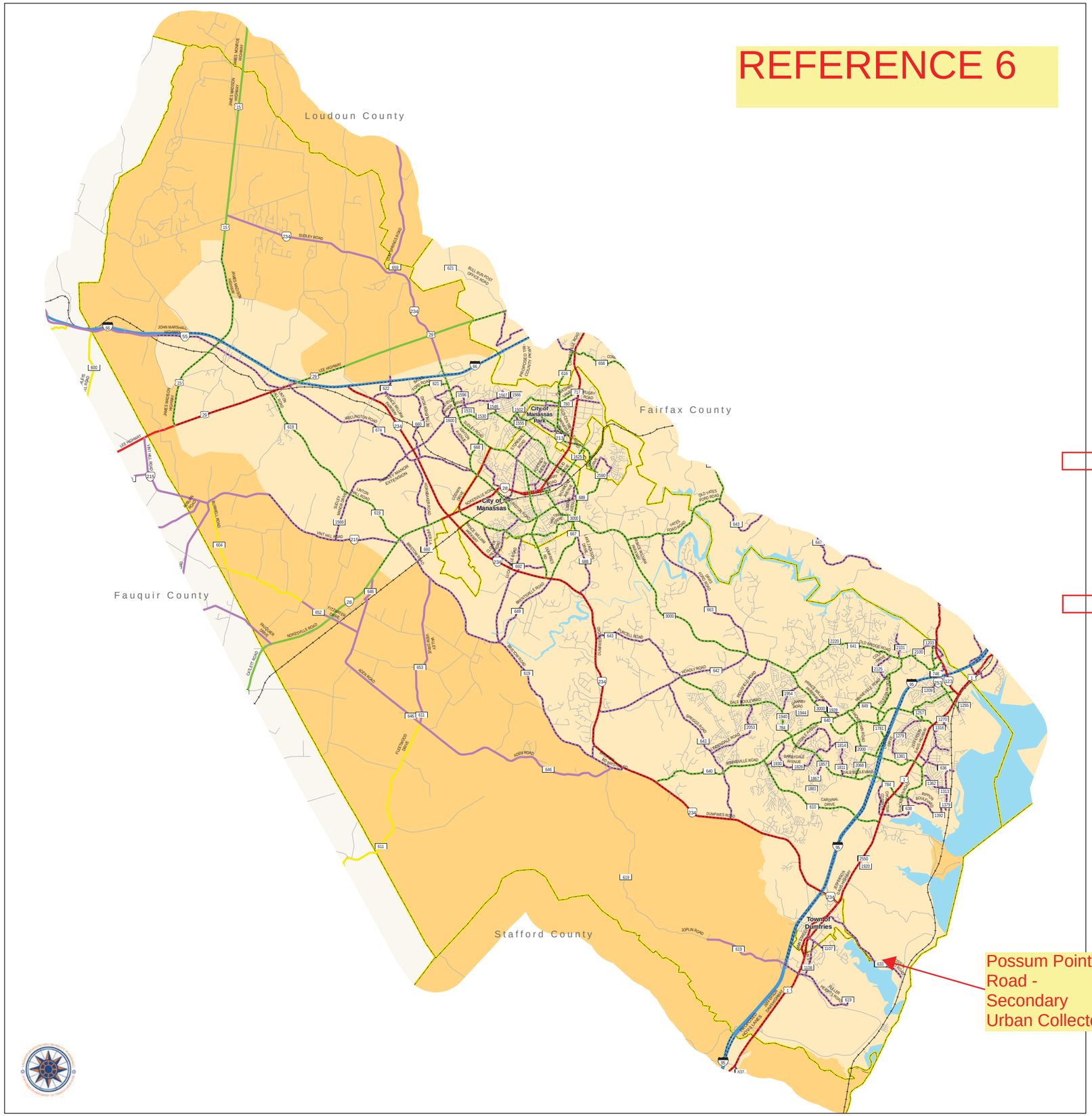
REFERENCE 6



Possum Point Road - Secondary Urban Collector

Functional Classification Actions	FHWA Approval Date
1995 Functional Classification	*May 10, 1993*
2005 Functional Classification	*July 3, 2007*

The accuracy or completeness of this map is not guaranteed or warranted. The purpose of this map is to illustrate the Commonwealth of Virginia's official highway functional classification system. Information and mileages stated on this map are relevant to the highway functional classification system only.

Jurisdiction Boundaries, Urban Cluster Boundaries, Urbanized Area Boundaries, and MPO Study Area Boundaries based on Census 2000 data. However, some boundary data has been modified, or smoothed, for transportation planning purposes. Urban Cluster Boundaries are only shown when outside of Urbanized Area Boundaries.

Request for information on the functional classification of roads on this map should be addressed to: Virginia Department of Transportation, Transportation and Mobility Planning Division, State Transportation Planner, 1401 East Broad Street, Richmond VA 23219. 804-786-2985 (TTY users, call 711).

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Proposed | Existing

FUNCTIONAL CLASSIFICATIONS
- Urban Interstate
- Urban Freeway & Expressway
- Urban Other Principal Arterial
- Urban Minor Arterial
- Urban Collector
- Rural Interstate
- Rural Other Principal Arterial
- Rural Minor Arterial
- Rural Major Collector
- Rural Minor Collector
- Not Classified, Urban Local, Rural Local

HIGHWAY ROUTE SIGNS
- Interstate
- US Highway
- VA Primary
- VA Secondary

BOUNDARIES
- Jurisdiction Boundary
- Urban Cluster Boundary
- Urbanized Area Boundary
- MPO Study Area Boundary

OTHER
- Railroads
- Major Water Feature

VIRGINIA HIGHWAY FUNCTIONAL CLASSIFICATION

Prince William County

2005 Functional Classification

Miles: 0 0.5 1 2 3 4

VDOT Virginia Department of Transportation

Prince William County 076

Table 6-1. Design Storm Selection Guidelines
(For Traveled Way Inundation)*

Roadway Classification	Exceedence Probability	Return Period
Rural Principal Arterial System	2%	50-yr
Rural Minor Arterial System	4% - 2%	25 yr - 50-yr
Rural Collector System, Major	4%	25-yr
Rural Collector System, Minor	10%	10-yr
Rural Local Road System	10%	10-yr
Urban Principal Arterial System	4% - 2%	25 yr - 50-yr
Urban Minor Arterial Street System	4%	25-yr
Urban Collector Street System	10%	10-yr
Urban Local Street System	10%	10-yr

Note: Federal law requires interstate highways to be provided with protection from the 2% flood. Facilities such as underpasses and depressed roadways, where no overflow relief is available, should also be designed for the 2% event.

* Rev 9/09

- Grade of the pipe is less than 0.5%
- Fills (not height of cover) greater than 20'

- Diameter or span 36" or greater
- Foundation is subject to settlement

The Drainage Designer will request that the Materials Division determine the amount of anticipated settlement along the pipeline. This request will accompany the request for culvert foundation data. The plan description for the structure will then note a camber equal to the amount of anticipated settlement.*

8.3.2 Hydraulic Criteria

These criteria relate to the hydraulic design of culverts based on flood flows, upstream and downstream water surface elevations, allowable velocities, and flow routing.

