 2.2 cfs @ 12.21 hrs, Volume= 9,413 cf, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

	Area (sf)	CN	Description
*	2,489	98	Impervious, HSG B
	11,702	61	>75% Grass cover, Good, HSG B
	47,893	55	Woods, Good, HSG B
	62,084	58	Weighted Average
	59,595		95.99% Pervious Area
	2,489		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	164	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.0	248	0.0160	2.04		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.7	462	Total			

Summary for Subcatchment EX 3: Existing Area 3

Runoff = 1.5 cfs @ 12.17 hrs, Volume= 5,764 cf, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

	Area (sf)	CN	Description
	31,571	55	Woods, Good, HSG B
*	4,781	83	Woods, wetland, HSG D
	36,352	59	Weighted Average
	36,352		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.3	96	0.1400	6.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	146	Total			

Summary for Subcatchment EX 4: Existing Area 4

Runoff = 2.0 cfs @ 12.11 hrs, Volume= 7,143 cf, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

Area (sf)	CN	Description
54,404	55	Woods, Good, HSG B
54,404		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1050	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	136	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.9	186	Total			

Summary for Subcatchment EX 5: Existing Area 5

Runoff = 3.0 cfs @ 12.11 hrs, Volume= 10,412 cf, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

Area (sf)	CN	Description
79,301	55	Woods, Good, HSG B
79,301		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1400	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	69	0.1800	6.83		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	124	0.1200	5.58		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	243	Total			

Summary for Pond IW: Isolated Wetland

Inflow Area = 36,352 sf, 0.00% Impervious, Inflow Depth = 1.90" for 25-Yr event
Inflow = 1.5 cfs @ 12.17 hrs, Volume= 5,764 cf
Outflow = 0.1 cfs @ 14.77 hrs, Volume= 2,056 cf, Atten= 91%, Lag= 155.9 min
Primary = 0.1 cfs @ 14.77 hrs, Volume= 2,056 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 142.52' @ 14.77 hrs Surf.Area= 3,537 sf Storage= 3,780 cf

Plug-Flow detention time= 360.3 min calculated for 2,055 cf (36% of inflow)
Center-of-Mass det. time= 219.6 min (1,088.9 - 869.4)

Volume	Invert	Avail.Storage	Storage Description
#1	141.20'	5,614 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)
141.20	2,288	230.0	0	0	2,288
142.00	2,958	273.0	2,093	2,093	4,021
143.00	4,116	346.0	3,521	5,614	7,630

Device	Routing	Invert	Outlet Devices
#1	Primary	142.50'	**16.0' long x 16.0' 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

Primary OutFlow Max=0.1 cfs @ 14.77 hrs HW=142.52' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.1 cfs @ 0.38 fps)

Summary for Link sum 1: Sum Ex 1

Inflow Area = 76,441 sf, 7.26% Impervious, Inflow Depth = 1.98" for 25-Yr event
Inflow = 2.8 cfs @ 12.17 hrs, Volume= 12,641 cf
Primary = 2.8 cfs @ 12.17 hrs, Volume= 12,641 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Link sum 2: Sum Ex 2

Inflow Area = 170,057 sf, 0.00% Impervious, Inflow Depth = 1.38" for 25-Yr event
Inflow = 4.9 cfs @ 12.11 hrs, Volume= 19,611 cf
Primary = 4.9 cfs @ 12.11 hrs, Volume= 19,611 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Subcatchment EX 1: Existing Area 1

Runoff = 1.6 cfs @ 12.08 hrs, Volume= 4,917 cf, Depth= 4.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

	Area (sf)	CN	Description
*	3,057	98	Impervious, HSG B
	5,784	58	Woods/grass comb., Good, HSG B
	5,516	61	>75% Grass cover, Good, HSG B
	14,357	68	Weighted Average
	11,300		78.71% Pervious Area
	3,057		21.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	50	0.0260	0.16		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.10"
0.5	92	0.0330	2.92		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
5.6	142	Total			

Summary for Subcatchment EX 2: Existung Area 2

Runoff = 3.8 cfs @ 12.20 hrs, Volume= 15,541 cf, Depth= 3.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

	Area (sf)	CN	Description
*	2,489	98	Impervious, HSG B
	11,702	61	>75% Grass cover, Good, HSG B
	47,893	55	Woods, Good, HSG B
	62,084	58	Weighted Average
	59,595		95.99% Pervious Area
	2,489		4.01% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	164	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
2.0	248	0.0160	2.04		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
13.7	462	Total			

Summary for Subcatchment EX 3: Existing Area 3

Runoff = 2.5 cfs @ 12.16 hrs, Volume= 9,428 cf, Depth= 3.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

	Area (sf)	CN	Description
	31,571	55	Woods, Good, HSG B
*	4,781	83	Woods, wetland, HSG D
	36,352	59	Weighted Average
	36,352		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.3	96	0.1400	6.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	146	Total			

Summary for Subcatchment EX 4: Existing Area 4

Runoff = 3.6 cfs @ 12.11 hrs, Volume= 12,160 cf, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

Area (sf)	CN	Description
54,404	55	Woods, Good, HSG B
54,404		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1050	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	136	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.9	186	Total			

Summary for Subcatchment EX 5: Existing Area 5

Runoff = 5.4 cfs @ 12.10 hrs, Volume= 17,724 cf, Depth= 2.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

Area (sf)	CN	Description
79,301	55	Woods, Good, HSG B
79,301		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1400	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	69	0.1800	6.83		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	124	0.1200	5.58		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	243	Total			

Summary for Pond IW: Isolated Wetland

Inflow Area = 36,352 sf, 0.00% Impervious, Inflow Depth = 3.11" for 100-Yr event
Inflow = 2.5 cfs @ 12.16 hrs, Volume= 9,428 cf
Outflow = 0.9 cfs @ 12.55 hrs, Volume= 5,720 cf, Atten= 63%, Lag= 23.0 min
Primary = 0.9 cfs @ 12.55 hrs, Volume= 5,720 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 142.58' @ 12.55 hrs Surf.Area= 3,603 sf Storage= 3,982 cf

Plug-Flow detention time= 209.1 min calculated for 5,720 cf (61% of inflow)
Center-of-Mass det. time= 93.8 min (948.2 - 854.3)

Volume	Invert	Avail.Storage	Storage Description
#1	141.20'	5,614 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)
141.20	2,288	230.0	0	0	2,288
142.00	2,958	273.0	2,093	2,093	4,021
143.00	4,116	346.0	3,521	5,614	7,630

Device	Routing	Invert	Outlet Devices
#1	Primary	142.50'	**16.0' long x 16.0' 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

Primary OutFlow Max=0.9 cfs @ 12.55 hrs HW=142.58' TW=0.00' (Dynamic Tailwater)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.9 cfs @ 0.74 fps)

Summary for Link sum 1: Sum Ex 1

Inflow Area = 76,441 sf, 7.26% Impervious, Inflow Depth = 3.21" for 100-Yr event
Inflow = 4.8 cfs @ 12.17 hrs, Volume= 20,458 cf
Primary = 4.8 cfs @ 12.17 hrs, Volume= 20,458 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Link sum 2: Sum Ex 2

Inflow Area = 170,057 sf, 0.00% Impervious, Inflow Depth = 2.51" for 100-Yr event
Inflow = 9.0 cfs @ 12.10 hrs, Volume= 35,603 cf
Primary = 9.0 cfs @ 12.10 hrs, Volume= 35,603 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

HydroCAD Analysis: Proposed Conditions

Subcat Reach Pond Link

Routing Diagram for 21-58 Developed
Prepared by Andover Consultants, Inc., Printed 5/9/2022

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
79,555	61	>75% Grass cover, Good, HSG B (DV 1, DV 2, DV 3, DV 4, DV 5, DV 6, DV 7, DV 7a, DV 8, DV 9)
1,362	96	Gravel surface, HSG B (DV 1, DV 3, DV 5, DV 7)
26,267	98	Impervious, HSG B (DV 1, DV 3, DV 5, DV 7)
2,760	98	Unconnected roofs, HSG B (DV 6, DV 7, DV 7a, DV 8, DV 9)
108,022	55	Woods, Good, HSG B (DV 3, DV 6, DV 7, DV 7a, DV 8, DV 9)
23,751	58	Woods/grass comb., Good, HSG B (DV 2, DV 5)
4,781	83	Woods/wetland, HSG D (DV 8)
246,498	**63**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
241,717	HSG B	DV 1, DV 2, DV 3, DV 4, DV 5, DV 6, DV 7, DV 7a, DV 8, DV 9
0	HSG C	
4,781	HSG D	DV 8
0	Other	
246,498		**TOTAL AREA**

