

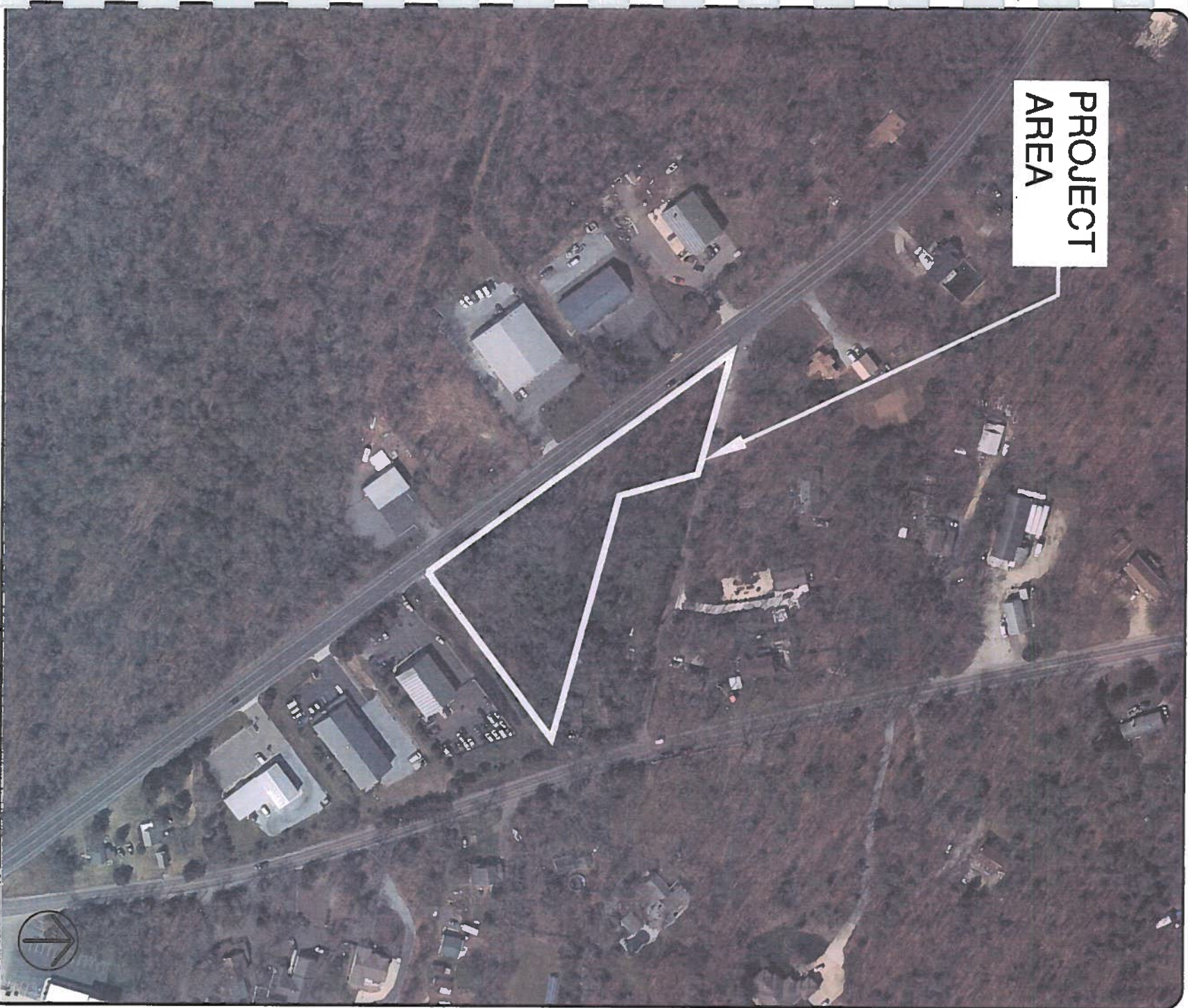
STORMWATER MANAGEMENT
REPORT
FOR
BLOCK 260, LOTS 4.04 & 4.05
DENNIS TOWNSHIP
CAPE MAY COUNTY, NJ

EDA #9444


Steven L. Filippone, P.E.

12-13-2022
Date
N.J.P.E. #29230

PROJECT
AREA

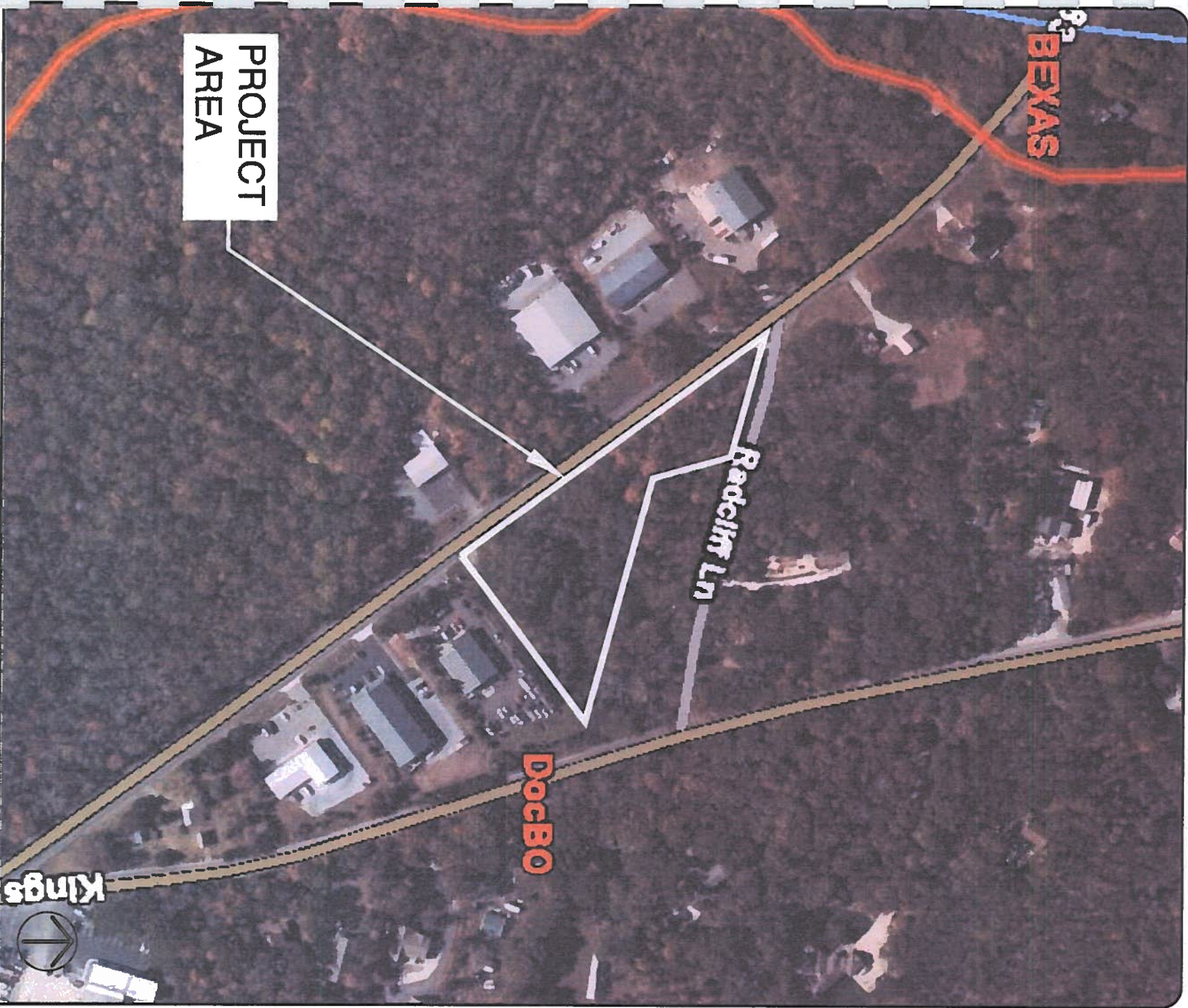


AERIAL
BLOCK 260, LOT 4.04 & 4.05
DENNIS TOWNSHIP, CAPE MAY COUNTY, NJ

DATE: 12/13/22
SCALE: 1" = 200'

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PROJECT #: 9444

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Design
Associates, P.A.
Engineers Environmental Planners Landscape Architects
CAMBRIDGE PROFESSIONAL OFFICES
5 Cambridge Drive Ocean View, NJ 08230
(609) 390-0332 FAX (609) 390-9204



PROJECT
AREA

Radcliff Ln

DocBo

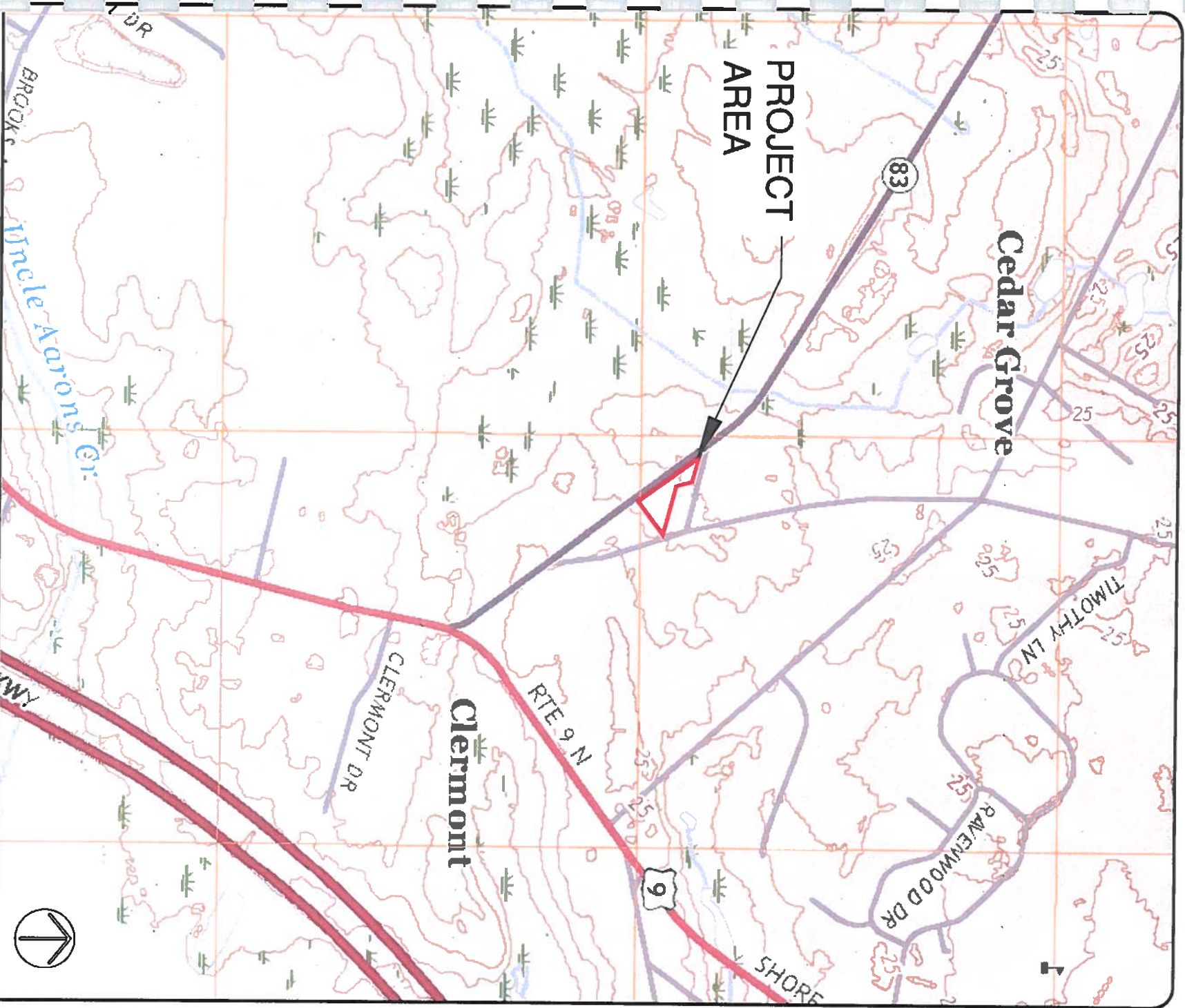
Kings

BEXAS

SOIL SURVEY MAP
BLOCK 260, LOT 4.04 & 4.05
DENNIS TOWNSHIP, CAPE MAY COUNTY, NJ

DATE: 12/13/22 DRAWN BY: MSB
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PROJECT
AREA

Cedar Grove

Clermont

RTE 9 N

CLEMONT DR

TIMOTHY LN

RAEWOOD DR

SHORE

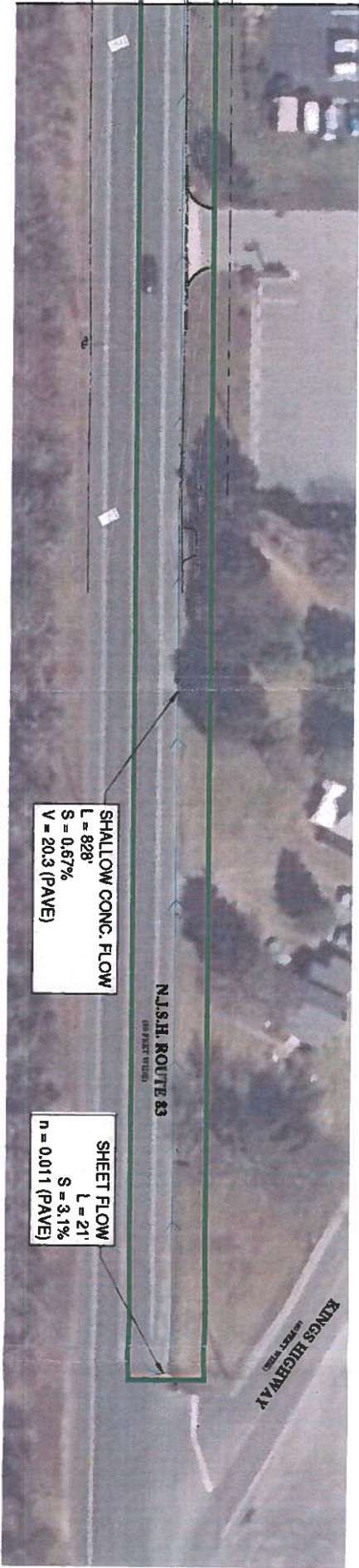
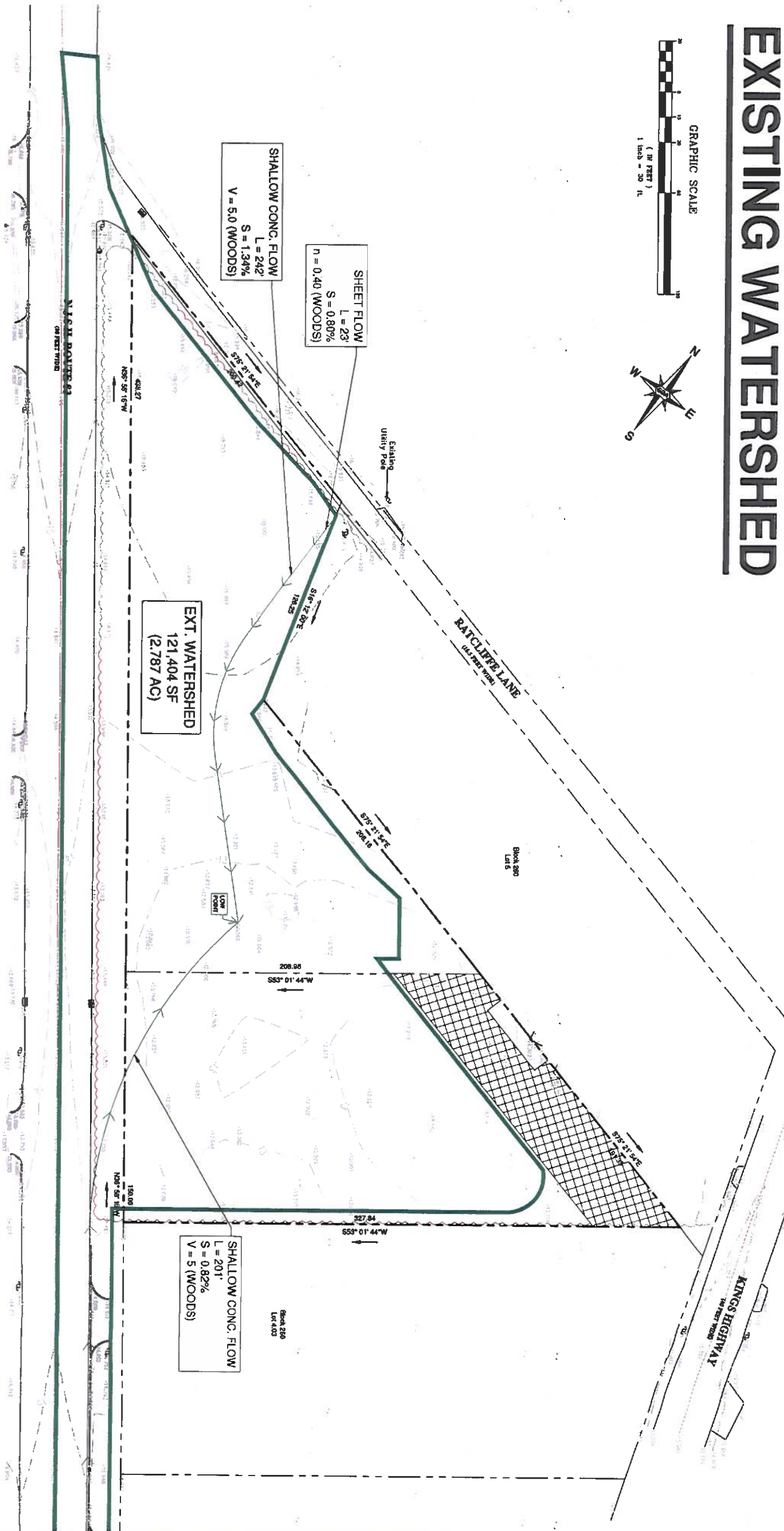
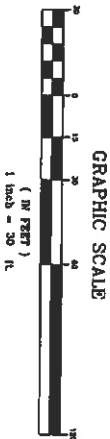
USGS MAP
BLOCK 260, LOT 4.04 & 4.05
DENNIS TOWNSHIP, CAPE MAY COUNTY, NJ

DATE: 12/13/22
SCALE: 1" = 1000'

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Associates, P.A.
Cambridge Professional Offices
5 Cambridge Drive Ocean View, NJ 08230
(609) 390-0332 FAX (609) 390-9204

EXISTING WATERSHED



Engineers - Landscape Architects - Planners

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SCALE: 1" = 30' (24 X 36)	CHECKED BY: SLF
PROJECT # 9444	SHEET: 1 OF 2



REVISION	DATE	BY

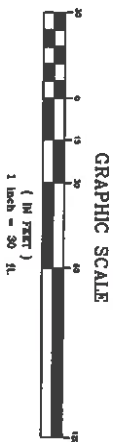
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STEVEN L. FILIPPONE
PROFESSIONAL ENGINEER
N.J.P.E. LIC. #29230

EDA Engineering Design Associates, P.A.
Engineers Environmental Planners Landscape Architects
CAMBRIDGE PROFESSIONAL OFFICES
5 Cambridge Drive Ocean View New Jersey 08230
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EXISTING WATERSHED
BLOCK 260, LOTS 4.04 & 4.05
DENNIS TOWNSHIP
CAPE MAY COUNTY, NEW JERSEY

PROPOSED WATERSHED



Engineers - Landscape Architects - Planners

EDA Engineering Design Associates, P.A.
Engineers Environmental Planners Landscape Architects
CAMBRIDGE PROFESSIONAL OFFICES
5 Cambridge Drive Ocean View New Jersey 08230
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PROPOSED WATERSHED
BLOCK 260, LOTS 4.04 & 4.05
DENNIS TOWNSHIP
CAPE MAY COUNTY, NEW JERSEY

STEVEN L. FILIPPONE
PROFESSIONAL ENGINEER
N.J.P.E. LIC. #28230

Steven L. Filippone

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PROJECT #: 0444	SHEET: 2 OF 2

EDA

STORMWATER MANAGEMENT CALCULATIONS

Existing Conditions

The project site consists of an area of 1,966 Acres. The parcel consists of woodland conditions. The soil type for the project site is (DocBO) Downer Loamy Sand 0 to 5% slopes.

Drainage Design

The project site consists of five (1) watershed areas:

- Existing Watershed #1 consists of woodland conditions. This watershed drains to the center of the property as a low point for the entire watershed. The property accepts runoff from Route 83 from Ratcliffe Lane to Kings Highway.

There are two (2) proposed wet pond stormwater basins within this watershed to mitigate stormwater runoff.

Post Development Design Storm
Groundwater Recharge

- Total Storage Required: 6,375 CF
- Total Storage Available: 48,729 CF

Basin Schedule to 100 Year Elevation

Wet Pond #1 32,135 CF (Elev. 12.21 - 13.49)
Wet Pond #2 16,594 CF (Elev. 10.35 - 13.98)

Meteorological Data

(New Jersey 24 Hour Rainfall Frequency Data – Dennis Township)

2-Year	3.32 Inches
10-Year	5.17 Inches
100- Year	8.92 Inches

Pre-Development Conditions – Existing Watershed #1 – 2.787 Acres

<u>Cover Type</u>	<u>CN Value</u>	<u>Area</u>
Woodland – A	30	1.825 Acres
Grass – A	39	0.306 Acres
Impervious	98	0.656 Acres

Tc (Pervious) = 16.4 Minutes; Tc (Impervious) = 16.0 Minutes

<u>Design Storm</u>	<u>Pre-Development Peak Inflow</u>	<u>Pre-Development Peak Outflow</u>
2-YR	0.00 CFS	0.00 CFS
10-YR	0.00 CFS	0.00 CFS
100-YR	0.00 CFS	0.00 CFS

Post-Development Conditions – Proposed Watershed #1 – 1.716 Acres

<u>Cover Type</u>	<u>CN Value</u>	<u>Area</u>
Grass – A	39	0.745 Acres
Gravel – A	76	0.278 Acres
Impervious	98	0.693 Acres

Tc (Pervious) = 2.5 Minutes; Tc (Impervious) = 9.1 Minutes

<u>Design Storm</u>	<u>Pre-Development Peak Inflow</u>	<u>Pre-Development Peak Outflow</u>
2-YR	0.00 CFS	0.00 CFS
10-YR	0.00 CFS	0.00 CFS
100-YR	0.00 CFS	0.00 CFS

Post-Development Conditions – Proposed Watershed #2 – 1.071 Acres

<u>Cover Type</u>	<u>CN Value</u>	<u>Area</u>
Woods – A	30	0.151 Acres
Grass – A	39	0.482 Acres
Gravel – A	76	0.031 Acres
Impervious	98	0.407 Acres

Tc (Pervious) = 16.4 Minutes; Tc (Impervious) = 5.9 Minutes

<u>Design Storm</u>	<u>Pre-Development Peak Inflow</u>	<u>Pre-Development Peak Outflow</u>
2-YR	0.00 CFS	0.00 CFS
10-YR	0.00 CFS	0.00 CFS
100-YR	0.00 CFS	0.00 CFS

Point of Discharge Analysis

Existing Watershed #1 vs Proposed Watershed #1 & #2

Design Storm	Pre-Development	Post-Development
	Peak Flows Ext WS #1	Peak Flows Prop WS #1 & #2
2-YR	0.00 CFS	0.00 CFS
10-YR	0.00 CFS	0.00 CFS
100-YR	0.00 CFS	0.00 CFS
		0%
		0%
		0%

The proposed stormwater storage facility has been designed to release the post-development peak flows for the 2-YR, 10-YR and 100-YR Design Storms below their respective pre-development peak flows. Due to no runoff coming off the site in existing conditions the basins have the volume to detain all 3 storms.

