

---

**Stormwater Management Report Addendum**  
NATURAL GAS SERVICE LATERAL METERING FACILITY

Revised June 17, 2016



## **Table of Contents**

- 1.0 STORMWATER NARRATIVE
- 2.0 RUNOFF RATES TABLE
- 3.0 STORMWATER MANAGEMENT CALCULATIONS
  - Pre- and Post- Development Hydrologic Calculations
  - TSS Removal, Water Quality and Recharge and Drawdown Calculations



## 1.0 STORMWATER NARRATIVE

As part of the proposed Exelon West Medway II Facility, a cross-country natural gas service lateral pipeline is necessary for the operation of the proposed turbines. The natural gas lateral will spur from the existing Algonquin Gas Transmission Company pipeline located northwest of the proposed facility.

The proposed gas service lateral includes the construction of a metering station to be built adjacent to an existing Eversource transmission line Right-of Way (ROW). The metering station will consist of two small equipment enclosures as well as a small gravel parking area that will be accessed via an existing power line access road within the Eversource ROW. To mitigate the minor impacts to runoff anticipated by the construction of this gas facility, a stormwater management system has been developed which provide recharge and treatment of stormwater runoff from the meter station area in accordance with MassDEP Stormwater and local regulations.

The proposed metering station is to be located along on a ridge line at the eastern edge of the existing cleared power line easement. Under existing conditions, the majority of the site drains to the east with the remaining portion draining to the west. As such, two stormwater design points were utilized for comparison of runoff rates for flow to each of these areas. Design Point, DP-01 represents flow to the east, and Design Point, DP-02 represents flow to the west.

A combination of Stormwater Management BMPs have been developed to address runoff from the proposed gas metering station. Two small infiltration basins are proposed along the east and west sides of the proposed facility and have been sized to mitigate the peak runoff rates up to the 100-year storm event. In addition, two crushed stone diaphragms in concert with downgradient grass vegetation will provide pre-treatment of runoff prior to entering the infiltration basins. Each basin is equipped with a small overflow spillway in the event of a large storm event. Runoff will be discharged and follow flow patterns consistent with the existing hydrology of the site. A Detail of the proposed overflow spillways have been provided in the revised Site Plans.

The USDA National Resource Conservation Service has mapped the soil type in the vicinity of the proposed metering station as Canton fine sandy loam. The characteristics of this soil are consistent with the classification of hydrologic soil group "B", and was assumed as such for the stormwater calculation purposes.

Per the MassDEP Stormwater Handbook (the Handbook), the required recharge volume for the proposed metering station is approximately 78 cubic feet. See Section 3.0 for the recharge, TSS Removal, Water Quality and Drawdown Calculations.

Maintenance of the proposed BMPs shall be in accordance with the procedures specified in the Site Owner's Manual included with the Stormwater Management Report.

## 2.0 RUNOFF RATES TABLE

The following table summarizes the Pre- and Post-Development Runoff Rates in cubic feet per second (cfs).

| Storm Event    | 2 Year      |      | 10 Year     |      | 25 Year     |      | 100 Year    |      |
|----------------|-------------|------|-------------|------|-------------|------|-------------|------|
|                | <i>Pre</i>  | Post | <i>Pre</i>  | Post | <i>Pre</i>  | Post | <i>Pre</i>  | Post |
| Design Point 1 | <i>0.09</i> | 0.04 | <i>0.51</i> | 0.18 | <i>0.85</i> | 0.30 | <i>1.59</i> | 0.94 |
| Design Point 2 | <i>0.07</i> | 0.07 | <i>0.26</i> | 0.22 | <i>0.38</i> | 0.31 | <i>0.64</i> | 0.49 |

## 3.0 STORMWATER MANAGEMENT CALCULATIONS

Please see enclosed the following calculations for stormwater management:

- Pre-and Post- Development Hydrologic Calculations
- TSS Removal, Water Quality and Recharge and Drawdown Calculations



# BEALS + THOMAS

BEALS AND THOMAS, INC.  
Reservoir Corporate Center  
144 Turnpike Road  
Southborough, MA 01772-2104

## CALCULATION SUMMARY

T 508.366.0560

F 508.366.4391

www.bealsandthomas.com

Regional Office: Plymouth, MA

### JOB NO./LOCATION:

1422.10  
Medway, Massachusetts

### CLIENT/PROJECT:

Exelon  
West Medway II

### SUBJECT/TITLE:

Gas Metering Station: Pre- and Post Development Conditions Hydrology Analysis

### OBJECTIVE OF CALCULATION:

- To determine the pre- and post-development peak rates of runoff from the proposed gas metering facility for the 2-, 10-, 25- and 100-year storm events.

### CALCULATION METHOD(S):

- CN and Tc determined based on TR-55 methodology.
- Runoff rates computed using HydroCAD version 10.00.

### ASSUMPTIONS:

- Surface cover types and boundaries have been estimated based upon MassGIS, USGS Color Ortho Imagery 2008.
- Hydrologic group of on-site soils was determined based on the United States Department of Agriculture, NRCS Soil Survey information.
- Per TR-55, a minimum time of concentration of 6.0 minutes was used.

### SOURCES OF DATA/EQUATIONS:

- Pre- and Post-Development Conditions Hydrologic Areas Maps prepared by Beals and Thomas, Inc, file numbers 142210P048B-001 and 002.
- TR-55 Urban Hydrology for Small Watersheds, SCS, 1986.
- NRCS Soil Survey Atlas Information for Norfolk and Suffolk Counties.

### CONCLUSIONS:

| Storm Event | Design Point-1 |      | Design Point-2 |      |
|-------------|----------------|------|----------------|------|
|             | Pre            | Post | Pre            | Post |
| 2-year      | 0.09           | 0.04 | 0.07           | 0.07 |
| 10-year     | 0.51           | 0.18 | 0.26           | 0.22 |
| 25-year     | 0.85           | 0.30 | 0.38           | 0.31 |
| 100-year    | 1.59           | 0.94 | 0.64           | 0.49 |

- Post development peak rates of runoff will be equal to or less than pre-development peak rates.

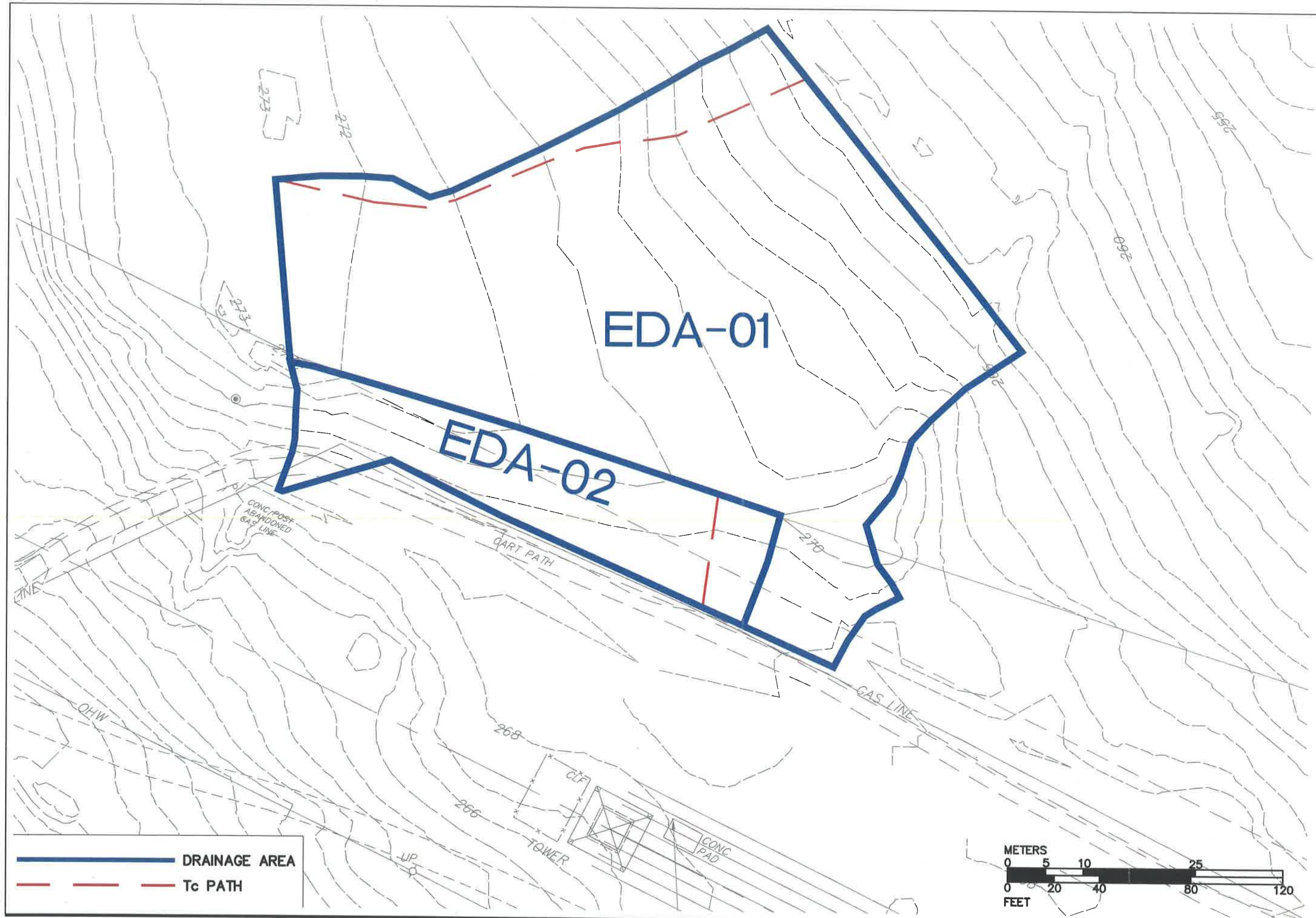
| REV | CALC. BY  | DATE    | CHECKED BY | DATE    | APPROVED BY | DATE    |
|-----|-----------|---------|------------|---------|-------------|---------|
| 0   | J. Murphy | 6/17/16 | MCS        | 6/17/16 | J. Murphy   | 6/17/16 |
|     |           |         |            |         |             |         |
|     |           |         |            |         |             |         |