Summary for Subcatchment DV 1: Area to Basin 1

Runoff = 0.3 cfs @ 12.09 hrs, Volume= 878 cf, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

	Area (sf)	CN	Description
*	3,515	98	Impervious, HSG B
	5,200	61	>75% Grass cover, Good, HSG B
	301	96	Gravel surface, HSG B
	9,016	77	Weighted Average
	5,501		61.01% Pervious Area
	3,515		38.99% Impervious Area

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

Summary for Subcatchment DV 2: Developed Area 2

Runoff = 0.0 cfs @ 12.13 hrs, Volume= 182 cf, Depth= 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

Area (sf)	CN	Description
2,042	58	Woods/grass comb., Good, HSG B
3,631	61	>75% Grass cover, Good, HSG B
5,673	60	Weighted Average
5,673		100.00% Pervious Area

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

Summary for Subcatchment DV 3: Area to Basin 2

Runoff = 0.2 cfs @ 12.11 hrs, Volume= 968 cf, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

	Area (sf)	CN	Description
*	2,596	98	Impervious, HSG B
	14,258	61	>75% Grass cover, Good, HSG B
	3,226	55	Woods, Good, HSG B
	246	96	Gravel surface, HSG B
	20,326	65	Weighted Average
	17,730		87.23% Pervious Area
	2,596		12.77% Impervious Area

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

Summary for Subcatchment DV 4: Developed Area 4

Runoff = 0.0 cfs @ 12.18 hrs, Volume= 139 cf, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

Area (sf)	CN	Description
3,157	61	>75% Grass cover, Good, HSG B
815	61	>75% Grass cover, Good, HSG B
3,972	61	Weighted Average
3,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0540	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	152	0.0260	2.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.4	202	Total			

Summary for Subcatchment DV 5: Area to Basin 3

Runoff = 0.3 cfs @ 12.20 hrs, Volume= 1,758 cf, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

	Area (sf)	CN	Description
*	3,741	98	Impervious, HSG B
	17,168	61	>75% Grass cover, Good, HSG B
	21,709	58	Woods/grass comb., Good, HSG B
	192	96	Gravel surface, HSG B
	42,810	63	Weighted Average
	39,069		91.26% Pervious Area
	3,741		8.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	87	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	19	0.3500	9.52		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.2	156	Total			

Summary for Subcatchment DV 6: Developed Area 6

Runoff = 0.1 cfs @ 12.33 hrs, Volume= 619 cf, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

Area (sf)	CN	Adj	Description
3,317	61		>75% Grass cover, Good, HSG B
552	98		Unconnected roofs, HSG B
24,594	55		Woods, Good, HSG B
28,463	57	56	Weighted Average, UI Adjusted
27,911			98.06% Pervious Area
552			1.94% Impervious Area
552			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1050	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	136	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.9	186	Total			

Summary for Subcatchment DV 7: Area to cul-de-sac drains

Runoff = 1.2 cfs @ 12.09 hrs, Volume= 3,951 cf, Depth= 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

	Area (sf)	CN	Description
*	16,415	98	Impervious, HSG B
	552	98	Unconnected roofs, HSG B
	862	55	Woods, Good, HSG B
	2,220	61	>75% Grass cover, Good, HSG B
	623	96	Gravel surface, HSG B
	20,672	92	Weighted Average
	3,705		17.92% Pervious Area
	16,967		82.08% Impervious Area
	552		3.25% Unconnected

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

Summary for Subcatchment DV 7a: Area to cul-de-sac swales

Runoff = 0.1 cfs @ 12.13 hrs, Volume= 632 cf, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

Area (sf)	CN	Adj	Description
16,141	61		>75% Grass cover, Good, HSG B
1,383	55		Woods, Good, HSG B
552	98		Unconnected roofs, HSG B
18,076	62	61	Weighted Average, UI Adjusted
17,524			96.95% Pervious Area
552			3.05% Impervious Area
552			100.00% Unconnected

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

Summary for Subcatchment DV 8: Developed Area 8

Runoff = 0.2 cfs @ 12.22 hrs, Volume= 1,113 cf, Depth= 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

	Area (sf)	CN	Description
	6,484	61	>75% Grass cover, Good, HSG B
	552	98	Unconnected roofs, HSG B
	19,992	55	Woods, Good, HSG B
*	4,781	83	Woods/wetland, HSG D
	31,809	61	Weighted Average
	31,257		98.26% Pervious Area
	552		1.74% Impervious Area
	552		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.3	96	0.1400	6.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	146	Total			

Summary for Subcatchment DV 9: Developed Area 9

Runoff = 0.2 cfs @ 12.33 hrs, Volume= 1,429 cf, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 2-Yr Rainfall=3.14"

Area (sf)	CN	Description
552	98	Unconnected roofs, HSG B
7,164	61	>75% Grass cover, Good, HSG B
57,965	55	Woods, Good, HSG B
65,681	56	Weighted Average
65,129		99.16% Pervious Area
552		0.84% Impervious Area
552		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1400	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	69	0.1800	6.83		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	124	0.1200	5.58		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	243	Total			

Summary for Pond 1P: Basin 1

Inflow Area = 9,016 sf, 38.99% Impervious, Inflow Depth = 1.17" for 2-Yr event
Inflow = 0.3 cfs @ 12.09 hrs, Volume= 878 cf
Outflow = 0.0 cfs @ 14.69 hrs, Volume= 878 cf, Atten= 93%, Lag= 155.5 min
Discarded = 0.0 cfs @ 14.69 hrs, Volume= 878 cf
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 137.44' @ 14.69 hrs Surf.Area= 1,069 sf Storage= 422 cf

Plug-Flow detention time= 279.8 min calculated for 878 cf (100% of inflow)
Center-of-Mass det. time= 279.8 min (1,133.3 - 853.5)

Volume	Invert	Avail.Storage	Storage Description
#1	137.00'	1,099 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.00	854	0	0
138.00	1,344	1,099	1,099

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.00'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 136.00' Phase-In= 0.01'
#2	Primary	137.50'	**6.0' long x 8.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.45 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.65 2.66 2.67 2.69 2.71

Discarded OutFlow Max=0.0 cfs @ 14.69 hrs HW=137.44' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=137.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 2P: Basin 2

Inflow Area = 20,326 sf, 12.77% Impervious, Inflow Depth = 0.57" for 2-Yr event
Inflow = 0.2 cfs @ 12.11 hrs, Volume= 968 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 139.27' @ 24.36 hrs Surf.Area= 3,655 sf Storage= 968 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	14,704 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	3,390	0	0
140.00	4,355	3,873	3,873
141.00	5,398	4,877	8,749
142.00	6,511	5,955	14,704

Summary for Pond 3P: Basin 3

Inflow Area = 42,810 sf, 8.74% Impervious, Inflow Depth = 0.49" for 2-Yr event
Inflow = 0.3 cfs @ 12.20 hrs, Volume= 1,758 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 140.41' @ 24.66 hrs Surf.Area= 4,522 sf Storage= 1,758 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	18,084 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	3,972	0	0
141.00	5,302	4,637	4,637
142.00	6,706	6,004	10,641
143.00	8,179	7,443	18,084

Summary for Pond 7Pa: subsurface chambers

Inflow Area = 20,672 sf, 82.08% Impervious, Inflow Depth = 2.29" for 2-Yr event
Inflow = 1.2 cfs @ 12.09 hrs, Volume= 3,951 cf
Outflow = 0.2 cfs @ 12.55 hrs, Volume= 3,949 cf, Atten= 83%, Lag= 27.9 min
Primary = 0.2 cfs @ 12.55 hrs, Volume= 3,949 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Starting Elev= 140.50' Surf.Area= 1,568 sf Storage= 280 cf
Peak Elev= 141.59' @ 12.55 hrs Surf.Area= 1,568 sf Storage= 1,802 cf (1,522 cf above start)
Flood Elev= 143.30' Surf.Area= 1,568 sf Storage= 4,200 cf (3,920 cf above start)