All of the proposed watershed areas have been created to be less than the 2.50 acre.

Wet Pond #1 – Storage Volumes

Elevation	Storage Volume
10.35	0 CF
11.00	5,201 CF
12.00	14,673 CF
13.00	25,930 CF
13.50	32,228 CF

Elevation

Water Quality Design Storm.....	10.70
2-Year Design Storm	11.43
10-Year Design Storm	12.10
100-Year Design Storm	13.49

Wet Pond #2 – Storage Volumes

Elevation	Storage Volume
12.21	0 CF
13.00	6,969 CF
14.00	16,823 CF
14.10	17,873 CF

Elevation

Water Quality Design Storm.....	12.39
2-Year Design Storm	12.75
10-Year Design Storm	13.11
100-Year Design Storm	13.98



NOAA Atlas 14, Volume 2, Version 3
Location name: Cape May Court House, New Jersey, USA*
Latitude: 39.155°, Longitude: -74.7668°
Elevation: 14.36 ft**
*source: ESRI Maps
**source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bohn, D. Martin, B. Lin, T. Parzybok, M. Vekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & Aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹											
Duration	Average recurrence interval (years)										
	1	2	5	10	25	50	100	200	500	1000	
5-min	0.348 (0.312-0.387)	0.404 (0.363-0.447)	0.460 (0.412-0.509)	0.533 (0.477-0.591)	0.600 (0.535-0.667)	0.662 (0.589-0.736)	0.716 (0.633-0.795)	0.765 (0.672-0.855)	0.820 (0.713-0.922)	0.876 (0.755-0.990)	
10-min	0.666 (0.498-0.916)	0.647 (0.590-0.716)	0.736 (0.659-0.815)	0.853 (0.763-0.945)	0.987 (0.894-1.09)	1.06 (0.937-1.17)	1.14 (1.01-1.26)	1.21 (1.07-1.36)	1.30 (1.13-1.46)	1.38 (1.19-1.56)	
15-min	0.894 (0.622-0.772)	0.813 (0.729-0.900)	0.932 (0.834-1.03)	1.08 (0.965-1.20)	1.21 (1.08-1.35)	1.34 (1.19-1.48)	1.44 (1.27-1.60)	1.53 (1.34-1.71)	1.63 (1.42-1.84)	1.73 (1.49-1.96)	
30-min	0.952 (0.853-1.05)	1.12 (1.01-1.24)	1.32 (1.19-1.47)	1.56 (1.40-1.73)	1.80 (1.60-2.00)	2.01 (1.79-2.24)	2.20 (1.95-2.45)	2.38 (2.09-2.66)	2.60 (2.26-2.92)	2.81 (2.42-3.17)	
60-min	1.19 (1.05-1.32)	1.41 (1.26-1.56)	1.70 (1.52-1.88)	2.04 (1.82-2.26)	2.39 (2.15-2.65)	2.73 (2.42-3.03)	3.03 (2.68-3.37)	3.34 (2.94-3.73)	3.73 (3.24-4.19)	4.10 (3.53-4.63)	
2-hr	1.45 (1.28-1.63)	1.72 (1.52-1.93)	2.08 (1.84-2.34)	2.52 (2.22-2.83)	2.98 (2.63-3.36)	3.42 (3.00-3.86)	3.84 (3.34-4.34)	4.26 (3.68-4.84)	4.81 (4.11-5.49)	5.33 (4.50-6.12)	
3-hr	1.59 (1.41-1.80)	1.88 (1.67-2.12)	2.29 (2.03-2.57)	2.77 (2.45-3.12)	3.31 (2.90-3.73)	3.82 (3.33-4.31)	4.31 (3.73-4.87)	4.83 (4.14-5.47)	5.49 (4.65-6.26)	6.13 (5.13-7.03)	
6-hr	1.96 (1.75-2.24)	2.32 (2.07-2.63)	2.80 (2.49-3.18)	3.40 (3.01-3.86)	4.10 (3.60-4.64)	4.79 (4.17-5.42)	5.45 (4.72-6.19)	6.17 (5.28-7.03)	7.14 (6.00-8.17)	8.08 (6.69-9.32)	
12-hr	2.36 (2.10-2.68)	2.78 (2.48-3.15)	3.36 (3.00-3.81)	4.12 (3.66-4.65)	5.04 (4.44-5.69)	5.97 (5.21-6.75)	6.91 (5.96-7.85)	7.86 (6.76-9.07)	9.40 (7.81-10.8)	10.9 (9.04-12.5)	
24-hr	2.73 (2.47-3.03)	3.32 (3.01-3.69)	4.31 (3.90-4.79)	5.17 (4.66-5.73)	6.48 (5.79-7.15)	7.63 (6.76-8.39)	8.92 (7.85-9.80)	10.4 (9.04-11.4)	12.6 (10.8-13.8)	14.6 (12.3-15.9)	
2-day	3.13 (2.83-3.49)	3.82 (3.44-4.25)	4.96 (4.47-5.51)	5.94 (5.34-6.59)	7.42 (6.65-8.20)	8.72 (7.73-9.63)	10.2 (8.95-11.2)	11.8 (10.3-13.0)	14.3 (12.3-15.7)	16.4 (14.4-18.1)	
3-day	3.30 (3.00-3.64)	4.01 (3.62-4.42)	5.19 (4.72-5.71)	6.19 (5.62-6.81)	7.70 (6.95-8.44)	9.01 (8.08-9.87)	10.5 (9.32-11.5)	12.1 (10.7-13.2)	14.6 (12.7-15.9)	16.7 (14.6-18.3)	
4-day	3.48 (3.18-3.78)	4.20 (3.87-4.60)	5.42 (4.97-5.91)	6.44 (5.80-7.03)	7.98 (7.27-8.69)	9.31 (8.43-10.1)	10.8 (9.69-11.7)	12.4 (11.1-13.5)	14.9 (13.1-16.1)	17.0 (14.8-18.4)	
7-day	4.01 (3.71-4.36)	4.84 (4.47-5.26)	6.13 (5.68-6.57)	7.23 (6.66-7.85)	8.85 (8.10-9.59)	10.2 (9.33-11.1)	11.8 (10.6-12.7)	13.4 (12.1-14.5)	15.9 (14.1-17.2)	18.1 (16.1-19.5)	
10-day	4.50 (4.19-4.85)	5.40 (5.02-5.84)	6.73 (6.26-7.27)	7.84 (7.26-8.45)	9.43 (8.70-10.2)	10.8 (9.88-11.6)	12.2 (11.1-13.1)	13.7 (12.5-14.8)	16.1 (14.4-17.3)	18.2 (16.1-19.5)	
20-day	6.01 (5.65-6.41)	7.15 (6.72-7.62)	8.65 (8.11-9.22)	9.85 (9.24-10.5)	11.6 (10.6-12.3)	12.9 (12.0-13.8)	14.3 (13.3-15.3)	16.8 (14.8-18.8)	17.9 (16.4-19.0)	19.5 (17.7-20.8)	
30-day	7.50 (7.07-7.95)	8.89 (8.37-9.43)	10.6 (9.97-11.2)	11.8 (11.2-12.7)	13.8 (12.9-14.6)	15.3 (14.3-16.2)	16.7 (15.6-17.7)	18.2 (17.0-19.3)	20.3 (18.8-21.5)	21.9 (20.1-23.3)	
45-day	8.49 (8.01-10.0)	11.2 (10.6-11.8)	13.1 (12.5-13.8)	14.6 (13.8-15.4)	16.5 (15.6-17.4)	18.0 (17.0-18.9)	19.4 (18.3-20.5)	20.8 (19.6-22.0)	22.7 (21.2-23.9)	24.0 (22.4-25.4)	
60-day	11.3 (10.7-11.9)	13.3 (12.6-13.9)	15.4 (14.6-16.1)	16.9 (16.1-17.8)	18.9 (17.9-19.8)	20.3 (19.3-21.4)	21.7 (20.6-22.8)	23.0 (21.7-24.2)	24.7 (23.2-26.0)	25.9 (24.3-27.3)	

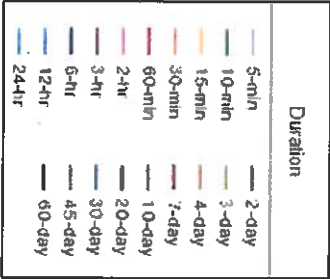
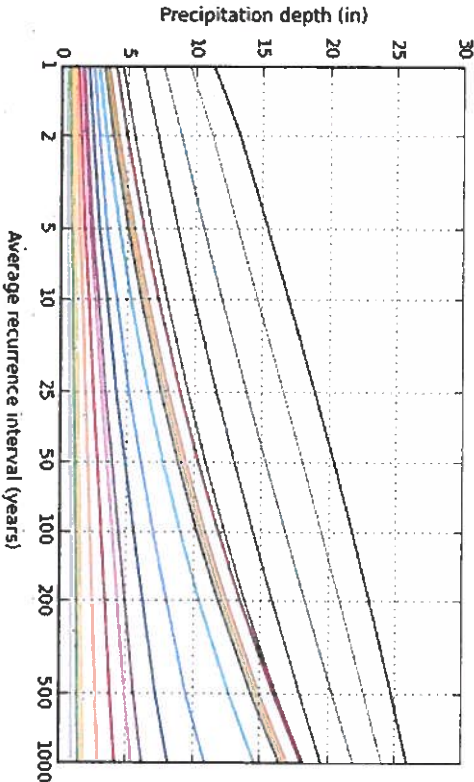
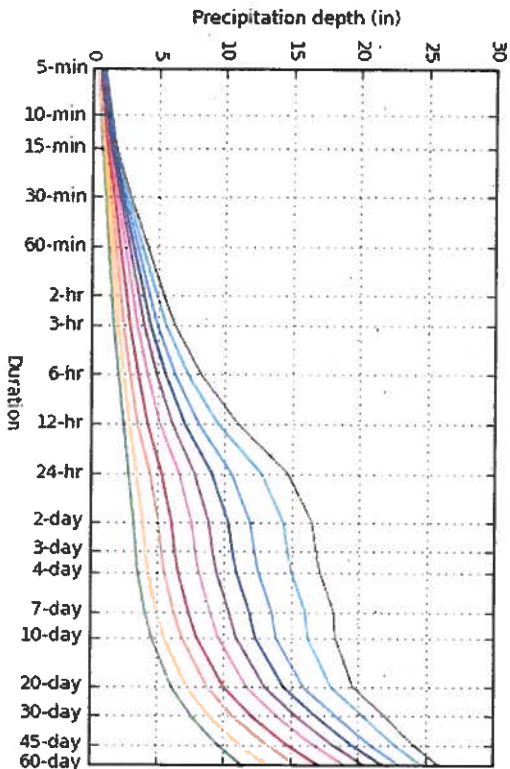
¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parentheses are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

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[PF graphical](#)

PDS-based depth-duration-frequency (DDF) curves
Latitude: 39.1550°, Longitude: -74.7668°



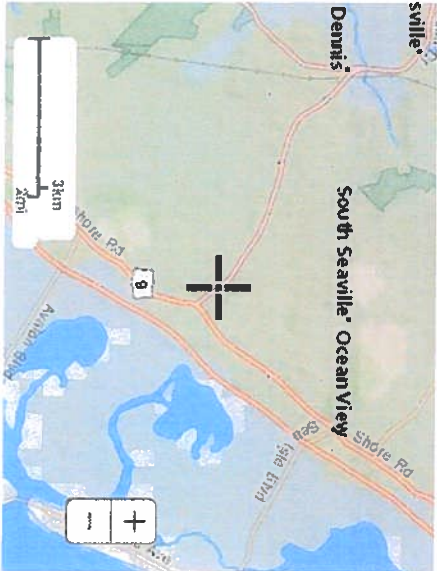
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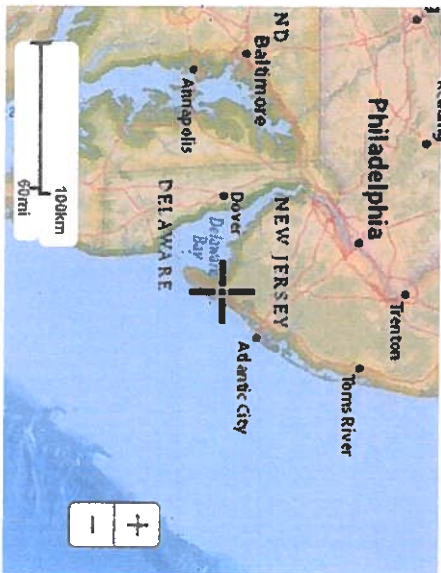
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Maps & aerials

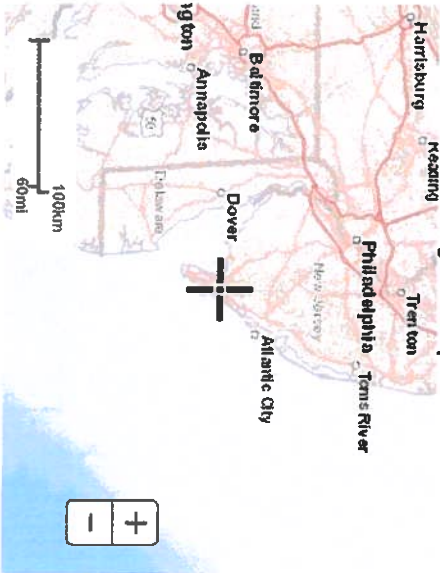
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



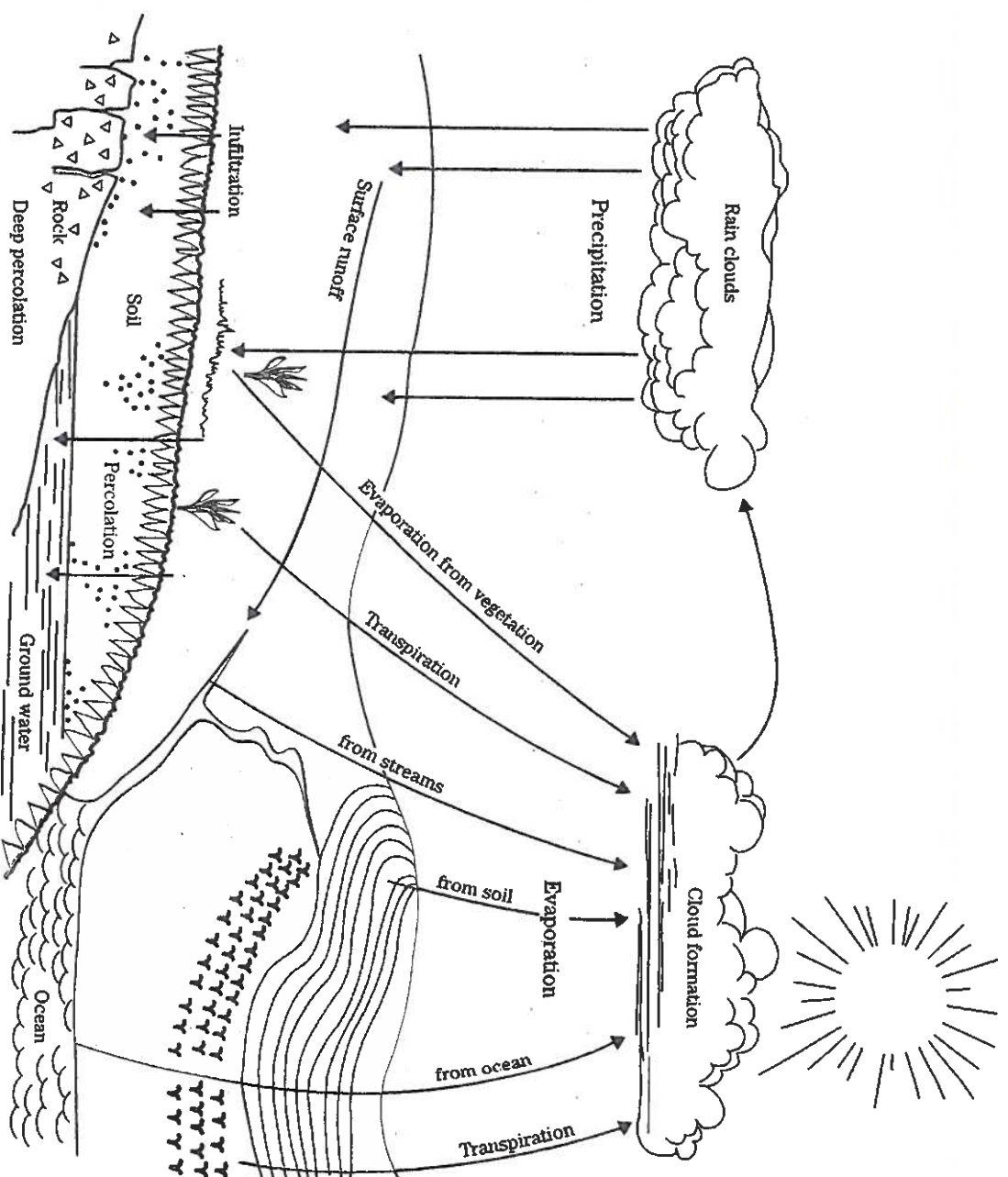
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Silver Spring, MD 20910
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Part 630 Hydrology
National Engineering Handbook

Chapter 15 **Time of Concentration**



Thick mulches in forests are associated with low retardance factors and reflect high degrees of retardance, as well as high infiltration rates. Hay meadows have relatively low retardance factors. Like thick mulches in forests, stem densities in meadows provide a high degree of retardance to overland flow in small watersheds. Conversely, bare surfaces with little retardance to overland flows are represented by high retardance factors.

The retardance factor is approximately the same as the curve number (CN) as defined in NEH630.09, Hydrologic Soil-Cover Complexes. In practical usage, CN is used as a surrogate for c_n , and the CN tables in NEH 630.09 may be used to approximate c_n in equations 15-4a and 15-4b. A CN of less than 50, or greater than 95 should not be used in the solution of equations 15-4a and 15-4b (Mockus 1961).

Applications and limitations—The watershed lag equation was developed using data from 24 watersheds ranging in size from 1.3 acres to 9.2 square miles, with the majority of the watersheds being less than 2,000 acres in size (Mockus 1961). Folmar and Miller (2000) revisited the development of this equation using additional watershed data and found that a reasonable upper limit may be as much as 19 square miles.

(b) Velocity method

Another method for determining time of concentration normally used within the NRCS is called the velocity method. The velocity method assumes that time of concentration is the sum of travel times for segments along the hydraulically most distant flow path.

$$T_c = T_u + T_2 + T_3 + \dots T_n \quad (\text{eq. 15-7})$$

where:

- T_c = time of concentration, h
- T_u = travel time of a segment u , h
- n = number of segments comprising the total hydraulic length

The segments used in the velocity method may be of three types: sheet flow, shallow concentrated flow, and open channel flow.

Sheet flow—Sheet flow is defined as flow over plane surfaces. Sheet flow usually occurs in the headwaters of a stream near the ridge line that defines the watershed boundary. Typically, sheet flow occurs for no more than 100 feet before transitioning to shallow concentrated flow (Merkel 2001).

A simplified version of the Manning's kinematic solution may be used to compute travel time for sheet flow. This simplified form of the kinematic equation was developed by Welle and Woodward (1986) after studying the impact of various parameters on the estimates.

$$T_t = \frac{0.007(n\ell)^{0.8}}{(P_2)^{0.6}S^{0.4}} \quad (\text{eq. 15-8})$$

where:

- T_t = travel time, h
- n = Manning's roughness coefficient (table 15-1)
- ℓ = sheet flow length, ft
- P_2 = 2-year, 24-hour rainfall, in
- S = slope of land surface, ft/ft

Table 15-1 Manning's roughness coefficients for sheet flow (flow depth generally ≤ 0.1 ft)

Surface description	n
Smooth surface (concrete, asphalt, gravel, or bare soil)	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover $\leq 20\%$	0.06
Residue cover $> 20\%$	0.17
Grass:	
Short-grass prairie	0.15
Dense grasses ^a	0.24
Bermudagrass	0.41
Range (natural)	0.13
Woods: ^b	
Light underbrush	0.40
Dense underbrush	0.80

1 The Manning's n values are a composite of information compiled by English (1980).
2 Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass, and purple glassy pappus.
3 When selecting a roughness coefficient, use a length of about 0.1 ft. This is the only part of the flow over the rough surface that will obstruct sheet flow.

This simplification is based on the following assumptions:

- shallow steady uniform flow
- constant rainfall excess intensity (that part of a rain available for runoff) both temporally and spatially
- 2-year, 24-hour rainfall assuming standard NRCS rainfall intensity-duration relations apply (Types I, II, and III)
- minor effect of infiltration on travel time

For sheet flow, the roughness coefficient includes the effects of roughness and the effects of raindrop impact including drag over the surface; obstacles such as litter, crop ridges, and rocks; and erosion and transport of sediment. These n values are only applicable for flow depths of approximately 0.1 foot or less, where sheet flow occurs. Table 15-1 gives roughness coefficient values for sheet flow for various surface conditions.