142210CS012A



BEALS + THOMAS



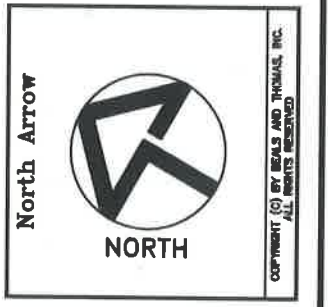


**Exelon Gas Meter Station:  
Pre-Development Hydrologic  
Areas Map**

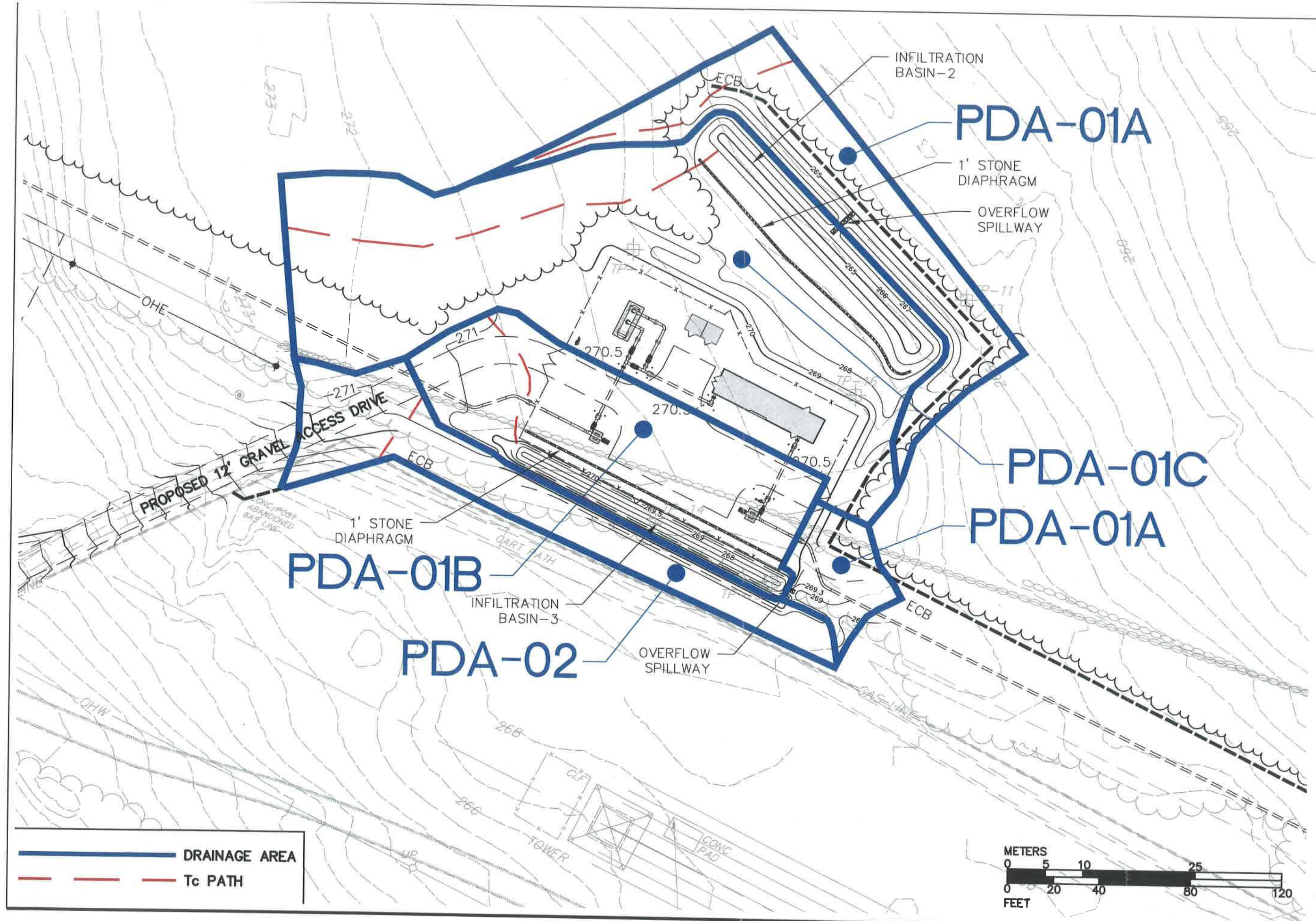
Scale: 1" = 40'      Date: 06/17/2016  
Plan No. 142210P048B-001  
B+T Project No. 1422.10

**West Medway II**  
Medway, Massachusetts

**Exelon West Medway, LLC & Exelon  
West Medway II, LLC**  
300 Exelon Way  
Kennett Square, Pennsylvania







**Exelon Gas Meter Station:  
Post-Development Hydrologic  
Areas Map**

Scale: 1" = 40'  
Date: 06/17/2016  
Plan No. 142210P048B-002  
B+T Project No. 1422.10

**West Medway II**  
Medway, Massachusetts

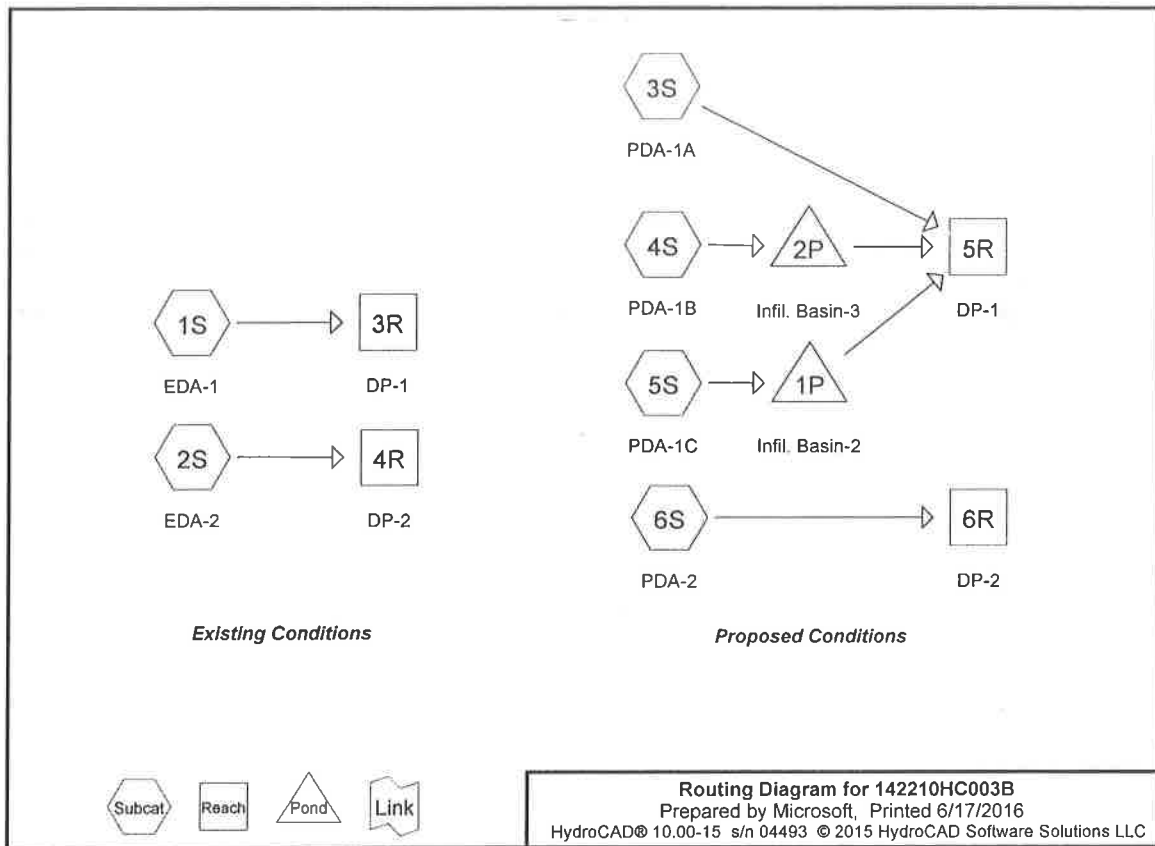
**Exelon West Medway, LLC & Exelon  
West Medway II, LLC**  
300 Exelon Way  
Kennett Square, Pennsylvania

North Arrow

NORTH

COPYRIGHT (C) BY BEALS AND THOMAS, INC.  
ALL RIGHTS RESERVED





# 142210HC003B

Prepared by Microsoft  
 HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Printed 6/17/2016

Page 2

## Area Listing (all nodes)

| Area<br>(acres) | CN | Description<br>(subcatchment-numbers)          |
|-----------------|----|------------------------------------------------|
| 0.086           | 69 | 50-75% Grass cover, Fair, HSG B (2S)           |
| 1.004           | 61 | >75% Grass cover, Good, HSG B (3S, 4S, 5S, 6S) |
| 0.116           | 85 | Gravel roads, HSG B (2S, 4S, 5S, 6S)           |
| 0.004           | 98 | Impervious Area (4S, 5S)                       |
| 0.017           | 98 | Roof Area (5S)                                 |
| 1.169           | 55 | Woods, Good, HSG B (1S, 2S, 3S)                |
| 0.026           | 65 | Woods/grass comb., Fair, HSG B (1S)            |
| 2.422           | 60 | TOTAL AREA                                     |

## Soil Listing (all nodes)

| Area<br>(acres) | Soil<br>Group | Subcatchment<br>Numbers |
|-----------------|---------------|-------------------------|
| 0.000           | HSG A         |                         |
| 2.401           | HSG B         | 1S, 2S, 3S, 4S, 5S, 6S  |
| 0.000           | HSG C         |                         |
| 0.000           | HSG D         |                         |
| 0.021           | Other         | 4S, 5S                  |
| 2.422           |               | TOTAL AREA              |

## Ground Covers (all nodes)

| HSG-A<br>(acres) | HSG-B<br>(acres) | HSG-C<br>(acres) | HSG-D<br>(acres) | Other<br>(acres) | Total<br>(acres) | Ground<br>Cover          | Subcatchment<br>Numbers |
|------------------|------------------|------------------|------------------|------------------|------------------|--------------------------|-------------------------|
| 0.000            | 0.086            | 0.000            | 0.000            | 0.000            | 0.086            | 50-75% Grass cover, Fair | 2S                      |
| 0.000            | 1.004            | 0.000            | 0.000            | 0.000            | 1.004            | >75% Grass cover, Good   | 3S, 4S, 5S, 6S          |
| 0.000            | 0.116            | 0.000            | 0.000            | 0.000            | 0.116            | Gravel roads             | 2S, 4S, 5S, 6S          |
| 0.000            | 0.000            | 0.000            | 0.000            | 0.004            | 0.004            | Impervious Area          | 4S, 5S                  |
| 0.000            | 0.000            | 0.000            | 0.000            | 0.017            | 0.017            | Roof Area                | 5S                      |
| 0.000            | 1.169            | 0.000            | 0.000            | 0.000            | 1.169            | Woods, Good              | 1S, 2S, 3S              |
| 0.000            | 0.026            | 0.000            | 0.000            | 0.000            | 0.026            | Woods/grass comb., Fair  | 1S                      |
| 0.000            | 2.401            | 0.000            | 0.000            | 0.021            | 2.422            | TOTAL AREA               |                         |

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-002yr Rainfall=3.20"

Printed 6/17/2016

Page 5

## Summary for Subcatchment 1S: EDA-1

Runoff = 0.09 cfs @ 12.53 hrs, Volume= 0.017 af, Depth&gt; 0.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-002yr Rainfall=3.20"

| Area (ac) | CN | Description                    |
|-----------|----|--------------------------------|
| 0.974     | 55 | Woods, Good, HSG B             |
| 0.026     | 65 | Woods/grass comb., Fair, HSG B |
| 1.000     | 55 | Weighted Average               |
| 1.000     |    | 100.00% Pervious Area          |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                          |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------|
| 15.4     | 50            | 0.0120        | 0.05              |                | Sheet Flow, Sheet Flow<br>Woods: Light underbrush n= 0.400 P2= 3.10" |
| 3.2      | 195           | 0.0400        | 1.00              |                | Shallow Concentrated Flow, SCF-1<br>Woodland Kv= 5.0 fps             |
| 18.7     | 245           | Total         |                   |                |                                                                      |

## Summary for Subcatchment 2S: EDA-2

Runoff = 0.07 cfs @ 12.13 hrs, Volume= 0.007 af, Depth&gt; 0.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-002yr Rainfall=3.20"

| Area (ac) | CN | Description                     |
|-----------|----|---------------------------------|
| 0.120     | 55 | Woods, Good, HSG B              |
| 0.086     | 69 | 50-75% Grass cover, Fair, HSG B |
| 0.005     | 85 | Gravel roads, HSG B             |
| 0.211     | 61 | Weighted Average                |
| 0.211     |    | 100.00% Pervious Area           |

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-002yr Rainfall=3.20"

Printed 6/17/2016

Page 6

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

## Summary for Subcatchment 3S: PDA-1A

Runoff = 0.04 cfs @ 12.34 hrs, Volume= 0.006 af, Depth&gt; 0.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-002yr Rainfall=3.20"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.075     | 55 | Woods, Good, HSG B            |
| 0.144     | 61 | >75% Grass cover, Good, HSG B |
| 0.219     | 59 | Weighted Average              |
| 0.219     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                                          |
|----------|---------------|---------------|-------------------|----------------|----------------------------------------------------------------------|
| 12.1     | 50            | 0.0220        | 0.07              |                | Sheet Flow, Sheet Flow<br>Woods: Light underbrush n= 0.400 P2= 3.10" |
| 1.6      | 106           | 0.0500        | 1.12              |                | Shallow Concentrated Flow, SCF-1<br>Woodland Kv= 5.0 fps             |
| 13.7     | 156           | Total         |                   |                |                                                                      |