8.3.2.1 Flood Frequency

Culverts should be designed to accommodate the following minimum flood frequencies where the primary concern is the maintenance of traffic flow and the convenience of the highway user:

Roadway	***Flood Frequency (Annual Risk)***
Interstate	50-year (2%)
Primary & Arterial	25-year (4%)
Secondary	10-year (10%)

The above requirements are minimum, and deviation requires approval from VDOT. Culverts should be designed to pass floods greater than those noted above where warranted by potential damage to adjacent property, loss of human life, injury, or heavy financial loss.

Future development of contributing watersheds and floodplains that have been zoned or delineated should be considered in determining the design flood. For the Interstate System, development during a period 20 years in the future should be considered. Adopted regional plans and approved zoning will be considered in determining the design discharge on all systems.

In compliance with the National Flood Insurance Program (NFIP) it is necessary to consider the 100-year frequency flood at all locations where construction will encroach

* Rev 7/14

SUBJECT POSSUM POINT CCR POND CLOSURES
EVALUATION OF POSSUM POINT ROAD CULVERT
BY SCHELAB DATE 8/23/2015 PROJ. NO. C150132.00
CHKD. BY BERKEME DATE 8/24/2015

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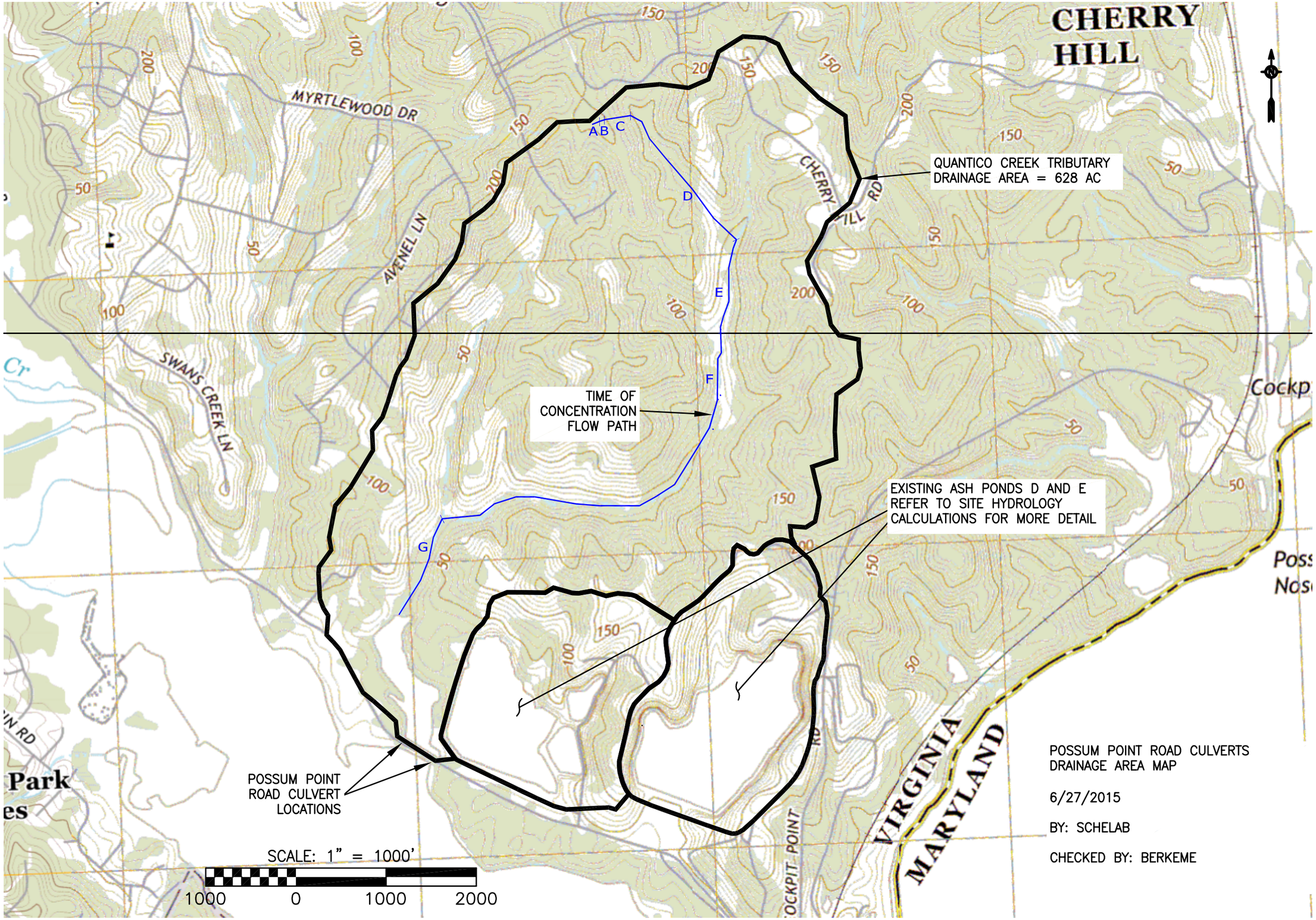
ATTACHMENT 2