Kibler and Aron (1982) and others indicated the **maximum sheet flow length is less than 100 feet**. To support the sheet flow limit of 100 feet, Merkel (2001) reviewed a number of technical papers on sheet flow. McCuen and Spiess (1995) indicated that use of flow length as the limiting variable in the equation 15-8 could lead to less accurate designs, and proposed that the limitation should instead be based on:

$$l = \frac{100\sqrt{S}}{n} \quad (\text{eq. 15-9})$$

$$\sim 9.6 \text{ min or } \Phi 1.6 \text{ hr}$$

Table 15-2 Maximum sheet flow lengths using the McCuen-Spiess limitation criterion

Cover type	n values	Slope (ft/ft)	Length (ft)
Range	0.13	0.01	77
Grass	0.41	0.01	24
Woods	0.80	0.01	12.5
Range	0.13	0.05	172
Grass	0.41	0.05	56
Woods	0.80	0.05	28

where:
 n = Manning's roughness coefficient
 l = limiting length of flow, ft
 S = slope, ft/ft

Table 15-2 provides maximum sheet flow lengths based on the McCuen-Spiess limiting criteria for various cover type— n value—slope combinations.

Shallow concentrated flow—After approximately 100 feet, sheet flow usually becomes shallow concentrated flow collecting in swales, small rills, and gullies. Shallow concentrated flow is assumed not to have a well-defined channel and has flow depths of 0.1 to 0.5 feet. It is assumed that shallow concentrated flow can be represented by one of seven flow types. The curves in figure 15-4 were used to develop the information in table 15-3.

To estimate shallow concentrated flow travel time, velocities are developed using figure 15-4, in which average velocity is a function of watercourse slope and type of channel (Kent 1964). For slopes less than 0.005 foot per foot, the equations in table 15-3 may be used.

After estimating average velocity using figure 15-4, use equation 15-1 to estimate travel time for the shallow concentrated flow segment.

Open channel flow—Shallow concentrated flow is assumed to occur after sheet flow ends at shallow depths of 0.1 to 0.5 feet. Beyond that channel flow is assumed to occur. Open channels are assumed to begin where surveyed cross-sectional information has been obtained, where channels are visible on aerial photographs, or where blueines (indicating streams) appear on U.S. Geological Survey (USGS) quadrangle sheets.

Manning's equation or water surface profile information can be used to estimate average flow velocity. Average flow velocity is usually determined for the bankfull elevation.

Manning's equation is:

$$V = \frac{1.49r^{2/3}S^{1/2}}{n} \quad (\text{eq. 15-10})$$

Existing Watershed (Peru)

$$S = 0.8\%$$

$$Z = 0.4\%$$

$$L = \frac{100 \sqrt{0.008}}{0.4} = 22.3'$$

$$L = 23'$$

Existing Watershed (Imp)

$$S = 3.1\%$$

$$Z = 0.11\%$$

$$L = \frac{100 \sqrt{0.031}}{0.11} = 160\% *$$

*Only exists for 2' on Road cross slope

$$\therefore L = 21'$$

Prop WS #1 (Imp)

$$S = 2.8\%$$

$$Z = 0.24\%$$

$$L = \frac{100 \sqrt{0.028}}{0.24} = 69' *$$

*only 16' in Prop Cond

$$L = 16'$$

Prop WS #2 (Peru)

$$S = 0.66\%$$

$$Z = 0.4\%$$

$$L = \frac{100 \sqrt{0.0066}}{0.4} = 21'$$

Prop WS #2 (Imp)

$$S = 3.1\%$$

$$Z = 0.11\%$$

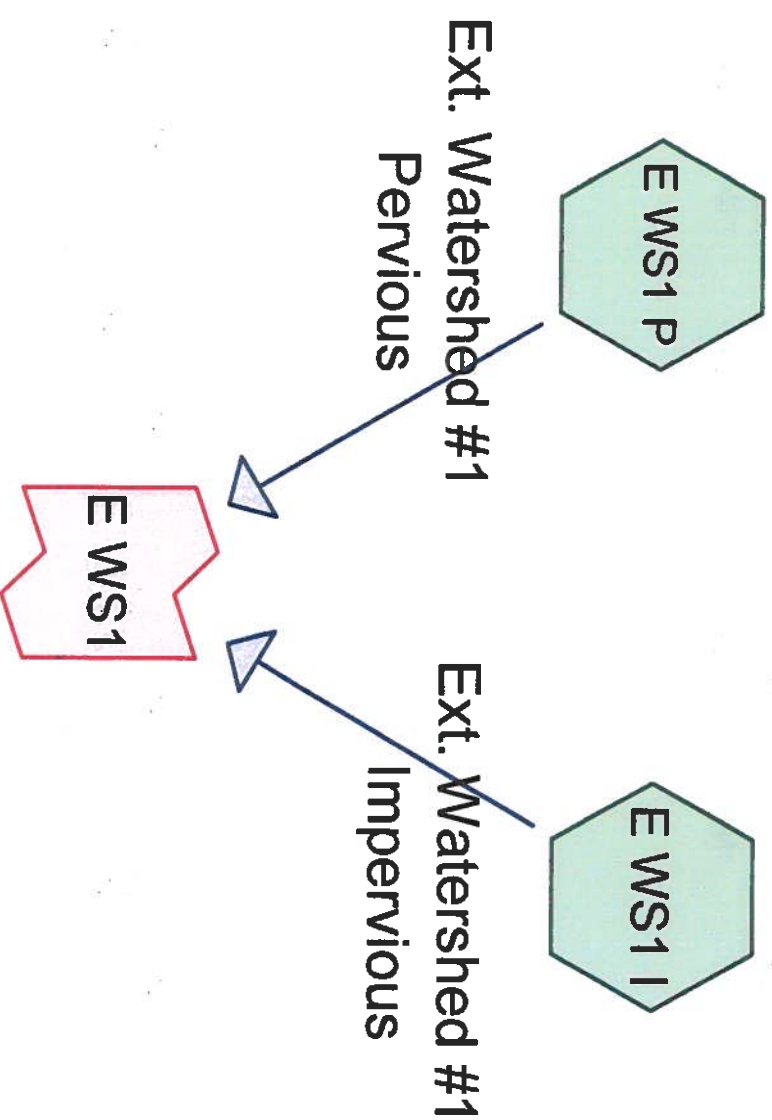
$$L = \frac{100 \sqrt{0.031}}{0.11} = 160\%$$

*only exists at 16' @

$$L = 16'$$

Road cross slope

PRE-DEVELOPMENT RUNOFF



Ext. Watershed #1 Low
Point



Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
13,312	39	>75% Grass cover, Good, HSG A (E WS1 P)
28,582	98	Paved parking, HSG A (E WS1 I)
79,510	30	Woods, Good, HSG A (E WS1 P)
121,404	47	TOTAL AREA

Ground Covers (selected nodes)							Sub Nun
HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	
13,312	0	0	0	0	13,312	>75% Grass cover, Good	
28,582	0	0	0	0	28,582	Paved parking	
79,510	0	0	0	0	79,510	Woods, Good	
121,404	0	0	0	0	121,404	TOTAL AREA	

Summary for Subcatchment E WS1 I: Ext. Watershed #1 Impervious

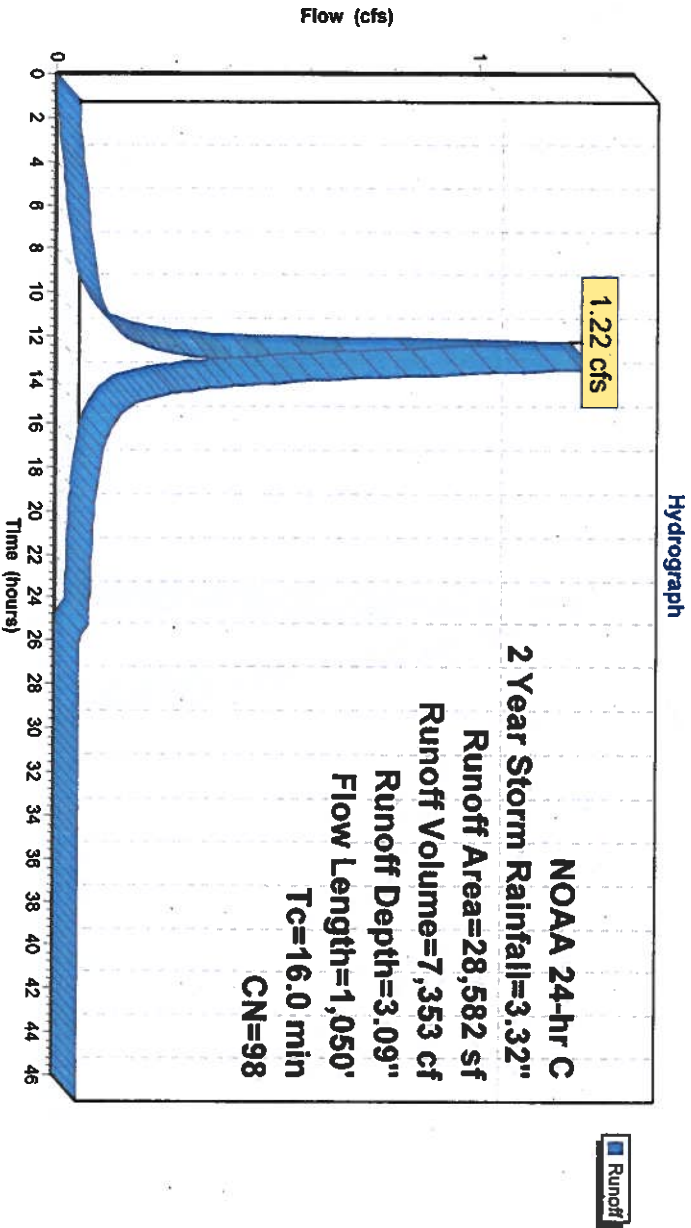
Runoff = 1.22 cfs @ 12.26 hrs, Volume= 7,353 cf, Depth= 3.09"
Routed to Link E WS1 : Ext. Watershed #1 Low Point

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 Year Storm Rainfall=3.32"

Area (sf)		CN	Description	
28,582		98	Paved parking, HSG A	
28,582			100.00% Impervious Area	

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0310	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
8.3	828	0.0067	1.66		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.4	201	0.0082	0.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.0	1,050	Total			

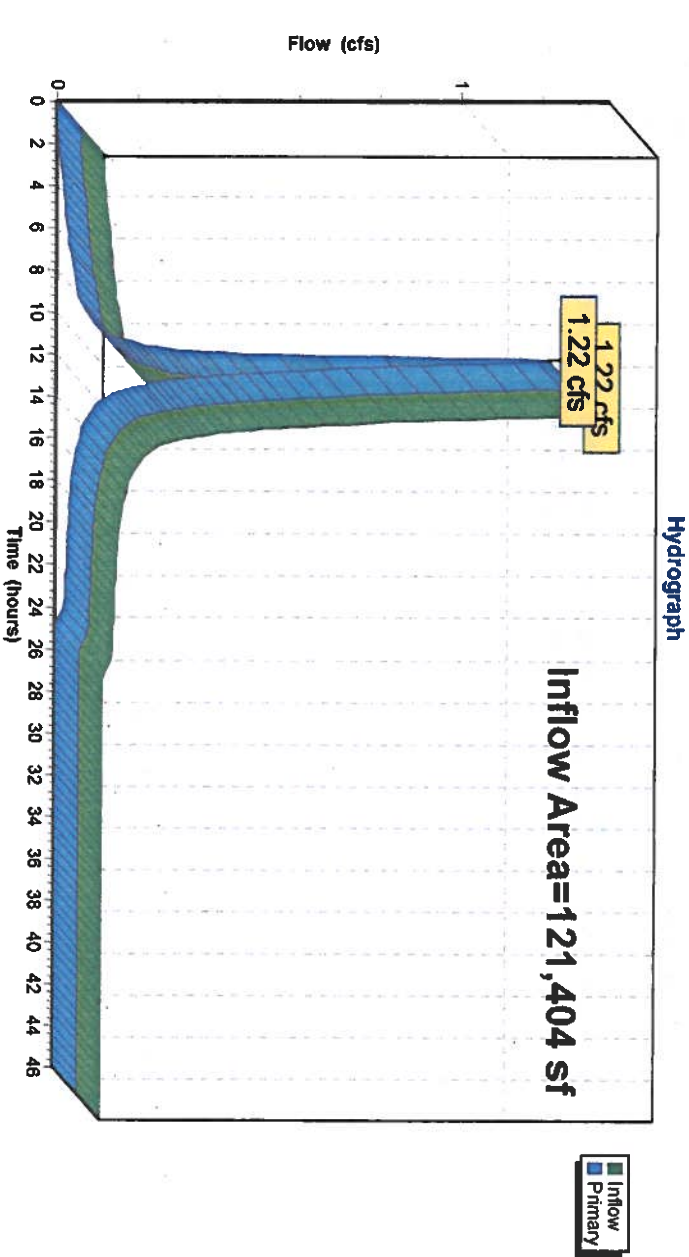
Subcatchment E WS1 I: Ext. Watershed #1 Impervious



Summary for Link E WS1: Ext. Watershed #1 Low Point

Inflow Area = 121,404 sf, 23.54% Impervious, Inflow Depth = 0.73" for 2 Year Storm event
Inflow = 1.22 cfs @ 12.26 hrs, Volume= 7,355 cf
Primary = 1.22 cfs @ 12.26 hrs, Volume= 7,355 cf, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link E WS1: Ext. Watershed #1 Low Point



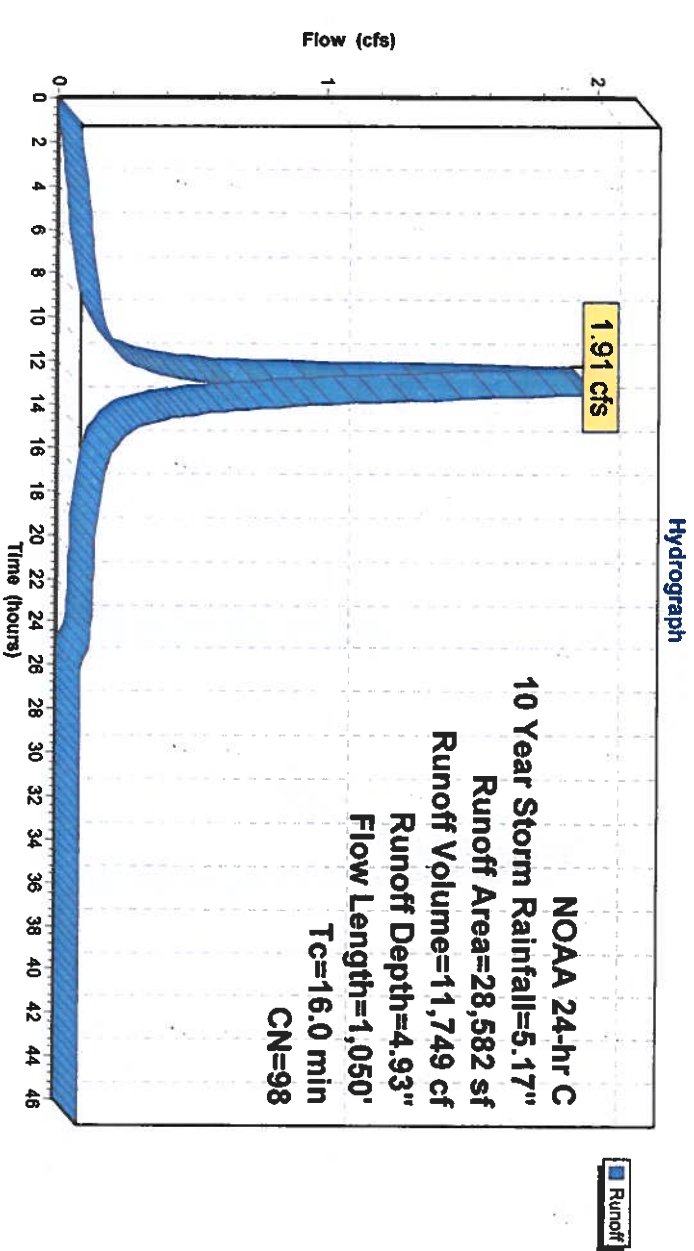
Summary for Subcatchment E WS1 I: Ext. Watershed #1 Impervious

Runoff = 1.91 cfs @ 12.26 hrs, Volume= 11,749 cf, Depth= 4.93"
Routed to Link E WS1 : Ext. Watershed #1 Low Point

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 Year Storm Rainfall=5.17"

Area (sf)		CN	Description		
*	28,582	98	Paved parking, HSG A		
	28,582		100.00% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0310	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
8.3	828	0.0067	1.66		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.4	201	0.0082	0.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.0	1,050	Total			

Subcatchment E WS1 I: Ext. Watershed #1 Impervious



Summary for Link E WS1: Ext. Watershed #1 Low Point

Inflow Area =

Inflow =

Primary =

121,404 sf, 23.54% Impervious, Inflow Depth = 1.19" for 10 Year Storm event

1.91 cfs @ 12.26 hrs, Volume=

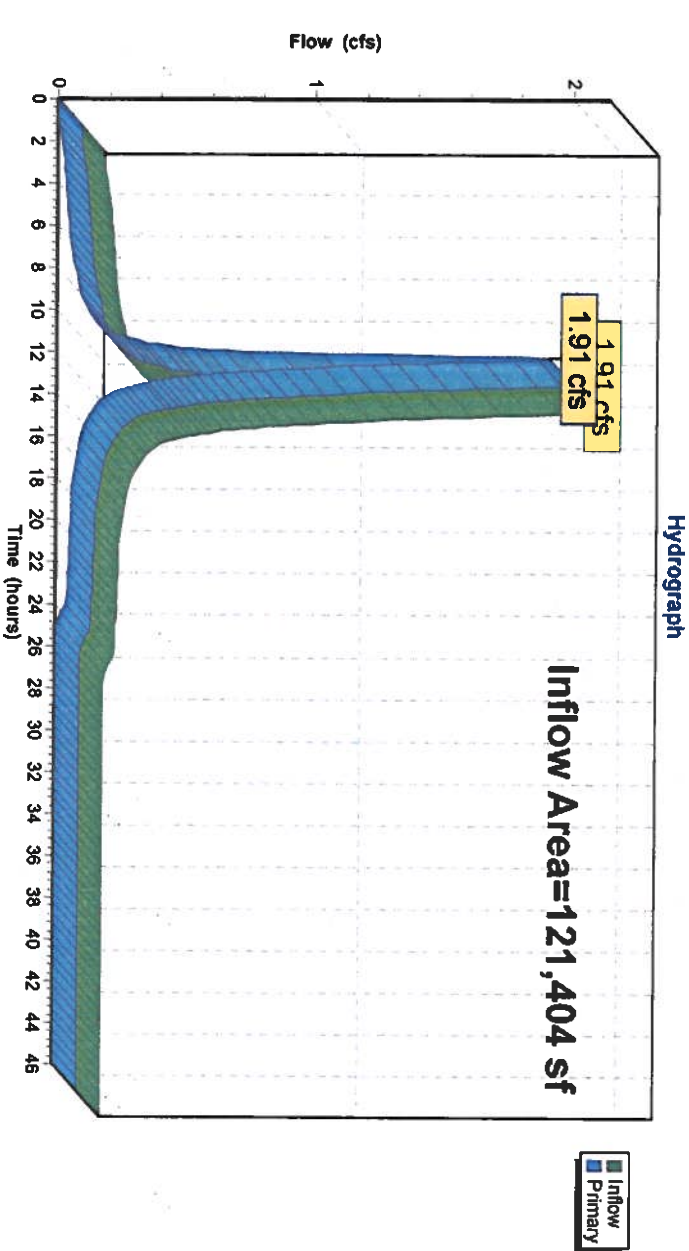
1.91 cfs @ 12.26 hrs, Volume=

12,081 cf

12,081 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link E WS1: Ext. Watershed #1 Low Point



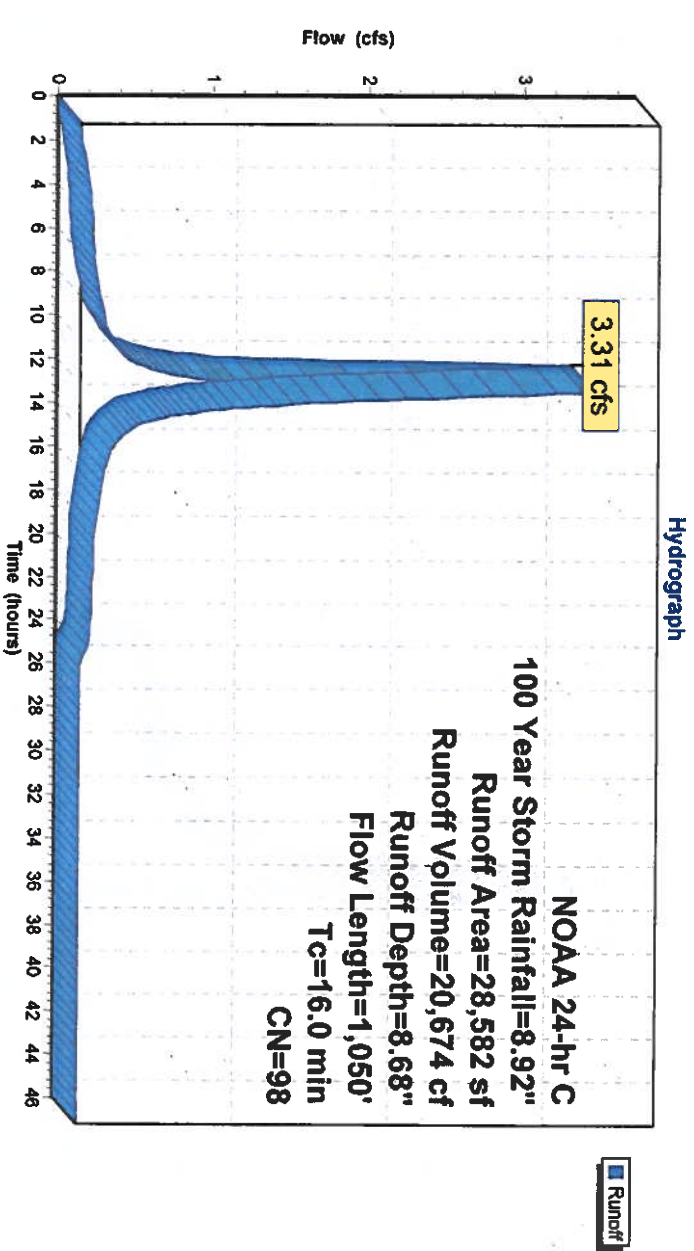
Summary for Subcatchment E WS1 I: Ext. Watershed #1 Impervious

Runoff = 3.31 cfs @ 12.26 hrs, Volume= 20,674 cf, Depth= 8.68"
Routed to Link E WS1 : Ext. Watershed #1 Low Point