## Summary for Subcatchment 4S: PDA-1B

Runoff = 0.20 cfs @ 12.10 hrs, Volume= 0.015 af, Depth&gt; 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-002yr Rainfall=3.20"

**142210HC003B**

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-002yr Rainfall=3.20"

Printed 6/17/2016

Page 7

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.150     | 61 | >75% Grass cover, Good, HSG B |
| 0.084     | 85 | Gravel roads, HSG B           |
| * 0.001   | 98 | Impervious Area               |
| 0.235     | 70 | Weighted Average              |
| 0.234     |    | 99.57% Pervious Area          |
| 0.001     |    | 0.43% Impervious Area         |

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

**Summary for Subcatchment 5S: PDA-1C**

Runoff = 0.19 cfs @ 12.33 hrs, Volume= 0.023 af, Depth&gt; 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-002yr Rainfall=3.20"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.188     | 61 | >75% Grass cover, Good, HSG B |
| 0.393     | 61 | >75% Grass cover, Good, HSG B |
| 0.011     | 85 | Gravel roads, HSG B           |
| * 0.017   | 98 | Roof Area                     |
| * 0.003   | 98 | Impervious Area               |
| 0.612     | 63 | Weighted Average              |
| 0.592     |    | 96.73% Pervious Area          |
| 0.020     |    | 3.27% Impervious Area         |

**142210HC003B**

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-002yr Rainfall=3.20"

Printed 6/17/2016

Page 8

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                |
|----------|---------------|---------------|-------------------|----------------|--------------------------------------------|
| 15.4     | 50            | 0.0120        | 0.05              |                | Sheet Flow, Sheet Flow                     |
|          |               |               |                   |                | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 2.5      | 132           | 0.0300        | 0.87              |                | Shallow Concentrated Flow, SCF-1           |
|          |               |               |                   |                | Woodland Kv= 5.0 fps                       |
| 0.0      | 6             | 0.2000        | 3.13              |                | Shallow Concentrated Flow, SCF-2           |
|          |               |               |                   |                | Short Grass Pasture Kv= 7.0 fps            |
| 17.9     | 188           | Total         |                   |                |                                            |

**Summary for Subcatchment 6S: PDA-2**

Runoff = 0.07 cfs @ 12.12 hrs, Volume= 0.006 af, Depth&gt; 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-002yr Rainfall=3.20"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.129     | 61 | >75% Grass cover, Good, HSG B |
| 0.016     | 85 | Gravel roads, HSG B           |
| 0.145     | 64 | Weighted Average              |
| 0.145     |    | 100.00% Pervious Area         |

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

**Summary for Reach 3R: DP-1**

Inflow Area = 1.000 ac, 0.00% Impervious, Inflow Depth > 0.21" for Norfolk-002yr event  
 Inflow = 0.09 cfs @ 12.53 hrs, Volume= 0.017 af  
 Outflow = 0.09 cfs @ 12.53 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 4R: DP-2**

Inflow Area = 0.211 ac, 0.00% Impervious, Inflow Depth > 0.39" for Norfolk-002yr event  
 Inflow = 0.07 cfs @ 12.13 hrs, Volume= 0.007 af  
 Outflow = 0.07 cfs @ 12.13 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 5R: DP-1**

Inflow Area = 1.066 ac, 1.97% Impervious, Inflow Depth > 0.07" for Norfolk-002yr event  
 Inflow = 0.04 cfs @ 12.34 hrs, Volume= 0.006 af  
 Outflow = 0.04 cfs @ 12.34 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 6R: DP-2**

Inflow Area = 0.145 ac, 0.00% Impervious, Inflow Depth > 0.50" for Norfolk-002yr event  
 Inflow = 0.07 cfs @ 12.12 hrs, Volume= 0.006 af  
 Outflow = 0.07 cfs @ 12.12 hrs, Volume= 0.006 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Pond 1P: Infil. Basin-2**

Inflow Area = 0.612 ac, 3.27% Impervious, Inflow Depth > 0.45" for Norfolk-002yr event  
 Inflow = 0.19 cfs @ 12.33 hrs, Volume= 0.023 af  
 Outflow = 0.02 cfs @ 15.66 hrs, Volume= 0.015 af, Atten= 87%, Lag= 200.1 min  
 Discarded = 0.02 cfs @ 15.66 hrs, Volume= 0.015 af  
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 265.59' @ 15.66 hrs Surf.Area= 1,058 sf Storage= 467 cf

Plug-Flow detention time= 187.8 min calculated for 0.015 af (67% of inflow)

Center-of-Mass det. time= 108.8 min ( 966.6 - 857.9 )

| Volume | Invert  | Avail. Storage | Storage Description                                 |
|--------|---------|----------------|-----------------------------------------------------|
| #1     | 265.00' | 3,505 cf       | Custom Stage Data (Prismatic) listed below (Recalc) |

| Elevation<br>(feet) | Surf. Area<br>(sq-ft) | Inc. Store<br>(cubic-feet) | Cum. Store<br>(cubic-feet) |
|---------------------|-----------------------|----------------------------|----------------------------|
| 265.00              | 536                   | 0                          | 0                          |
| 266.00              | 1,427                 | 982                        | 982                        |
| 266.50              | 2,490                 | 979                        | 1,961                      |
| 267.00              | 3,687                 | 1,544                      | 3,505                      |

| Device | Routing   | Invert  | Outlet Devices                                                                                   |
|--------|-----------|---------|--------------------------------------------------------------------------------------------------|
| #1     | Discarded | 265.00' | 1.020 in/hr Exfiltration over Surface area                                                       |
| #2     | Primary   | 266.50' | 2.0' long x 9.0' 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) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67  |
|        |           |         | 2.69                                                                                             |

Discarded OutFlow Max=0.02 cfs @ 15.66 hrs HW=265.59' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=265.00' (Free Discharge)

2=Broad-Crested Rectangular Weir( Controls 0.00 cfs)

**Summary for Pond 2P: Infil. Basin-3**

Inflow Area = 0.235 ac, 0.43% Impervious, Inflow Depth > 0.75" for Norfolk-002yr event  
 Inflow = 0.20 cfs @ 12.10 hrs, Volume= 0.015 af  
 Outflow = 0.02 cfs @ 14.99 hrs, Volume= 0.010 af, Atten= 93%, Lag= 173.2 min  
 Discarded = 0.02 cfs @ 14.99 hrs, Volume= 0.010 af  
 Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

## 142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-002yr Rainfall=3.20"

Printed 6/17/2016

Page 11

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 268.73' @ 14.99 hrs Surf.Area= 639 sf Storage= 322 cf

Plug-Flow detention time=205.4 min calculated for 0.010 af (65% of inflow)  
 Center-of-Mass det. time= 126.8 min ( 955.2 - 828.4 )

| Volume              | Invert               | Avail.Storage             | Storage Description                                |
|---------------------|----------------------|---------------------------|----------------------------------------------------|
| #1                  | 268.00'              | 1,590 cf                  | Custom Stage Data (Prismatic Listed below (Recalc) |
| Elevation<br>(feet) | Surf.Area<br>(sq-ft) | Inc.Store<br>(cubic-feet) | Cum.Store<br>(cubic-feet)                          |
| 268.00              | 239                  | 0                         | 0                                                  |
| 269.00              | 784                  | 512                       | 512                                                |
| 269.50              | 1,069                | 463                       | 975                                                |
| 270.00              | 1,390                | 615                       | 1,590                                              |

| Device                                                                                           | Routing   | Invert  | Outlet Devices                                          |
|--------------------------------------------------------------------------------------------------|-----------|---------|---------------------------------------------------------|
| #1                                                                                               | Discarded | 268.00' | 1.020 in/hr Exfiltration over Surface area              |
| #2                                                                                               | Primary   | 269.30' | 2.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07  |           |         |                                                         |
| 3.32                                                                                             |           |         |                                                         |

Discarded OutFlow Max=0.02 cfs @ 14.99 hrs HW=268.73' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=268.00' (Free Discharge)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

## 142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-010yr Rainfall=4.70"

Printed 6/17/2016

Page 12

## Summary for Subcatchment 1S: EDA-1

Runoff = 0.51 cfs @ 12.33 hrs, Volume= 0.061 af, Depth> 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Norfolk-010yr Rainfall=4.70"

| Area (ac) | CN | Description                    |
|-----------|----|--------------------------------|
| 0.974     | 55 | Woods, Good, HSG B             |
| 0.026     | 65 | Woods/grass comb., Fair, HSG B |
| 1.000     | 55 | Weighted Average               |
| 1.000     |    | 100.00% Pervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------|
| 15.4        | 50               | 0.0120           | 0.05                 |                   | <b>Sheet Flow, Sheet Flow</b>              |
|             |                  |                  |                      |                   | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 3.2         | 195              | 0.0400           | 1.00                 |                   | <b>Shallow Concentrated Flow, SCF-1</b>    |
|             |                  |                  |                      |                   | Woodland Kv= 5.0 fps                       |
| 18.7        | 245              | Total            |                      |                   |                                            |

## Summary for Subcatchment 2S: EDA-2

Runoff = 0.26 cfs @ 12.10 hrs, Volume= 0.019 af, Depth> 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 Type III 24-hr Norfolk-010yr Rainfall=4.70"

| Area (ac) | CN | Description                     |
|-----------|----|---------------------------------|
| 0.120     | 55 | Woods, Good, HSG B              |
| 0.086     | 69 | 50-75% Grass cover, Fair, HSG B |
| 0.005     | 85 | Gravel roads, HSG B             |
| 0.211     | 61 | Weighted Average                |
| 0.211     |    | 100.00% Pervious Area           |

## 142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-010yr Rainfall=4.70"

Printed 6/17/2016

Page 13

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------|
| 6.0         |                  |                  |                      |                   | Direct Entry, Minimum Tc |

## Summary for Subcatchment 3S: PDA-1A

Runoff = 0.18 cfs @ 12.22 hrs, Volume= 0.017 af, Depth&gt; 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-010yr Rainfall=4.70"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.075     | 55 | Woods, Good, HSG B            |
| 0.144     | 61 | >75% Grass cover, Good, HSG B |
| 0.219     | 59 | Weighted Average              |
| 0.219     |    | 100.00% Pervious Area         |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------------------------------------------------------|
| 12.1        | 50               | 0.0220           | 0.07                 |                   | Sheet Flow, Sheet Flow<br>Woods: Light underbrush n= 0.400 P2= 3.10" |
| 1.6         | 106              | 0.0500           | 1.12                 |                   | Shallow Concentrated Flow, SCF-1<br>Woodland Kv= 5.0 fps             |
| 13.7        | 156              | Total            |                      |                   |                                                                      |

## Summary for Subcatchment 4S: PDA-1B

Runoff = 0.48 cfs @ 12.10 hrs, Volume= 0.033 af, Depth&gt; 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-010yr Rainfall=4.70"

## 142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-010yr Rainfall=4.70"

Printed 6/17/2016

Page 14

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.150     | 61 | >75% Grass cover, Good, HSG B |
| 0.084     | 85 | Gravel roads, HSG B           |
| 0.001     | 98 | Impervious Area               |
| 0.235     | 70 | Weighted Average              |
| 0.234     |    | 99.57% Pervious Area          |
| 0.001     |    | 0.43% Impervious Area         |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 6.0         |                  |                  |                      |                   | Direct Entry, |