Hydrologic Calculations for Tributary to Quantico Creek



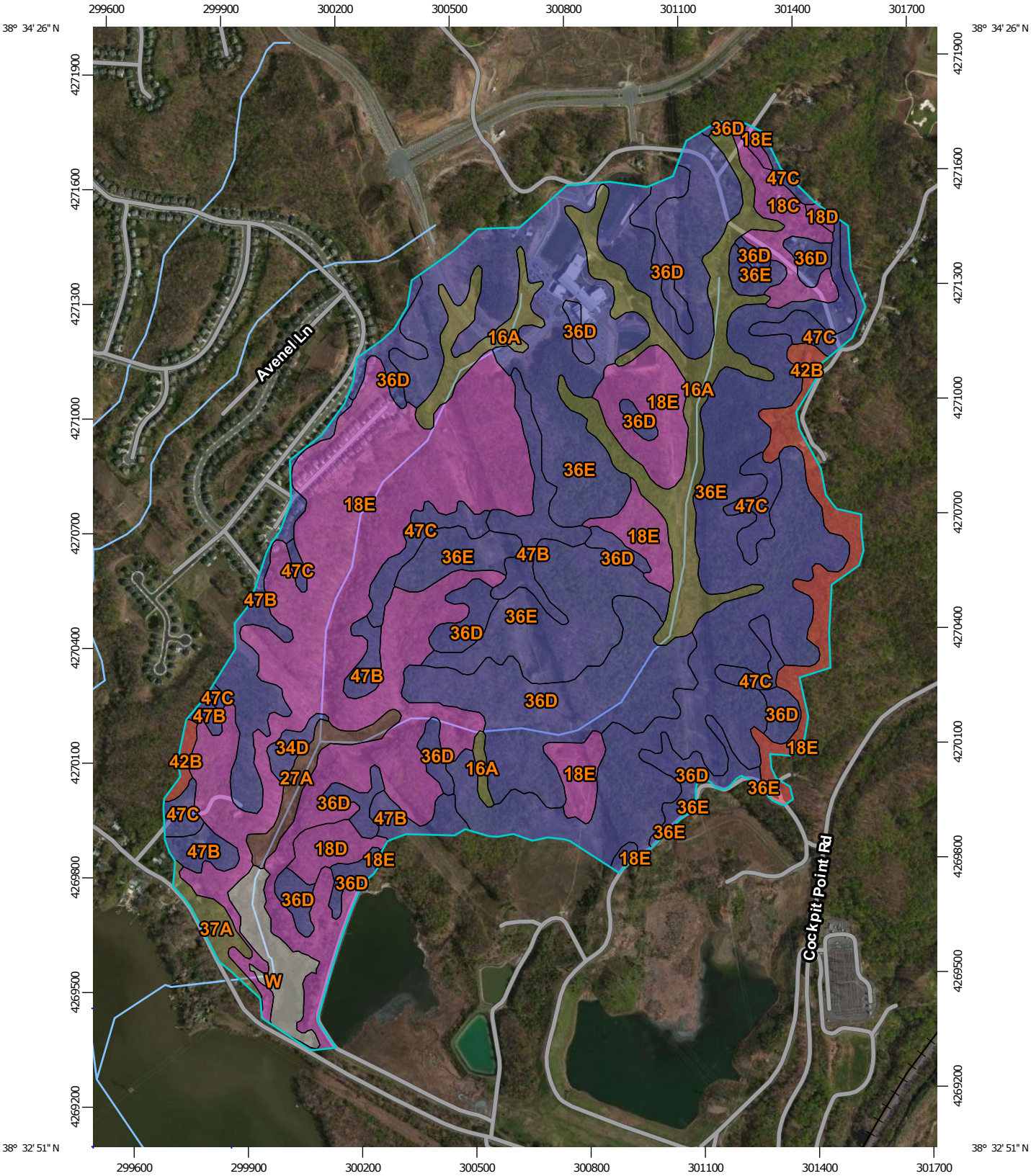
POSSUM POINT ROAD CULVERTS
DRAINAGE AREA MAP

6/27/2015

BY: SCHELAB

CHECKED BY: BERKEME

Hydrologic Soil Group—Prince William County, Virginia
(Possum Point Road Culvert Drainage Area)



Map Scale: 1:14,300 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: Prince William County, Virginia
Survey Area Data: Version 12, Dec 13, 2013

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

Date(s) aerial images were photographed: Data not available.

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Prince William County, Virginia (VA153)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
16A	Delanco fine sandy loam, 0 to 4 percent slopes	C/D	46.1	7.3%
18C	Dumfries sandy loam, 7 to 15 percent slopes	A	10.5	1.7%
18D	Dumfries sandy loam, 15 to 25 percent slopes	A	6.5	1.0%
18E	Dumfries sandy loam, 25 to 50 percent slopes	A	167.2	26.6%
27A	Hatboro-Codorus complex, 0 to 2 percent slopes	B/D	6.8	1.1%
34D	Lunt loam, 15 to 25 percent slopes	B	2.7	0.4%
36D	Marr very fine sandy loam, 7 to 25 percent slopes	B	82.1	13.1%
36E	Marr very fine sandy loam, 25 to 50 percent slopes	B	212.2	33.7%
37A	Marumsco loam, 0 to 4 percent slopes	C/D	4.7	0.8%
42B	Neabsco-Quantico complex, 2 to 7 percent slopes	D	18.6	3.0%
47B	Quantico sandy loam, 2 to 7 percent slopes	B	37.6	6.0%
47C	Quantico sandy loam, 7 to 15 percent slopes	B	23.6	3.8%
W	Water		10.2	1.6%
Totals for Area of Interest			**628.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Runoff Curve Number

Project:	By:	Date:
Possum Point Pond Closures - H&H Calculations	SCHELAB	6/26/2015
C150132.00	Checked:	Date:
Location:	BERKEME	7/2/2015
Drainage Area to Possum Point Road Culvert		

Check one: ■ Present ❑ Under Development ❑ Developed

Hydrologic Group	Cover Description	CN			Area	Product of CN x Area
		Table 2-2*	Figure 2-3	Figure 2-4	■ Acres ❑ miles^2 ❑ %	
A	Woods (good)	30			140.8	4,223
B	Woods (good)	55			279.1	15,351
C	Woods (good)	70			38.9	2,724
D	Woods (good)	77			22.1	1,702
A	Meadow	30			40.1	1,202
B	Meadow	58			79.5	4,610
C	Meadow	71			11.1	787
D	Meadow	78			6.3	491
Water	Water	98			10.2	1,000
			TOTALS		**628.0**	**32,089**

CN (weighted) = Total Product / Total Area

CN	**51**

*From USDA's TR-55 "Urban Hydrology for Small Watersheds"

Possum Point Pond Closures C150132.00	By: SCHELAB	Date: 6/23/2015
Location: Possum Point Road Culverts	Checked: BERKEME	Date: 7/2/2015

Check one: ■ Present ❑ Under Development ❑ Developed

Sheet Flow

Segment ID	A		
Surface Description	WOODS		
Manning's Roughness Coefficient, n	0.4		(TR-55, Table 3-1)
Flow Length, L	100	ft	
Two-year 24-hour Rainfall, P_2	3.12	in	
Land Slope, s	0.07	ft/ft	
Travel Time, $T_t = (0.007*(n*L)^{0.8}) / (P_2^{0.5}*s^{0.4})$	**0.2196**	**hrs**	

Shallow Concentrated Flow

Segment ID	B	C	D		
Surface Description (Paved / Unpaved)	Unpaved	Unpaved	Unpaved		
Surface Description Coefficient, C	16.13	16.13	16.13		
Flow Length, L	57	292	1830		ft
Watercourse Slope, s	0.070	0.170	0.029		ft/ft
Average Velocity, $V = C*s^{0.5}$	4.27	6.65	2.75		ft/sec
Travel Time, $T_t = (L) / (3600*V)$	**0.004**	**0.012**	**0.185**		**hrs**

Channel Flow (Based on SIR 207-5162 Data)

Segment ID	E	F	G	
Cross Sectional Flow Area, A	4.4	9	12	ft^2
Bankfull Discharge, Q	12.00	22.00	29.00	cfs
Velocity, V	2.73	2.44	2.42	ft
Flow Length, L	1065	4518	1176	ft
Travel Time, $T_t = (L) / (3600*V)$	**0.1085**	**0.5134**	**0.1352**	**hrs**

Time of Concentration

Sheet Flow T_t	0.2196	hrs
Shallow Concentrated Flow T_t	0.2009	hrs
Channel Flow Tt	0.7571	hrs
Time of Concentration, T_c	**1.1776**	**hrs**
	71	**mins**

SUBJECT POSSUM POINT CCR POND CLOSURES
EVALUATION OF POSSUM POINT ROAD CULVERT
BY SCHELAB DATE 8/23/2015 PROJ. NO. C150132.00
CHKD. BY BERKEME DATE 8/24/2015

