STORMWATER MANAGEMENT REPORT

For

Coventry Crossings

Harkney Hill Road
Coventry, Rhode Island
Assessor's Plat 10, Lot 29
Assessor's Plat 18, Lot 86

***prepared for*:**
KREG New Homes, LLC.
39 Nooseneck Hill Road
West Greenwich, Rhode Island 02817

prepared by:

Garofalo & Associates, Inc.
85 Corliss Street, Providence, RI 02940
Tel.: (401).273.6000; Fax: (401).273.1000

January 4, 2023
(REV. 08/01/2024)

PN 7398-00

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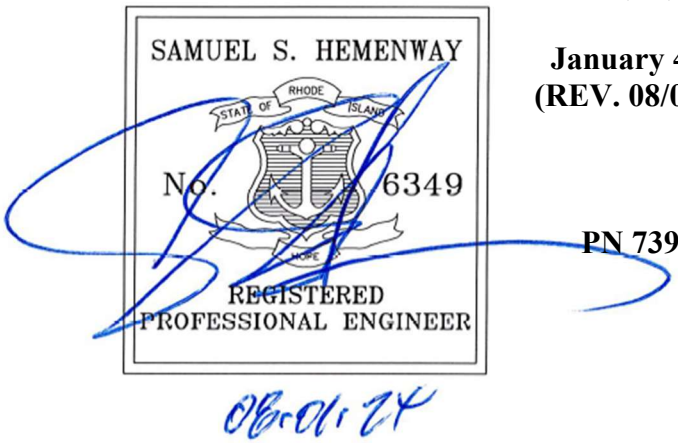

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I. PROJECT SUMMARY

Garofalo and Associates, Inc. has prepared this Stormwater Management Report to outline drainage requirements for development activities proposed on Harkney Hill Road, and outline the calculations and methodology used to design a proposed stormwater management system to comply with the Town of Coventry Stormwater Ordinance, the current edition of the *RI Stormwater Design and Installations Standards Manual* (RISDISM) and the Freshwater Wetlands Rules and Regulations.

The 30.96-acre project area is situated on the northern portion of Harkney Hill Road (Route 118), immediately north of the intersection of Harkney Hill Road and Nooseneck Hill Road (Route 3). The property is identified as the Town of Coventry Tax Assessor's Plat 10, Lot 29 and Tax Assessor's Plat 18, Lot 86. The site is bounded by Harkney Hill Road and Nooseneck Hill Road to the east and south, Hill Farm Road and residences of Wisteria Drive to the west, and residences of Wood Cove Drive to the north.