## Summary for Subcatchment 5S: PDA-1C

Runoff = 0.61 cfs @ 12.27 hrs, Volume= 0.061 af, Depth&gt; 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-010yr Rainfall=4.70"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.188     | 61 | >75% Grass cover, Good, HSG B |
| 0.393     | 61 | >75% Grass cover, Good, HSG B |
| 0.011     | 85 | Gravel roads, HSG B           |
| 0.017     | 98 | Roof Area                     |
| 0.003     | 98 | Impervious Area               |
| 0.612     | 63 | Weighted Average              |
| 0.592     |    | 96.73% Pervious Area          |
| 0.020     |    | 3.27% Impervious Area         |

**142210HC003B**

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-010yr Rainfall=4.70"

Printed 6/17/2016

Page 15

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------|
| 15.4        | 50               | 0.0120           | 0.05                 |                   | Sheet Flow, Sheet Flow                     |
|             |                  |                  |                      |                   | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 2.5         | 132              | 0.0300           | 0.87                 |                   | Shallow Concentrated Flow, SCF-1           |
|             |                  |                  |                      |                   | Woodland Kv= 5.0 fps                       |
| 0.0         | 6                | 0.2000           | 3.13                 |                   | Shallow Concentrated Flow, SCF-2           |
|             |                  |                  |                      |                   | Short Grass Pasture Kv= 7.0 fps            |
| 17.9        | 188              | Total            |                      |                   |                                            |

**Summary for Subcatchment 6S: PDA-2**

Runoff = 0.22 cfs @ 12.10 hrs, Volume= 0.015 af, Depth&gt; 1.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-010yr Rainfall=4.70"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.129     | 61 | >75% Grass cover, Good, HSG B |
| 0.016     | 85 | Gravel roads, HSG B           |
| 0.145     | 64 | Weighted Average              |
| 0.145     |    | 100.00% Pervious Area         |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------|
| 6.0         |                  |                  |                      |                   | Direct Entry, Minimum Tc |

**Summary for Reach 3R: DP-1**Inflow Area = 1.000 ac, 0.00% Impervious, Inflow Depth > 0.73" for Norfolk-010yr event  
Inflow = 0.51 cfs @ 12.33 hrs, Volume= 0.061 af  
Outflow = 0.51 cfs @ 12.33 hrs, Volume= 0.061 af, Atten= 0%, Lag= 0.0 min**142210HC003B**

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-010yr Rainfall=4.70"

Printed 6/17/2016

Page 16

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 4R: DP-2**Inflow Area = 0.211 ac, 0.00% Impervious, Inflow Depth > 1.08" for Norfolk-010yr event  
Inflow = 0.26 cfs @ 12.10 hrs, Volume= 0.019 af  
Outflow = 0.26 cfs @ 12.10 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 5R: DP-1**Inflow Area = 1.066 ac, 1.97% Impervious, Inflow Depth > 0.22" for Norfolk-010yr event  
Inflow = 0.18 cfs @ 12.22 hrs, Volume= 0.020 af  
Outflow = 0.18 cfs @ 12.22 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 6R: DP-2**Inflow Area = 0.145 ac, 0.00% Impervious, Inflow Depth > 1.26" for Norfolk-010yr event  
Inflow = 0.22 cfs @ 12.10 hrs, Volume= 0.015 af  
Outflow = 0.22 cfs @ 12.10 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Pond 1P: Infil. Basin-2**Inflow Area = 0.612 ac, 3.27% Impervious, Inflow Depth > 1.19" for Norfolk-010yr event  
Inflow = 0.61 cfs @ 12.27 hrs, Volume= 0.061 af  
Outflow = 0.05 cfs @ 15.84 hrs, Volume= 0.031 af, Atten= 92%, Lag= 214.2 min  
Discarded = 0.05 cfs @ 15.84 hrs, Volume= 0.031 af  
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

## 142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-010yr Rainfall=4.70"

Printed 6/17/2016

Page 17

Peak Elev= 266.32' @ 15.84 hrs Surf.Area= 2,111 sf Storage= 1,551 cf

Plug-Flow detention time= 223.8 min calculated for 0.031 af (50% of inflow)

Center-of-Mass det. time= 132.5 min ( 966.1 - 833.6 )

| Volume | Invert  | Avail. Storage | Storage Description                                 |
|--------|---------|----------------|-----------------------------------------------------|
| #1     | 265.00' | 3,505 cf       | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation<br>(feet) | Surf. Area<br>(sq-ft) | Inc. Store<br>(cubic-feet) | Cum. Store<br>(cubic-feet) |
|---------------------|-----------------------|----------------------------|----------------------------|
| 265.00              | 536                   | 0                          | 0                          |
| 266.00              | 1,427                 | 982                        | 982                        |
| 266.50              | 2,490                 | 979                        | 1,961                      |
| 267.00              | 3,687                 | 1,544                      | 3,505                      |

| Device                                                                                           | Routing   | Invert  | Outlet Devices                                          |
|--------------------------------------------------------------------------------------------------|-----------|---------|---------------------------------------------------------|
| #1                                                                                               | Discarded | 265.00' | 1.020 in/hr Exfiltration over Surface area              |
| #2                                                                                               | Primary   | 266.50' | 2.0' long x 9.0' 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) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67  |           |         |                                                         |
| 2.69                                                                                             |           |         |                                                         |

Discarded OutFlow Max=0.05 cfs @ 15.84 hrs HW=266.32' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=265.00' (Free Discharge)

2=Broad-Crested Rectangular Weir( Controls 0.00 cfs)

## Summary for Pond 2P: Infil. Basin-3

Inflow Area = 0.235 ac, 0.43% Impervious, Inflow Depth > 1.67" for Norfolk-010yr event  
 Inflow = 0.48 cfs @ 12.10 hrs, Volume= 0.033 af  
 Outflow = 0.04 cfs @ 13.83 hrs, Volume= 0.018 af, Atten= 92%, Lag= 103.8 min  
 Discarded = 0.02 cfs @ 13.83 hrs, Volume= 0.015 af  
 Primary = 0.02 cfs @ 13.83 hrs, Volume= 0.002 af

## 142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-010yr Rainfall=4.70"

Printed 6/17/2016

Page 18

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 269.32' @ 13.83 hrs Surf.Area= 968 sf Storage= 794 cf

Plug-Flow detention time= 210.0 min calculated for 0.018 af (54% of inflow)

Center-of-Mass det. time= 125.7 min ( 935.8 - 810.1 )

| Volume | Invert  | Avail. Storage | Storage Description                                 |
|--------|---------|----------------|-----------------------------------------------------|
| #1     | 268.00' | 1,590 cf       | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation<br>(feet) | Surf. Area<br>(sq-ft) | Inc. Store<br>(cubic-feet) | Cum. Store<br>(cubic-feet) |
|---------------------|-----------------------|----------------------------|----------------------------|
| 268.00              | 239                   | 0                          | 0                          |
| 269.00              | 784                   | 512                        | 512                        |
| 269.50              | 1,069                 | 463                        | 975                        |
| 270.00              | 1,390                 | 615                        | 1,590                      |

| Device                                                                                           | Routing   | Invert  | Outlet Devices                                          |
|--------------------------------------------------------------------------------------------------|-----------|---------|---------------------------------------------------------|
| #1                                                                                               | Discarded | 268.00' | 1.020 in/hr Exfiltration over Surface area              |
| #2                                                                                               | Primary   | 269.30' | 2.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07  |           |         |                                                         |
| 3.32                                                                                             |           |         |                                                         |

Discarded OutFlow Max=0.02 cfs @ 13.83 hrs HW=269.32' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.02 cfs @ 13.83 hrs HW=269.32' (Free Discharge)

2=Broad-Crested Rectangular Weir(Weir Controls 0.02 cfs @ 0.36 fps)

## Summary for Subcatchment 1S: EDA-1

Runoff = 0.85 cfs @ 12.31 hrs, Volume= 0.092 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-025yr Rainfall=5.50"

| Area (ac) | CN | Description                    |
|-----------|----|--------------------------------|
| 0.974     | 55 | Woods, Good, HSG B             |
| 0.026     | 65 | Woods/grass comb., Fair, HSG B |
| 1.000     | 55 | Weighted Average               |
| 1.000     |    | 100.00% Pervious Area          |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                |
|----------|---------------|---------------|-------------------|----------------|--------------------------------------------|
| 15.4     | 50            | 0.0120        | 0.05              |                | Sheet Flow, Sheet Flow                     |
|          |               |               |                   |                | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 3.2      | 195           | 0.0400        | 1.00              |                | Shallow Concentrated Flow, SCF-1           |
|          |               |               |                   |                | Woodland Kv= 5.0 fps                       |
| 18.7     | 245           | Total         |                   |                |                                            |

## Summary for Subcatchment 2S: EDA-2

Runoff = 0.38 cfs @ 12.10 hrs, Volume= 0.027 af, Depth> 1.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-025yr Rainfall=5.50"

| Area (ac) | CN | Description                     |
|-----------|----|---------------------------------|
| 0.120     | 55 | Woods, Good, HSG B              |
| 0.086     | 69 | 50-75% Grass cover, Fair, HSG B |
| 0.005     | 85 | Gravel roads, HSG B             |
| 0.211     | 61 | Weighted Average                |
| 0.211     |    | 100.00% Pervious Area           |

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

## Summary for Subcatchment 3S: PDA-1A

Runoff = 0.28 cfs @ 12.21 hrs, Volume= 0.025 af, Depth> 1.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-025yr Rainfall=5.50"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.075     | 55 | Woods, Good, HSG B            |
| 0.144     | 61 | >75% Grass cover, Good, HSG B |
| 0.219     | 59 | Weighted Average              |
| 0.219     |    | 100.00% Pervious Area         |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                |
|----------|---------------|---------------|-------------------|----------------|--------------------------------------------|
| 12.1     | 50            | 0.0220        | 0.07              |                | Sheet Flow, Sheet Flow                     |
|          |               |               |                   |                | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 1.6      | 106           | 0.0500        | 1.12              |                | Shallow Concentrated Flow, SCF-1           |
|          |               |               |                   |                | Woodland Kv= 5.0 fps                       |
| 13.7     | 156           | Total         |                   |                |                                            |

## Summary for Subcatchment 4S: PDA-1B

Runoff = 0.65 cfs @ 12.10 hrs, Volume= 0.044 af, Depth> 2.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-025yr Rainfall=5.50"

**142210HC003B**

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-025yr Rainfall=5.50"

Printed 6/17/2016

Page 21

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.150     | 61 | >75% Grass cover, Good, HSG B |
| 0.084     | 85 | Gravel roads, HSG B           |
| * 0.001   | 98 | Impervious Area               |
| 0.235     | 70 | Weighted Average              |
| 0.234     |    | 99.57% Pervious Area          |
| 0.001     |    | 0.43% Impervious Area         |

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

**Summary for Subcatchment 5S: PDA-1C**

Runoff = 0.88 cfs @ 12.27 hrs, Volume= 0.085 af, Depth&gt; 1.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-025yr Rainfall=5.50"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.188     | 61 | >75% Grass cover, Good, HSG B |
| 0.393     | 61 | >75% Grass cover, Good, HSG B |
| 0.011     | 85 | Gravel roads, HSG B           |
| * 0.017   | 98 | Roof Area                     |
| * 0.003   | 98 | Impervious Area               |
| 0.612     | 63 | Weighted Average              |
| 0.592     |    | 96.73% Pervious Area          |
| 0.020     |    | 3.27% Impervious Area         |

**142210HC003B**

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-025yr Rainfall=5.50"

Printed 6/17/2016

Page 22

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description                                |
|----------|---------------|---------------|-------------------|----------------|--------------------------------------------|
| 15.4     | 50            | 0.0120        | 0.05              |                | Sheet Flow, Sheet Flow                     |
|          |               |               |                   |                | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 2.5      | 132           | 0.0300        | 0.87              |                | Shallow Concentrated Flow, SCF-1           |
|          |               |               |                   |                | Woodland Kv= 5.0 fps                       |
| 0.0      | 6             | 0.2000        | 3.13              |                | Shallow Concentrated Flow, SCF-2           |
|          |               |               |                   |                | Short Grass Pasture Kv= 7.0 fps            |
| 17.9     | 188           | Total         |                   |                |                                            |