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 Year Storm Rainfall=8.92"

Area (sf)		CN	Description		
28,582		98	Paved parking, HSG A		
28,582		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0310	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
8.3	828	0.0067	1.66		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.4	201	0.0082	0.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.0	1,050	Total			

Subcatchment E WS1 I: Ext. Watershed #1 Impervious



Summary for Link E WS1: Ext. Watershed #1 Low Point

Inflow Area =

Inflow =

Primary =

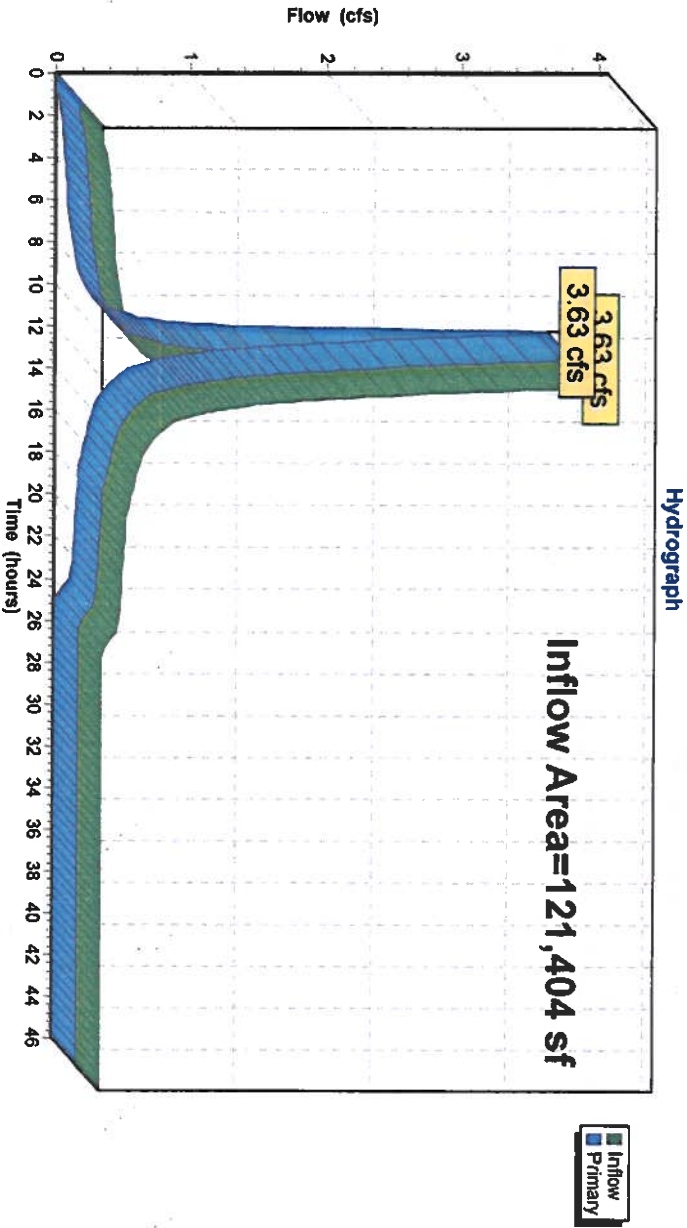
Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

121,404 sf, 23.54% Impervious, Inflow Depth = 2.64" for 100 Year Storm event

3.63 cfs @ 12.28 hrs, Volume= 26,755 cf

3.63 cfs @ 12.28 hrs, Volume= 26,755 cf, Atten= 0%, Lag= 0.0 min

Link E WS1: Ext. Watershed #1 Low Point



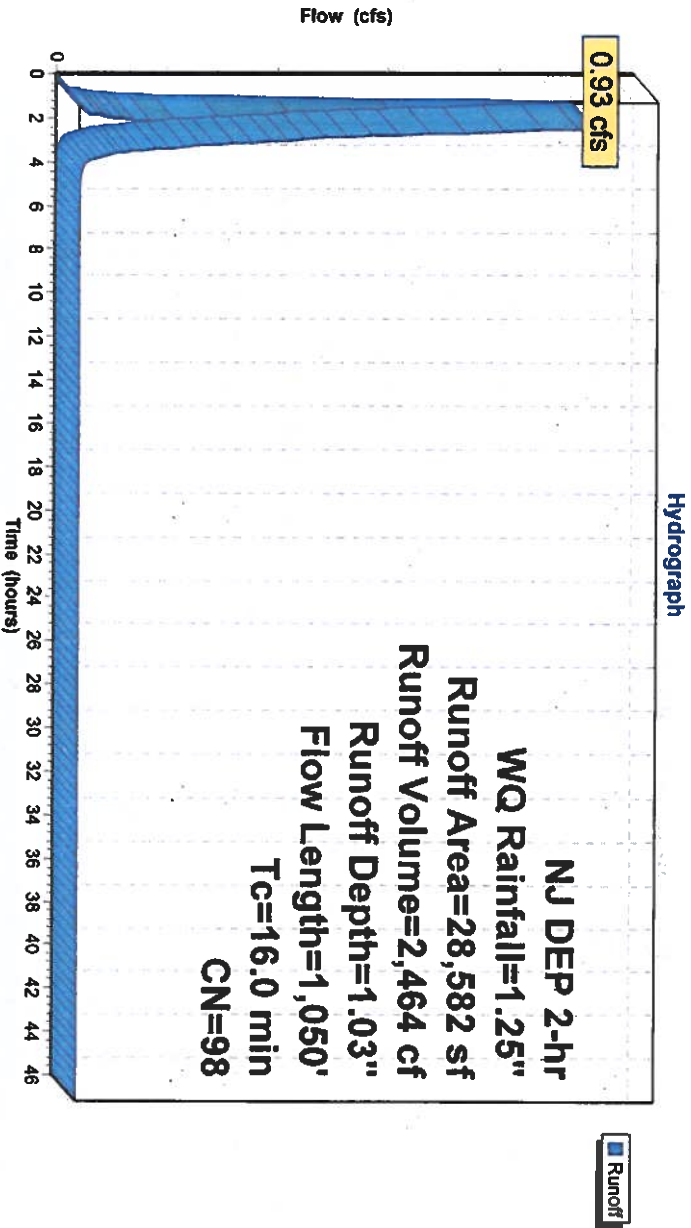
Summary for Subcatchment E WS1 I: Ext. Watershed #1 Impervious

Runoff = 0.93 cfs @ 1.25 hrs, Volume= 2,464 cf, Depth= 1.03"
Routed to Link E WS1 : Ext. Watershed #1 Low Point

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)		CN	Description		
*	28,582	98	Paved parking, HSG A		
	28,582		100.00% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0310	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
8.3	828	0.0067	1.66		Shallow Concentrated Flow, Paved Kv= 20.3 fps
7.4	201	0.0082	0.45		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.0	1,050	Total			

Subcatchment E WS1 I: Ext. Watershed #1 Impervious



Summary for Link E WS1: Ext. Watershed #1 Low Point

Inflow Area =

Inflow =

Primary =

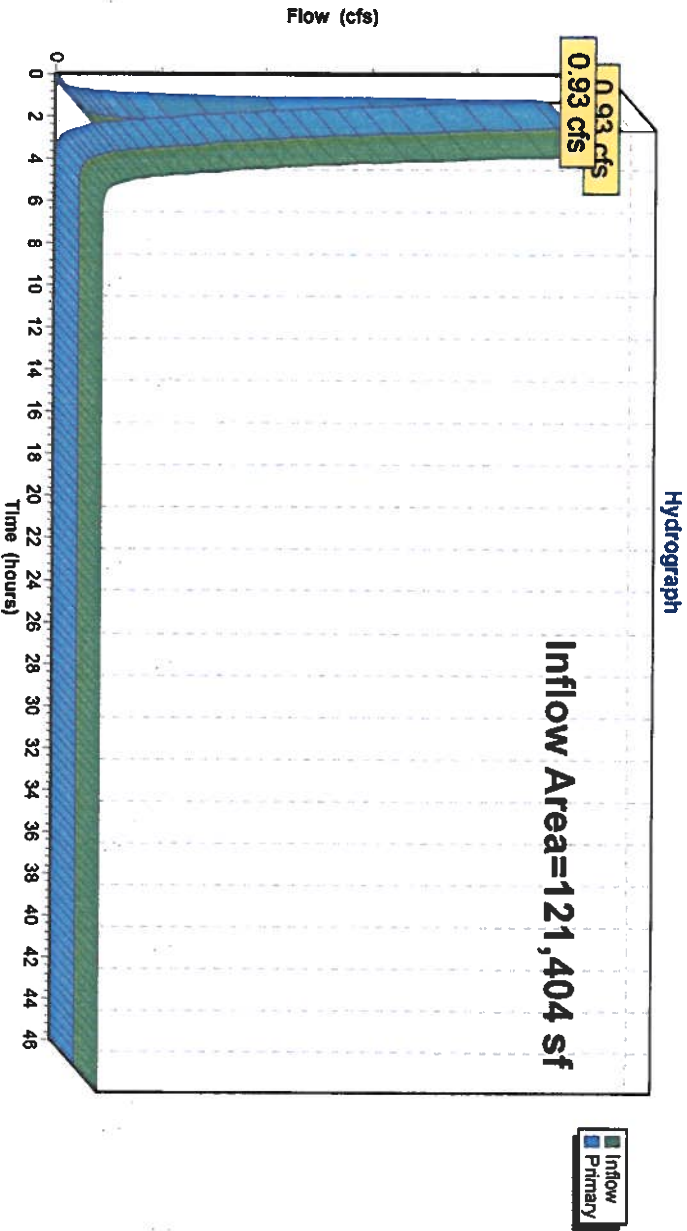
121,404 sf, 23.54% Impervious, Inflow Depth = 0.24" for WQ event

= 0.93 cfs @ 1.25 hrs, Volume= 2,464 cf

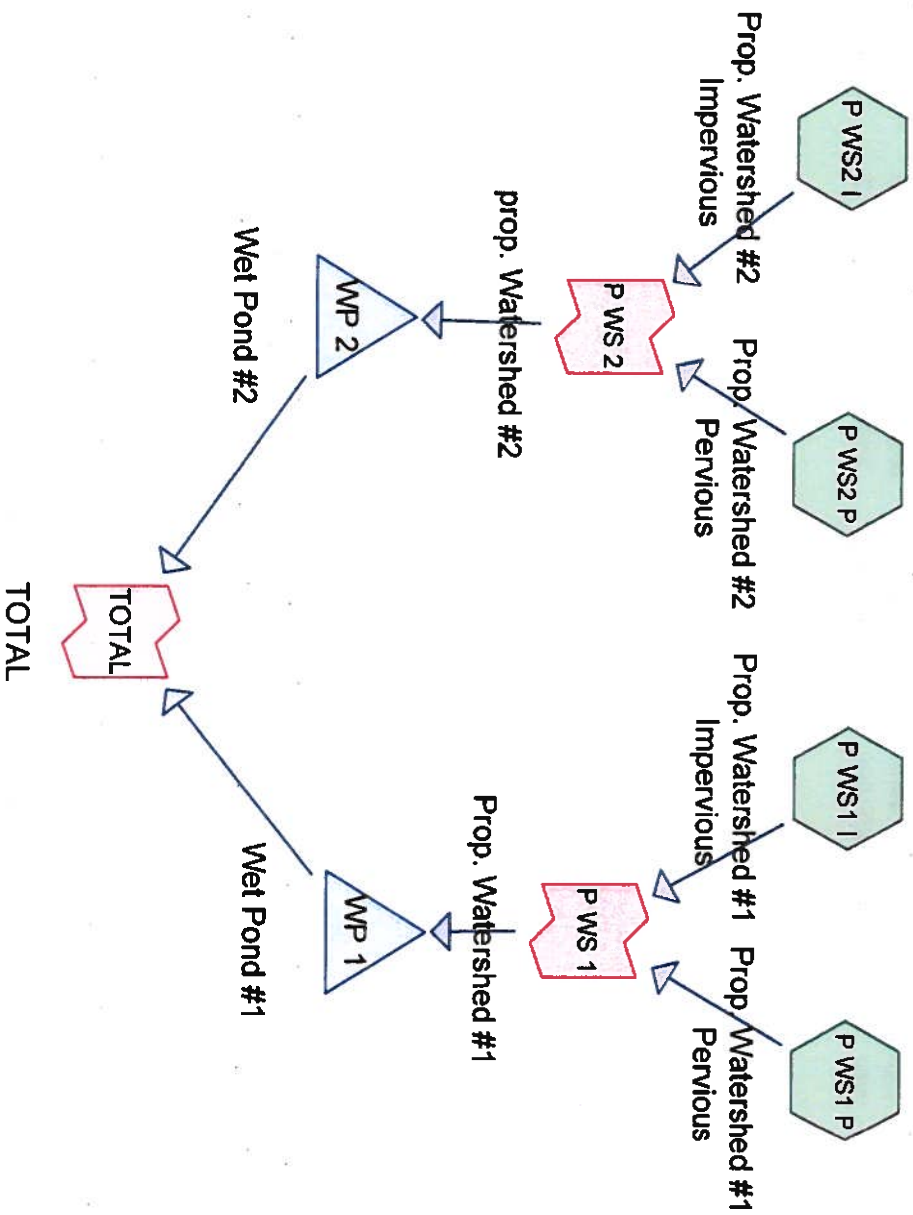
= 0.93 cfs @ 1.25 hrs, Volume= 2,464 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link E WS1: Ext. Watershed #1 Low Point



POST-DEVELOPMENT RUNOFF



Subcat

Reach

Pond

Link

Routing Diagram for Matt Ryan Development Group (RT 83)
Prepared by Engineering Design Associates, Printed 12/13/2022
HydroCAD® 10.20-2c s/n 01171 © 2021 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
53,427	39	>75% Grass cover, Good, HSG A (P WS1 P, P WS2 P)
13,428	76	Gravel roads, HSG A (P WS1 P, P WS2 P)
47,952	98	Paved parking, HSG A (P WS1 I, P WS2 I)
6,597	30	Woods, Good, HSG A (P WS2 P)
121,404	66	TOTAL AREA

Ground Covers (selected nodes)							Sub Nun
HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	
53,427	0	0	0	0	53,427	>75% Grass cover, Good	
13,428	0	0	0	0	13,428	Gravel roads	
47,952	0	0	0	0	47,952	Paved parking	
6,597	0	0	0	0	6,597	Woods, Good	
121,404	0	0	0	0	121,404	TOTAL AREA	

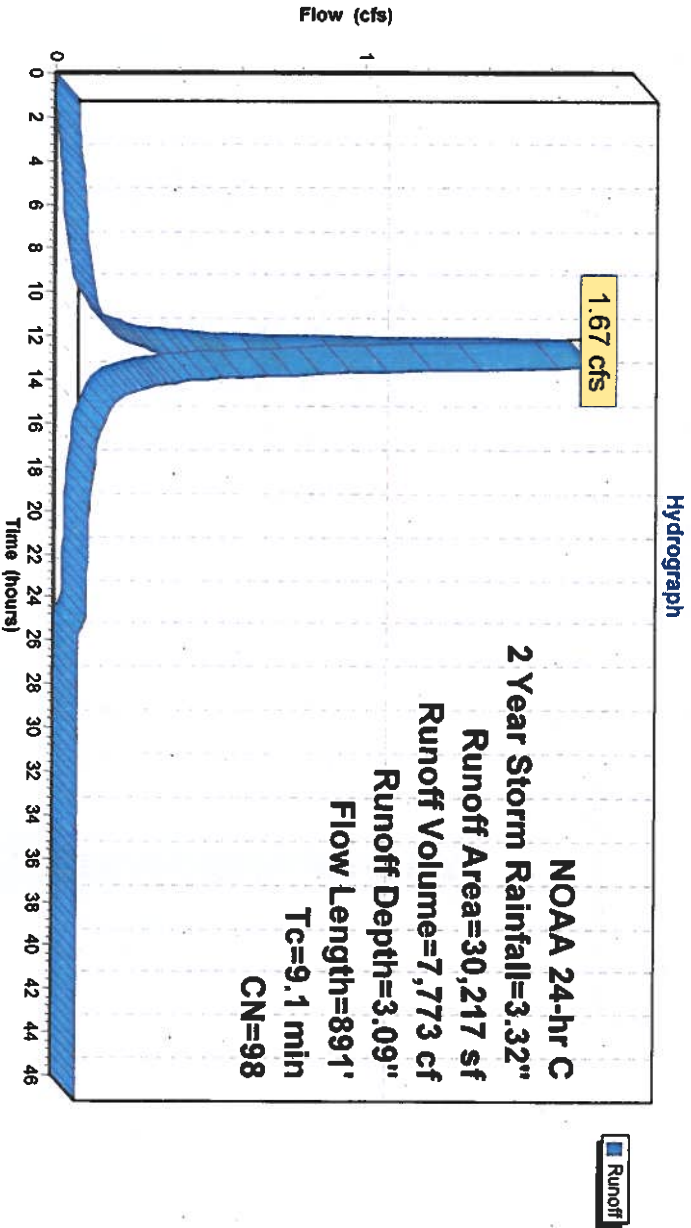
Summary for Subcatchment P WS1 I: Prop. Watershed #1 Impervious

Runoff = 1.67 cfs @ 12.17 hrs, Volume= 7.773 cf, Depth= 3.09"
Routed to Link P WS 1 : Prop. Watershed #1

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 Year Storm Rainfall=3.32"

Area (sf)		CN	Description		
30,217		98	Paved parking, HSG A		
30,217			100.00% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0310	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
8.3	828	0.0067	1.66		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	42	0.0100	1.50		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
9.1	891	Total			

Subcatchment P WS1 I: Prop. Watershed #1 Impervious



Summary for Subcatchment P WS2 I: Prop. Watershed #2 Impervious

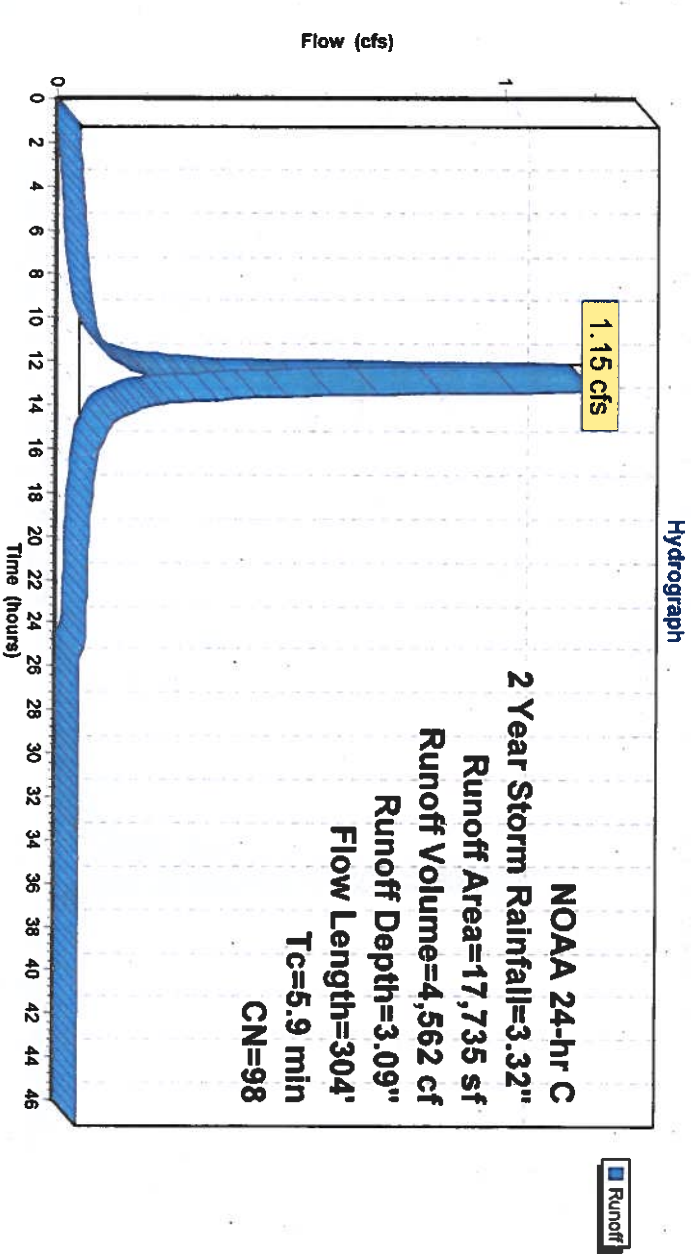
[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.15 cfs @ 12.14 hrs, Volume= 4,562 cf, Depth= 3.09"
Routed to Link P WS 2 : prop. Watershed #2

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2 Year Storm Rainfall=3.32"

Area(sf)		CN	Description		
17,735		98	Paved parking, HSG A		
17,735			100.00% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	11	0.0310	1.07		Sheet Flow, Smooth surfaces n=0.011 P2= 3.31"
2.2	203	0.0056	1.52		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.5	90	0.0072	0.42		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
5.9	304	Total			

Subcatchment P WS2 I: Prop. Watershed #2 Impervious



Summary for Pond WP 1: Wet Pond #1

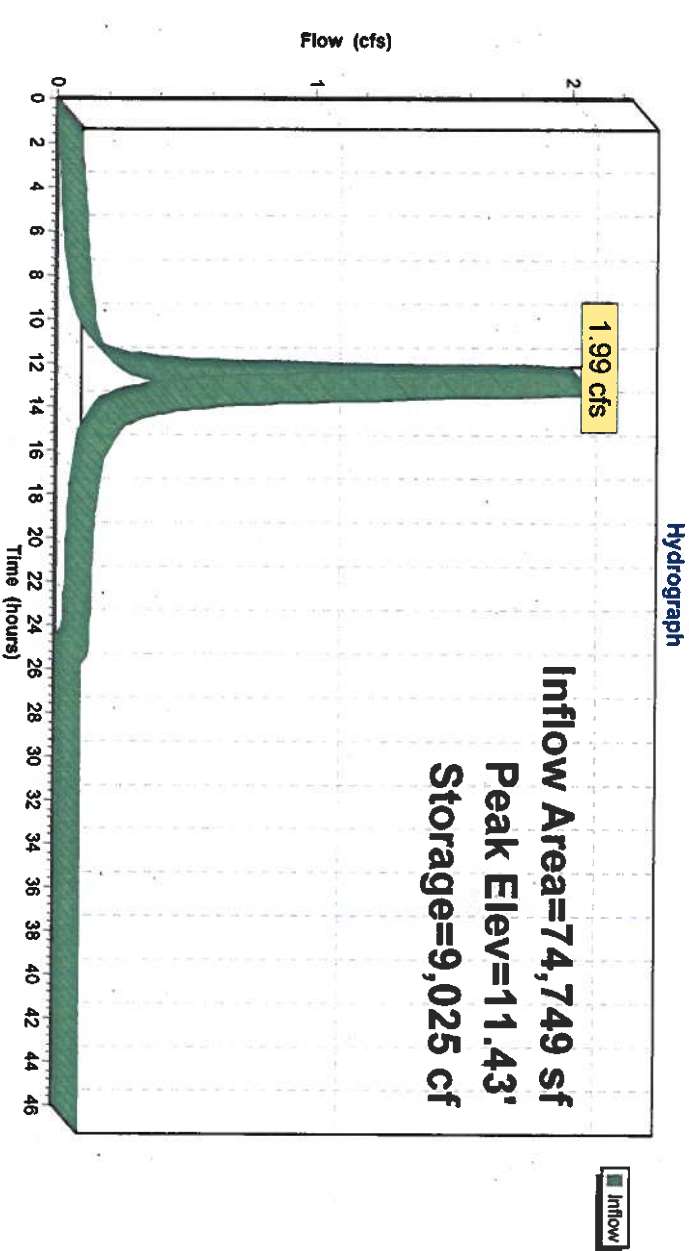
Inflow Area = 74,749 sf, 40.42% Impervious, Inflow Depth = 1.45" for 2 Year Storm event
Inflow = 1.99 cfs @ 12.16 hrs, Volume= 9,025 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
Peak Elev= 11.43' @ 25.05 hrs Surf.Area= 9,342 sf Storage= 9,025 cf