Plug-Flow detention time= 151.0 min calculated for 3,668 cf (93% of inflow)
Center-of-Mass det. time= 92.6 min (891.0 - 798.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.30'	0 cf	**16.00'W x 42.00'L x 3.67'H Field A** 2,466 cf Overall - 2,466 cf Embedded = 0 cf x 40.0% Voids
#2A	140.30'	1,800 cf	**Shea Leaching Chamber 8x14x3.7**x 6 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 6 Chambers in 2 Rows
#3B	140.30'	0 cf	**8.00'W x 56.00'L x 3.67'H Field B** 1,644 cf Overall - 1,644 cf Embedded = 0 cf x 40.0% Voids
#4B	140.30'	1,200 cf	**Shea Leaching Chamber 8x14x3.7**x 4 Inside #3 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf
#5C	140.30'	0 cf	**8.00'W x 56.00'L x 3.67'H Field C** 1,644 cf Overall - 1,644 cf Embedded = 0 cf x 40.0% Voids
#6C	140.30'	1,200 cf	**Shea Leaching Chamber 8x14x3.7**x 4 Inside #5 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf
		4,200 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	140.50'	**10.0" Round Culvert** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 140.50' / 140.40' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf
#2	Device 1	140.50'	**1.0" Vert. Orifice/Grate X 8.00** C= 0.600
#3	Device 1	141.80'	**2.0" Vert. Orifice/Grate X 6.00** C= 0.600
#4	Device 1	142.80'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.2 cfs @ 12.55 hrs HW=141.59' (Free Discharge)
└**1=Culvert** (Passes 0.2 cfs of 1.9 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.2 cfs @ 4.92 fps)
  ├**3=Orifice/Grate** (Controls 0.0 cfs)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 7Pb: swales

Inflow Area = 18,076 sf, 3.05% Impervious, Inflow Depth = 0.42" for 2-Yr event
Inflow = 0.1 cfs @ 12.13 hrs, Volume= 632 cf
Outflow = 0.0 cfs @ 12.59 hrs, Volume= 632 cf, Atten= 67%, Lag= 28.1 min
Discarded = 0.0 cfs @ 12.59 hrs, Volume= 632 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 143.06' @ 12.59 hrs Surf.Area= 1,739 sf Storage= 97 cf

Plug-Flow detention time= 16.5 min calculated for 632 cf (100% of inflow)
Center-of-Mass det. time= 16.5 min (933.8 - 917.3)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,890 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	1,587	0	0
144.00	4,193	2,890	2,890

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.00'	**1.020 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'

Discarded OutFlow Max=0.0 cfs @ 12.59 hrs HW=143.06' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.0 cfs)

Summary for Pond IW: Isolated Wetland

Inflow Area = 31,809 sf, 1.74% Impervious, Inflow Depth = 0.42" for 2-Yr event
Inflow = 0.2 cfs @ 12.22 hrs, Volume= 1,113 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 141.65' @ 24.66 hrs Surf.Area= 2,655 sf Storage= 1,112 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	141.20'	10,937 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)
141.20	2,288	230.0	0	0	2,288
142.00	2,958	273.0	2,093	2,093	4,021
143.00	4,116	346.0	3,521	5,614	7,630
144.00	6,630	405.0	5,323	10,937	11,176

Device	Routing	Invert	Outlet Devices
#1	Primary	142.55'	**15.0" Round Culvert** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.55' / 140.60' S= 0.0361 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=141.20' (Free Discharge)
↑—**1=Culvert** (Controls 0.0 cfs)

Summary for Link SUM 1: Sum 1 (Hampstead St)

Inflow Area = 18,661 sf, 18.84% Impervious, Inflow Depth = 0.21" for 2-Yr event
Inflow = 0.1 cfs @ 12.15 hrs, Volume= 321 cf
Primary = 0.1 cfs @ 12.15 hrs, Volume= 321 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Link SUM 2: Sum 2 (wetland)

Inflow Area = 164,701 sf, 11.64% Impervious, Inflow Depth > 0.44" for 2-Yr event
Inflow = 0.4 cfs @ 12.34 hrs, Volume= 5,997 cf
Primary = 0.4 cfs @ 12.34 hrs, Volume= 5,997 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Subcatchment DV 1: Area to Basin 1

Runoff = 0.6 cfs @ 12.09 hrs, Volume= 1,946 cf, Depth= 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

	Area (sf)	CN	Description
*	3,515	98	Impervious, HSG B
	5,200	61	>75% Grass cover, Good, HSG B
	301	96	Gravel surface, HSG B
	9,016	77	Weighted Average
	5,501		61.01% Pervious Area
	3,515		38.99% Impervious Area

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

Summary for Subcatchment DV 2: Developed Area 2

Runoff = 0.2 cfs @ 12.10 hrs, Volume= 604 cf, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

Area (sf)	CN	Description
2,042	58	Woods/grass comb., Good, HSG B
3,631	61	>75% Grass cover, Good, HSG B
5,673	60	Weighted Average
5,673		100.00% Pervious Area

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

Summary for Subcatchment DV 3: Area to Basin 2

Runoff = 0.8 cfs @ 12.10 hrs, Volume= 2,756 cf, Depth= 1.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

	Area (sf)	CN	Description
*	2,596	98	Impervious, HSG B
	14,258	61	>75% Grass cover, Good, HSG B
	3,226	55	Woods, Good, HSG B
	246	96	Gravel surface, HSG B
	20,326	65	Weighted Average
	17,730		87.23% Pervious Area
	2,596		12.77% Impervious Area

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

Summary for Subcatchment DV 4: Developed Area 4

Runoff = 0.1 cfs @ 12.15 hrs, Volume= 445 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

Area (sf)	CN	Description
3,157	61	>75% Grass cover, Good, HSG B
815	61	>75% Grass cover, Good, HSG B
3,972	61	Weighted Average
3,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0540	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	152	0.0260	2.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.4	202	Total			

Summary for Subcatchment DV 5: Area to Basin 3

Runoff = 1.3 cfs @ 12.17 hrs, Volume= 5,293 cf, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

	Area (sf)	CN	Description
*	3,741	98	Impervious, HSG B
	17,168	61	>75% Grass cover, Good, HSG B
	21,709	58	Woods/grass comb., Good, HSG B
	192	96	Gravel surface, HSG B
	42,810	63	Weighted Average
	39,069		91.26% Pervious Area
	3,741		8.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	87	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	19	0.3500	9.52		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.2	156	Total			

Summary for Subcatchment DV 6: Developed Area 6

Runoff = 0.6 cfs @ 12.12 hrs, Volume= 2,422 cf, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

Area (sf)	CN	Adj	Description
3,317	61		>75% Grass cover, Good, HSG B
552	98		Unconnected roofs, HSG B
24,594	55		Woods, Good, HSG B
28,463	57	56	Weighted Average, UI Adjusted
27,911			98.06% Pervious Area
552			1.94% Impervious Area
552			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1050	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	136	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.9	186	Total			

Summary for Subcatchment DV 7: Area to cul-de-sac drains

Runoff = 2.1 cfs @ 12.08 hrs, Volume= 6,977 cf, Depth= 4.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

	Area (sf)	CN	Description
*	16,415	98	Impervious, HSG B
	552	98	Unconnected roofs, HSG B
	862	55	Woods, Good, HSG B
	2,220	61	>75% Grass cover, Good, HSG B
	623	96	Gravel surface, HSG B
	20,672	92	Weighted Average
	3,705		17.92% Pervious Area
	16,967		82.08% Impervious Area
	552		3.25% Unconnected

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

Summary for Subcatchment DV 7a: Area to cul-de-sac swales

Runoff = 0.6 cfs @ 12.10 hrs, Volume= 2,026 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

Area (sf)	CN	Adj	Description
16,141	61		>75% Grass cover, Good, HSG B
1,383	55		Woods, Good, HSG B
552	98		Unconnected roofs, HSG B
18,076	62	61	Weighted Average, UI Adjusted
17,524			96.95% Pervious Area
552			3.05% Impervious Area
552			100.00% Unconnected