**Summary for Subcatchment 6S: PDA-2**

Runoff = 0.31 cfs @ 12.10 hrs, Volume= 0.021 af, Depth&gt; 1.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-025yr Rainfall=5.50"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.129     | 61 | >75% Grass cover, Good, HSG B |
| 0.016     | 85 | Gravel roads, HSG B           |
| 0.145     | 64 | Weighted Average              |
| 0.145     |    | 100.00% Pervious Area         |

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

**Summary for Reach 3R: DP-1**

Inflow Area = 1.000 ac, 0.00% Impervious, Inflow Depth > 1.10" for Norfolk-025yr event  
 Inflow = 0.85 cfs @ 12.31 hrs, Volume= 0.092 af  
 Outflow = 0.85 cfs @ 12.31 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-025yr Rainfall=5.50"

Printed 6/17/2016

Page 23

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 4R: DP-2**

Inflow Area = 0.211 ac, 0.00% Impervious, Inflow Depth > 1.53" for Norfolk-025yr event  
 Inflow = 0.38 cfs @ 12.10 hrs, Volume= 0.027 af  
 Outflow = 0.38 cfs @ 12.10 hrs, Volume= 0.027 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 5R: DP-1**

Inflow Area = 1.066 ac, 1.97% Impervious, Inflow Depth > 0.49" for Norfolk-025yr event  
 Inflow = 0.30 cfs @ 12.46 hrs, Volume= 0.043 af  
 Outflow = 0.30 cfs @ 12.46 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 6R: DP-2**

Inflow Area = 0.145 ac, 0.00% Impervious, Inflow Depth > 1.75" for Norfolk-025yr event  
 Inflow = 0.31 cfs @ 12.10 hrs, Volume= 0.021 af  
 Outflow = 0.31 cfs @ 12.10 hrs, Volume= 0.021 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Pond 1P: Infil. Basin-2**

Inflow Area = 0.612 ac, 3.27% Impervious, Inflow Depth > 1.67" for Norfolk-025yr event  
 Inflow = 0.88 cfs @ 12.27 hrs, Volume= 0.085 af  
 Outflow = 0.10 cfs @ 14.22 hrs, Volume= 0.045 af, Atten= 88%, Lag= 117.5 min  
 Discarded = 0.06 cfs @ 14.22 hrs, Volume= 0.038 af  
 Primary = 0.04 cfs @ 14.22 hrs, Volume= 0.007 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-025yr Rainfall=5.50"

Printed 6/17/2016

Page 24

Peak Elev= 266.54' @ 14.22 hrs Surf.Area= 2,586 sf Storage= 2,063 cf

Plug-Flow detention time=208.2 min calculated for 0.045 af (53% of inflow)

Center-of-Mass det. time= 122.5 min ( 948.6 - 826.1 )

| Volume           | Invert             | Avail. Storage          | Storage Description                                        |
|------------------|--------------------|-------------------------|------------------------------------------------------------|
| #1               | 265.00'            | 3,505 cf                | <b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) |
| Elevation (feet) | Surf. Area (sq-ft) | Inc. Store (cubic-feet) | Cum. Store (cubic-feet)                                    |
| 265.00           | 536                | 0                       | 0                                                          |
| 266.00           | 1,427              | 982                     | 982                                                        |
| 266.50           | 2,490              | 979                     | 1,961                                                      |
| 267.00           | 3,687              | 1,544                   | 3,505                                                      |

| Device                                                                                           | Routing   | Invert  | Outlet Devices                                          |
|--------------------------------------------------------------------------------------------------|-----------|---------|---------------------------------------------------------|
| #1                                                                                               | Discarded | 265.00' | 1.020 in/hr Exfiltration over Surface area              |
| #2                                                                                               | Primary   | 266.50' | 2.0' long x 9.0' 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) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.66 2.67  |           |         |                                                         |
| 2.69                                                                                             |           |         |                                                         |

Discarded OutFlow Max=0.06 cfs @ 14.22 hrs HW=266.54' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.04 cfs @ 14.22 hrs HW=266.54' (Free Discharge)

2=Broad-Crested Rectangular Weir (Weir Controls 0.04 cfs @ 0.49 fps)

**Summary for Pond 2P: Infil. Basin-3**

Inflow Area = 0.235 ac, 0.43% Impervious, Inflow Depth > 2.23" for Norfolk-025yr event  
 Inflow = 0.65 cfs @ 12.10 hrs, Volume= 0.044 af  
 Outflow = 0.16 cfs @ 12.52 hrs, Volume= 0.028 af, Atten= 76%, Lag= 25.5 min  
 Discarded = 0.02 cfs @ 12.52 hrs, Volume= 0.016 af  
 Primary = 0.13 cfs @ 12.52 hrs, Volume= 0.011 af

## 142210HC003B

Prepared by Microsoft  
HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-025yr Rainfall=5.50"

Printed 6/17/2016

Page 25

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Peak Elev= 269.39' @ 12.52 hrs Surf.Area= 1,008 sf Storage= 863 cf

Plug-Flow detention time= 156.4 min calculated for 0.028 af (63% of inflow)  
Center-of-Mass det. time= 80.1 min ( 883.7 - 803.6 )

| Volume              | Invert                | Avail. Storage             | Storage Description                                 |
|---------------------|-----------------------|----------------------------|-----------------------------------------------------|
| #1                  | 268.00'               | 1,590 cf                   | Custom Stage Data (Prismatic) Listed below (Recalc) |
| Elevation<br>(feet) | Surf. Area<br>(sq-ft) | Inc. Store<br>(cubic-feet) | Cum. Store<br>(cubic-feet)                          |
| 268.00              | 239                   | 0                          | 0                                                   |
| 269.00              | 784                   | 512                        | 512                                                 |
| 269.50              | 1,069                 | 463                        | 975                                                 |
| 270.00              | 1,390                 | 615                        | 1,590                                               |

| Device | Routing   | Invert  | Outlet Devices                                                                                   |
|--------|-----------|---------|--------------------------------------------------------------------------------------------------|
| #1     | Discarded | 268.00' | 1.020 in/hr Exfiltration over Surface area                                                       |
| #2     | Primary   | 269.30' | 2.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07  |
|        |           |         | 3.32                                                                                             |

Discarded OutFlow Max=0.02 cfs @ 12.52 hrs HW=269.39' (Free Discharge)  
1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.13 cfs @ 12.52 hrs HW=269.39' (Free Discharge)  
2=Broad-Crested Rectangular Weir (Weir Controls 0.13 cfs @ 0.72 fps)

## 142210HC003B

Prepared by Microsoft  
HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-100yr Rainfall=7.00"

Printed 6/17/2016

Page 26

## Summary for Subcatchment 1S: EDA-1

Runoff = 1.59 cfs @ 12.28 hrs, Volume= 0.160 af, Depth> 1.92"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-100yr Rainfall=7.00"

| Area (ac) | CN | Description                    |
|-----------|----|--------------------------------|
| 0.974     | 55 | Woods, Good, HSG B             |
| 0.026     | 65 | Woods/grass comb., Fair, HSG B |
| 1.000     | 55 | Weighted Average               |
| 1.000     |    | 100.00% Pervious Area          |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------------------------|
| 15.4        | 50               | 0.0120           | 0.05                 |                   | Sheet Flow, Sheet Flow                     |
|             |                  |                  |                      |                   | Woods: Light underbrush n= 0.400 P2= 3.10" |
| 3.2         | 195              | 0.0400           | 1.00                 |                   | Shallow Concentrated Flow, SCF-1           |
|             |                  |                  |                      |                   | Woodland Kv= 5.0 fps                       |
| 18.7        | 245              | Total            |                      |                   |                                            |

## Summary for Subcatchment 2S: EDA-2

Runoff = 0.64 cfs @ 12.10 hrs, Volume= 0.044 af, Depth> 2.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-100yr Rainfall=7.00"

| Area (ac) | CN | Description                     |
|-----------|----|---------------------------------|
| 0.120     | 55 | Woods, Good, HSG B              |
| 0.086     | 69 | 50-75% Grass cover, Fair, HSG B |
| 0.005     | 85 | Gravel roads, HSG B             |
| 0.211     | 61 | Weighted Average                |
| 0.211     |    | 100.00% Pervious Area           |

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-100yr Rainfall=7.00"

Printed 6/17/2016

Page 27

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description              |
|-------------|------------------|------------------|----------------------|-------------------|--------------------------|
| 6.0         |                  |                  |                      |                   | Direct Entry, Minimum Tc |

**Summary for Subcatchment 3S: PDA-1A**

Runoff = 0.48 cfs @ 12.20 hrs, Volume= 0.042 af, Depth&gt; 2.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-100yr Rainfall=7.00"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.075     | 55 | Woods, Good, HSG B            |
| 0.144     | 61 | >75% Grass cover, Good, HSG B |
| 0.219     | 59 | Weighted Average              |
| 0.219     |    | 100.00% Pervious Area         |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                          |
|-------------|------------------|------------------|----------------------|-------------------|----------------------------------------------------------------------|
| 12.1        | 50               | 0.0220           | 0.07                 |                   | Sheet Flow, Sheet Flow<br>Woods: Light underbrush n= 0.400 P2= 3.10" |
| 1.6         | 106              | 0.0500           | 1.12                 |                   | Shallow Concentrated Flow, SCF-1<br>Woodland Kv= 5.0 fps             |
| 13.7        | 156              | Total            |                      |                   |                                                                      |

**Summary for Subcatchment 4S: PDA-1B**

Runoff = 0.98 cfs @ 12.09 hrs, Volume= 0.066 af, Depth&gt; 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-100yr Rainfall=7.00"

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-100yr Rainfall=7.00"

Printed 6/17/2016

Page 28

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.150     | 61 | >75% Grass cover, Good, HSG B |
| 0.084     | 85 | Gravel roads, HSG B           |
| 0.001     | 98 | Impervious Area               |
| 0.235     | 70 | Weighted Average              |
| 0.234     |    | 99.57% Pervious Area          |
| 0.001     |    | 0.43% Impervious Area         |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description   |
|-------------|------------------|------------------|----------------------|-------------------|---------------|
| 6.0         |                  |                  |                      |                   | Direct Entry, |

**Summary for Subcatchment 5S: PDA-1C**

Runoff = 1.43 cfs @ 12.26 hrs, Volume= 0.136 af, Depth&gt; 2.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Type III 24-hr Norfolk-100yr Rainfall=7.00"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.188     | 61 | >75% Grass cover, Good, HSG B |
| 0.393     | 61 | >75% Grass cover, Good, HSG B |
| 0.011     | 85 | Gravel roads, HSG B           |
| 0.017     | 98 | Roof Area                     |
| 0.003     | 98 | Impervious Area               |
| 0.612     | 63 | Weighted Average              |
| 0.592     |    | 96.73% Pervious Area          |
| 0.020     |    | 3.27% Impervious Area         |

**142210HC003B**

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-100yr Rainfall=7.00"

Printed 6/17/2016

Page 29

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                                                                 |
|-------------|------------------|------------------|----------------------|-------------------|-----------------------------------------------------------------------------|
| 15.4        | 50               | 0.0120           | 0.05                 |                   | <b>Sheet Flow, Sheet Flow</b><br>Woods: Light underbrush n= 0.400 P2= 3.10" |
| 2.5         | 132              | 0.0300           | 0.87                 |                   | <b>Shallow Concentrated Flow, SCF-1</b><br>Woodland Kv= 5.0 fps             |
| 0.0         | 6                | 0.2000           | 3.13                 |                   | <b>Shallow Concentrated Flow, SCF-2</b><br>Short Grass Pasture Kv= 7.0 fps  |
| 17.9        | 188              | Total            |                      |                   |                                                                             |