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ATTACHMENT 3

HY-8 Calculations

HY-8 Culvert Analysis Report

Possum Point Road Culvert Evaluation

Normal Water Surface Elevation on Quantico Creek

By: SCHELAB, 6/26/2015

Checked by: BERKEME, 7/2/2015

Table 1 - Culvert Summary Table: Possum Point Road Culverts

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
0.00	0.00	5.00	0.000	4.400	0-NF	0.000	0.000	5.840	6.000	0.000	0.000
150.00	150.00	5.22	3.191	4.622	1-S1t	1.372	2.314	5.840	6.000	2.778	0.000
300.00	300.00	5.94	4.931	5.339	1-S1t	1.977	3.322	5.840	6.000	5.557	0.000
450.00	450.00	7.11	6.509	6.057	5-S2n	2.466	4.102	3.037	6.000	15.670	0.000
600.00	600.00	9.02	8.417	7.347	5-S2n	2.908	4.731	3.610	6.000	16.893	0.000
750.00	750.00	11.49	10.888	9.004	5-S2n	3.328	5.209	4.123	6.000	18.131	0.000
900.00	876.65	14.06	13.460	10.690	5-S2n	3.679	5.492	4.511	6.000	19.252	0.000
1000.00	882.06	14.18	13.579	10.768	5-S2n	3.694	5.502	4.527	6.000	19.303	0.000
1200.00	889.29	14.34	13.740	10.873	5-S2n	3.714	5.514	4.548	6.000	19.373	0.000
1350.00	893.66	14.44	13.838	10.937	5-S2n	3.726	5.521	4.560	6.000	19.416	0.000
1500.00	897.62	14.53	13.927	10.995	5-S2n	3.737	5.527	4.571	6.000	19.454	0.000

****

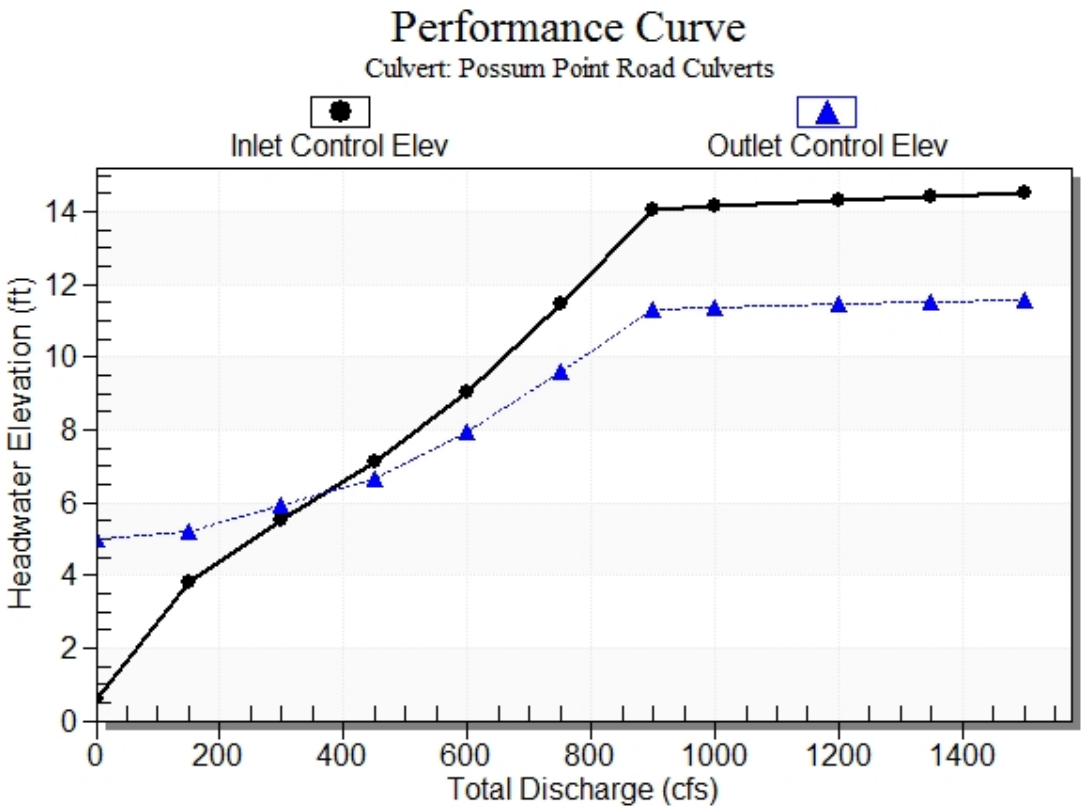
Straight Culvert

Inlet Elevation (invert): 0.60 ft, Outlet Elevation (invert): -0.84 ft

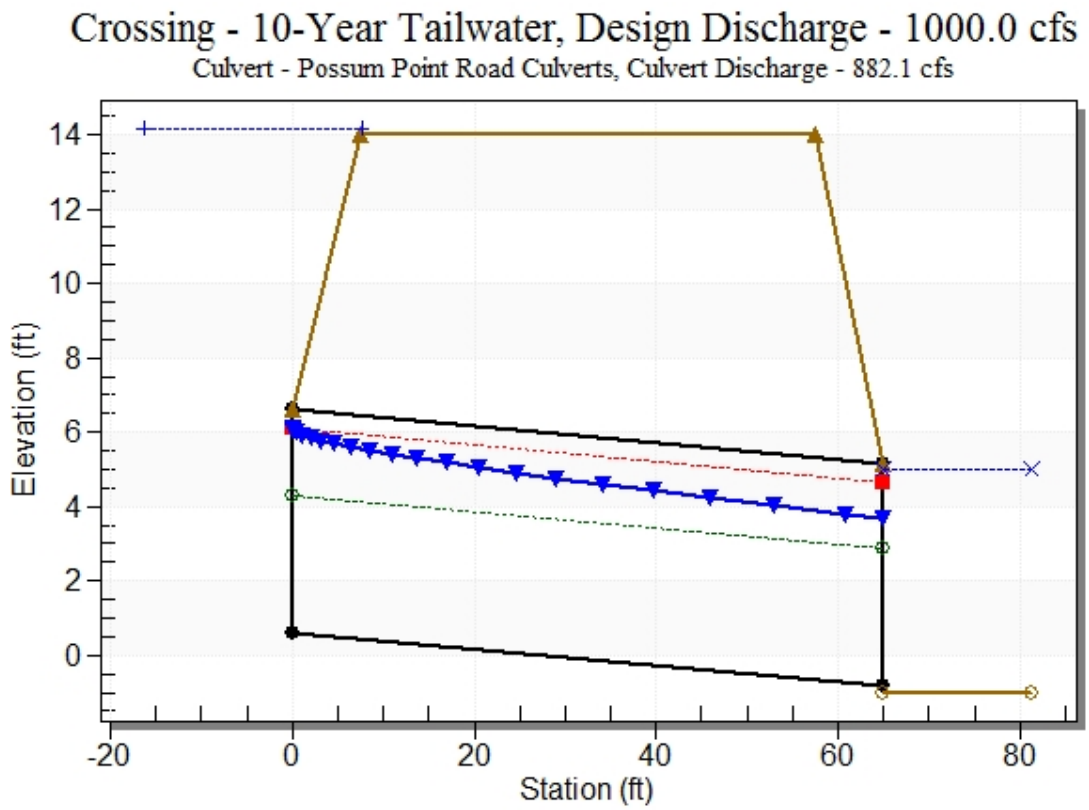
Culvert Length: 65.02 ft, Culvert Slope: 0.0222