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

Summary for Subcatchment DV 8: Developed Area 8

Runoff = 0.9 cfs @ 12.17 hrs, Volume= 3,566 cf, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

	Area (sf)	CN	Description
	6,484	61	>75% Grass cover, Good, HSG B
	552	98	Unconnected roofs, HSG B
	19,992	55	Woods, Good, HSG B
*	4,781	83	Woods/wetland, HSG D
	31,809	61	Weighted Average
	31,257		98.26% Pervious Area
	552		1.74% Impervious Area
	552		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.3	96	0.1400	6.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	146	Total			

Summary for Subcatchment DV 9: Developed Area 9

Runoff = 1.5 cfs @ 12.11 hrs, Volume= 5,589 cf, Depth= 1.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 10-Yr Rainfall=4.96"

Area (sf)	CN	Description
552	98	Unconnected roofs, HSG B
7,164	61	>75% Grass cover, Good, HSG B
57,965	55	Woods, Good, HSG B
65,681	56	Weighted Average
65,129		99.16% Pervious Area
552		0.84% Impervious Area
552		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1400	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	69	0.1800	6.83		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	124	0.1200	5.58		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	243	Total			

Summary for Pond 1P: Basin 1

Inflow Area = 9,016 sf, 38.99% Impervious, Inflow Depth = 2.59" for 10-Yr event
Inflow = 0.6 cfs @ 12.09 hrs, Volume= 1,946 cf
Outflow = 0.4 cfs @ 12.22 hrs, Volume= 1,946 cf, Atten= 44%, Lag= 7.8 min
Discarded = 0.0 cfs @ 12.22 hrs, Volume= 1,214 cf
Primary = 0.3 cfs @ 12.22 hrs, Volume= 732 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 137.58' @ 12.22 hrs Surf.Area= 1,138 sf Storage= 577 cf

Plug-Flow detention time= 202.5 min calculated for 1,945 cf (100% of inflow)
Center-of-Mass det. time= 202.7 min (1,032.8 - 830.1)

Volume	Invert	Avail.Storage	Storage Description
#1	137.00'	1,099 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.00	854	0	0
138.00	1,344	1,099	1,099

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.00'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 136.00' Phase-In= 0.01'
#2	Primary	137.50'	**6.0' long x 8.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.45 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.65 2.66 2.67 2.69 2.71

Discarded OutFlow Max=0.0 cfs @ 12.22 hrs HW=137.58' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=0.3 cfs @ 12.22 hrs HW=137.58' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.3 cfs @ 0.69 fps)

Summary for Pond 2P: Basin 2

Inflow Area = 20,326 sf, 12.77% Impervious, Inflow Depth = 1.63" for 10-Yr event
Inflow = 0.8 cfs @ 12.10 hrs, Volume= 2,756 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 139.74' @ 24.36 hrs Surf.Area= 4,100 sf Storage= 2,756 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	14,704 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	3,390	0	0
140.00	4,355	3,873	3,873
141.00	5,398	4,877	8,749
142.00	6,511	5,955	14,704

Summary for Pond 3P: Basin 3

Inflow Area = 42,810 sf, 8.74% Impervious, Inflow Depth = 1.48" for 10-Yr event
Inflow = 1.3 cfs @ 12.17 hrs, Volume= 5,293 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 141.12' @ 24.66 hrs Surf.Area= 5,473 sf Storage= 5,293 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	18,084 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	3,972	0	0
141.00	5,302	4,637	4,637
142.00	6,706	6,004	10,641
143.00	8,179	7,443	18,084

Summary for Pond 7Pa: subsurface chambers

Inflow Area = 20,672 sf, 82.08% Impervious, Inflow Depth = 4.05" for 10-Yr event
Inflow = 2.1 cfs @ 12.08 hrs, Volume= 6,977 cf
Outflow = 0.6 cfs @ 12.40 hrs, Volume= 6,975 cf, Atten= 70%, Lag= 19.1 min
Primary = 0.6 cfs @ 12.40 hrs, Volume= 6,975 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Starting Elev= 140.50' Surf.Area= 1,568 sf Storage= 280 cf
Peak Elev= 142.23' @ 12.40 hrs Surf.Area= 1,568 sf Storage= 2,708 cf (2,428 cf above start)
Flood Elev= 143.30' Surf.Area= 1,568 sf Storage= 4,200 cf (3,920 cf above start)

Plug-Flow detention time= 126.1 min calculated for 6,695 cf (96% of inflow)
Center-of-Mass det. time= 87.1 min (870.0 - 783.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.30'	0 cf	**16.00'W x 42.00'L x 3.67'H Field A** 2,466 cf Overall - 2,466 cf Embedded = 0 cf x 40.0% Voids
#2A	140.30'	1,800 cf	**Shea Leaching Chamber 8x14x3.7**x 6 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 6 Chambers in 2 Rows
#3B	140.30'	0 cf	**8.00'W x 56.00'L x 3.67'H Field B** 1,644 cf Overall - 1,644 cf Embedded = 0 cf x 40.0% Voids
#4B	140.30'	1,200 cf	**Shea Leaching Chamber 8x14x3.7**x 4 Inside #3 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf
#5C	140.30'	0 cf	**8.00'W x 56.00'L x 3.67'H Field C** 1,644 cf Overall - 1,644 cf Embedded = 0 cf x 40.0% Voids
#6C	140.30'	1,200 cf	**Shea Leaching Chamber 8x14x3.7**x 4 Inside #5 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf
		4,200 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	140.50'	**10.0" Round Culvert** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 140.50' / 140.40' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf
#2	Device 1	140.50'	**1.0" Vert. Orifice/Grate X 8.00** C= 0.600
#3	Device 1	141.80'	**2.0" Vert. Orifice/Grate X 6.00** C= 0.600
#4	Device 1	142.80'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.6 cfs @ 12.40 hrs HW=142.23' (Free Discharge)
└─**1=Culvert** (Passes 0.6 cfs of 3.0 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.3 cfs @ 6.26 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.4 cfs @ 2.85 fps)
  └─**4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 7Pb: swales

Inflow Area = 18,076 sf, 3.05% Impervious, Inflow Depth = 1.35" for 10-Yr event
Inflow = 0.6 cfs @ 12.10 hrs, Volume= 2,026 cf
Outflow = 0.1 cfs @ 13.72 hrs, Volume= 2,026 cf, Atten= 90%, Lag= 97.0 min
Discarded = 0.1 cfs @ 13.72 hrs, Volume= 2,026 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 143.37' @ 13.72 hrs Surf.Area= 2,548 sf Storage= 762 cf

Plug-Flow detention time= 138.8 min calculated for 2,025 cf (100% of inflow)
Center-of-Mass det. time= 138.8 min (1,011.7 - 872.9)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,890 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	1,587	0	0
144.00	4,193	2,890	2,890

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.00'	**1.020 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'

Discarded OutFlow Max=0.1 cfs @ 13.72 hrs HW=143.37' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Summary for Pond IW: Isolated Wetland

Inflow Area = 31,809 sf, 1.74% Impervious, Inflow Depth = 1.35" for 10-Yr event
Inflow = 0.9 cfs @ 12.17 hrs, Volume= 3,566 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min
Primary = 0.0 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 142.46' @ 24.66 hrs Surf.Area= 3,466 sf Storage= 3,566 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	141.20'	10,937 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)
141.20	2,288	230.0	0	0	2,288
142.00	2,958	273.0	2,093	2,093	4,021
143.00	4,116	346.0	3,521	5,614	7,630
144.00	6,630	405.0	5,323	10,937	11,176

Device	Routing	Invert	Outlet Devices
#1	Primary	142.55'	**15.0" Round Culvert** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.55' / 140.60' S= 0.0361 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.0 cfs @ 0.00 hrs HW=141.20' (Free Discharge)
↑—**1=Culvert** (Controls 0.0 cfs)

Summary for Link SUM 1: Sum 1 (Hampstead St)

Inflow Area = 18,661 sf, 18.84% Impervious, Inflow Depth = 1.15" for 10-Yr event
Inflow = 0.5 cfs @ 12.20 hrs, Volume= 1,781 cf
Primary = 0.5 cfs @ 12.20 hrs, Volume= 1,781 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Link SUM 2: Sum 2 (wetland)