**Summary for Subcatchment 6S: PDA-2**

Runoff = 0.49 cfs @ 12.10 hrs, Volume= 0.033 af, Depth&gt; 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Type III 24-hr Norfolk-100yr Rainfall=7.00"

| Area (ac) | CN | Description                   |
|-----------|----|-------------------------------|
| 0.129     | 61 | >75% Grass cover, Good, HSG B |
| 0.016     | 85 | Gravel roads, HSG B           |
| 0.145     | 64 | Weighted Average              |
| 0.145     |    | 100.00% Pervious Area         |

| Tc<br>(min) | Length<br>(feet) | Slope<br>(ft/ft) | Velocity<br>(ft/sec) | Capacity<br>(cfs) | Description                     |
|-------------|------------------|------------------|----------------------|-------------------|---------------------------------|
| 6.0         |                  |                  |                      |                   | <b>Direct Entry, Minimum Tc</b> |

**Summary for Reach 3R: DP-1**

Inflow Area = 1.000 ac, 0.00% Impervious, Inflow Depth > 1.92" for Norfolk-100yr event  
 Inflow = 1.59 cfs @ 12.28 hrs, Volume= 0.160 af  
 Outflow = 1.59 cfs @ 12.28 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min

**142210HC003B**

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-100yr Rainfall=7.00"

Printed 6/17/2016

Page 30

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 4R: DP-2**

Inflow Area = 0.211 ac, 0.00% Impervious, Inflow Depth > 2.48" for Norfolk-100yr event  
 Inflow = 0.64 cfs @ 12.10 hrs, Volume= 0.044 af  
 Outflow = 0.64 cfs @ 12.10 hrs, Volume= 0.044 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 5R: DP-1**

Inflow Area = 1.066 ac, 1.97% Impervious, Inflow Depth > 1.38" for Norfolk-100yr event  
 Inflow = 0.94 cfs @ 12.23 hrs, Volume= 0.123 af  
 Outflow = 0.94 cfs @ 12.23 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Reach 6R: DP-2**

Inflow Area = 0.145 ac, 0.00% Impervious, Inflow Depth > 2.77" for Norfolk-100yr event  
 Inflow = 0.49 cfs @ 12.10 hrs, Volume= 0.033 af  
 Outflow = 0.49 cfs @ 12.10 hrs, Volume= 0.033 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Summary for Pond 1P: Infil. Basin-2**

Inflow Area = 0.612 ac, 3.27% Impervious, Inflow Depth > 2.66" for Norfolk-100yr event  
 Inflow = 1.43 cfs @ 12.26 hrs, Volume= 0.136 af  
 Outflow = 0.52 cfs @ 12.71 hrs, Volume= 0.092 af, Atten= 64%, Lag= 27.2 min  
 Discarded = 0.07 cfs @ 12.71 hrs, Volume= 0.042 af  
 Primary = 0.45 cfs @ 12.71 hrs, Volume= 0.050 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-100yr Rainfall=7.00"

Printed 6/17/2016

Page 31

Peak Elev= 266.70' @ 12.71 hrs Surf.Area= 2,973 sf Storage= 2,512 cf

Plug-Flow detention time= 135.5 min calculated for 0.092 af (68% of inflow)

Center-of-Mass det. time= 65.0 min ( 880.8 - 815.8 )

| Volume | Invert  | Avail.Storage | Storage Description                                 |
|--------|---------|---------------|-----------------------------------------------------|
| #1     | 265.00' | 3,505 cf      | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 265.00           | 536               | 0                      | 0                      |
| 266.00           | 1,427             | 982                    | 982                    |
| 266.50           | 2,490             | 979                    | 1,961                  |
| 267.00           | 3,687             | 1,544                  | 3,505                  |

| Device | Routing   | Invert  | Outlet Devices                                                                                       |
|--------|-----------|---------|------------------------------------------------------------------------------------------------------|
| #1     | Discarded | 265.00' | 1.020 in/hr Exfiltration over Surface area                                                           |
| #2     | Primary   | 266.50' | 2.0' long x 9.0' 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) 2.46 2.55 2.70 2.69 2.68 2.68 2.67 2.64 2.64 2.64 2.65 2.64 2.65 2.65 2.65 2.66 2.67 |
|        |           |         | 2.69                                                                                                 |

Discarded OutFlow Max=0.07 cfs @ 12.71 hrs HW=266.70' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.44 cfs @ 12.71 hrs HW=266.70' (Free Discharge)

2=Broad-Crested Rectangular Weir (Weir Controls 0.44 cfs @ 1.10 fps)

## Summary for Pond 2P: Infil. Basin-3

|               |            |                   |                                              |
|---------------|------------|-------------------|----------------------------------------------|
| Inflow Area = | 0.235 ac,  | 0.43% Impervious, | Inflow Depth > 3.36" for Norfolk-100yr event |
| Inflow =      | 0.98 cfs @ | 12.09 hrs,        | Volume= 0.066 af                             |
| Outflow =     | 0.51 cfs @ | 12.26 hrs,        | Volume= 0.049 af, Atten= 48%, Lag= 10.0 min  |
| Discarded =   | 0.03 cfs @ | 12.26 hrs,        | Volume= 0.017 af                             |
| Primary =     | 0.48 cfs @ | 12.26 hrs,        | Volume= 0.031 af                             |

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-100yr Rainfall=7.00"

Printed 6/17/2016

Page 32

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
Peak Elev= 269.52' @ 12.26 hrs Surf.Area= 1,080 sf Storage= 993 cf

Plug-Flow detention time= 106.2 min calculated for 0.048 af (73% of inflow)

Center-of-Mass det. time= 44.0 min ( 838.3 - 794.3 )

| Volume | Invert  | Avail.Storage | Storage Description                                 |
|--------|---------|---------------|-----------------------------------------------------|
| #1     | 268.00' | 1,590 cf      | Custom Stage Data (Prismatic) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|------------------|-------------------|------------------------|------------------------|
| 268.00           | 239               | 0                      | 0                      |
| 269.00           | 784               | 512                    | 512                    |
| 269.50           | 1,069             | 463                    | 975                    |
| 270.00           | 1,390             | 615                    | 1,590                  |

| Device | Routing   | Invert  | Outlet Devices                                                                                   |
|--------|-----------|---------|--------------------------------------------------------------------------------------------------|
| #1     | Discarded | 268.00' | 1.020 in/hr Exfiltration over Surface area                                                       |
| #2     | Primary   | 269.30' | 2.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07  |
|        |           |         | 3.32                                                                                             |

Discarded OutFlow Max=0.03 cfs @ 12.26 hrs HW=269.52' (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.48 cfs @ 12.26 hrs HW=269.52' (Free Discharge)

2=Broad-Crested Rectangular Weir (Weir Controls 0.48 cfs @ 1.11 fps)





grasses help to control erosion. Slope and rapid permeability are the main limitations to use of the soil as sites for septic tank absorption fields. If the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. Installing distribution lines across the slope helps to prevent the effluent from breaking out on the surface. In some areas precautionary measures are needed to reduce the pollution hazard.

This soil is in capability subclass IVe.

**C5B—Canton fine sandy loam, 3 to 8 percent slopes, extremely stony.** This is a very deep, gently sloping, well drained soil on the sides of upland hills and ridges near plains and terraces. Areas are irregular in shape and range from 6 to 150 acres in size. Stones 10 to 24 inches in diameter cover 1 to 15 percent of the surface. In some map units the stones are in clusters and the rest of these map units do not have stones.

Typically, the surface layer is black fine sandy loam about 1 inch thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part. Some areas have more gravel throughout.

Included with this soil in mapping are small areas of Charlton, Merrimac, and extremely stony Montauk soils in positions on the landscape similar to those of the Canton soil. Also included, in low areas and depressions, are areas of extremely stony Scituate soils. Included areas make up about 20 percent of the map unit.

Soil properties:

*Permeability:* Moderately rapid in the surface layer and the subsoil and rapid in the substratum.

*Available water capacity:* Low or moderate.

*Soil reaction:* Very strongly acid to moderately acid throughout.

*Depth to bedrock:* More than 60 inches.

*Depth to the seasonal high water table:* More than 6 feet.

**Hydrologic group: B.**

Most areas of this soil are woodland. Some areas are used as individual homesites. A few areas are used for pasture.

This soil is poorly suited to cultivated crops unless the surface is cleared of stones. The soil is fairly well suited to use as pastureland and as orchards. Stones and boulders, however, limit the use of conventional farm equipment.

Potential productivity for eastern white pine on this soil is high. The soil is easily managed for woodland. If conifers are grown, plant competition at regeneration is moderate. Thinning crowded stands to accepted stocking levels allows more vigorous growth. Shelterwood cutting, seed-tree cutting, and clearcutting help to establish natural regeneration or to provide suitable planting sites. Removing or controlling competing vegetation allows best growth of newly established seedlings. Pruning helps to improve the quality of white pine. Large stones on the surface generally limit the use of harvesting and planting equipment.

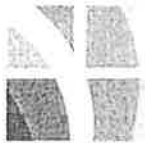
There are no major limitations to use of this soil for building site development and for local roads and streets. However, if the soil is used as sites for septic tank absorption fields, ground water pollution is a hazard. Because of rapid permeability, the soil readily absorbs but does not adequately filter the effluent. The large stones in this soil generally hinder excavation operations and the installation of distribution lines for septic tank absorption fields.

This soil is in capability subclass VI.

**CbC—Canton fine sandy loam, 8 to 15 percent slopes, extremely stony.** This is a very deep, strongly sloping, well drained soil on the sides of upland hills and ridges near outwash plains and terraces. Areas are irregular in shape and range from 6 to 150 acres in size. Stones 10 to 24 inches in diameter cover 1 to 15 percent of the land surface. In some map units the stones are in clusters and the rest of these map units do not have stones.

Typically, the surface layer is black fine sandy loam about 1 inch thick. The subsurface layer is dark gray fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. It is yellowish brown fine sandy loam in the upper part and light yellowish brown fine sandy loam in the lower part. The substratum is gravelly loamy sand to a depth of 60 inches or more. It is light olive gray in the upper part and olive gray in the lower part.

Included with this soil in mapping are small areas of Charlton and extremely stony Montauk soils in positions on the landscape similar to those of the Canton soil. Also included are areas of extremely stony Chatfield soils on knobs and extremely stony Scituate soils along



**BEALS + THOMAS**

Soil Test Pit Log

1422.10 – Medway, MA

Deep Observation Hole Number:

TP-16 (Northstar #ing)

| Depth (in.) | Soil Horizon/<br>Layer | Soil Matrix: Color-<br>Moist (Munsell) | Redoximorphic Features |       |         | Soil Texture<br>(USDA) | Coarse Fragments<br>% by Volume |                     | Soil Structure | Soil<br>Consistence<br>(Moist) | Other |
|-------------|------------------------|----------------------------------------|------------------------|-------|---------|------------------------|---------------------------------|---------------------|----------------|--------------------------------|-------|
|             |                        |                                        | Depth                  | Color | Percent |                        | Gravel                          | Cobbles<br>& Stones |                |                                |       |
| 2-0         | D                      | —                                      | —                      | —     | —       | —                      | —                               | —                   | —              | —                              | —     |
| 0-6         | A                      | 10 YR <sup>3</sup> / <sub>6</sub>      | —                      | —     | —       | fine<br>sandy loam     | 5-10%<br>5-10%                  | 10-15%<br>10-15%    | Massive        | Friable                        |       |
| 6-21        | B                      | 10 YR <sup>5</sup> / <sub>8</sub>      | —                      | —     | —       | fine<br>sandy loam     | 5-10%<br>5-10%                  | 10-15%<br>10-15%    | Massive        | Friable                        |       |
| 21-36"      | C                      | 10 YR <sup>5</sup> / <sub>2</sub>      | —                      | —     | —       | gravelly<br>loamy sand | 15-20%<br>15-20%                | 15-20%<br>15-20%    | Massive        | Friable                        |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |

Additional Notes:

Repaired @ 36", ledge encountered.