****

Culvert Performance Curve Plot: Possum Point Road Culverts



Water Surface Profile Plot for Culvert: Possum Point Road Culverts



Site Data - Possum Point Road Culverts

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 0.60 ft

Outlet Station: 65.00 ft

Outlet Elevation: -0.84 ft

Number of Barrels: 2

Culvert Data Summary - Possum Point Road Culverts

Barrel Shape: Circular

Barrel Diameter: 6.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0130

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall

Inlet Depression: NONE

Table 2 - Downstream Channel Rating Curve (Crossing: 10-Year Tailwater)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
0.00	5.00	6.00
150.00	5.00	6.00
300.00	5.00	6.00
450.00	5.00	6.00
600.00	5.00	6.00
750.00	5.00	6.00
900.00	5.00	6.00
1000.00	5.00	6.00
1200.00	5.00	6.00
1350.00	5.00	6.00
1500.00	5.00	6.00

Tailwater Channel Data - 10-Year Tailwater

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 5.00 ft

Roadway Data for Crossing: 10-Year Tailwater

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 520.00 ft

Crest Elevation: 14.00 ft

Roadway Surface: Paved

Roadway Top Width: 50.00 ft

SUBJECT POSSUM POINT CCR POND CLOSURES
EVALUATION OF POSSUM POINT ROAD CULVERT
BY SCHELAB DATE 8/23/2015 PROJ. NO. C150132.00
CHKD. BY BERKEME DATE 8/24/2015

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ATTACHMENT 4

HEC-HMS Routing

100-YEAR STORM

Summary Results for Reservoir "Trib to Quantico Creek"

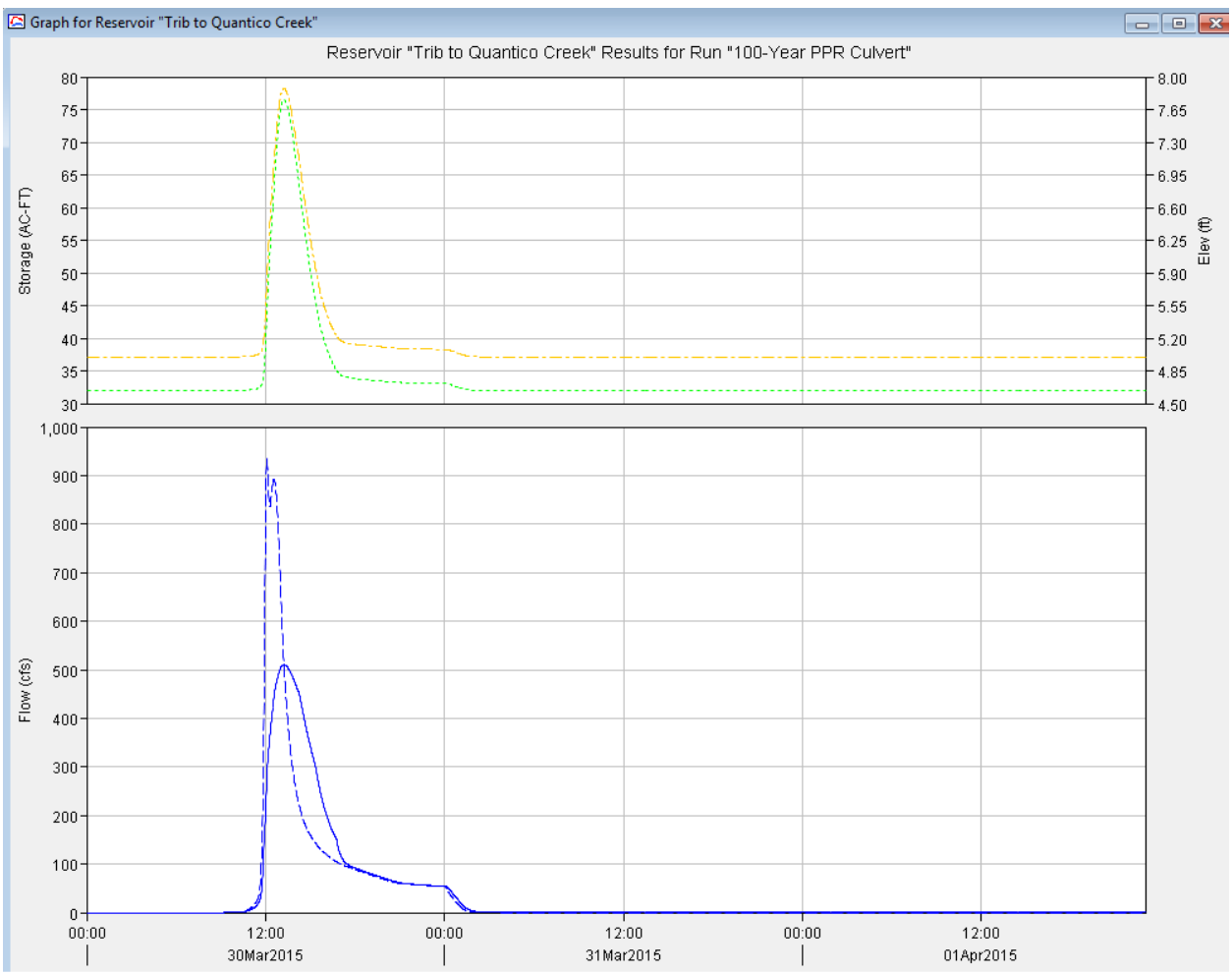
Project: Ponds D and E Simulation Run: 100-Year PPR Culvert
Reservoir: Trib to Quantico Creek

Start of Run:	30Mar2015, 00:00	Basin Model:	Possum Piont Road Culvert
End of Run:	01Apr2015, 23:00	Meteorologic Model:	100-yr Storm
Compute Time:	23Aug2015, 16:08:09	Control Specifications:	Control 1

Volume Units: IN AC-FT

Computed Results

Peak Inflow:	934.1 (CFS)	Date/Time of Peak Inflow:	30Mar2015, 12:06
Peak Discharge:	510.2 (CFS)	Date/Time of Peak Discharge:	30Mar2015, 13:14
Inflow Volume:	194.7 (AC-FT)	Peak Storage:	76.5 (AC-FT)
Discharge Volume:	194.7 (AC-FT)	Peak Elevation:	7.9 (FT)



10-Year Storm

Summary Results for Reservoir "Trib to Quantico Creek"