Inflow Area = 164,701 sf, 11.64% Impervious, Inflow Depth = 1.09" for 10-Yr event
Inflow = 2.4 cfs @ 12.14 hrs, Volume= 14,986 cf
Primary = 2.4 cfs @ 12.14 hrs, Volume= 14,986 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Subcatchment DV 1: Area to Basin 1

Runoff = 0.9 cfs @ 12.09 hrs, Volume= 2,680 cf, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

	Area (sf)	CN	Description
*	3,515	98	Impervious, HSG B
	5,200	61	>75% Grass cover, Good, HSG B
	301	96	Gravel surface, HSG B
	9,016	77	Weighted Average
	5,501		61.01% Pervious Area
	3,515		38.99% Impervious Area

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

Summary for Subcatchment DV 2: Developed Area 2

Runoff = 0.3 cfs @ 12.10 hrs, Volume= 939 cf, Depth= 1.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

Area (sf)	CN	Description
2,042	58	Woods/grass comb., Good, HSG B
3,631	61	>75% Grass cover, Good, HSG B
5,673	60	Weighted Average
5,673		100.00% Pervious Area

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

Summary for Subcatchment DV 3: Area to Basin 2

Runoff = 1.3 cfs @ 12.09 hrs, Volume= 4,106 cf, Depth= 2.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

	Area (sf)	CN	Description
*	2,596	98	Impervious, HSG B
	14,258	61	>75% Grass cover, Good, HSG B
	3,226	55	Woods, Good, HSG B
	246	96	Gravel surface, HSG B
	20,326	65	Weighted Average
	17,730		87.23% Pervious Area
	2,596		12.77% Impervious Area

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

Summary for Subcatchment DV 4: Developed Area 4

Runoff = 0.2 cfs @ 12.14 hrs, Volume= 686 cf, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

Area (sf)	CN	Description
3,157	61	>75% Grass cover, Good, HSG B
815	61	>75% Grass cover, Good, HSG B
3,972	61	Weighted Average
3,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0540	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	152	0.0260	2.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.4	202	Total			

Summary for Subcatchment DV 5: Area to Basin 3

Runoff = 2.1 cfs @ 12.16 hrs, Volume= 8,015 cf, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

	Area (sf)	CN	Description
*	3,741	98	Impervious, HSG B
	17,168	61	>75% Grass cover, Good, HSG B
	21,709	58	Woods/grass comb., Good, HSG B
	192	96	Gravel surface, HSG B
	42,810	63	Weighted Average
	39,069		91.26% Pervious Area
	3,741		8.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	87	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	19	0.3500	9.52		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.2	156	Total			

Summary for Subcatchment DV 6: Developed Area 6

Runoff = 1.1 cfs @ 12.11 hrs, Volume= 3,927 cf, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

Area (sf)	CN	Adj	Description
3,317	61		>75% Grass cover, Good, HSG B
552	98		Unconnected roofs, HSG B
24,594	55		Woods, Good, HSG B
28,463	57	56	Weighted Average, UI Adjusted
27,911			98.06% Pervious Area
552			1.94% Impervious Area
552			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1050	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	136	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.9	186	Total			

Summary for Subcatchment DV 7: Area to cul-de-sac drains

Runoff = 2.7 cfs @ 12.08 hrs, Volume= 8,902 cf, Depth= 5.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

	Area (sf)	CN	Description
*	16,415	98	Impervious, HSG B
	552	98	Unconnected roofs, HSG B
	862	55	Woods, Good, HSG B
	2,220	61	>75% Grass cover, Good, HSG B
	623	96	Gravel surface, HSG B
	20,672	92	Weighted Average
	3,705		17.92% Pervious Area
	16,967		82.08% Impervious Area
	552		3.25% Unconnected

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

Summary for Subcatchment DV 7a: Area to cul-de-sac swales

Runoff = 1.0 cfs @ 12.10 hrs, Volume= 3,122 cf, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

Area (sf)	CN	Adj	Description
16,141	61		>75% Grass cover, Good, HSG B
1,383	55		Woods, Good, HSG B
552	98		Unconnected roofs, HSG B
18,076	62	61	Weighted Average, UI Adjusted
17,524			96.95% Pervious Area
552			3.05% Impervious Area
552			100.00% Unconnected

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

Summary for Subcatchment DV 8: Developed Area 8

Runoff = 1.4 cfs @ 12.17 hrs, Volume= 5,494 cf, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

	Area (sf)	CN	Description
	6,484	61	>75% Grass cover, Good, HSG B
	552	98	Unconnected roofs, HSG B
	19,992	55	Woods, Good, HSG B
*	4,781	83	Woods/wetland, HSG D
	31,809	61	Weighted Average
	31,257		98.26% Pervious Area
	552		1.74% Impervious Area
	552		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.3	96	0.1400	6.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	146	Total			

Summary for Subcatchment DV 9: Developed Area 9

Runoff = 2.6 cfs @ 12.10 hrs, Volume= 9,063 cf, Depth= 1.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 25-Yr Rainfall=6.10"

Area (sf)	CN	Description
552	98	Unconnected roofs, HSG B
7,164	61	>75% Grass cover, Good, HSG B
57,965	55	Woods, Good, HSG B
65,681	56	Weighted Average
65,129		99.16% Pervious Area
552		0.84% Impervious Area
552		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1400	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	69	0.1800	6.83		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	124	0.1200	5.58		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	243	Total			

Summary for Pond 1P: Basin 1

Inflow Area = 9,016 sf, 38.99% Impervious, Inflow Depth = 3.57" for 25-Yr event
Inflow = 0.9 cfs @ 12.09 hrs, Volume= 2,680 cf
Outflow = 0.7 cfs @ 12.14 hrs, Volume= 2,680 cf, Atten= 15%, Lag= 3.1 min
Discarded = 0.0 cfs @ 12.14 hrs, Volume= 1,332 cf
Primary = 0.7 cfs @ 12.14 hrs, Volume= 1,347 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 137.63' @ 12.14 hrs Surf.Area= 1,164 sf Storage= 639 cf

Plug-Flow detention time= 164.8 min calculated for 2,679 cf (100% of inflow)
Center-of-Mass det. time= 164.9 min (985.8 - 820.9)

Volume	Invert	Avail.Storage	Storage Description
#1	137.00'	1,099 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.00	854	0	0
138.00	1,344	1,099	1,099

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.00'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 136.00' Phase-In= 0.01'
#2	Primary	137.50'	**6.0' long x 8.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.45 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.65 2.66 2.67 2.69 2.71

Discarded OutFlow Max=0.0 cfs @ 12.14 hrs HW=137.63' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=0.7 cfs @ 12.14 hrs HW=137.63' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Weir Controls 0.7 cfs @ 0.89 fps)

Summary for Pond 2P: Basin 2

Inflow Area = 20,326 sf, 12.77% Impervious, Inflow Depth = 2.42" for 25-Yr event
Inflow = 1.3 cfs @ 12.09 hrs, Volume= 4,106 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 140.05' @ 24.36 hrs Surf.Area= 4,411 sf Storage= 4,106 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	14,704 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	3,390	0	0
140.00	4,355	3,873	3,873
141.00	5,398	4,877	8,749
142.00	6,511	5,955	14,704

Summary for Pond 3P: Basin 3

Inflow Area = 42,810 sf, 8.74% Impervious, Inflow Depth = 2.25" for 25-Yr event
Inflow = 2.1 cfs @ 12.16 hrs, Volume= 8,015 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 141.59' @ 24.66 hrs Surf.Area= 6,132 sf Storage= 8,015 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	18,084 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	3,972	0	0
141.00	5,302	4,637	4,637
142.00	6,706	6,004	10,641
143.00	8,179	7,443	18,084

Summary for Pond 7Pa: subsurface chambers

Inflow Area = 20,672 sf, 82.08% Impervious, Inflow Depth = 5.17" for 25-Yr event
Inflow = 2.7 cfs @ 12.08 hrs, Volume= 8,902 cf
Outflow = 0.9 cfs @ 12.38 hrs, Volume= 8,900 cf, Atten= 68%, Lag= 18.0 min
Primary = 0.9 cfs @ 12.38 hrs, Volume= 8,900 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Starting Elev= 140.50' Surf.Area= 1,568 sf Storage= 280 cf
Peak Elev= 142.65' @ 12.38 hrs Surf.Area= 1,568 sf Storage= 3,283 cf (3,003 cf above start)
Flood Elev= 143.30' Surf.Area= 1,568 sf Storage= 4,200 cf (3,920 cf above start)