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

Volume					Storage Description		
#1	Invert	Avail. Storage	Storage		Custom Stage Data (Prismatic) Listed below (Recalc)		
Elevation (feet)	Surf. Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)				
10.35	7,421	0	0				
13.50	13,041	32,228	32,228				

Pond WP 1: Wet Pond #1

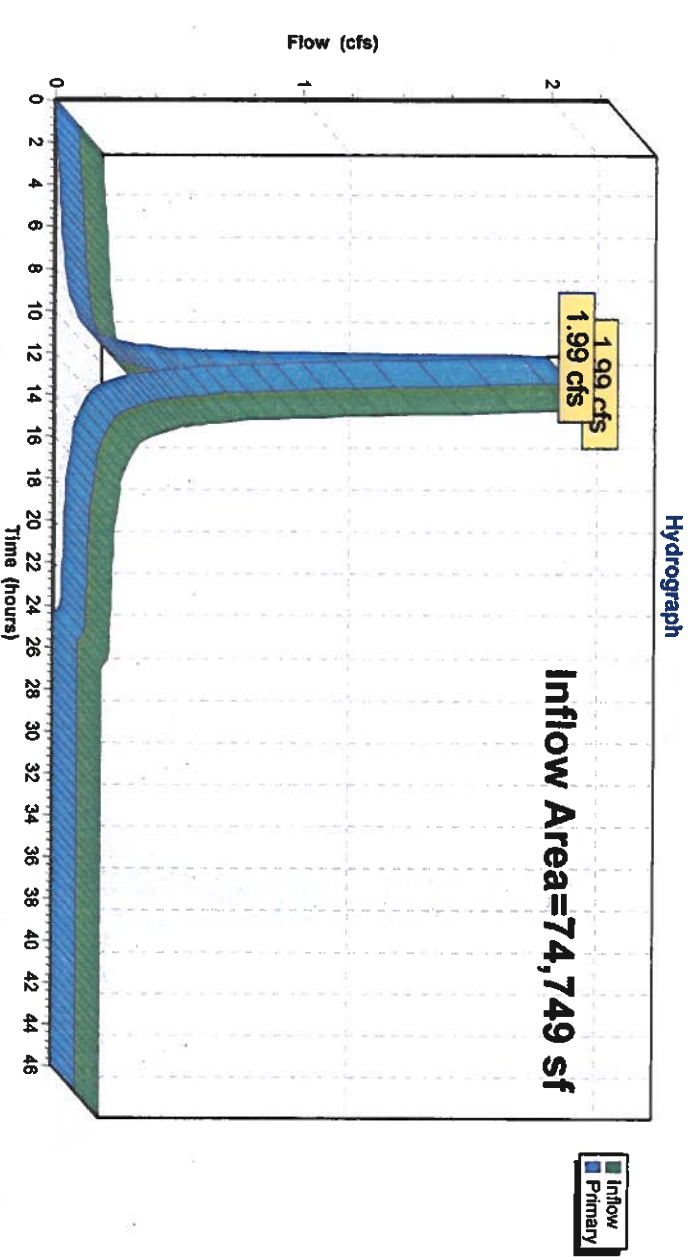


Summary for Link P WS 1: Prop. Watershed #1

Inflow Area = 74,749 sf, 40.42% Impervious, Inflow Depth = 1.45" for 2 Year Storm event
Inflow = 1.99 cfs @ 12.16 hrs, Volume= 9,025 cf
Primary = 1.99 cfs @ 12.16 hrs, Volume= 9,025 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond W/P 1 : Wet Pond #1

Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link P WS 1: Prop. Watershed #1

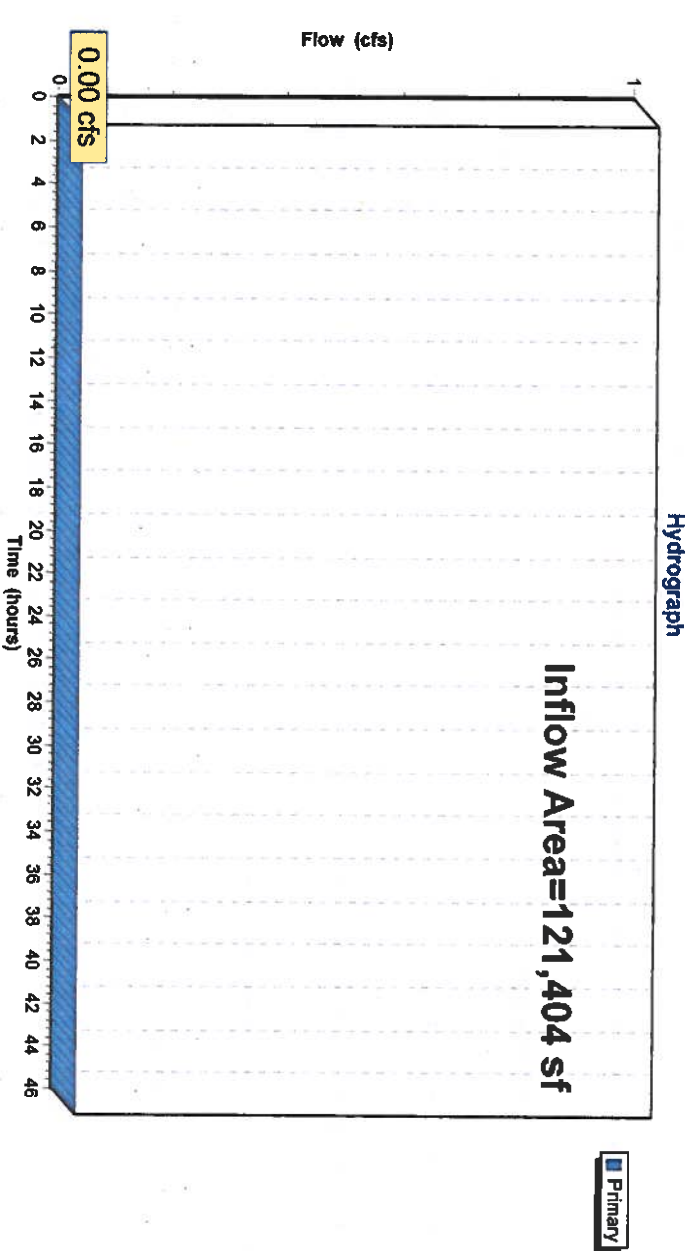


Summary for Link TOTAL: TOTAL

[43] Hint: Has no inflow (Outflow=Zero)

Inflow Area = 121,404 sf, 39.50% Impervious, Inflow Depth = 0.00" for 2 Year Storm event
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link TOTAL: TOTAL



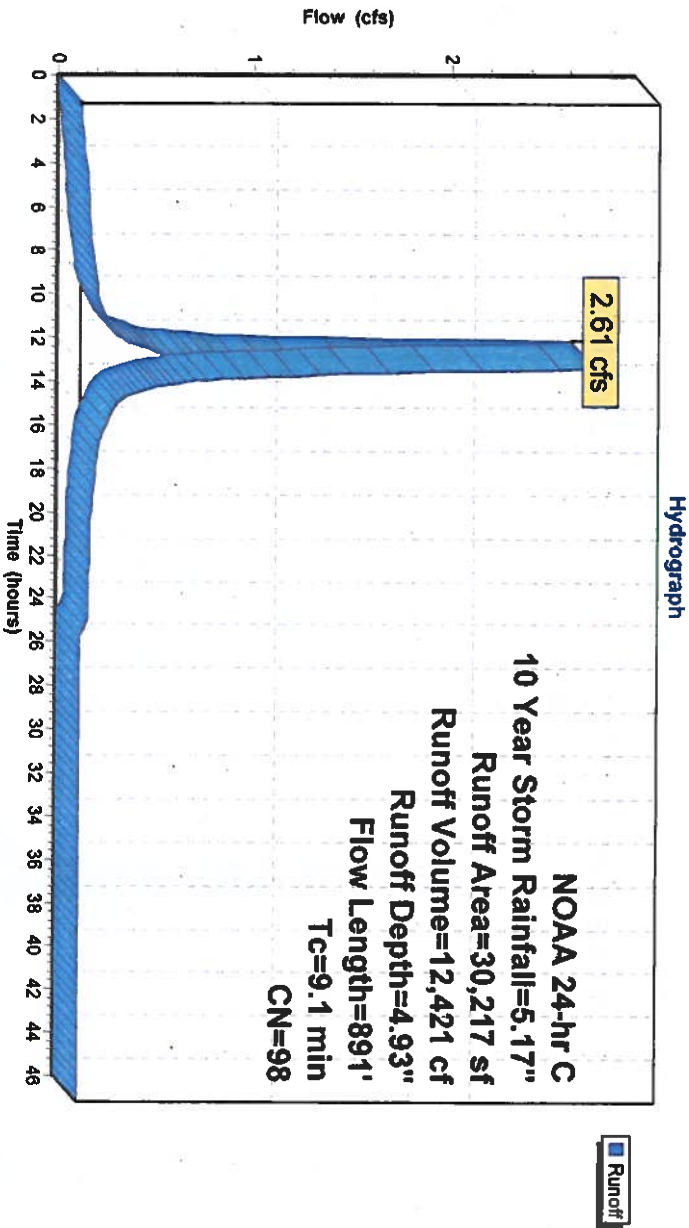
Summary for Subcatchment P WS1 I: Prop. Watershed #1 Impervious

Runoff = 2.61 cfs @ 12.17 hrs, Volume= 12,421 cf, Depth= 4.93"
Routed to Link P WS 1 : Prop. Watershed #1

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 Year Storm Rainfall=5.17"

Area (sf)		CN	Description		
*	30,217	98	Paved parking, HSG A		
	30,217		100.00% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0310	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
8.3	828	0.0067	1.66		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	42	0.0100	1.50		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
9.1	891	Total			

Subcatchment P WS1 I: Prop. Watershed #1 Impervious



Summary for Subcatchment P WS2 I: Prop. Watershed #2 Impervious

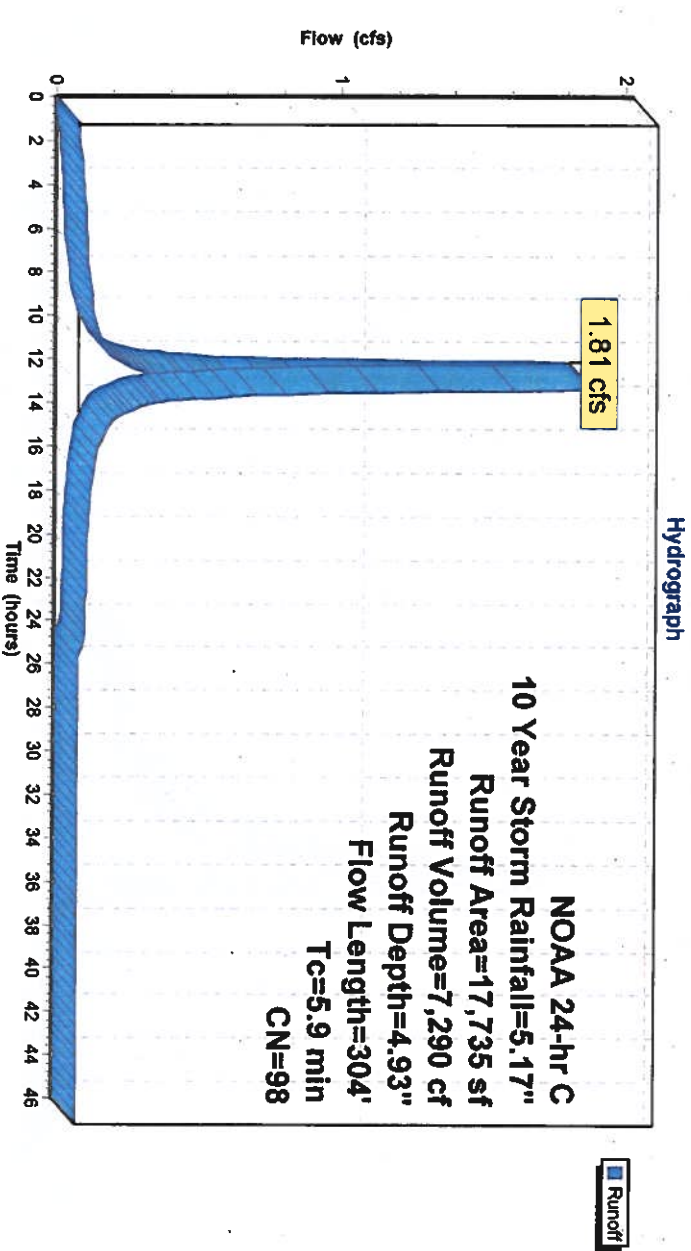
[49] Hint: Tc<2dt may require smaller dt

Runoff = 1.81 cfs @ 12.14 hrs, Volume= 7,290 cf, Depth= 4.93"
Routed to Link P WS 2 : prop. Watershed #2

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10 Year Storm Rainfall=5.17"

Area (sf)		CN	Description		
17,735		98	Paved parking, HSG A		
17,735			100.00% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	11	0.0310	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
2.2	203	0.0056	1.52		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.5	90	0.0072	0.42		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
5.9	304	Total			

Subcatchment P WS2 I: Prop. Watershed #2 Impervious



Summary for Pond WP 1: Wet Pond #1

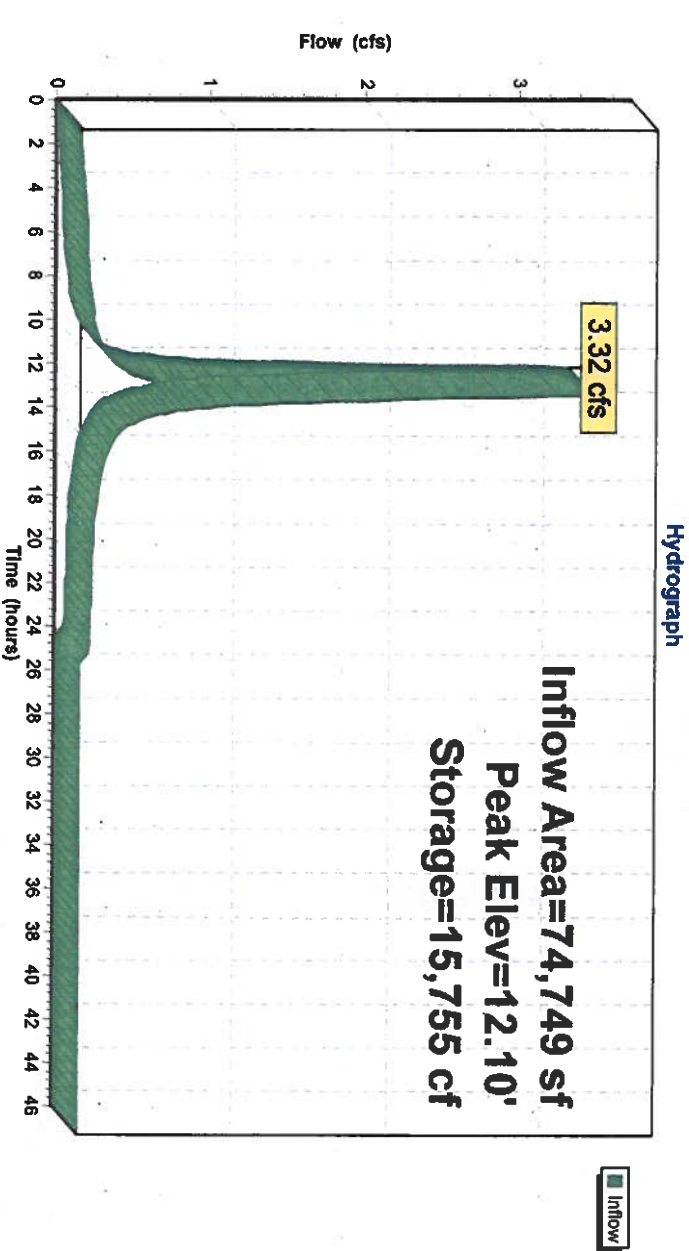
Inflow Area = 74,749 sf, 40.42% Impervious, Inflow Depth = 2.53" for 10 Year Storm event
Inflow = 3.32 cfs @ 12.15 hrs, Volume= 15,756 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
Peak Elev= 12.10' @ 25.05 hrs Surf.Area= 10,549 sf Storage= 15,755 cf

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

Volume					Storage Description		
#1	Invert	Avail.Storage	Custom Stage Data (Prismatic)Listed below (Recalc)				
Elevation	Surf.Area	Inc.Store	Cum.Store				
(feet)	(sq-ft)	(cubic-feet)	(cubic-feet)				
10.35	7,421	0	0				
13.50	13,041	32,228	32,228				

Pond WP 1: Wet Pond #1

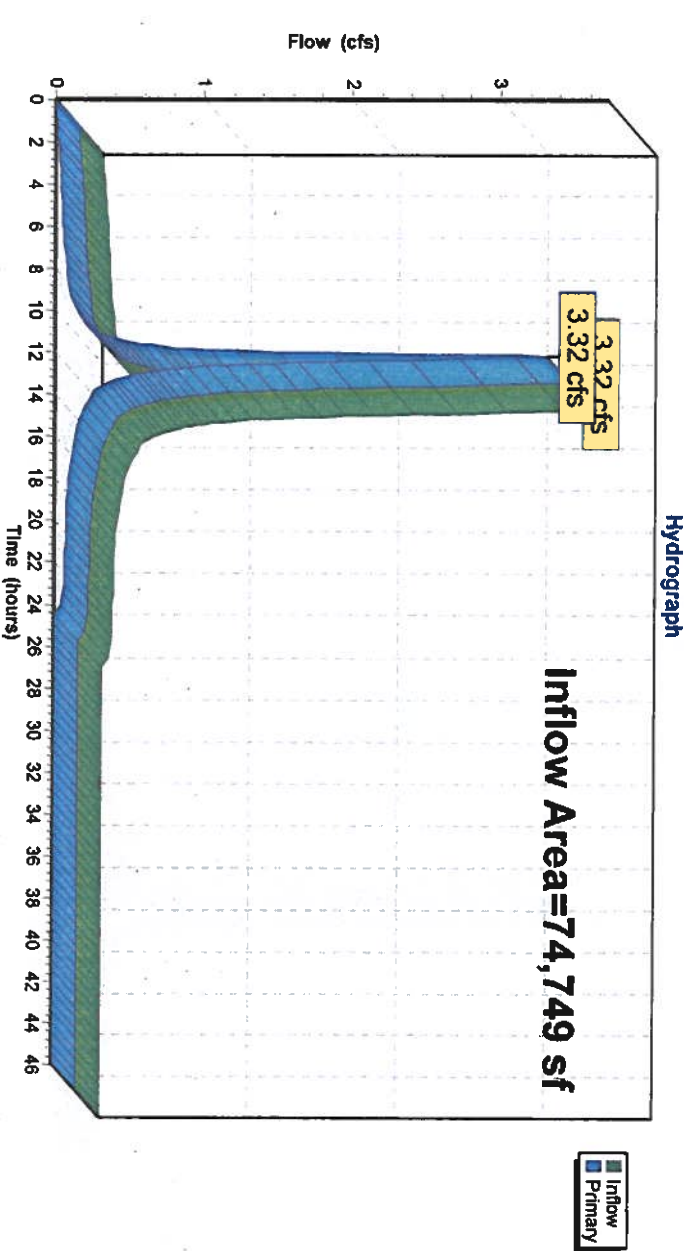


Summary for Link P WS 1: Prop. Watershed #1

Inflow Area = 74,749 sf, 40.42% Impervious, Inflow Depth = 2.53" for 10 Year Storm event
Inflow = 3.32 cfs @ 12.15 hrs, Volume= 15,756 cf
Primary = 3.32 cfs @ 12.15 hrs, Volume= 15,756 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond WP 1 : Wet Pond #1

Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link P WS 1: Prop. Watershed #1