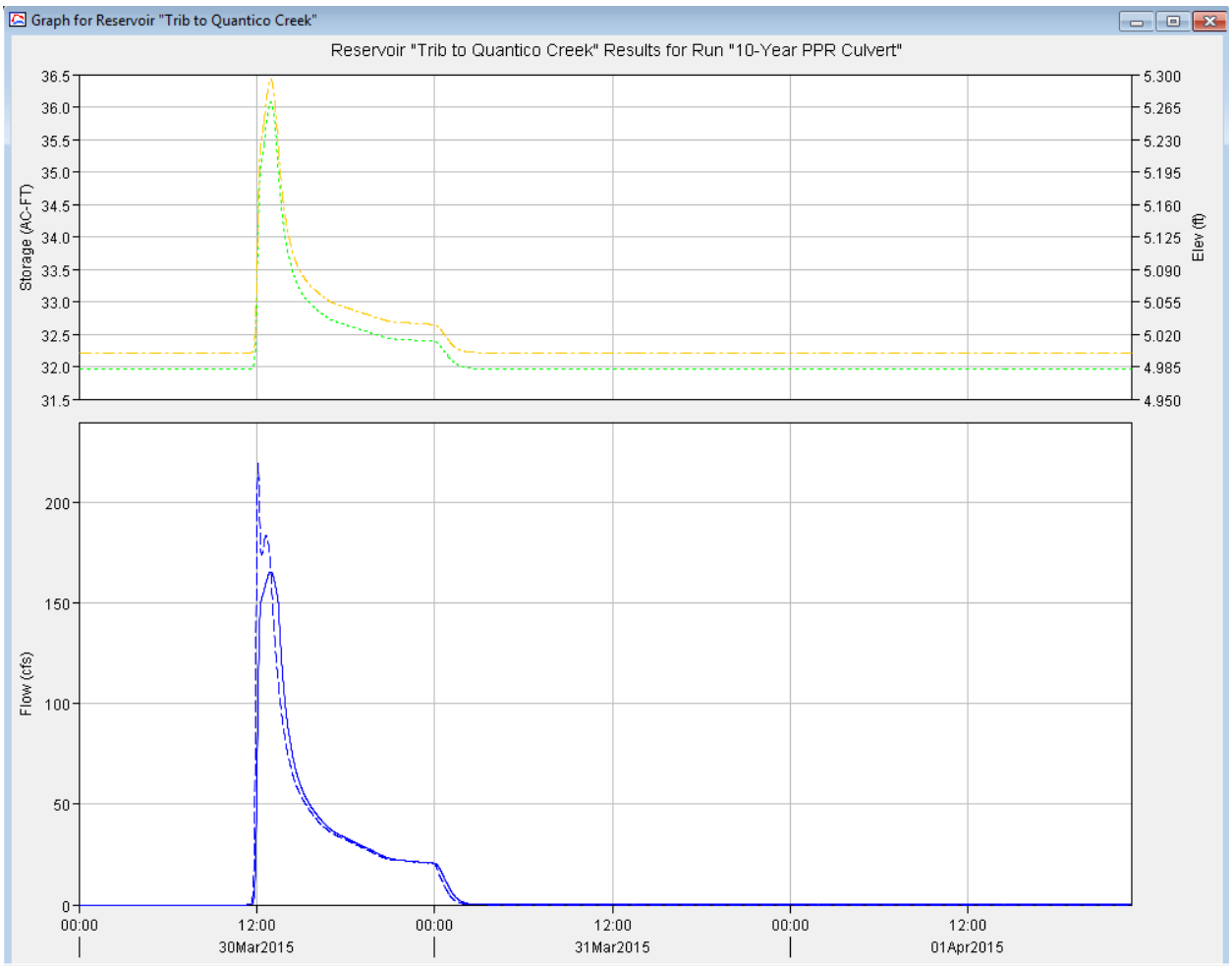
Project: Ponds D and E Simulation Run: 10-Year PPR Culvert
Reservoir: Trib to Quantico Creek

Start of Run:	30Mar2015, 00:00	Basin Model:	Possum Piont Road Culvert
End of Run:	01Apr2015, 23:00	Meteorologic Model:	10-yr Storm
Compute Time:	23Aug2015, 16:06:18	Control Specifications:	Control 1

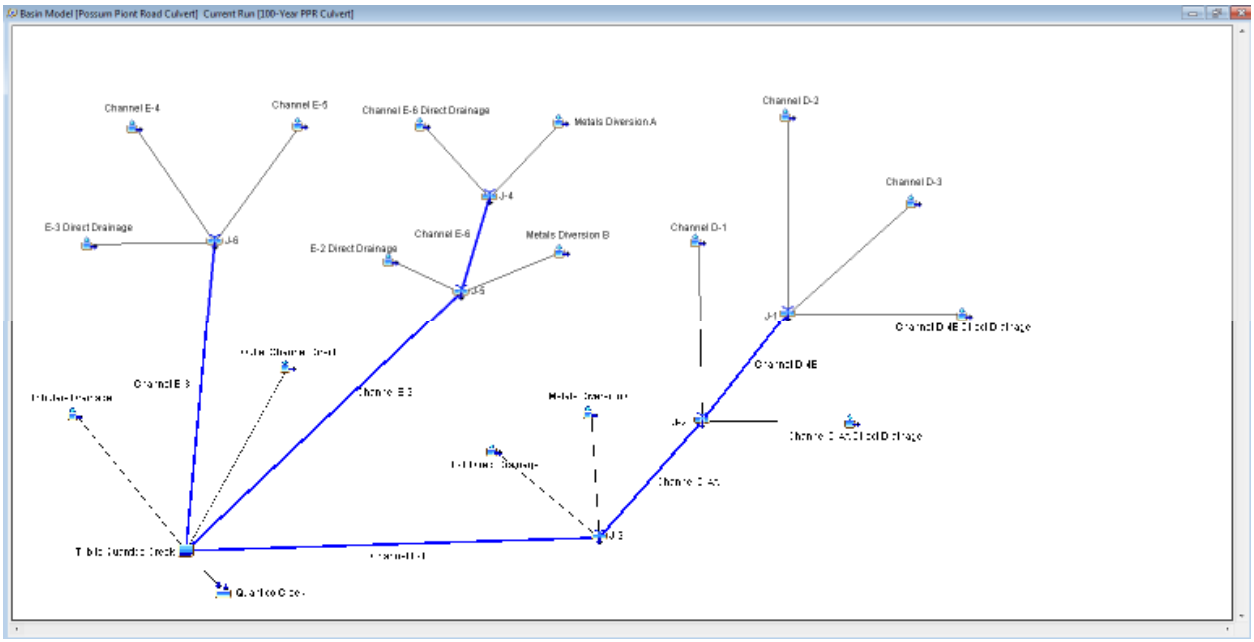
Volume Units: IN AC-FT

Computed Results

Peak Inflow:	219.3 (CFS)	Date/Time of Peak Inflow:	30Mar2015, 12:06
Peak Discharge:	165.6 (CFS)	Date/Time of Peak Discharge:	30Mar2015, 12:57
Inflow Volume:	54.3 (AC-FT)	Peak Storage:	36.1 (AC-FT)
Discharge Volume:	54.3 (AC-FT)	Peak Elevation:	5.3 (FT)



BASIN SCHEMATIC AND INPUT SUMMARY



HEC-HMS Report of Input Fields
Loss Method : SCS Curve Number
Transform Method : SCS Unit Hydrograph