Plug-Flow detention time= 114.0 min calculated for 8,617 cf (97% of inflow)
Center-of-Mass det. time= 82.1 min (858.8 - 776.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.30'	0 cf	**16.00'W x 42.00'L x 3.67'H Field A** 2,466 cf Overall - 2,466 cf Embedded = 0 cf x 40.0% Voids
#2A	140.30'	1,800 cf	**Shea Leaching Chamber 8x14x3.7**x 6 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 6 Chambers in 2 Rows
#3B	140.30'	0 cf	**8.00'W x 56.00'L x 3.67'H Field B** 1,644 cf Overall - 1,644 cf Embedded = 0 cf x 40.0% Voids
#4B	140.30'	1,200 cf	**Shea Leaching Chamber 8x14x3.7**x 4 Inside #3 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf
#5C	140.30'	0 cf	**8.00'W x 56.00'L x 3.67'H Field C** 1,644 cf Overall - 1,644 cf Embedded = 0 cf x 40.0% Voids
#6C	140.30'	1,200 cf	**Shea Leaching Chamber 8x14x3.7**x 4 Inside #5 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf
		4,200 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	140.50'	**10.0" Round Culvert** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 140.50' / 140.40' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf
#2	Device 1	140.50'	**1.0" Vert. Orifice/Grate X 8.00** C= 0.600
#3	Device 1	141.80'	**2.0" Vert. Orifice/Grate X 6.00** C= 0.600
#4	Device 1	142.80'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.9 cfs @ 12.38 hrs HW=142.65' (Free Discharge)
└**1=Culvert** (Passes 0.9 cfs of 3.5 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.3 cfs @ 6.98 fps)
  ├**3=Orifice/Grate** (Orifice Controls 0.6 cfs @ 4.20 fps)
  └**4=Orifice/Grate** (Controls 0.0 cfs)

Summary for Pond 7Pb: swales

Inflow Area = 18,076 sf, 3.05% Impervious, Inflow Depth = 2.07" for 25-Yr event
Inflow = 1.0 cfs @ 12.10 hrs, Volume= 3,122 cf
Outflow = 0.1 cfs @ 14.16 hrs, Volume= 3,122 cf, Atten= 92%, Lag= 123.9 min
Discarded = 0.1 cfs @ 14.16 hrs, Volume= 3,122 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 143.59' @ 14.16 hrs Surf.Area= 3,119 sf Storage= 1,383 cf

Plug-Flow detention time= 221.2 min calculated for 3,121 cf (100% of inflow)
Center-of-Mass det. time= 221.1 min (1,080.3 - 859.2)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,890 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	1,587	0	0
144.00	4,193	2,890	2,890

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.00'	**1.020 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'

Discarded OutFlow Max=0.1 cfs @ 14.16 hrs HW=143.59' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Summary for Pond IW: Isolated Wetland

Inflow Area = 31,809 sf, 1.74% Impervious, Inflow Depth = 2.07" for 25-Yr event
Inflow = 1.4 cfs @ 12.17 hrs, Volume= 5,494 cf
Outflow = 0.1 cfs @ 17.66 hrs, Volume= 1,589 cf, Atten= 96%, Lag= 329.8 min
Primary = 0.1 cfs @ 17.66 hrs, Volume= 1,589 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 142.67' @ 17.66 hrs Surf.Area= 3,709 sf Storage= 4,310 cf

Plug-Flow detention time= 559.1 min calculated for 1,589 cf (29% of inflow)
Center-of-Mass det. time= 417.9 min (1,282.0 - 864.1)

Volume	Invert	Avail.Storage	Storage Description
#1	141.20'	10,937 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)
141.20	2,288	230.0	0	0	2,288
142.00	2,958	273.0	2,093	2,093	4,021
143.00	4,116	346.0	3,521	5,614	7,630
144.00	6,630	405.0	5,323	10,937	11,176

Device	Routing	Invert	Outlet Devices
#1	Primary	142.55'	**15.0" Round Culvert** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.55' / 140.60' S= 0.0361 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.1 cfs @ 17.66 hrs HW=142.67' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.1 cfs @ 0.92 fps)

Summary for Link SUM 1: Sum 1 (Hampstead St)

Inflow Area = 18,661 sf, 18.84% Impervious, Inflow Depth = 1.91" for 25-Yr event
Inflow = 1.2 cfs @ 12.13 hrs, Volume= 2,973 cf
Primary = 1.2 cfs @ 12.13 hrs, Volume= 2,973 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Link SUM 2: Sum 2 (wetland)

Inflow Area = 164,701 sf, 11.64% Impervious, Inflow Depth > 1.71" for 25-Yr event
Inflow = 4.4 cfs @ 12.11 hrs, Volume= 23,480 cf
Primary = 4.4 cfs @ 12.11 hrs, Volume= 23,480 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Subcatchment DV 1: Area to Basin 1

Runoff = 1.2 cfs @ 12.09 hrs, Volume= 3,860 cf, Depth= 5.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

	Area (sf)	CN	Description
*	3,515	98	Impervious, HSG B
	5,200	61	>75% Grass cover, Good, HSG B
	301	96	Gravel surface, HSG B
	9,016	77	Weighted Average
	5,501		61.01% Pervious Area
	3,515		38.99% Impervious Area

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

Summary for Subcatchment DV 2: Developed Area 2

Runoff = 0.5 cfs @ 12.09 hrs, Volume= 1,523 cf, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

Area (sf)	CN	Description
2,042	58	Woods/grass comb., Good, HSG B
3,631	61	>75% Grass cover, Good, HSG B
5,673	60	Weighted Average
5,673		100.00% Pervious Area

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

Summary for Subcatchment DV 3: Area to Basin 2

Runoff = 2.1 cfs @ 12.09 hrs, Volume= 6,391 cf, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

	Area (sf)	CN	Description
*	2,596	98	Impervious, HSG B
	14,258	61	>75% Grass cover, Good, HSG B
	3,226	55	Woods, Good, HSG B
	246	96	Gravel surface, HSG B
	20,326	65	Weighted Average
	17,730		87.23% Pervious Area
	2,596		12.77% Impervious Area

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

Summary for Subcatchment DV 4: Developed Area 4

Runoff = 0.3 cfs @ 12.14 hrs, Volume= 1,102 cf, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

Area (sf)	CN	Description
3,157	61	>75% Grass cover, Good, HSG B
815	61	>75% Grass cover, Good, HSG B
3,972	61	Weighted Average
3,972		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0540	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	152	0.0260	2.60		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
9.4	202	Total			

Summary for Subcatchment DV 5: Area to Basin 3

Runoff = 3.4 cfs @ 12.16 hrs, Volume= 12,669 cf, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

	Area (sf)	CN	Description
*	3,741	98	Impervious, HSG B
	17,168	61	>75% Grass cover, Good, HSG B
	21,709	58	Woods/grass comb., Good, HSG B
	192	96	Gravel surface, HSG B
	42,810	63	Weighted Average
	39,069		91.26% Pervious Area
	3,741		8.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0300	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.5	87	0.0300	2.79		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.0	19	0.3500	9.52		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.2	156	Total			

Summary for Subcatchment DV 6: Developed Area 6

Runoff = 2.0 cfs @ 12.11 hrs, Volume= 6,615 cf, Depth= 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

Area (sf)	CN	Adj	Description
3,317	61		>75% Grass cover, Good, HSG B
552	98		Unconnected roofs, HSG B
24,594	55		Woods, Good, HSG B
28,463	57	56	Weighted Average, UI Adjusted
27,911			98.06% Pervious Area
552			1.94% Impervious Area
552			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	50	0.1050	0.13		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.4	136	0.1000	5.09		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.9	186	Total			

Summary for Subcatchment DV 7: Area to cul-de-sac drains

Runoff = 3.5 cfs @ 12.08 hrs, Volume= 11,878 cf, Depth= 6.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