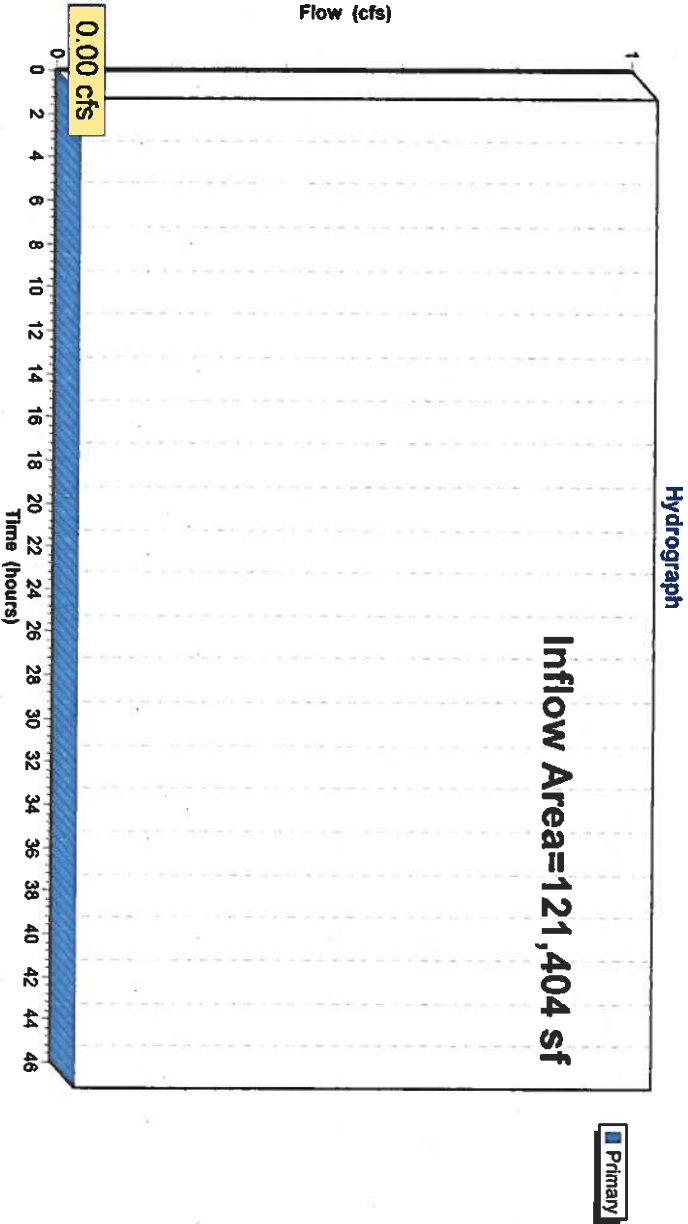


Summary for Link TOTAL: TOTAL

[43] Hint: Has no inflow (Outflow=Zero)

Inflow Area = 121,404 sf, 39.50% Impervious, Inflow Depth = 0.00" for 10 Year Storm event
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link TOTAL: TOTAL



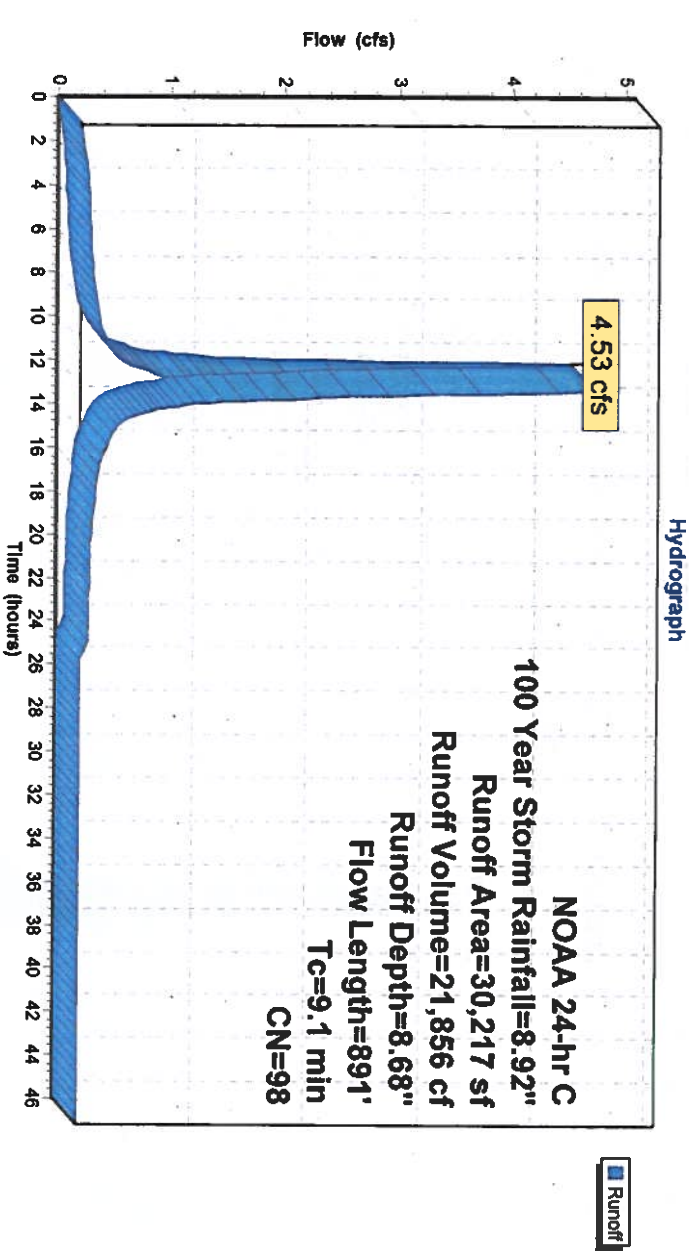
Summary for Subcatchment P WS1 I: Prop. Watershed #1 Impervious

Runoff = 4.53 cfs @ 12.17 hrs, Volume= 21,856 cf, Depth= 8.68"
Routed to Link P WS 1 : Prop. Watershed #1

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 Year Storm Rainfall=8.92"

Area (sf)		CN	Description		
*	30,217	98	Paved parking, HSG A		
	30,217		100.00% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0310	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
8.3	828	0.0067	1.66		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	42	0.0100	1.50		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps

Subcatchment P WS1 I: Prop. Watershed #1 Impervious



Summary for Subcatchment P WS2 I: Prop. Watershed #2 Impervious

[49] Hint: Tc<2dt may require smaller dt

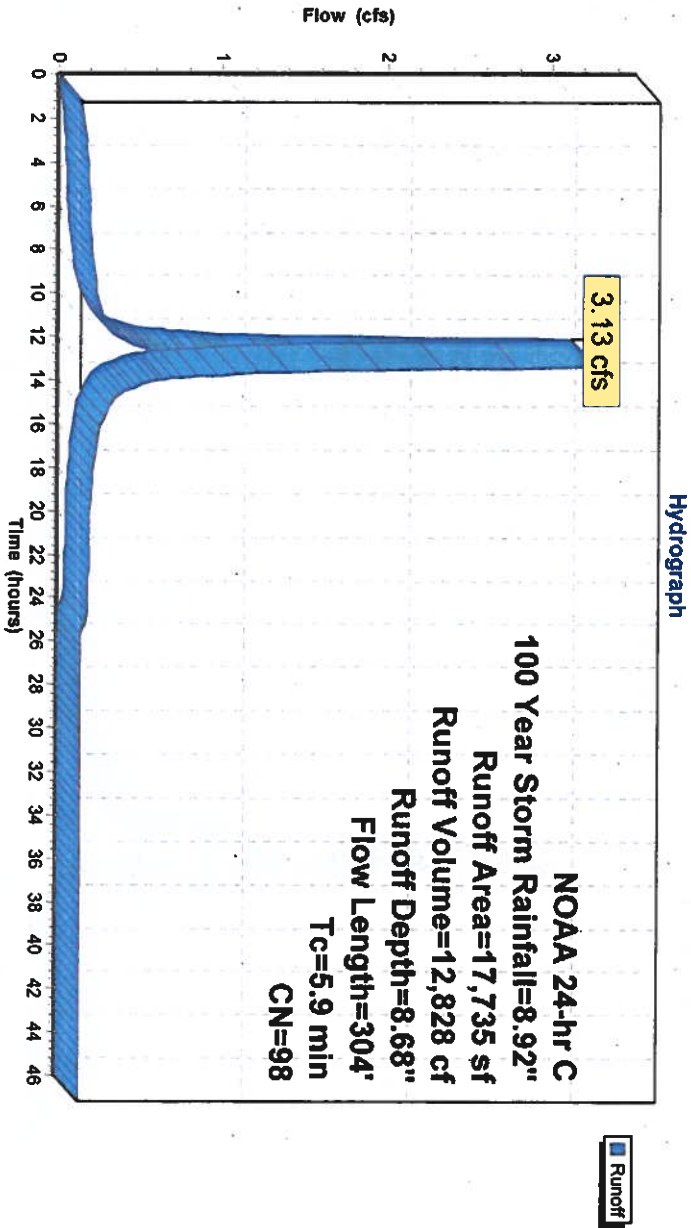
Runoff = 3.13 cfs @ 12.14 hrs, Volume= 12,828 cf, Depth= 8.68"
Routed to Link P WS 2 : prop. Watershed #2

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 100 Year Storm Rainfall=8.92"

Area (sf)	CN	Description
17,735	98	Paved parking, HSG A
17,735		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	11	0.0310	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
2.2	203	0.0056	1.52		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.5	90	0.0072	0.42		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
5.9	304	Total			

Subcatchment P WS2 I: Prop. Watershed #2 Impervious



Summary for Pond WP 1: Wet Pond #1

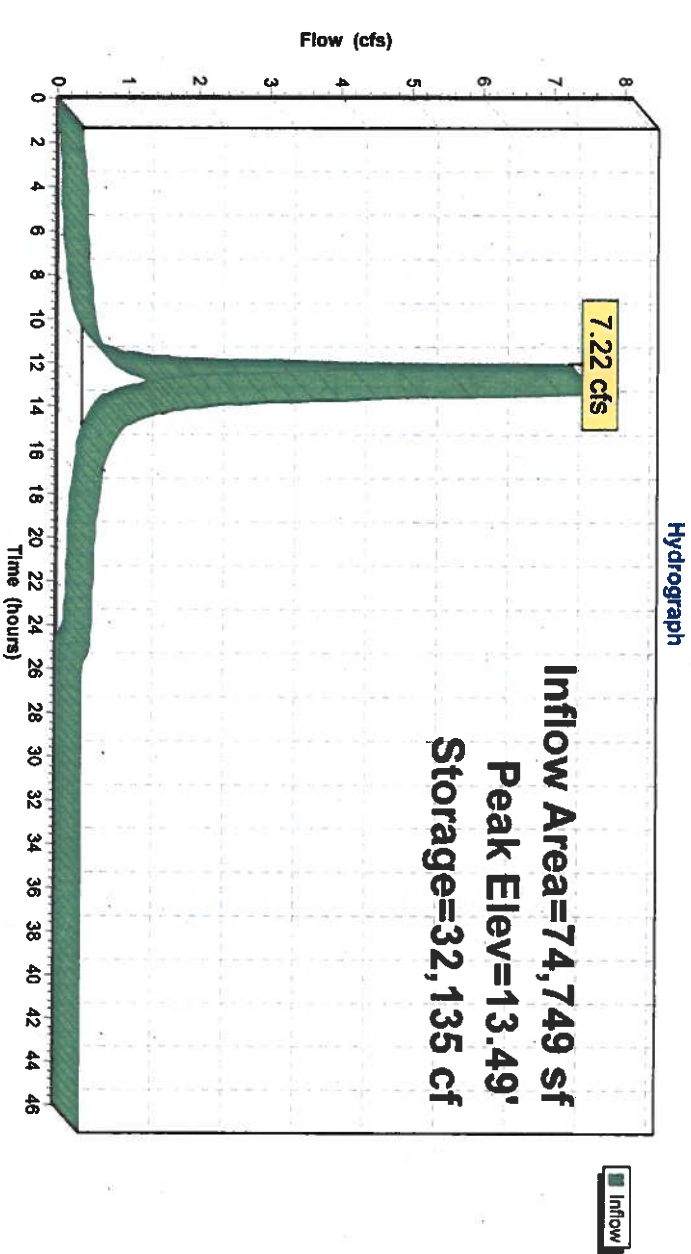
Inflow Area = 74,749 sf, 40.42% Impervious, Inflow Depth = 5.16" for 100 Year Storm event
Inflow = 7.22 cfs @ 12.13 hrs, Volume= 32,135 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
Peak Elev= 13.49' @ 25.05 hrs Surf.Area= 13,028 sf Storage= 32,135 cf

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

Volume	Invert	Avail.Storage	Storage Description		
#1	10.35'	32,228 cf	Custom Stage Data (Prismatic)Listed below (Recalc)		
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)		
10.35	7,421	0	0		
13.50	13,041	32,228	32,228		

Pond WP 1: Wet Pond #1



Summary for Link P WS 1: Prop. Watershed #1

Inflow Area =

Inflow =

Primary =

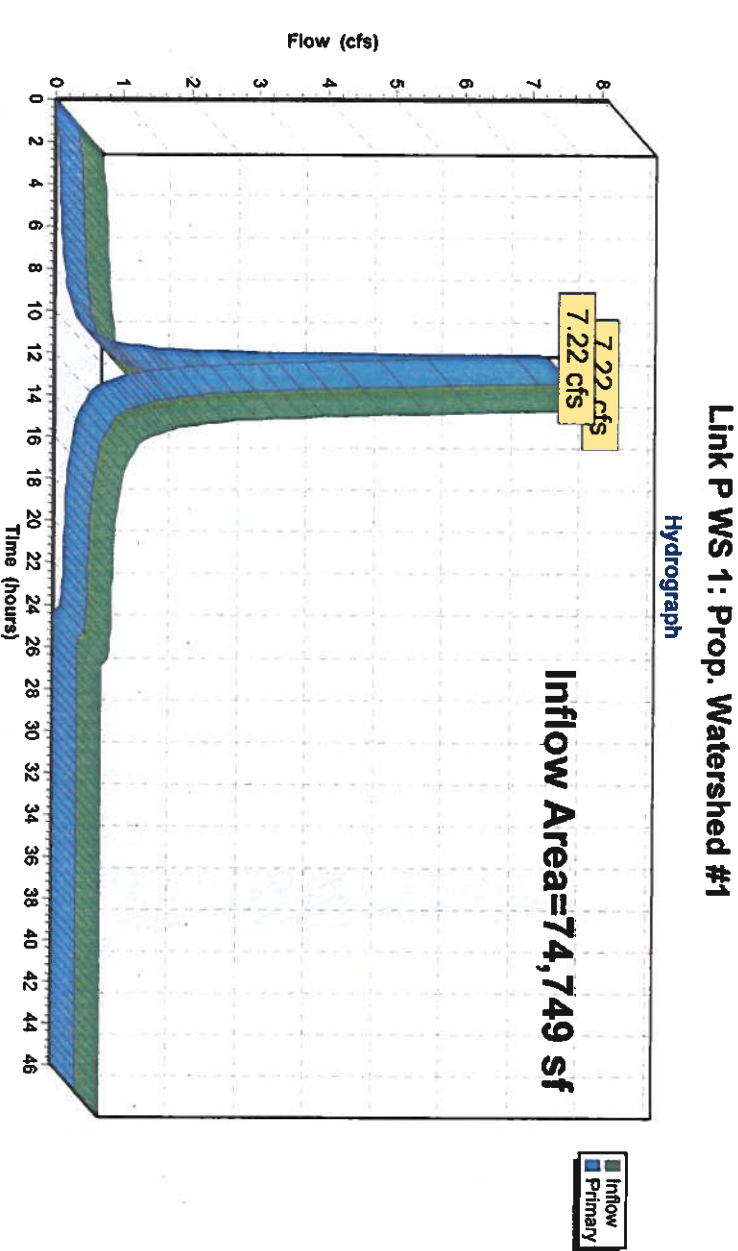
Routed to Pond WP 1 : Wet Pond #1

74,749 sf, 40.42% Impervious, Inflow Depth = 5.16" for 100 Year Storm event

7.22 cfs @ 12.13 hrs, Volume= 32,135 cf

7.22 cfs @ 12.13 hrs, Volume= 32,135 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

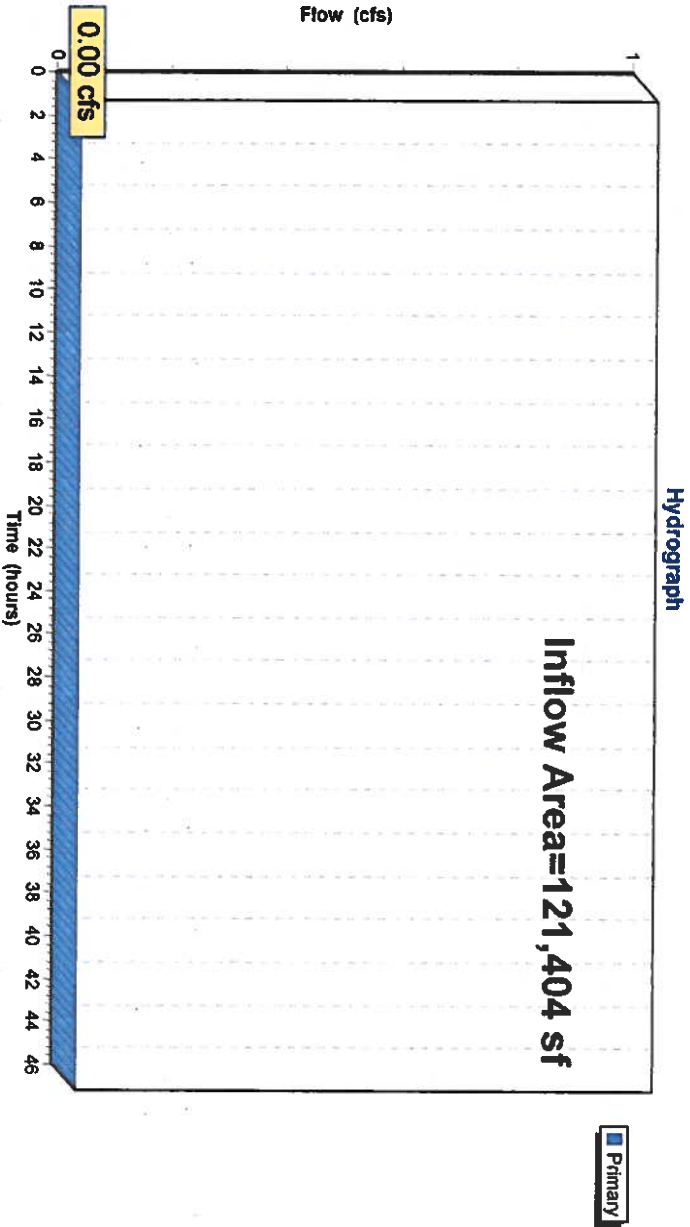


Summary for Link TOTAL: TOTAL

[43] Hint: Has no inflow (Outflow=Zero)

Inflow Area = 121,404 sf, 39.50% Impervious, Inflow Depth = 0.00" for 100 Year Storm event
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link TOTAL: TOTAL



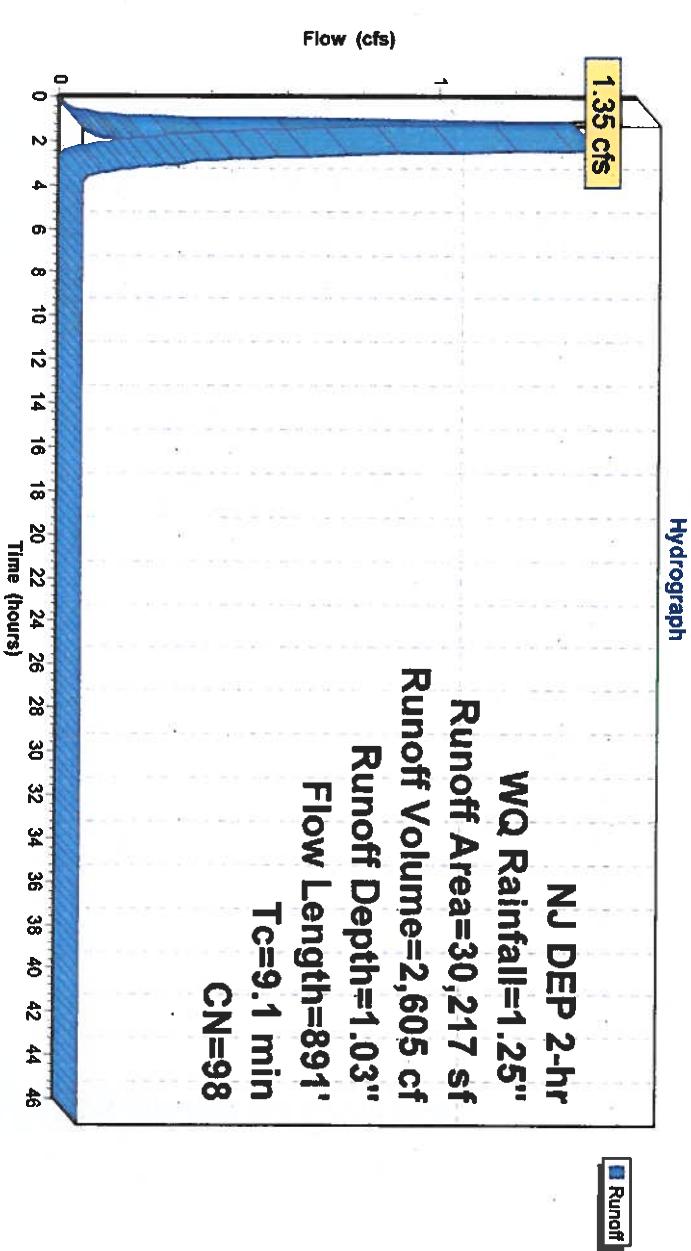
Summary for Subcatchment P WS1 I: Prop. Watershed #1 Impervious

Runoff = 1.35 cfs @ 1.16 hrs, Volume= 2,605 cf, Depth= 1.03"
Routed to Link P WS 1 : Prop. Watershed #1

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)		CN	Description		
30,217		98	Paved parking, HSG A		
30,217			100.00% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	21	0.0310	1.22		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
8.3	828	0.0067	1.66		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.5	42	0.0100	1.50		Shallow Concentrated Flow, Grassed Waterway Kv= 15.0 fps
9.1	891	Total			