SCHELAB - SAI Consultants

Model Summary

Hydrologic Input Data

Basin Model: Possum Point Road Culvert
Description:
Version: 4.0
Units: English

Summary Table

Name	Area (sq mi)	Loss Method	% Impervious	CN	Transform Method	SCS lag (min)
Tributary Drainage	0.06125	SCS	0	51	SCS	42.0
Channel D-1	0.0082038	SCS	0	56	SCS	10.0
Channel D-2	0.0067188	SCS	0	58	SCS	15.0
Channel D-3	0.0084312	SCS	0	48	SCS	10.0
Channel D-4E Direct Drainage	0.0034708	SCS	0	48	SCS	7.0
Channel D-4W Direct Drainage	0.0003548	SCS	0	48	SCS	10.0
E-1 Direct Drainage	0.0010219	SCS	0	61	SCS	5.4
Metals Diversion B	0.0003984	SCS	0	48	SCS	3.6
E-2 Direct Drainage	0.0158103	SCS	0	58	SCS	11.4
Channel E-6 Direct Drainage	0.0103847	SCS	0	62	SCS	5.4
Metals Diversion A	0.0037185	SCS	0	61	SCS	3.6
Metals Diversion C	0.0062710	SCS	0	63	SCS	10.8
E-3 Direct Drainage	0.0254103	SCS	0	60	SCS	14.4
Channel E-4	0.0086625	SCS	0	55	SCS	3.6
Channel E-5	0.0062025	SCS	0	55	SCS	3.6
Outlet Channel Direct	0.0067208	SCS	0	48	SCS	14.4

Direct Method (SI Report 2015-01-03)

Note: This Model is the same as the Post development condition for the closure site with the additional fo the Tributary Drainage and PPR Culverts.

Elevation Area Curve for the Tributary to Quantico Creek

Paired Data | Table | Graph

Elevation (FT)	Area (AC)
-2.0000	0.00000
3.0000	10.50000
5.0000	13.70000
10.0000	19.30000
15.0000	24.80000
20.0000	32.70000

Elevation Discharge Curve for the PPR Culverts

Paired Data | Table | Graph

Elevation (FT)	Discharge (CFS)
-2.0000	0.00000
5.0000	0.00000
5.2200	150.00000
5.9400	300.00000
7.1100	450.00000
9.0200	600.00000
11.4900	750.00000
14.0600	876.65002
14.1800	882.06000
14.3400	889.28998
14.4400	893.65997
14.5300	897.62000

APPENDIX F
Water Quality Calculations

gai consultants
transforming ideas into reality®

SUBJECT	DOMINION – POSSUM POINT CCR POND CLOSURES – WATER QUALITY CALCULATIONS					
BY	HAYSTE	DATE	09/11/2015	PROJ. NO.	C150132.00	
CHKD. BY	SCHELAB	DATE	09/13/2015	SHEET NO.	1 OF 1	

gai consultants

Purpose:

To determine the water quality requirements for the site based on the Virginia Runoff Reduction Method.

References:

1. Virginia Administrative Code 9VAC25-870 "Virginia Stormwater Management Program (VSMP) Regulation", July 1, 2014

2. Virginia Runoff Reduction Method (VRRM) ReDevelopment Worksheet –Version 2.8, June 2014

Assumptions:

1. Bodies of water and gravel access roads are considered impervious surfaces.

2. Disturbed areas that are not gravel access roads or proposed ponds will be considered managed turf as a worse case runoff scenario.

3. The proposed land disturbing activities are assumed to qualify as redevelopment because they are to be performed on prior developed land.

Procedure:

The VRRM worksheet created by the Virginia Department of Environmental Quality (VaDEQ) was used to compare the pre-redevelopment site conditions to the post-redevelopment site conditions to determine if the site complies with VSMP regulations for water quality. See the attached sheets.

The proposed project for Pond ABC involves 21 acres of disturbance to a site with 0.2 acres of impervious access roads. The limits of disturbance for Ponds D/E involve 199 combined acres for Ponds D and E and 26 acres of combined potential borrow areas. Ponds D/ E has 73.66 acres of existing impervious area made up of existing ponds and gravel access roads, this will be reduced to 4.5 acres for post-redevelopment.

Conclusions:

Based on the VRRM redevelopment worksheet the proposed site improvements will not create conditions that require the installation of additional water treatment methods in order to comply with VSMP regulations for water quality.

Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014
To be used w/ DRAFT 2013 BMP Standards and Specifications
Site Data

Project Name: Pond ABC
Date:

	data input cells
	calculation cells
	constant values

Post-ReDevelopment Project & Land Cover Information

Total Disturbed Acreage 21.00

Constants

Annual Rainfall (inches)	43
Target Rainfall Event (inches)	1.00
Phosphorus EMC (mg/L)	0.26
Nitrogen EMC (mg/L)	1.86
Target Phosphorus Target Load (lb/acre/yr)	0.41
Pj	0.90

Pre-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	20.80	0.00	0.00	20.80
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	0.00	0.00
Impervious Cover (acres)	0.00	0.20	0.00	0.00	0.20
				Total	21.00

Post-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	20.80	0.00	0.00	20.80
Impervious Cover (acres)	0.00	0.20	0.00	0.00	0.20
				Total	21.00
Area Check	Okay	Okay	Okay	Okay	

Rv Coefficients

	A soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

Land Cover Summary Pre-ReDevelopment	Listed	Adjusted[1]	Land Cover Summary Post-ReDevelopment		Land Cover Summary Post-ReDevelopment New Impervious	
Forest/Open Space Cover (acres)	20.80	20.80	Forest/Open Space Cover (acres)	0.00		
Composite Rv(forest)	0.03	0.03	Composite Rv(forest)	0.00		
% Forest	99%	99%	% Forest	0%		
Managed Turf Cover (acres)	0.00	0.00	Managed Turf Cover (acres)	20.80		
Composite Rv(turf)	0.00	0.00	Composite Rv(turf)	0.20		
% Managed Turf	0%	0%	% Managed Turf	99%		
Impervious Cover (acres)	0.20	0.20	ReDev. Impervious Cover (acres)	0.20	New Impervious Cover (acres)	0.00
Rv(impervious)	0.95	0.95	Rv(impervious)	0.95	Rv(impervious)	0.95
% Impervious	1%	1%	% Impervious	1%	% Impervious	Check Area
Total Site Area (acres)	21.00	21.00	**Total ReDev. Site Area (acres)**	21.00	**Total New Dev. Site Area (acres)**	0.00
Site Rv	0.04	0.04	**ReDev. Site Rv**	0.21	**New Dev. Site Rv**	0.95
Pre-Development Treatment Volume (acre-ft)	0.0678	0.0678	Post-ReDevelopment Treatment Volume (acre-ft)	0.3625	Post-Development Treatment Volume (acre-ft)	0.0000
Pre-Development Treatment Volume (cubic feet)	2,955	2,955	Post-ReDevelopment Treatment Volume (cubic feet)	15,791	Post-Development Treatment Volume (cubic feet)	0
Pre-Development Load (TP) (lb/yr)	1.86	1.86	Post-ReDevelopment Load (TP) (lb/yr)	9.92	Post-Development Load (TP) (lb/yr)	0.00

[1] *Adjusted* **Land Cover Summary** reflects the pre redevelopment land cover minus the pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requriement for the new impervious cover to meet the new development load limit is computed in **Column I**.