# BEALS + THOMAS

Soil Test Pit Log

1422.10 – Medway, MA

Deep Observation Hole Number:

TP-17 (Northstar #ing)

| Depth (in.) | Soil Horizon/<br>Layer | Soil Matrix: Color-<br>Moist (Munsell) | Redoximorphic Features |       |         | Soil Texture<br>(USDA) | Coarse Fragments<br>% by Volume |                     | Soil Structure | Soil<br>Consistence<br>(Moist) | Other |
|-------------|------------------------|----------------------------------------|------------------------|-------|---------|------------------------|---------------------------------|---------------------|----------------|--------------------------------|-------|
|             |                        |                                        | Depth                  | Color | Percent |                        | Gravel                          | Cobbles<br>& Stones |                |                                |       |
| 2-0         | O                      | —                                      | —                      | —     | —       | —                      |                                 |                     | —              | —                              | —     |
| 0-6         | A                      | 10 YR 3/6                              | —                      | —     | —       | fine<br>sandy loam     | 5-10%                           | 15-20%              | Massive        | Friable                        | —     |
| 6-24        | B                      | 10 YR 5/8                              | —                      | —     | —       | fine<br>sandy loam     | 5-10%                           | 15-20%              | Massive        | Friable                        | —     |
| 24-30       | C                      | 10 YR 5/2                              | —                      | —     | —       | gravelly<br>fine sand  | 5-10%                           | 10-15               | Massive        | Friable                        |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |

Additional Notes:

Refined @ 30", solid ledge encountered.



# BEALS + THOMAS

Soil Test Pit Log

1422.10 – Medway, MA

Deep Observation Hole Number:

TP-14 (Nonsar #ing)

| Depth (in.) | Soil Horizon/<br>Layer | Soil Matrix: Color-<br>Moist (Munsell) | Redoximorphic Features |       |         | Soil Texture<br>(USDA) | Coarse Fragments<br>% by Volume |                     | Soil Structure | Soil<br>Consistence<br>(Moist) | Other |
|-------------|------------------------|----------------------------------------|------------------------|-------|---------|------------------------|---------------------------------|---------------------|----------------|--------------------------------|-------|
|             |                        |                                        | Depth                  | Color | Percent |                        | Gravel                          | Cobbles<br>& Stones |                |                                |       |
| 2-0         | O                      | —                                      | —                      | —     | —       | —                      | —                               | —                   | —              | —                              | —     |
| 0-6         | A                      | 10 YR <sup>3</sup> / <sub>6</sub>      | —                      | —     | —       | Fine<br>sandy loam     | 5-10%                           | 5-10%               | Massive        | Friable                        | —     |
| 6-24        | B                      | 10 YR <sup>5</sup> / <sub>8</sub>      | —                      | —     | —       | Fine<br>sandy loam     | 5-10%                           | 5-10%               | Massive        | Friable                        | —     |
| 24-48       | C                      | 10 YR <sup>5</sup> / <sub>2</sub>      | —                      | —     | —       | gravelly<br>loamy sand | 20-25%                          | 10-15%              | Massive        | Friable                        | —     |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |

Additional Notes:

Refined @ ≈ 3.5-4' Fractured ledge.



**BEALS + THOMAS**  
Soil Test Pit Log

1422.10 – Medway, MA

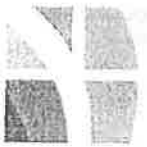
Deep Observation Hole Number:

*TP-15 (Northwestern # 15)*

| Depth (in.) | Soil Horizon/<br>Layer | Soil Matrix: Color-<br>Moist (Munsell) | Redoximorphic Features |       |         | Soil Texture<br>(USDA) | Coarse Fragments<br>% by Volume |                     | Soil Structure | Soil<br>Consistence<br>(Moist) | Other |
|-------------|------------------------|----------------------------------------|------------------------|-------|---------|------------------------|---------------------------------|---------------------|----------------|--------------------------------|-------|
|             |                        |                                        | Depth                  | Color | Percent |                        | Gravel                          | Cobbles<br>& Stones |                |                                |       |
| 2-0         | 0                      | —                                      | —                      | —     | —       | —                      | —                               | —                   | —              | —                              | —     |
| 0-6         | A                      | 10 YR <sup>3</sup> / <sub>6</sub>      | —                      | —     | —       | Fine<br>sandy loam     | 10-15%                          | 10-15%              | Massive        | Frable                         | —     |
| 6-24        | B                      | 10 YR <sup>5</sup> / <sub>2</sub>      | —                      | —     | —       | Fine<br>sandy loam     | 10-15%                          | 15-20%              | Massive        | Frable                         | —     |
| 24-66       | C                      | 10 YR <sup>5</sup> / <sub>2</sub>      | —                      | —     | —       | gravelly<br>loamy sand | 20-25%                          | 15-20%              | Massive        | Frable                         | —     |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |

Additional Notes:

*Fractured sole encountered @ approx. 60". Could rip through it easily.*



# BEALS + THOMAS

Soil Test Pit Log

1422.10 – Medway, MA

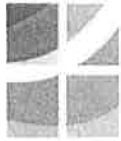
Deep Observation Hole Number:

TP-11

| Depth (in.) | Soil Horizon/<br>Layer | Soil Matrix: Color-<br>Moist (Munsell) | Redoximorphic Features |       |         | Soil Texture<br>(USDA) | Coarse Fragments<br>% by Volume |                     | Soil Structure | Soil<br>Consistence<br>(Moist) | Other |
|-------------|------------------------|----------------------------------------|------------------------|-------|---------|------------------------|---------------------------------|---------------------|----------------|--------------------------------|-------|
|             |                        |                                        | Depth                  | Color | Percent |                        | Gravel                          | Cobbles<br>& Stones |                |                                |       |
| 2-0         | O                      | -                                      | -                      | -     | -       | -                      | -                               | -                   | -              | -                              | -     |
| 0-6         | A                      | 10YR 3/6                               | -                      | -     | -       | fine<br>sandy loam     | 5-10%                           | 10-15%              | massive        | friable                        | -     |
| 6-24        | B                      | 10YR 5/6                               | -                      | -     | -       | fine<br>sandy loam     | 10-15%                          | 10-15%              | massive        | friable                        | -     |
| 24-60       | C                      | 10YR 5/2                               | -                      | -     | -       | gravelly<br>loamy sand | 20-25%                          | 10-15%              | massive        | friable                        | -     |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |
|             |                        |                                        |                        |       |         |                        |                                 |                     |                |                                |       |

Additional Notes:

Returned to 60". Fractured pit encountered. Could rip chunks of rock.



# BEALS + THOMAS

## Standard 4: Water Quality Volume Summary

$$V_{WQ} = (D_{WQ} / 12 \text{ in/ft}) \times (A_{IMP} \times 43,560 \text{ SF/Ac}) \text{ where:}$$

$V_{WQ}$  = Required Water Quality Volume [CF]

$D_{WQ}$  = Water Quality Depth : 1-inch for discharges within a Zone II or Interim Wellhead Protection Area, to or near critical areas, runoff from LUHPPL, or exfiltration to soil with infiltration rate 2.4 in/hr or greater; ½-inch for discharges to other areas.

$A_{IMP}$  = Post-development Impervious Area; may exclude roof top areas [Ac]

### Required Water Quality Volume:

| Drainage Area/<br>Treatment Train    | $A_{IMP}$<br>[Ac] | $D_{WQ}$ [in] | $V_{WQ}$ Required<br>[CF] |            |
|--------------------------------------|-------------------|---------------|---------------------------|------------|
| PDA-1B                               | 0.001             | 0.5           | 2                         |            |
| PDA-1C                               | 0.003             | 0.5           | 5                         |            |
| Total Required Water Quality Volume: |                   |               | 7                         | Cubic Feet |

### Provided Water Quality Volume:

| Drainage Area/<br>Treatment Train    | BMP                  | Water Quality<br>Volume Provided<br>[CF] |            |
|--------------------------------------|----------------------|------------------------------------------|------------|
| PDA-1B                               | Infiltration Basin-3 | 772                                      |            |
| PDA-1C                               | Infiltration Basin-2 | 1,961                                    |            |
| Total Provided Water Quality Volume: |                      | 2,733                                    | Cubic Feet |

WATER QUALITY VOLUME PROVIDED IS GREATER THAN OR EQUAL TO THE REQUIRED WATER QUALITY VOLUME, THEREFORE  
PROPOSED STORMWATER MANAGEMENT DESIGN IS IN COMPLIANCE WITH STANDARD 4.

JOB NO. 1422.10

COMPUTED BY: JRM

CHECKED BY: MC

JOB: West Medway II - Meter Station

DATE: 6/17/16

DATE: 6/17/16



# BEALS + THOMAS

## Standard 3: Groundwater Recharge

### Groundwater Recharge Volume Required:

$R_v = F \times \text{Impervious Area}$ , where:

$R_v$  = Required Recharge Volume [Ac-ft]

$F$  = Target Depth Factor associated with each Hydrologic Soil Group (HSG) [in]

**Impervious Area** = Total Pavement and Rooftop Area under Post-development Conditions [Ac]

|                                                            |      |    | Impervious Area<br>[Acres] | Required Recharge<br>Volume [Ac-ft] |
|------------------------------------------------------------|------|----|----------------------------|-------------------------------------|
| HSG "A", use $F =$                                         | 0.6  | in | 0.000                      | 0.000                               |
| HSG "B", use $F =$                                         | 0.35 | in | 0.021                      | 0.001                               |
| HSG "C", use $F =$                                         | 0.25 | in | 0.000                      | 0.000                               |
| HSG "D", use $F =$                                         | 0.1  | in | 0.000                      | 0.000                               |
| <b>Total Required Recharge Volume (<math>R_v</math>) =</b> |      |    |                            | <b>0.001</b> Ac-ft                  |

### Capture Area Adjustment: (Ref: DEP Handbook V.3 Ch.1 P.27-28)

Total Site Impervious Area (Total) = 0.021 Acres

Impervious Area Draining to Infiltrative BMPs (infil) = 0.021 Acres (PDA-01B Impervious Area)

Percent Imp. Area Draining to Infiltrative BMPs = 100.0%

Capture Area Adjustment Factor = (Total)/(Infil) =  $C_a$  = 1.00

**Adjusted Required Recharge Volume =  $C_a \times R_v$**  **0.001** Ac-ft

### Groundwater Recharge Volume Provided :

| BMP                                     | Provided Recharge<br>Volume [Ac-ft] |
|-----------------------------------------|-------------------------------------|
| Infiltration Basin 2 =                  | 0.045                               |
| Infiltration Basin 3 =                  | 0.018                               |
| <b>Total Provided Recharge Volume =</b> | <b>0.063</b> Ac-ft                  |

**PROVIDED GROUNDWATER RECHARGE VOLUME IS GREATER THAN OR EQUAL TO THE REQUIRED RECHARGE VOLUME,  
THEREFORE PROPOSED STORMWATER MANAGEMENT DESIGN IS IN COMPLIANCE WITH STANDARD 3.**

JOB NO. 1422.10  
JOB: West Medway II - Meter Station

COMPUTED BY: JRM  
DATE: 6/17/16

CHECKED BY: MC  
DATE: 6/17/16



# BEALS + THOMAS

## Standard 3: Drawdown

$$\text{Drawdown Time} = \frac{R_v}{(K) (\text{Bottom Area})}$$

where:

$R_v$  = Storage Volume Below Outlet [Ac-ft]

$K$  = Infiltration Rate [in/hr]

Bottom Area = Bottom Area of Recharge System [Ac]

### Infiltration Basin-2

$R_v$  = 0.045 Ac-ft

$K$  = 1.020 in/hr

Bottom Area = 0.012 Acres

**Drawdown Time = 44.118 Hours** < 72 Hours, Design is in compliance with the standard.

### Infiltration Basin-3

$R_v$  = 0.018 Ac-ft

$K$  = 1.020 in/hr

Bottom Area = 0.005 Acres

**Drawdown Time = 42.353 Hours** < 72 Hours, Design is in compliance with the standard.

#### Note:

1. The infiltration BMPs have been designed to fully drain within 72 hours, therefore the proposed stormwater management design is in compliance with Standard 3 .
2. Infiltration Rate based on Volume 3, Chapter 1, Table 2.3.3 *Rawls Rates* from the 2008 MA DEP Stormwater Management Handbook.