Subcatchment P WS1 I: Prop. Watershed #1 Impervious



Summary for Subcatchment P WS2 I: Prop. Watershed #2 Impervious

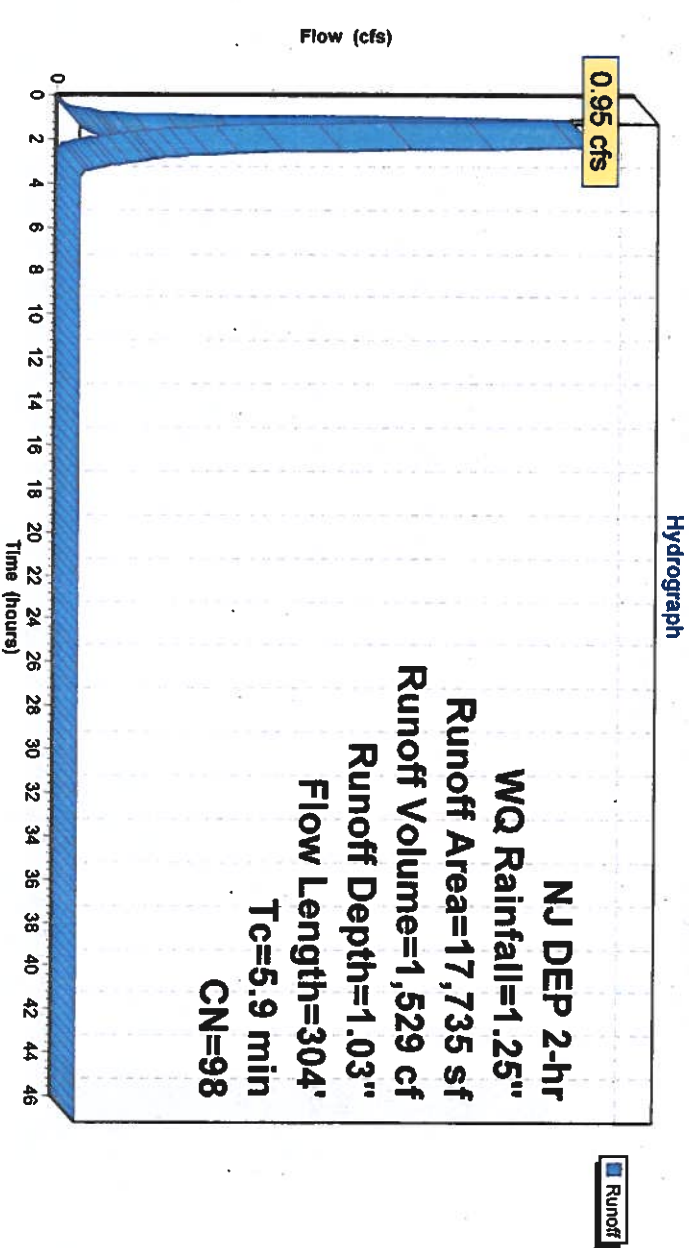
[49] Hint: Tc<2dt may require smaller dt

Runoff = 0.95 cfs @ 1.12 hrs, Volume= 1,529 cf, Depth= 1.03"
Routed to Link P WS 2 : prop. Watershed #2

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-Q, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (sf)		CN	Description		
17,735		98	Paved parking, HSG A		
17,735			100.00% Impervious Area		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	11	0.0310	1.07		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.31"
2.2	203	0.0056	1.52		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.5	90	0.0072	0.42		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
5.9	304	Total			

Subcatchment P WS2 I: Prop. Watershed #2 Impervious



Summary for Pond WP 1: Wet Pond #1

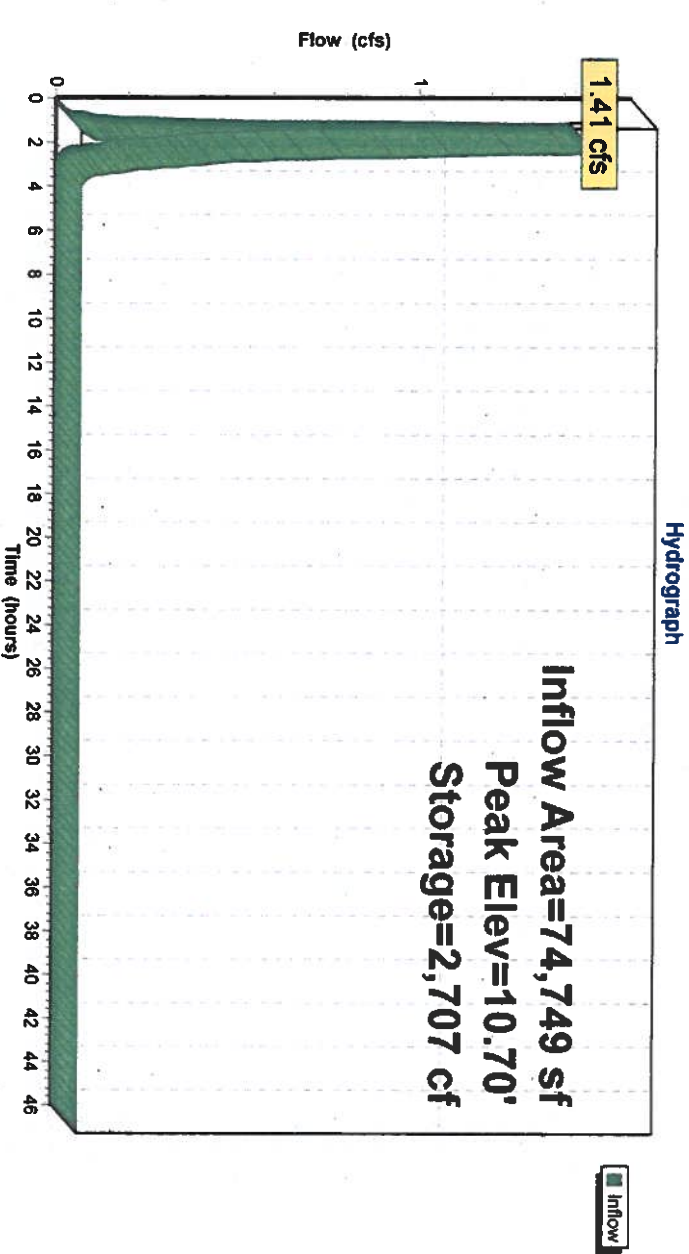
Inflow Area = 74,749 sf, 40.42% Impervious, Inflow Depth = 0.43" for WQ event
Inflow = 1.41 cfs @ 1.16 hrs, Volume= 2,707 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs
Peak Elev= 10.70' @ 3.05 hrs Surf.Area= 8,046 sf Storage= 2,707 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	10.35'	32,228 cf	Custom Stage Data (Prismatic) listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
10.35	7,421	0	0
13.50	13,041	32,228	32,228

Pond WP 1: Wet Pond #1

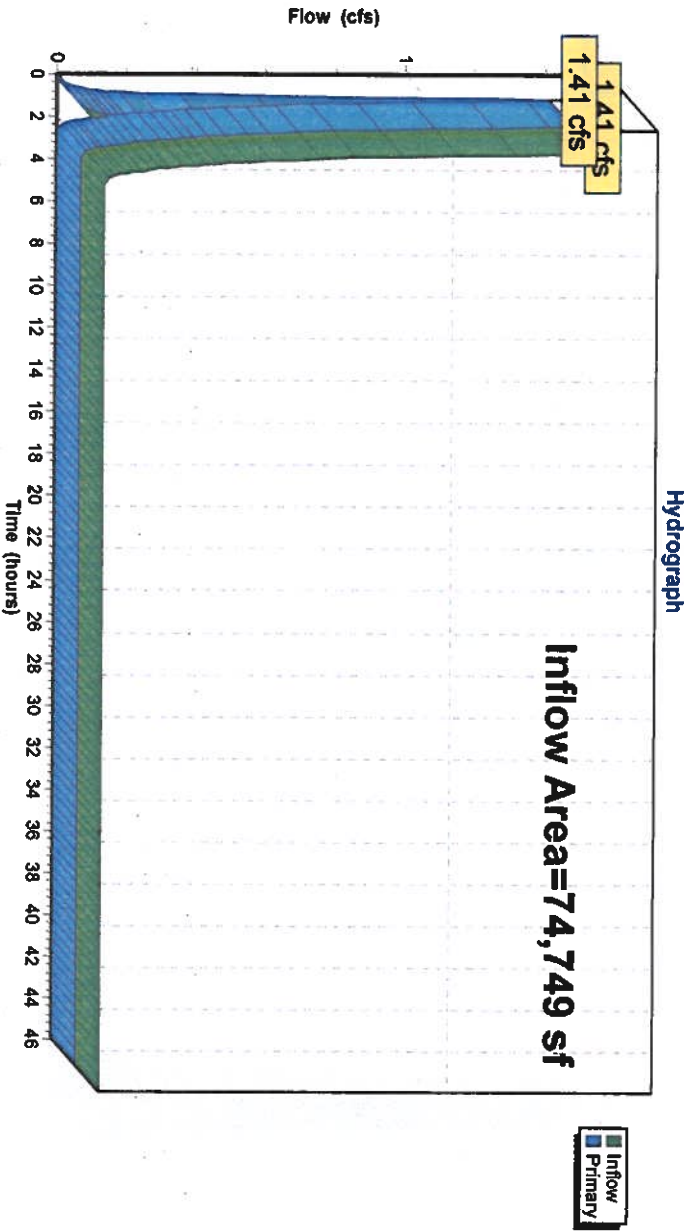


Summary for Link P WS 1: Prop. Watershed #1

Inflow Area = 74,749 sf, 40.42% Impervious, Inflow Depth = 0.43" for WQ event
Inflow = 1.41 cfs @ 1.16 hrs, Volume= 2,707 cf
Primary = 1.41 cfs @ 1.16 hrs, Volume= 2,707 cf, Atten= 0%, Lag= 0.0 min
Routed to Pond WP 1 : Wet Pond #1

Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link P WS 1: Prop. Watershed #1

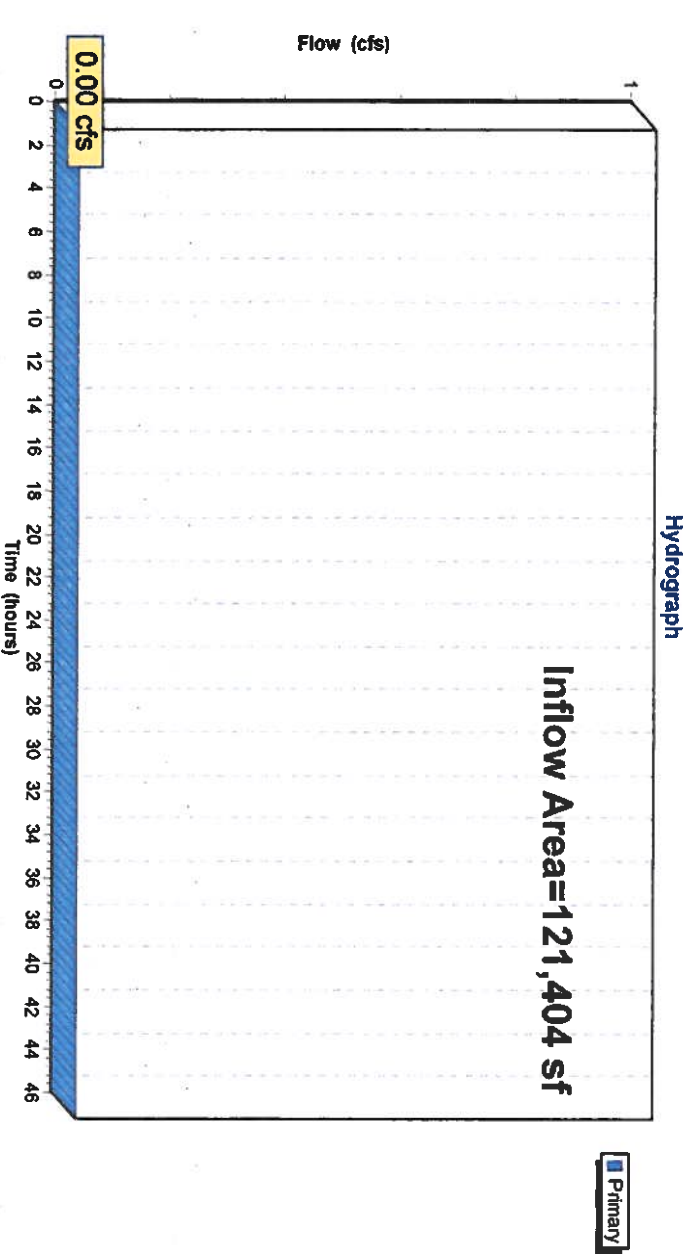


Summary for Link TOTAL: TOTAL

[43] Hint: Has no inflow (Outflow=Zero)

Inflow Area = 121,404 sf, 39.50% Impervious, Inflow Depth = 0.00" for WQ event
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary outflow = Inflow, Time Span= 0.00-46.00 hrs, dt= 0.05 hrs

Link TOTAL: TOTAL



SOILS DATA

TEST PIT #1

<u>DEPTH</u>	<u>DESCRIPTION</u>
0"- 8"	10YR 4/2 Dark Grayish Brown, Sandy Loam, Subangular Blocky, Friable
8"- 14"	10YR 6/3 Pale Brown, Loamy Sand, Subangular Blocky, Friable
14"- 25"	10YR 6/6 Brownish Yellow, Loamy Sand, Subangular Blocky, Friable
25"- 43"	10YR 6/6 Brownish Yellow, Sandy Loam, Subangular Blocky, Friable
43"- 70"	10YR 8/2 Very Pale Brown, Fine Sand, Single Grain, Loose w/mottles of 10YR 8/1 White, Few, Fine & Faint
70"- 99"	10YR 7/1 Light Gray, Fine Sand, Single Grain, Loose
99"- 123"	10YR 6/3 Pale Brown, Fine Sand, Single Grain, Loose w/mottles of 10YR 7/1 Light Gray, Common, Medium & Distinct

Depth of Seasonal High Water: 43"
Depth of Groundwater: 120"
Date Performed: 11/17/2022
Witnessed By: Heather Carr Johnson, Cape May County Health Dept.
Performed By: Christopher J. Carey, LLA

TEST PIT #2

<u>DEPTH</u>	<u>DESCRIPTION</u>
0"- 5"	10YR 4/2 Dark Grayish Brown, Sandy Loam, Subangular Blocky, Friable
5"- 15"	10YR 5/4 Yellowish Brown, Loamy Sand, Subangular Blocky, Friable
15"- 26"	10YR 5/4 Yellowish Brown, Sandy Loam, Subangular Blocky, Friable
26"- 35"	10YR 6/3 Pale Brown, Loamy Sand, Subangular Blocky, Friable
35"- 53"	10YR 7/4 Very Pale Brown, Loamy Sand, Subangular Blocky, Friable
53"- 86"	10YR 7/3 Very Pale Brown, Loamy Sand, Subangular Blocky, Friable, w/mottles of 10YR 8/1 White, Few, Fine & Faint
86"- 123"	10YR 6/3 Pale Brown, Fine Sand, Single Grain, Loose w/mottles of 10YR 7/1 Light Gray, Few, Fine & Faint

Depth of Seasonal High Water: 53"
Depth of Groundwater: 120"
Date Performed: 11/17/2022
Witnessed By: Heather Carr Johnson, Cape May County Health Dept.
Performed By: Christopher J. Carey, LLA

TEST PIT #3

DEPTH	DESCRIPTION
0" - 6"	10YR 3/2 Very Dark Grayish Brown, Sandy Loam, Subangular Blocky, Friable
6" - 26"	10YR 5/3 Brown, Loamy Sand, Subangular Blocky, Friable
26" - 36"	10YR 5/6 Yellowish Brown, Sandy Loam, Subangular Blocky, Friable
36" - 43"	10YR 7/3 Very Pale Brown, Sand, Single Grain, Loose
43" - 123"	10YR 8/2 Very Pale Brown, Fine Sand, Single Grain, Loose w/mottles of 10YR 7/1 Light Gray, Few, Fine & Faint

Depth of Seasonal High Water: 43"
Depth of Groundwater: 110"
Date Performed: 11/17/2022
Performed By: Christopher J. Carey, LLA

TEST PIT #4

DEPTH	DESCRIPTION
0" - 8"	10YR 3/2 Very Dark Grayish Brown, Sandy Loam, Subangular Blocky, Friable
8" - 21"	10YR 5/3 Brown, Loamy Sand, Subangular Blocky, Friable
21" - 36"	10YR 5/4 Yellowish Brown, Sandy Loam, Subangular Blocky, Friable
36" - 39"	10YR 7/4 Very Pale Brown, Sand, Single Grain, Loose
39" - 82"	10YR 8/2 Very Pale Brown, Fine Sand, Single Grain, Loose w/mottles of 10YR 8/1 White, Few, Fine & Faint
82" - 120"	10YR 6/2 Light Brownish Gray, Fine Sand, Single Grain, Loose w/mottles of 10YR 8/1 White, Common, Medium & Distinct

Depth of Seasonal High Water: 39"
Depth of Groundwater: 96"
Date Performed: 11/17/2022
Performed By: Christopher J. Carey, LLA

TEST PIT #5

DEPTH	DESCRIPTION
0" - 8"	10YR 4/2 Dark Grayish Brown, Sandy Loam, Subangular Blocky, Friable
8" - 30"	10YR 6/4 Light Yellowish Brown, Sandy Loam, Subangular Blocky, Friable
30" - 65"	10YR 6/2 Light Brownish Gray, Fine Sand, Single Grain, Loose w/mottles of 10YR 7/1 Light Gray, Few, Fine & Faint
65" - 112"	10YR 6/1 Gray, Fine Sand, Single Grain, Loose w/mottles of 10YR 7/3 Very Pale Brown, Common, Medium & Distinct

Depth of Seasonal High Water: 30"
Depth of Groundwater: 48"
Date Performed: 11/17/2022
Performed By: Christopher J. Carey, LLA

TEST PIT #6

DEPTH	DESCRIPTION
0" - 7"	10YR 3/2 Dark Brown, Sandy Loam, Subangular Blocky, Friable
7" - 12"	10YR 4/2 Dark Grayish Brown, Sandy Loam, Subangular Blocky, Friable
12" - 35"	10YR 5/4 Yellowish Brown, Sandy Loam, Subangular Blocky, Friable
35" - 59"	10YR 7/2 Light Gray, Sand, Single Grain, Loose w/mottles of 10YR 8/1 White, Few, Fine & Faint
59" - 107"	10YR 6/1 Gray, Fine Sand, Single Grain, Loose
Depth of Seasonal High Water:	35"
Depth of Groundwater:	72"
Date Performed:	11/17/2022
Performed By:	Christopher J. Carey, LLA

CJC/tt

Ryan Development Group - EDA #9444
Block 260, Lots 4.04 & 4.05

CAPE MAY COUNTY DEPARTMENT OF HEALTH
SEWAGE DISPOSAL SYSTEM APPLICATION - ATTACHMENT "B"

SOIL PERMEABILITY CLASS RATING DATA MUNICIPALITY - Dennis Township

1. Test Number 1 Replicate Letter A

2. Sample Depth 30" Soil Pit Boring Number TP#3 Date Collected 11/17/2022

3. Coarse Fragment Content

Total Wt. of Sample, W.T., Grams (g) 432.8

Wt. of Material Retained on 2 mm Sieve, W.C.F., g 128.2

Wt. % Coarse Fragment (W.C.F./W.T. x 100): 29.6%

4. Oven Dry Weight (24 Hrs., 105° C) of 40 g Air Dry Sample, g, Wt. 39.9

5. Hydrometer Calibration, Rc 5

Temperature of Suspension, °F 70°

6. Hydrometer Reading - 40 Sec., g, R1 10

Temperature of Suspension, °F 70°

7. Corrected Hydrometer Reading, g, R1' 5.4

8. Hydrometer Reading - 2 Hrs., g, R2 8

Temperature of Suspension, °F 70°

9. Corrected Hydrometer Reading, g, R2' 3.4

10. % Sand = $(39.9 - 5.4)/39.9 \times 100 =$ 86.5%

11. % Clay = $3.4/39.9 \times 100 =$ 8.5%

12. Sieve Analysis:

(a) Oven Dry Wt. (2 Hrs., 105° C) Total Sand Fraction

(Soil Retained in 0.047 mm Sieve), g 31.1

(b) Wt. of Fine Plus Very Fine Sand Fraction

(Sand Passing 0.25 mm Sieve), g 9.1

(c) % Fine Plus Very Fine Sand (b/a) 29.2%

13. Soil Morphology (Natural Soil Samples Only):

Structure of Soil Horizon Tested

Consistence of Soil Horizon Tested: Dry Moist

14. Soil Permeability Class Rating (Based upon Average Textural Analysis of this Replicate and other Replicate Samples)
K-4

15. I HEREBY CERTIFY THAT THE INFORMATION FURNISHED ON THIS ATTACHMENT "B" IS TRUE AND ACCURATE. I AM AWARE THAT FALSIFICATION OF DATA IS A VIOLATION OF THE WATER POLLUTION CONTROL ACT (N.J.S.A.) 58:10A-1 et seq.) AND IS SUBJECT TO PENALTIES AS PRESCRIBED IN N.J.A.C. 7:14-8.

SIGNATURE OF SOIL EVALUATOR

DATE 11/28/2022

SIGNATURE OF PROFESSIONAL ENGINEER

LICENSE NUMBER 29230

Ryan Development Group - EDA #9444
Block 260, Lots 4.04 & 4.05

CAPE MAY COUNTY DEPARTMENT OF HEALTH
SEWAGE DISPOSAL SYSTEM APPLICATION - ATTACHMENT "B"

SOIL PERMEABILITY CLASS RATING DATA MUNICIPALITY - Dennis Township

1. Test Number 1 Replicate Letter B

2. Sample Depth 30" Soil Pit Boring Number TP#3 Date Collected 11/17/2022

3. Coarse Fragment Content

Total Wt. of Sample, W.T., Grams (g) 432.8

Wt. of Material Retained on 2 mm Sieve, W.C.F., g 128.2

Wt. % Coarse Fragment (W.C.F./W.T. x 100): 29.6%

4. Oven Dry Weight (24 Hrs., 105° C) of 40 g Air Dry Sample, g. Wt. 39.9

5. Hydrometer Calibration, Rc 5

Temperature of Suspension, °F 70°

6. Hydrometer Reading - 40 Sec., g, R1 10

Temperature of Suspension, °F 70°

Corrected Hydrometer Reading, g, R1' 5.4

7. Hydrometer Reading - 2 Hrs., g, R2 9

Temperature of Suspension, °F 70°

9. Corrected Hydrometer Reading, g, R2' 4.4

10. % Sand = (39.9 - 5.4)/39.9 x 100 = 86.5%

11. % Clay = 4.4/39.9 x 100 = 11%

12. Sieve Analysis:

(a) Oven Dry Wt. (2 Hrs., 105° C) Total Sand Fraction

(Soil Retained in 0.047 mm Sieve), g 30.8

(b) Wt. of Fine Plus Very Fine Sand Fraction

(Sand Passing 0.25 mm Sieve), g 10.2

(c) % Fine Plus Very Fine Sand (b/a) 33.1%

13. Soil Morphology (Natural Soil Samples Only):

Structure of Soil Horizon Tested

Consistence of Soil Horizon Tested: Dry Moist

14. Soil Permeability Class Rating (Based upon Average Textural Analysis of this Replicate and other Replicate Samples)
K-4

15. I HEREBY CERTIFY THAT THE INFORMATION FURNISHED ON THIS ATTACHMENT "B" IS TRUE AND ACCURATE. I AM AWARE THAT FALSIFICATION OF DATA IS A VIOLATION OF THE WATER POLLUTION CONTROL ACT (N.J.S.A.) 58:10A-1 et seq.) AND IS SUBJECT TO PENALTIES AS PRESCRIBED IN N.J.A.C. 7:14-8.