Maximum % Reduction Required Below Pre-ReDevelopment Load	20%
TP Load Reduction Required for Redeveloped Area (lb/yr)	0.00
TP Load Reduction Required for New Impervious Area (lb/yr)	0.00
Total Load Reduction Required (lb/yr)	**0.00**
Pre-Development Load (TN) (lb/yr) 13.28	Post-Development Load (TN) (lb/yr) 70.97

Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014

Site Data Summary

Total Rainfall = 43 inches

Site Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	*0.00*
Turf (acres)	0.00	20.80	0.00	0.00	20.80	*99.05*
Impervious (acres)	0.00	0.20	0.00	0.00	0.20	*0.95*
					21.00	*100.00*

Site Rv	0.21
Post Development Treatment Volume (ft^3)	15791
Post Development TP Load (lb/yr)	9.92
Post Development TN Load (lb/yr)	70.97
Total TP Load Reduction Required (lb/yr)	0.00

Total Runoff Volume Reduction (ft^3)	0
Total TP Load Reduction Achieved (lb/yr)	0
Total TN Load Reduction Achieved (lb/yr)	0.00
Adjusted Post Development TP Load (lb/yr)	9.92
Remaining Phosphorous Load Reduction (Lb/yr) Required	0.00

Drainage Area Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	*0.00*
Turf (acres)	20.80	0.00	0.00	0.00	0.00	*20.80*
Impervious (acres)	0.20	0.00	0.00	0.00	0.00	*0.20*
						21.00

Drainage Area Compliance Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	0.00	0.00	0.00	0.00	0.00	*0.00*
TN Load Red. (lb/yr)	0.00	0.00	0.00	0.00	0.00	*0.00*

Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014
To be used w/ DRAFT 2013 BMP Standards and Specifications
Site Data

Project Name: Pond D/E
Date:

	data input cells
	calculation cells
	constant values

Post-ReDevelopment Project & Land Cover Information

Total Disturbed Acreage 225.00

Constants

Annual Rainfall (inches)	43
Target Rainfall Event (inches)	1.00
Phosphorus EMC (mg/L)	0.26
Nitrogen EMC (mg/L)	1.86
Target Phosphorus Target Load (lb/acre/yr)	0.41
Pj	0.90

Pre-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	151.34	0.00	0.00	151.34
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	0.00	0.00	0.00	0.00
Impervious Cover (acres)	0.00	73.66	0.00	0.00	73.66
				Total	225.00

Post-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested land	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed	0.00	220.50	0.00	0.00	220.50
Impervious Cover (acres)	0.00	4.50	0.00	0.00	4.50
				Total	225.00
Area Check	Okay	Okay	Okay	Okay	

Rv Coefficients

	A soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

Land Cover Summary	Listed	Adjusted[1]	Land Cover Summary		Land Cover Summary	
Pre-ReDevelopment			**Post-ReDevelopment**		**Post-ReDevelopment New Impervious**	
Forest/Open Space Cover (acres)	151.34	151.34	Forest/Open Space Cover (acres)	0.00		
Composite Rv(forest)	0.03	0.03	Composite Rv(forest)	0.00		
% Forest	67%	67%	% Forest	0%		
Managed Turf Cover (acres)	0.00	0.00	Managed Turf Cover (acres)	220.50		
Composite Rv(turf)	0.00	0.00	Composite Rv(turf)	0.20		
% Managed Turf	0%	0%	% Managed Turf	98%		
Impervious Cover (acres)	73.66	73.66	ReDev. Impervious Cover (acres)	4.50	New Impervious Cover (acres)	0.00
Rv(impervious)	0.95	0.95	Rv(impervious)	0.95	Rv(impervious)	0.95
% Impervious	33%	33%	% Impervious	2%	% Impervious	Check Area
Total Site Area (acres)	225.00	225.00	**Total ReDev. Site Area (acres)**	225.00	**Total New Dev. Site Area (acres)**	0.00
Site Rv	0.33	0.33	**ReDev. Site Rv**	0.22	**New Dev. Site Rv**	0.95
Pre-Development Treatment Volume (acre-ft)	6.2098	6.2098	Post-ReDevelopment Treatment Volume (acre-ft)	4.0313	Post-Development Treatment Volume (acre-ft)	0.0000
Pre-Development Treatment Volume (cubic feet)	270,497	270,497	Post-ReDevelopment Treatment Volume (cubic feet)	175,601	Post-Development Treatment Volume (cubic feet)	0
Pre-Development Load (TP) (lb/yr)	169.95	169.95	Post-ReDevelopment Load (TP) (lb/yr)	110.33	Post-Development Load (TP) (lb/yr)	0.00

[1] *Adjusted* **Land Cover Summary** reflects the pre redevelopment land cover minus the pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover. The adjusted total acreage is consistent with the Post Redevelopment acreage (minus the acreage of new impervious cover). The load reduction requriement for the new impervious cover to meet the new development load limit is computed in **Column I**.

Maximum % Reduction Required Below Pre-ReDevelopment Load	20%
TP Load Reduction Required for Redeveloped Area (lb/yr)	0.00
TP Load Reduction Required for New Impervious Area (lb/yr)	0.00
Total Load Reduction Required (lb/yr)	**0.00**
Pre-Development Load (TN) (lb/yr) 1215.82	Post-Development Load (TN) (lb/yr) 789.28

Virginia Runoff Reduction Method ReDevelopment Worksheet - v2.8 - June 2014

Site Data Summary

Total Rainfall = 43 inches

Site Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	*0.00*
Turf (acres)	0.00	220.50	0.00	0.00	220.50	*98.00*
Impervious (acres)	0.00	4.50	0.00	0.00	4.50	*2.00*
					225.00	*100.00*

Site Rv	0.22
Post Development Treatment Volume (ft^3)	175601
Post Development TP Load (lb/yr)	110.33
Post Development TN Load (lb/yr)	789.28
Total TP Load Reduction Required (lb/yr)	0.00

Total Runoff Volume Reduction (ft^3)	0
Total TP Load Reduction Achieved (lb/yr)	0
Total TN Load Reduction Achieved (lb/yr)	0.00
Adjusted Post Development TP Load (lb/yr)	110.33
Remaining Phosphorous Load Reduction (Lb/yr) Required	0.00

Drainage Area Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest (acres)	0.00	0.00	0.00	0.00	0.00	*0.00*
Turf (acres)	220.50	0.00	0.00	0.00	0.00	*220.50*
Impervious (acres)	4.50	0.00	0.00	0.00	0.00	*4.50*
						225.00

Drainage Area Compliance Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Red. (lb/yr)	0.00	0.00	0.00	0.00	0.00	*0.00*
TN Load Red. (lb/yr)	0.00	0.00	0.00	0.00	0.00	*0.00*