	Area (sf)	CN	Description
*	16,415	98	Impervious, HSG B
	552	98	Unconnected roofs, HSG B
	862	55	Woods, Good, HSG B
	2,220	61	>75% Grass cover, Good, HSG B
	623	96	Gravel surface, HSG B
	20,672	92	Weighted Average
	3,705		17.92% Pervious Area
	16,967		82.08% Impervious Area
	552		3.25% Unconnected

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

Summary for Subcatchment DV 7a: Area to cul-de-sac swales

Runoff = 1.6 cfs @ 12.09 hrs, Volume= 5,017 cf, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

Area (sf)	CN	Adj	Description
16,141	61		>75% Grass cover, Good, HSG B
1,383	55		Woods, Good, HSG B
552	98		Unconnected roofs, HSG B
18,076	62	61	Weighted Average, UI Adjusted
17,524			96.95% Pervious Area
552			3.05% Impervious Area
552			100.00% Unconnected

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

Summary for Subcatchment DV 8: Developed Area 8

Runoff = 2.4 cfs @ 12.16 hrs, Volume= 8,829 cf, Depth= 3.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

	Area (sf)	CN	Description
	6,484	61	>75% Grass cover, Good, HSG B
	552	98	Unconnected roofs, HSG B
	19,992	55	Woods, Good, HSG B
*	4,781	83	Woods/wetland, HSG D
	31,809	61	Weighted Average
	31,257		98.26% Pervious Area
	552		1.74% Impervious Area
	552		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	50	0.0280	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.3	96	0.1400	6.02		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
11.3	146	Total			

Summary for Subcatchment DV 9: Developed Area 9

Runoff = 4.7 cfs @ 12.10 hrs, Volume= 15,264 cf, Depth= 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Type III 24-hr 100-Yr Rainfall=7.85"

Area (sf)	CN	Description
552	98	Unconnected roofs, HSG B
7,164	61	>75% Grass cover, Good, HSG B
57,965	55	Woods, Good, HSG B
65,681	56	Weighted Average
65,129		99.16% Pervious Area
552		0.84% Impervious Area
552		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1400	0.14		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.2	69	0.1800	6.83		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
0.4	124	0.1200	5.58		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
6.4	243	Total			

Summary for Pond 1P: Basin 1

Inflow Area = 9,016 sf, 38.99% Impervious, Inflow Depth = 5.14" for 100-Yr event
Inflow = 1.2 cfs @ 12.09 hrs, Volume= 3,860 cf
Outflow = 1.1 cfs @ 12.12 hrs, Volume= 3,860 cf, Atten= 8%, Lag= 2.0 min
Discarded = 0.0 cfs @ 12.12 hrs, Volume= 1,471 cf
Primary = 1.1 cfs @ 12.12 hrs, Volume= 2,388 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 137.68' @ 12.12 hrs Surf.Area= 1,187 sf Storage= 694 cf

Plug-Flow detention time= 129.8 min calculated for 3,860 cf (100% of inflow)
Center-of-Mass det. time= 129.8 min (940.3 - 810.5)

Volume	Invert	Avail.Storage	Storage Description
#1	137.00'	1,099 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
137.00	854	0	0
138.00	1,344	1,099	1,099

Device	Routing	Invert	Outlet Devices
#1	Discarded	137.00'	**0.520 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 136.00' Phase-In= 0.01'
#2	Primary	137.50'	**6.0' long x 8.5' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.45 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.65 2.66 2.67 2.69 2.71

Discarded OutFlow Max=0.0 cfs @ 12.12 hrs HW=137.68' (Free Discharge)
↑**1=Exfiltration** (Controls 0.0 cfs)

Primary OutFlow Max=1.1 cfs @ 12.12 hrs HW=137.68' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Weir Controls 1.1 cfs @ 1.04 fps)

Summary for Pond 2P: Basin 2

Inflow Area = 20,326 sf, 12.77% Impervious, Inflow Depth = 3.77" for 100-Yr event
Inflow = 2.1 cfs @ 12.09 hrs, Volume= 6,391 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 140.54' @ 24.36 hrs Surf.Area= 4,921 sf Storage= 6,391 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	139.00'	14,704 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
139.00	3,390	0	0
140.00	4,355	3,873	3,873
141.00	5,398	4,877	8,749
142.00	6,511	5,955	14,704

Summary for Pond 3P: Basin 3

Inflow Area = 42,810 sf, 8.74% Impervious, Inflow Depth = 3.55" for 100-Yr event
Inflow = 3.4 cfs @ 12.16 hrs, Volume= 12,669 cf
Outflow = 0.0 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 142.29' @ 24.66 hrs Surf.Area= 7,137 sf Storage= 12,668 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	140.00'	18,084 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
140.00	3,972	0	0
141.00	5,302	4,637	4,637
142.00	6,706	6,004	10,641
143.00	8,179	7,443	18,084

Summary for Pond 7Pa: subsurface chambers

Inflow Area = 20,672 sf, 82.08% Impervious, Inflow Depth = 6.90" for 100-Yr event
Inflow = 3.5 cfs @ 12.08 hrs, Volume= 11,878 cf
Outflow = 1.9 cfs @ 12.21 hrs, Volume= 11,875 cf, Atten= 45%, Lag= 7.4 min
Primary = 1.9 cfs @ 12.21 hrs, Volume= 11,875 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Starting Elev= 140.50' Surf.Area= 1,568 sf Storage= 280 cf
Peak Elev= 143.03' @ 12.21 hrs Surf.Area= 1,568 sf Storage= 3,818 cf (3,538 cf above start)
Flood Elev= 143.30' Surf.Area= 1,568 sf Storage= 4,200 cf (3,920 cf above start)

Plug-Flow detention time= 100.8 min calculated for 11,591 cf (98% of inflow)
Center-of-Mass det. time= 75.3 min (844.9 - 769.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	140.30'	0 cf	**16.00'W x 42.00'L x 3.67'H Field A** 2,466 cf Overall - 2,466 cf Embedded = 0 cf x 40.0% Voids
#2A	140.30'	1,800 cf	**Shea Leaching Chamber 8x14x3.7**x 6 Inside #1 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf 6 Chambers in 2 Rows
#3B	140.30'	0 cf	**8.00'W x 56.00'L x 3.67'H Field B** 1,644 cf Overall - 1,644 cf Embedded = 0 cf x 40.0% Voids
#4B	140.30'	1,200 cf	**Shea Leaching Chamber 8x14x3.7**x 4 Inside #3 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf
#5C	140.30'	0 cf	**8.00'W x 56.00'L x 3.67'H Field C** 1,644 cf Overall - 1,644 cf Embedded = 0 cf x 40.0% Voids
#6C	140.30'	1,200 cf	**Shea Leaching Chamber 8x14x3.7**x 4 Inside #5 Inside= 84.0"W x 36.0"H => 23.08 sf x 13.00'L = 300.0 cf Outside= 96.0"W x 44.0"H => 29.36 sf x 14.00'L = 411.0 cf
		4,200 cf	Total Available Storage

Storage Group A created with Chamber Wizard
Storage Group B created with Chamber Wizard
Storage Group C created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	140.50'	**10.0" Round Culvert** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 140.50' / 140.40' S= 0.0048 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.55 sf
#2	Device 1	140.50'	**1.0" Vert. Orifice/Grate X 8.00** C= 0.600
#3	Device 1	141.80'	**2.0" Vert. Orifice/Grate X 6.00** C= 0.600
#4	Device 1	142.80'	**10.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.9 cfs @ 12.21 hrs HW=143.03' (Free Discharge)
└─**1=Culvert** (Passes 1.9 cfs of 3.8 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.3 cfs @ 7.59 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.7 cfs @ 5.15 fps)
  └─**4=Orifice/Grate** (Weir Controls 0.9 cfs @ 1.55 fps)

Summary for Pond 7Pb: swales

Inflow Area = 18,076 sf, 3.05% Impervious, Inflow Depth = 3.33" for 100-Yr event
Inflow = 1.6 cfs @ 12.09 hrs, Volume= 5,017 cf
Outflow = 0.1 cfs @ 14.82 hrs, Volume= 5,017 cf, Atten= 94%, Lag= 163.9 min
Discarded = 0.1 cfs @ 14.82 hrs, Volume= 5,017 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
Peak Elev= 143.91' @ 14.82 hrs Surf.Area= 3,971 sf Storage= 2,542 cf