JOB NO. 1422.10

COMPUTED BY: JRM

CHECKED BY: MC

JOB: West Medway II - Meter Station

DATE: 6/17/16

DATE: 6/17/16

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-002yr Rainfall=3.20"

Printed 6/17/2016

## Stage-Area-Storage for Pond 1P: Infil. Basin-2

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) | Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|
| 265.00              | 536                | 0                       | 266.04              | 1,512              | 1,040                   |
| 265.02              | 554                | 11                      | 266.06              | 1,555              | 1,071                   |
| 265.04              | 572                | 22                      | 266.08              | 1,597              | 1,102                   |
| 265.06              | 589                | 34                      | 266.10              | 1,640              | 1,135                   |
| 265.08              | 607                | 46                      | 266.12              | 1,682              | 1,168                   |
| 265.10              | 625                | 58                      | 266.14              | 1,725              | 1,202                   |
| 265.12              | 643                | 71                      | 266.16              | 1,767              | 1,237                   |
| 265.14              | 661                | 84                      | 266.18              | 1,810              | 1,273                   |
| 265.16              | 679                | 97                      | 266.20              | 1,852              | 1,309                   |
| 265.18              | 696                | 111                     | 266.22              | 1,895              | 1,347                   |
| 265.20              | 714                | 125                     | 266.24              | 1,937              | 1,385                   |
| 265.22              | 732                | 139                     | 266.26              | 1,980              | 1,424                   |
| 265.24              | 750                | 154                     | 266.28              | 2,022              | 1,464                   |
| 265.26              | 768                | 169                     | 266.30              | 2,065              | 1,505                   |
| 265.28              | 785                | 185                     | 266.32              | 2,107              | 1,547                   |
| 265.30              | 803                | 201                     | 266.34              | 2,150              | 1,590                   |
| 265.32              | 821                | 217                     | 266.36              | 2,192              | 1,633                   |
| 265.34              | 839                | 234                     | 266.38              | 2,235              | 1,677                   |
| 265.36              | 857                | 251                     | 266.40              | 2,277              | 1,722                   |
| 265.38              | 875                | 268                     | 266.42              | 2,320              | 1,768                   |
| 265.40              | 892                | 286                     | 266.44              | 2,362              | 1,815                   |
| 265.42              | 910                | 304                     | 266.46              | 2,405              | 1,863                   |
| 265.44              | 928                | 322                     | 266.48              | 2,447              | 1,911                   |
| 265.46              | 946                | 341                     | 266.50              | 2,490              | 1,961                   |
| 265.48              | 964                | 360                     | 266.52              | 2,538              | 2,011                   |
| 265.50              | 982                | 379                     | 266.54              | 2,586              | 2,062                   |
| 265.52              | 999                | 399                     | 266.56              | 2,634              | 2,114                   |
| 265.54              | 1,017              | 419                     | 266.58              | 2,682              | 2,168                   |
| 265.56              | 1,035              | 440                     | 266.60              | 2,729              | 2,222                   |
| 265.58              | 1,053              | 461                     | 266.62              | 2,777              | 2,277                   |
| 265.60              | 1,071              | 482                     | 266.64              | 2,825              | 2,333                   |
| 265.62              | 1,088              | 504                     | 266.66              | 2,873              | 2,390                   |
| 265.64              | 1,106              | 526                     | 266.68              | 2,921              | 2,448                   |
| 265.66              | 1,124              | 548                     | 266.70              | 2,969              | 2,507                   |
| 265.68              | 1,142              | 570                     | 266.72              | 3,017              | 2,566                   |
| 265.70              | 1,160              | 593                     | 266.74              | 3,065              | 2,627                   |
| 265.72              | 1,178              | 617                     | 266.76              | 3,112              | 2,689                   |
| 265.74              | 1,195              | 641                     | 266.78              | 3,160              | 2,752                   |
| 265.76              | 1,213              | 665                     | 266.80              | 3,208              | 2,815                   |
| 265.78              | 1,231              | 689                     | 266.82              | 3,256              | 2,880                   |
| 265.80              | 1,249              | 714                     | 266.84              | 3,304              | 2,946                   |
| 265.82              | 1,267              | 739                     | 266.86              | 3,352              | 3,012                   |
| 265.84              | 1,284              | 765                     | 266.88              | 3,400              | 3,080                   |
| 265.86              | 1,302              | 790                     | 266.90              | 3,448              | 3,148                   |
| 265.88              | 1,320              | 817                     | 266.92              | 3,495              | 3,218                   |
| 265.90              | 1,338              | 843                     | 266.94              | 3,543              | 3,288                   |
| 265.92              | 1,356              | 870                     | 266.96              | 3,591              | 3,359                   |
| 265.94              | 1,374              | 897                     | 266.98              | 3,639              | 3,432                   |
| 265.96              | 1,391              | 925                     | 267.00              | 3,687              | 3,505                   |
| 265.98              | 1,409              | 953                     |                     |                    |                         |
| 266.00              | 1,427              | 982                     |                     |                    |                         |
| 266.02              | 1,470              | 1,010                   |                     |                    |                         |

← STORAGE BELOW  
OUTLET

142210HC003B

Prepared by Microsoft

HydroCAD® 10.00-15 s/n 04493 © 2015 HydroCAD Software Solutions LLC

Type III 24-hr Norfolk-002yr Rainfall=3.20"

Printed 6/17/2016

## Stage-Area-Storage for Pond 2P: Infil. Basin-3

| Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) | Elevation<br>(feet) | Surface<br>(sq-ft) | Storage<br>(cubic-feet) |
|---------------------|--------------------|-------------------------|---------------------|--------------------|-------------------------|
| 268.00              | 239                | 0                       | 269.04              | 807                | 543                     |
| 268.02              | 250                | 5                       | 269.06              | 818                | 560                     |
| 268.04              | 261                | 10                      | 269.08              | 830                | 576                     |
| 268.06              | 272                | 15                      | 269.10              | 841                | 593                     |
| 268.08              | 283                | 21                      | 269.12              | 852                | 610                     |
| 268.10              | 294                | 27                      | 269.14              | 864                | 627                     |
| 268.12              | 304                | 33                      | 269.16              | 875                | 644                     |
| 268.14              | 315                | 39                      | 269.18              | 887                | 662                     |
| 268.16              | 326                | 45                      | 269.20              | 898                | 680                     |
| 268.18              | 337                | 52                      | 269.22              | 909                | 698                     |
| 268.20              | 348                | 59                      | 269.24              | 921                | 716                     |
| 268.22              | 359                | 66                      | 269.26              | 932                | 735                     |
| 268.24              | 370                | 73                      | 269.28              | 944                | 753                     |
| 268.26              | 381                | 81                      | 269.30              | 955                | 772                     |
| 268.28              | 392                | 88                      | 269.32              | 966                | 792                     |
| 268.30              | 403                | 96                      | 269.34              | 978                | 811                     |
| 268.32              | 413                | 104                     | 269.36              | 989                | 831                     |
| 268.34              | 424                | 113                     | 269.38              | 1,001              | 851                     |
| 268.36              | 435                | 121                     | 269.40              | 1,012              | 871                     |
| 268.38              | 446                | 130                     | 269.42              | 1,023              | 891                     |
| 268.40              | 457                | 139                     | 269.44              | 1,035              | 912                     |
| 268.42              | 468                | 148                     | 269.46              | 1,046              | 932                     |
| 268.44              | 479                | 158                     | 269.48              | 1,058              | 953                     |
| 268.46              | 490                | 168                     | 269.50              | 1,069              | 975                     |
| 268.48              | 501                | 178                     | 269.52              | 1,082              | 996                     |
| 268.50              | 512                | 188                     | 269.54              | 1,095              | 1,018                   |
| 268.52              | 522                | 198                     | 269.56              | 1,108              | 1,040                   |
| 268.54              | 533                | 209                     | 269.58              | 1,120              | 1,062                   |
| 268.56              | 544                | 219                     | 269.60              | 1,133              | 1,085                   |
| 268.58              | 555                | 230                     | 269.62              | 1,146              | 1,108                   |
| 268.60              | 566                | 242                     | 269.64              | 1,159              | 1,131                   |
| 268.62              | 577                | 253                     | 269.66              | 1,172              | 1,154                   |
| 268.64              | 588                | 265                     | 269.68              | 1,185              | 1,178                   |
| 268.66              | 599                | 276                     | 269.70              | 1,197              | 1,201                   |
| 268.68              | 610                | 289                     | 269.72              | 1,210              | 1,225                   |
| 268.70              | 620                | 301                     | 269.74              | 1,223              | 1,250                   |
| 268.72              | 631                | 313                     | 269.76              | 1,236              | 1,274                   |
| 268.74              | 642                | 326                     | 269.78              | 1,249              | 1,299                   |
| 268.76              | 653                | 339                     | 269.80              | 1,262              | 1,324                   |
| 268.78              | 664                | 352                     | 269.82              | 1,274              | 1,350                   |
| 268.80              | 675                | 366                     | 269.84              | 1,287              | 1,375                   |
| 268.82              | 686                | 379                     | 269.86              | 1,300              | 1,401                   |
| 268.84              | 697                | 393                     | 269.88              | 1,313              | 1,427                   |
| 268.86              | 708                | 407                     | 269.90              | 1,326              | 1,454                   |
| 268.88              | 719                | 421                     | 269.92              | 1,339              | 1,480                   |
| 268.90              | 729                | 436                     | 269.94              | 1,351              | 1,507                   |
| 268.92              | 740                | 451                     | 269.96              | 1,364              | 1,534                   |
| 268.94              | 751                | 465                     | 269.98              | 1,377              | 1,562                   |
| 268.96              | 762                | 481                     | 270.00              | 1,390              | 1,590                   |
| 268.98              | 773                | 496                     |                     |                    |                         |
| 269.00              | 784                | 512                     |                     |                    |                         |
| 269.02              | 795                | 527                     |                     |                    |                         |

← STORAGE BELOW  
OUTLET

**INSTRUCTIONS:**

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C value within Row
5. Total TSS Removal = Sum All Values in Column D

Location: PDA-01B,C

| A<br>BMP <sup>1</sup>          | B<br>TSS Removal  |  | C<br>Starting TSS |  | D<br>Amount   |  | E<br>Remaining |  |
|--------------------------------|-------------------|--|-------------------|--|---------------|--|----------------|--|
|                                | Rate <sup>1</sup> |  | Load*             |  | Removed (B*C) |  | Load (C-D)     |  |
| STONE DIAPHRAGM / FILTER STRIP | 0.10              |  | 1.00              |  | 0.10          |  | 0.90           |  |
| INFILTRATION BASIN             | 0.80              |  | 0.90              |  | 0.72          |  | 0.18           |  |
|                                |                   |  |                   |  |               |  |                |  |
|                                |                   |  |                   |  |               |  |                |  |
|                                |                   |  |                   |  |               |  |                |  |

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

**Total TSS Removal =**

82%

Project: 1422.10

Prepared By: JRM

Date: 4/15/16

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

# TSS Removal Calculation Worksheet