SIGNATURE OF SOIL EVALUATOR 11/28/2022 [Signature]

DATE

SIGNATURE OF PROFESSIONAL ENGINEER [Signature]

LICENSE NUMBER 29230

Ryan Development Group - EDA #9444
Block 260, Lots 4.04 & 4.05

CAPE MAY COUNTY DEPARTMENT OF HEALTH
SEWAGE DISPOSAL SYSTEM APPLICATION - ATTACHMENT "B"

SOIL PERMEABILITY CLASS RATING DATA MUNICIPALITY - Dennis Township

1. Test Number 1 Replicate Letter A

2. Sample Depth 31" Soil Pit Boring Number TP#4 Date Collected 11/17/2022

3. Coarse Fragment Content

Total Wt. of Sample, W.T., Grams (g) 350.6

Wt. of Material Retained on 2 mm Sieve, W.C.F., g 10.2

Wt. % Coarse Fragment (W.C.F./W.T. x 100): 29.1%

4. Oven Dry Weight (24 Hrs., 105° C) of 40 g Air Dry Sample, g, Wt. 40

5. Hydrometer Calibration, Rc 5

Temperature of Suspension, °F 70°

6. Hydrometer Reading - 40 Sec., g, R1 12

Temperature of Suspension, °F 70°

7. Corrected Hydrometer Reading, g, R1' 7.4

8. Hydrometer Reading - 2 Hrs., g, R2 7.5

Temperature of Suspension, °F 70°

9. Corrected Hydrometer Reading, g, R2' 2.9

10. % Sand = $(40 - 7.4)/40 \times 100 =$ 81.5%

11. % Clay = $2.9/40 \times 100 =$ 7.25%

12. Sieve Analysis:

(a) Oven Dry Wt. (2 Hrs., 105° C) Total Sand Fraction

(Soil Retained in 0.047 mm Sieve), g 30.4

(b) Wt. of Fine Plus Very Fine Sand Fraction

(Sand Passing 0.25 mm Sieve), g 27

(c) % Fine Plus Very Fine Sand (b/a) 88.8%

13. Soil Morphology (Natural Soil Samples Only):

Structure of Soil Horizon Tested

Consistence of Soil Horizon Tested: Dry Moist

14. Soil Permeability Class Rating (Based upon Average Textural Analysis of this Replicate and other Replicate Samples)
K-3 (Adjusted)

15. I HEREBY CERTIFY THAT THE INFORMATION FURNISHED ON THIS ATTACHMENT "B" IS TRUE AND ACCURATE. I AM AWARE THAT FALSIFICATION OF DATA IS A VIOLATION OF THE WATER POLLUTION CONTROL ACT (N.J.S.A.) 58:10A-1 et seq.) AND IS SUBJECT TO PENALTIES AS PRESCRIBED IN N.J.A.C. 7:14-8.

SIGNATURE OF SOIL EVALUATOR

DATE 11/28/2022

SIGNATURE OF PROFESSIONAL ENGINEER

LICENSE NUMBER 29030

Ryan Development Group - EDA #9444
Block 260, Lots 4.04 & 4.05

CAPE MAY COUNTY DEPARTMENT OF HEALTH
SEWAGE DISPOSAL SYSTEM APPLICATION - ATTACHMENT "B"

SOIL PERMEABILITY CLASS RATING DATA MUNICIPALITY - Dennis Township

1. Test Number 1 Replicate Letter B

2. Sample Depth 31" Soil Pit Boring Number TP#4 Date Collected 11/17/2022

3. Coarse Fragment Content
Total Wt. of Sample, W.T., Grams (g) 350.6
Wt. of Material Retained on 2 mm Sieve, W.C.F., g 10.2
Wt. % Coarse Fragment (W.C.F./W.T. x 100): 29.1%

4. Oven Dry Weight (24 Hrs., 105° C) of 40 g Air Dry Sample, g, Wt. 40

5. Hydrometer Calibration, Rc 5
Temperature of Suspension, °F 70°

6. Hydrometer Reading - 40 Sec, g, R1 11.5
Temperature of Suspension, °F 70°

7. Corrected Hydrometer Reading, g, R1' 6.9

8. Hydrometer Reading - 2 Hrs, g, R2 8
Temperature of Suspension, °F 70°

9. Corrected Hydrometer Reading, g, R2' 3.4

10. % Sand = $(40 - 6.9)/40 \times 100 =$ 82.7%

11. % Clay = $3.4/40 \times 100 =$ 8.5%

12. Sieve Analysis:
(a) Oven Dry Wt. (2 Hrs., 105° C) Total Sand Fraction
(Soil Retained in 0.047 mm Sieve), g 31.8
(b) Wt. of Fine Plus Very Fine Sand Fraction
(Sand Passing 0.25 mm Sieve), g 28.1
(c) % Fine Plus Very Fine Sand (b/a) 88.4%

13. Soil Morphology (Natural Soil Samples Only):
Structure of Soil Horizon Tested _____
Consistence of Soil Horizon Tested: _____ Dry _____ Moist _____

14. Soil Permeability Class Rating (Based upon Average Textural Analysis of this Replicate and other Replicate Samples)
K-3 (Adjusted)

15. I HEREBY CERTIFY THAT THE INFORMATION FURNISHED ON THIS ATTACHMENT "B" IS TRUE AND ACCURATE. I AM AWARE THAT FALSIFICATION OF DATA IS A VIOLATION OF THE WATER POLLUTION CONTROL ACT (N.J.S.A.) 58:10A-1 et seq.) AND IS SUBJECT TO PENALTIES AS PRESCRIBED IN N.J.A.C. 7:14-8.

SIGNATURE OF SOIL EVALUATOR _____
DATE 11/28/2022
SIGNATURE OF PROFESSIONAL ENGINEER _____
LICENSE NUMBER 22230

Ryan Development Group - EDA #9444
Block 260, Lots 4.04 & 4.05

CAPE MAY COUNTY DEPARTMENT OF HEALTH
SEWAGE DISPOSAL SYSTEM APPLICATION - ATTACHMENT "B"

SOIL PERMEABILITY CLASS RATING DATA MUNICIPALITY - Dennis Township

1. Test Number 1 Replicate Letter A

2. Sample Depth 26" Soil Pit Boring Number TP#5 Date Collected 11/17/2022

3. Coarse Fragment Content

Total Wt. of Sample, W.T., Grams (g) 522.7

Wt. of Material Retained on 2 mm Sieve, W.C.F., g 13.3

Wt. % Coarse Fragment (W.C.F./W.T. x 100): 2.5%

4. Oven Dry Weight (24 Hrs., 105° C) of 40 g Air Dry Sample, g. Wt. 39.7

5. Hydrometer Calibration, Rc 5
Temperature of Suspension, °F 70°

6. Hydrometer Reading - 40 Sec., g. R1 14
Temperature of Suspension, °F 70°

Corrected Hydrometer Reading, g. R1' 9.4

7. Hydrometer Reading - 2 Hrs., g. R2 7
Temperature of Suspension, °F 70°

Corrected Hydrometer Reading, g. R2' 2.4

10. % Sand = $(39.7 - 9.4) / 39.7 \times 100 =$ 76.3%

11. % Clay = $2.4 / 40 \times 100 =$ 6%

12. Sieve Analysis:

(a) Oven Dry Wt. (2 Hrs., 105° C) Total Sand Fraction

(Soil Retained in 0.047 mm Sieve), g 28.1

(b) Wt. of Fine Plus Very Fine Sand Fraction

(Sand Passing 0.25 mm Sieve), g 17

(c) % Fine Plus Very Fine Sand (b/a) 60.5%

13. Soil Morphology (Natural Soil Samples Only):

Structure of Soil Horizon Tested

Consistence of Soil Horizon Tested: Dry Moist

14. Soil Permeability Class Rating (Based upon Average Textural Analysis of this Replicate and other Replicate Samples)
K-3 (Adjusted)

15. I HEREBY CERTIFY THAT THE INFORMATION FURNISHED ON THIS ATTACHMENT "B" IS TRUE AND ACCURATE. I AM AWARE THAT FALSIFICATION OF DATA IS A VIOLATION OF THE WATER POLLUTION CONTROL ACT (N.J.S.A.) 58:10A-1 et seq.) AND IS SUBJECT TO PENALTIES AS PRESCRIBED IN N.J.A.C. 7:14-8.

SIGNATURE OF SOIL EVALUATOR

DATE 11/28/2022

SIGNATURE OF PROFESSIONAL ENGINEER

LICENSE NUMBER 29236

Ryan Development Group - EDA #9444
Block 260, Lots 4.04 & 4.05

CAPE MAY COUNTY DEPARTMENT OF HEALTH
SEWAGE DISPOSAL SYSTEM APPLICATION - ATTACHMENT "B"

SOIL PERMEABILITY CLASS RATING DATA MUNICIPALITY - Dennis Township

1. Test Number 1 Replicate Letter B

2. Sample Depth 26" Soil Pit Boring Number TP#5 Date Collected 11/17/2022

3. Coarse Fragment Content

Total Wt. of Sample, W.T., Grams (g) 522.7

Wt. of Material Retained on 2 mm Sieve, W.C.F., g 13.3

Wt. % Coarse Fragment (W.C.F./W.T. x 100): 2.5%

4. Oven Dry Weight (24 Hrs., 105° C) of 40 g Air Dry Sample, g. Wt. 39.7

5. Hydrometer Calibration, Rc 5

Temperature of Suspension, °F 70°

6. Hydrometer Reading - 40 Sec., g, R1 14

Temperature of Suspension, °F 70°

7. Corrected Hydrometer Reading, g, R1' 9.4

8. Hydrometer Reading - 2 Hrs., g, R2 7.5

Temperature of Suspension, °F 70°

9. Corrected Hydrometer Reading, g, R2' 2.9

10. % Sand = $(40 - 9.4)/40 \times 100 =$ 76.3%

11. % Clay = $2.9/40 \times 100 =$ 7.2%

12. Sieve Analysis:

(a) Oven Dry Wt. (2 Hrs., 105° C) Total Sand Fraction

(Soil Retained in 0.047 mm Sieve), g 25.7

(b) Wt. of Fine Plus Very Fine Sand Fraction

(Sand Passing 0.25 mm Sieve), g 16.7

(c) % Fine Plus Very Fine Sand (b/a) 64.9%

13. Soil Morphology (Natural Soil Samples Only):

Structure of Soil Horizon Tested

Consistence of Soil Horizon Tested: Dry Moist

14. Soil Permeability Class Rating (Based upon Average Textural Analysis of this Replicate and other Replicate Samples)

K-3 (Adjusted)

15. I HEREBY CERTIFY THAT THE INFORMATION FURNISHED ON THIS ATTACHMENT "B" IS TRUE AND ACCURATE. I AM AWARE THAT FALSIFICATION OF DATA IS A VIOLATION OF THE WATER POLLUTION CONTROL ACT (N.J.S.A.) 58:10A-1 et seq.) AND IS SUBJECT TO PENALTIES AS PRESCRIBED IN N.J.A.C. 7:14-8.

SIGNATURE OF SOIL EVALUATOR [Signature]

DATE 11/28/2022

SIGNATURE OF PROFESSIONAL ENGINEER [Signature]

LICENSE NUMBER 29230

Ryan Development Group - EDA #9444
Block 260, Lots 4.04 & 4.05

CAPE MAY COUNTY DEPARTMENT OF HEALTH
SEWAGE DISPOSAL SYSTEM APPLICATION - ATTACHMENT "B"

SOIL PERMEABILITY CLASS RATING DATA

MUNICIPALITY - Dennis Township

1. Test Number 1 Replicate Letter A

2. Sample Depth 26" Soil Pit Boring Number TP#6 Date Collected 11/17/2022

3. Coarse Fragment Content

Total Wt. of Sample, W.T., Grams (g) 363.5

Wt. of Material Retained on 2 mm Sieve, W.C.F., g 85.9

Wt. % Coarse Fragment (W.C.F./W.T. x 100): 23.6%

4. Oven Dry Weight (24 Hrs., 105° C) of 40 g Air Dry Sample, g. Wt. 39.7

5. Hydrometer Calibration, Rc 5

Temperature of Suspension, °F 70°

6. Hydrometer Reading - 40 Sec., g, R1 14

Temperature of Suspension, °F 70°

7. Corrected Hydrometer Reading, g, R1' 9.4

8. Hydrometer Reading - 2 Hrs., g, R2 9

Temperature of Suspension, °F 70°

9. Corrected Hydrometer Reading, g, R2' 4.4

10. % Sand = (39.7 - 9.4)/39.7 x 100 = 76.3%

11. % Clay = 4.4/39.7 x 100 = 11.1%

12. Sieve Analysis:

(a) Oven Dry Wt. (2 Hrs., 105° C) Total Sand Fraction

(Soil Retained in 0.047 mm Sieve), g 26.9

(b) Wt. of Fine Plus Very Fine Sand Fraction

(Sand Passing 0.25 mm Sieve), g 20

(c) % Fine Plus Very Fine Sand (b/a) 74.3%

13. Soil Morphology (Natural Soil Samples Only):

Structure of Soil Horizon Tested

Consistence of Soil Horizon Tested: Dry Moist

14. Soil Permeability Class Rating (Based upon Average Textural Analysis of this Replicate and other Replicate Samples)
K-3 (Adjusted)

15. I HEREBY CERTIFY THAT THE INFORMATION FURNISHED ON THIS ATTACHMENT "B" IS TRUE AND ACCURATE. I AM AWARE THAT FALSIFICATION OF DATA IS A VIOLATION OF THE WATER POLLUTION CONTROL ACT (N.J.S.A.) 58:10A-1 et seq.) AND IS SUBJECT TO PENALTIES AS PRESCRIBED IN N.J.A.C. 7:14-8.

SIGNATURE OF SOIL EVALUATOR 11/28/2022 [Signature]

DATE 11/28/2022

SIGNATURE OF PROFESSIONAL ENGINEER [Signature]

LICENSE NUMBER 24230

Ryan Development Group - EDA #9444
Block 260, Lots 4.04 & 4.05

CAPE MAY COUNTY DEPARTMENT OF HEALTH
SEWAGE DISPOSAL SYSTEM APPLICATION - ATTACHMENT "B"

SOIL PERMEABILITY CLASS RATING DATA

MUNICIPALITY - Dennis Township

1. Test Number 1 Replicate Letter B

2. Sample Depth 26" Soil Pit Boring Number TP#6 Date Collected 11/17/2022

3. Coarse Fragment Content

Total Wt. of Sample, W.T., Grams (g) 363.5

Wt. of Material Retained on 2 mm Sieve, W.C.F., g 85.9

Wt. % Coarse Fragment (W.C.F./W.T. x 100): 23.6%

4. Oven Dry Weight (24 Hrs., 105° C) of 40 g Air Dry Sample, g, Wt. 39.7

5. Hydrometer Calibration, Rc 5

Temperature of Suspension, °F 70°

6. Hydrometer Reading - 40 Sec., g, R1 14

Temperature of Suspension, °F 70°

7. Corrected Hydrometer Reading, g, R1' 9.4

8. Hydrometer Reading - 2 Hrs., g, R2 9

Temperature of Suspension, °F 70°

9. Corrected Hydrometer Reading, g, R2' 4.4

10. % Sand = $(39.7 - 9.4)/35.7 \times 100 =$ 76.3%

11. % Clay = $4.4/39.7 \times 100 =$ 11.1%

12. Sieve Analysis:

(a) Oven Dry Wt. (2 Hrs., 105° C) Total Sand Fraction

(Soil Retained in 0.047 mm Sieve), g 27.2

(b) Wt. of Fine Plus Very Fine Sand Fraction

(Sand Passing 0.25 mm Sieve), g 21.7

(c) % Fine Plus Very Fine Sand (b/a) 79.8%

13. Soil Morphology (Natural Soil Samples Only):

Structure of Soil Horizon Tested

Consistence of Soil Horizon Tested: Dry Moist

14. Soil Permeability Class Rating (Based upon Average Textural Analysis of this Replicate and other Replicate Samples)

K-3 (Adjusted)

15. I HEREBY CERTIFY THAT THE INFORMATION FURNISHED ON THIS ATTACHMENT "B" IS TRUE AND ACCURATE. I AM AWARE THAT FALSIFICATION OF DATA IS A VIOLATION OF THE WATER POLLUTION CONTROL ACT (N.J.S.A.) 58:10A-1 et seq.) AND IS SUBJECT TO PENALTIES AS PRESCRIBED IN N.J.A.C. 7:14-8.

SIGNATURE OF SOIL EVALUATOR

DATE 11/28/2022

SIGNATURE OF PROFESSIONAL ENGINEER

LICENSE NUMBER 29230

LOW IMPACT DEVELOPMENT CHECKLIST

Category		Requirement
Site Selection	1	Site must be located in a designated low impact development area.
	2	Site must be adjacent to a water body or wetland.
	3	Site must be in a flood plain or other high risk area.
	4	Site must be in a designated low impact development area.
Site Design	5	Site must be designed to minimize impervious surface area.
	6	Site must be designed to maximize permeable surface area.
	7	Site must be designed to minimize runoff.
	8	Site must be designed to maximize infiltration.
Construction	9	Construction must be completed within 12 months of site selection.
	10	Construction must be completed within 12 months of site selection.
	11	Construction must be completed within 12 months of site selection.
	12	Construction must be completed within 12 months of site selection.
Maintenance	13	Site must be maintained in accordance with the low impact development checklist.
	14	Site must be maintained in accordance with the low impact development checklist.
	15	Site must be maintained in accordance with the low impact development checklist.
	16	Site must be maintained in accordance with the low impact development checklist.

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

Municipality: Dennis Township

County: Cape May Date: 12/13/22

Review board or agency: Dennis Township Planning Board

Proposed land development name: Ryan Development Group

Lot(s): 4.04 & 4.05 Block(s): 260

Project or application number: ---

Applicant's name: Ryan Development Group c/o Matt Ryan

Applicant's address: 3283 Dune Drive
Avalon, NJ 08202

Telephone: 410-371-3122 Fax: ---

Email address: mryan@ryan-development.com

Designer's name: Steven L. Filippone P.E. Engineering Design Associates

Designer's address: 5 Cambridge Drive
Ocean View, NJ 08230

Telephone: (609) 390-0332 Fax: (609) 390-9204

Email address: sfilippone@engineeringdesign.com

Part 2: Review of Local Stormwater Management Regulations

Title and date of stormwater management regulations used in development design:

Dennis Township Ordinance

Do regulations include nonstructural requirements? Yes: [X] No:

If yes, briefly describe:

List LID-BMPs prohibited by local regulations: None

Pre-design meeting held? Yes: No: [X]

Meeting held with:

Pre-design site walk held? Yes: No: [X]

Site walk held with:

Other agencies with stormwater review jurisdiction:

Name: Cape Atlantic Soil Conservation District

Required approval:

Name:

Required approval:

Name:

Required approval:

3.2 Minimize Land Disturbance

Minimizing land disturbance is a nonstructural LID-BMP that can be applied during both the development's construction and post-construction phases. This section of the checklist helps identify those land disturbance strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to minimize land disturbance and the resultant change in the site's hydrologic character.

A. Have inventories of existing site soils and slopes been performed? Yes ☒ No ☐
If yes, were these inventories factors in the site's layout and design? Yes ☒ No ☐

B. Does the development's design utilize any of the following nonstructural LID-BMPs?
Restrict permanent site disturbance by land owners? Yes ☒ No ☐
If yes, how: Landscape Buffers

Restrict temporary site disturbance during construction? Yes ☐ No ☒
If yes, how: _____

Consider soils and slopes in selecting disturbance limits? Yes ☒ No ☐
If yes, how: Soils were analyzed for stormwater basin and septic design

C. Specify percentage of site to be cleared: 89% Regraded 89%
D. Specify percentage of cleared areas done so for buildings: 13.90%
For driveways and parking: 20.39% For roadways: 0%

3.3 Impervious Area Management

New impervious surfaces at a development site can have the greatest adverse effect on groundwater recharge and stormwater quality and quantity. This section of the checklist helps identify those nonnatural strategies and LID-BMPs that have been incorporated into a proposed development's design to comprehensively manage the extent and impacts of new impervious surfaces.

A. Specify impervious cover at site: Existing: 0 Acres Proposed: 0.67 Acres

B. Specify maximum site impervious coverage allowed by regulations:	1.1796 Acres
	EDA #9444

C. Compare proposed street carway widths with those required by regulations.

Type of Street	Proposed Carway Width (feet)	Required Carway Width (feet)
Residential access - low intensity	--	--
Residential access - medium intensity	--	--
Residential access - high intensity with parking	--	--
Residential access - high intensity without parking	--	--
Neighborhood	--	--
Minor collector - low intensity without parking	--	--
Minor collector - with one parking lane	--	--
Minor collector - with two parking lanes	--	--
Minor collector - without parking	--	--
Major collector	--	--

Dennis Township
Cape May
12/13/22

D) Compare proposed parking space dimensions with those required by regulations:

Proposed	Regulations
9' x 18'	9' x 18'

E. Compare proposed number of parking spaces with those required by regulations.

Proposed 21 Regulations 21

3.4 Time of Concentration Modifications

Decreasing a site's time of concentration (Tc) can lead directly to increased site runoff rates which, in turn, can create new and/or aggravate existing erosion and flooding problems downstream. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to effectively minimize such Tc decreases.

When reviewing Tc modification strategies, it is important to remember that a drainage area's Tc should reflect the general conditions throughout the area. As a result, Tc modifications must generally be applied throughout a drainage area, not just along a specific Tc route.

A. Specify percentage of site's total stormwater conveyance system length that will be:

Storm sewer: 0% Vegetated swale: 25% Natural channel: --
Stormwater management facility: 25% Other: Offsite Gutter Slopes 50%

Note: the total length of the stormwater conveyance system should be measured from the site's downstream property line to the downstream limit of sheet flow at the system's headwaters.

B. What design criteria and/or site changes would be required to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages in A above?

None

C. In conveyance system subareas that have overland or sheet flow over impervious surfaces or turf grass, what practical and effective site changes can be made to:

Decrease overland flow slope: None

Increase overland flow roughness: None

E. Prevention and Containment of Spills

Identify locations where pollutants are located on the site, and the features that prevent these pollutants from being exposed to stormwater runoff. **4.04 & 4.05**

Pollutant: -- Location: --

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: -- Location: --
260

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: -- Location: --

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: -- Location: --

Feature utilized to prevent pollutant exposure, harmful accumulation, or contain spills:

Pollutant: -- Location: --