Plug-Flow detention time= 325.6 min calculated for 5,015 cf (100% of inflow)
Center-of-Mass det. time= 325.6 min (1,170.5 - 844.9)

Volume	Invert	Avail.Storage	Storage Description
#1	143.00'	2,890 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
143.00	1,587	0	0
144.00	4,193	2,890	2,890

Device	Routing	Invert	Outlet Devices
#1	Discarded	143.00'	**1.020 in/hr Exfiltration over Horizontal area** Phase-In= 0.01'

Discarded OutFlow Max=0.1 cfs @ 14.82 hrs HW=143.91' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.1 cfs)

Summary for Pond IW: Isolated Wetland

Inflow Area = 31,809 sf, 1.74% Impervious, Inflow Depth = 3.33" for 100-Yr event
Inflow = 2.4 cfs @ 12.16 hrs, Volume= 8,829 cf
Outflow = 0.2 cfs @ 13.63 hrs, Volume= 4,923 cf, Atten= 90%, Lag= 88.1 min
Primary = 0.2 cfs @ 13.63 hrs, Volume= 4,923 cf

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs / 3
Peak Elev= 142.80' @ 13.63 hrs Surf.Area= 3,874 sf Storage= 4,831 cf

Plug-Flow detention time= 318.1 min calculated for 4,921 cf (56% of inflow)
Center-of-Mass det. time= 200.3 min (1,050.1 - 849.8)

Volume	Invert	Avail.Storage	Storage Description
#1	141.20'	10,937 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)
141.20	2,288	230.0	0	0	2,288
142.00	2,958	273.0	2,093	2,093	4,021
143.00	4,116	346.0	3,521	5,614	7,630
144.00	6,630	405.0	5,323	10,937	11,176

Device	Routing	Invert	Outlet Devices
#1	Primary	142.55'	**15.0" Round Culvert** L= 54.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 142.55' / 140.60' S= 0.0361 '/' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=0.2 cfs @ 13.63 hrs HW=142.80' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 0.2 cfs @ 1.35 fps)

Summary for Link SUM 1: Sum 1 (Hampstead St)

Inflow Area = 18,661 sf, 18.84% Impervious, Inflow Depth = 3.22" for 100-Yr event
Inflow = 1.9 cfs @ 12.12 hrs, Volume= 5,013 cf
Primary = 1.9 cfs @ 12.12 hrs, Volume= 5,013 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Summary for Link SUM 2: Sum 2 (wetland)

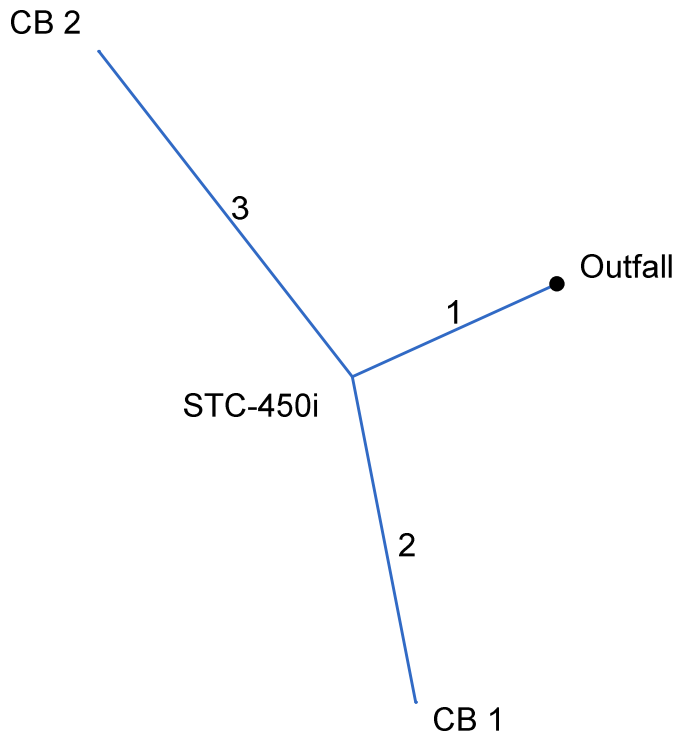
Inflow Area = 164,701 sf, 11.64% Impervious, Inflow Depth = 2.82" for 100-Yr event
Inflow = 7.6 cfs @ 12.11 hrs, Volume= 38,677 cf
Primary = 7.6 cfs @ 12.11 hrs, Volume= 38,677 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Drainage Calculations

- **Closed Drains to Subsurface Detention**
- **Open swales**

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



Project File: 21-58 cul de sac drains.stm	Number of lines: 3	Date: 4/6/2022

Storm Sewer Tabulation

Station		Len	Drng Area		Rnoff coeff	Area x C		Tc		Rain (I)	Total flow	Cap full	Vel	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
Line	To Line	(ft)	Incr (ac)	Total (ac)	(C)	Incr	Total	Inlet (min)	Syst (min)	(in/hr)	(cfs)	(cfs)	(ft/s)	Size (in)	Slope (%)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	
3	1	9	0.15	0.15	0.95	0.14	0.14	5.0	5.0	5.5	0.78	2.65	2.94	12	0.56	140.85	140.90	141.22	141.27	144.52	144.32	D-2
2	1	7	0.33	0.33	0.73	0.24	0.24	5.0	5.0	5.5	1.32	3.01	3.71	12	0.71	140.85	140.90	141.31	141.36	144.52	144.32	D-1
1	End	5	0.00	0.48	0.00	0.00	0.38	0.0	5.1	5.5	2.09	3.61	4.43	12	1.03	140.55	140.60	141.17	141.15	141.71	144.52	D-3

Project File: 21-58 cul de sac drains.stm

Number of lines: 3

Run Date: 4/6/2022

NOTES:Intensity = 53.67 / (Inlet time + 11.40) ^ 0.82; Return period =Yrs. 10 ; c = cir e = ellip b = box

Hydraulic Analysis Report

Project Data

Project Title: Project -80 Hampstead Street

Designer: JSF

Project Date: Wednesday, April 6, 2022

Project Units: U.S. Customary Units

Notes: average slope for roadside swales (station 2+00 to 3+75) = 1.5%
n = 0.025 for grass swale, C = 0.95 (10 yr) impervious areas, I = 5.5 in/hr (10 yr),
A = tributary area in acres; Q = C x I x A

Channel Analysis: Channel right

Notes: Q10 = 0.95 x 5.5 x 0.09 = 0.47 cfs

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width: 4.0000 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0250

Flow: 0.4700 cfs

Result Parameters

Depth: 0.0837 ft

Area of Flow: 0.3488 ft^2

Wetted Perimeter: 4.3743 ft

Hydraulic Radius: 0.0797 ft

Average Velocity: 1.3476 ft/s

Top Width: 4.3348 ft

Froude Number: 0.8372

Critical Depth: 0.0745 ft

Critical Velocity: 1.5210 ft/s

Critical Slope: 0.0221 ft/ft

Critical Top Width: 4.30 ft

Calculated Max Shear Stress: 0.0783 lb/ft^2 **

Calculated Avg Shear Stress: 0.0746 lb/ft^2

** swales are straight, no bend effects (< 0.35 psf, short grass, OK)

Channel Analysis: Channel left

Notes: Q10 = 0.95 x 5.5 x 0.065 = 0.34 cfs

Input Parameters

Channel Type: Trapezoidal

Side Slope 1 (Z1): 2.0000 ft/ft

Side Slope 2 (Z2): 2.0000 ft/ft

Channel Width: 4.0000 ft

Longitudinal Slope: 0.0150 ft/ft

Manning's n: 0.0250

Flow: 0.3400 cfs

Result Parameters

Depth: 0.0687 ft

Area of Flow: 0.2843 ft^2

Wetted Perimeter: 4.3073 ft

Hydraulic Radius: 0.0660 ft

Average Velocity: 1.1960 ft/s

Top Width: 4.2748 ft

Froude Number: 0.8173

Critical Depth: 0.0602 ft

Critical Velocity: 1.3714 ft/s

Critical Slope: 0.0237 ft/ft

Critical Top Width: 4.24 ft

Calculated Max Shear Stress: 0.0643 lb/ft^2

Calculated Avg Shear Stress: 0.0618 lb/ft^2

swales are straight, no bend effects (< 0.35 psf, short grass, OK)