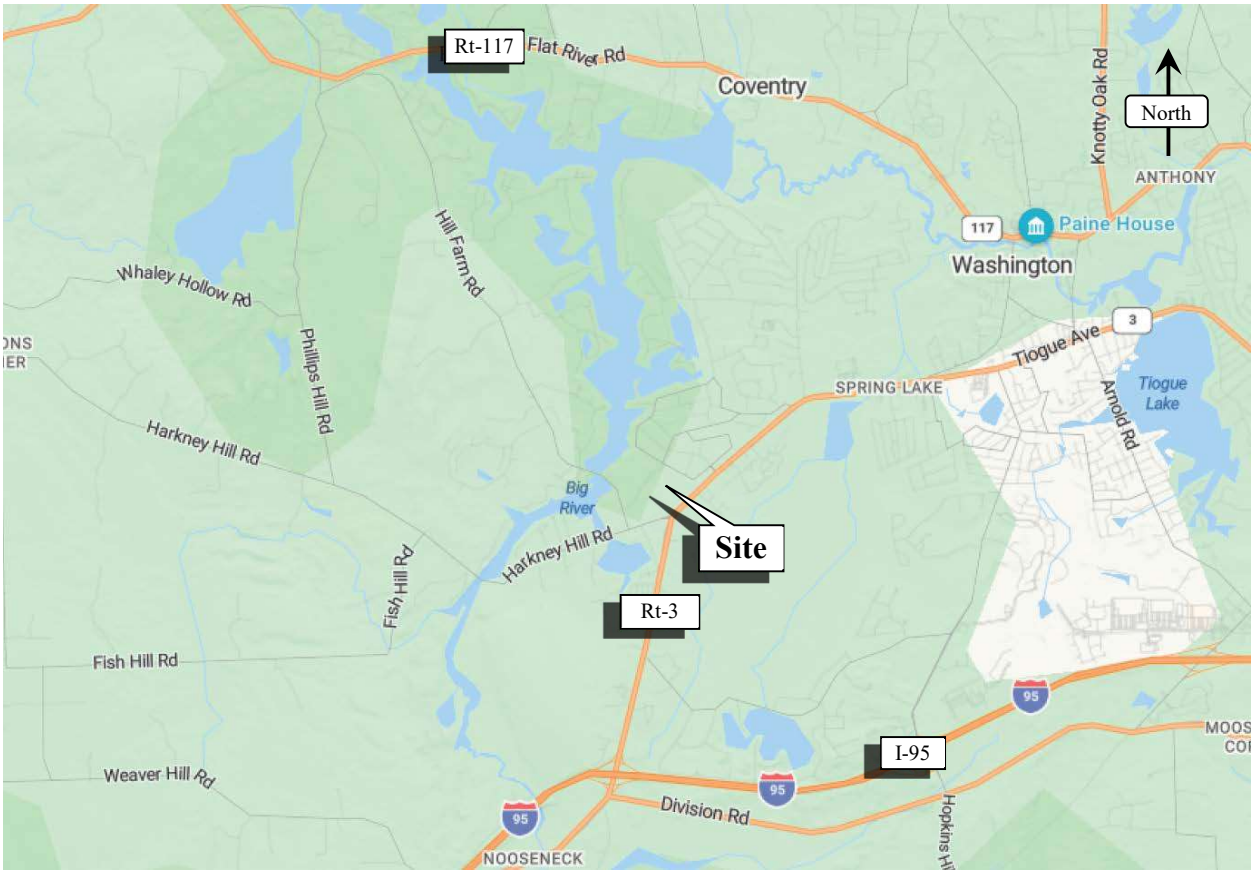


Figure 1. Locus Map

The proposed development primarily involves the construction of sixty (60) single unit residences and thirty (30) duplex residences, along with a commercial structure. Two site accesses are proposed to serve the development. The southern access is proposed along Harkney Hill Road approximately 250 feet north of Maple Root Road, and the northern access is located along Nooseneck Hill Road approximately 170 feet south of Leisure Way. Both site accesses will serve the residential units, with the northern access additionally serving the commercial building. Parking will be provided by individual driveways at each single-unit and duplex residence, with a parking field providing parking for the commercial building. The project will also provide pedestrian walkways, lighting, landscaping, and other site amenities.

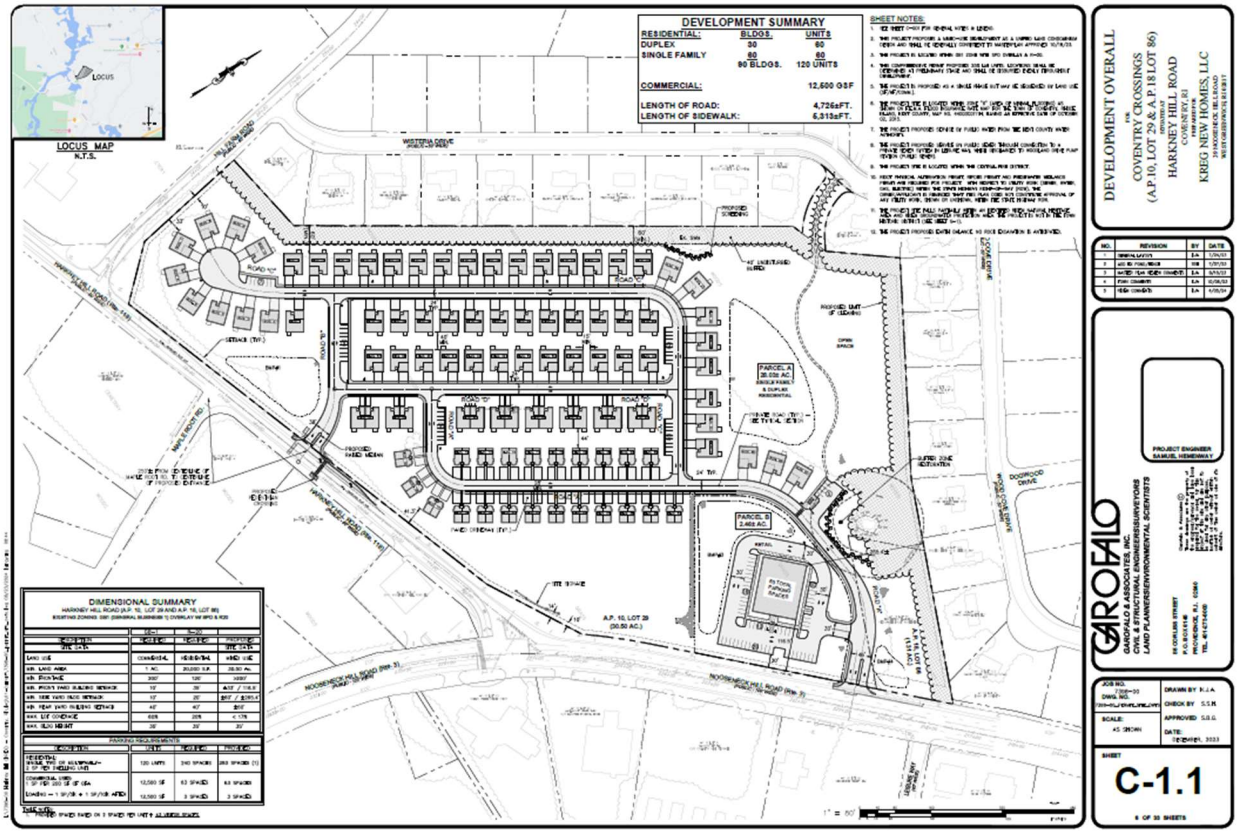


Figure 2. Development Schematic

II. SITE CONDITIONS

2.1 Site Characteristics

The existing 30.96-acre project area is located north of the Harkney Hill Road and Nooseneck Hill Road intersection, and is comprised of A.P. 10, Lot 29 and A.P. 18, Lot 86. The site is presently undeveloped and is mostly comprised of open fields. Wooded areas are additionally present around the site perimeter and adjacent to the abutting residential properties. Grades throughout the site are flat, generally sloping in a northeasterly direction.

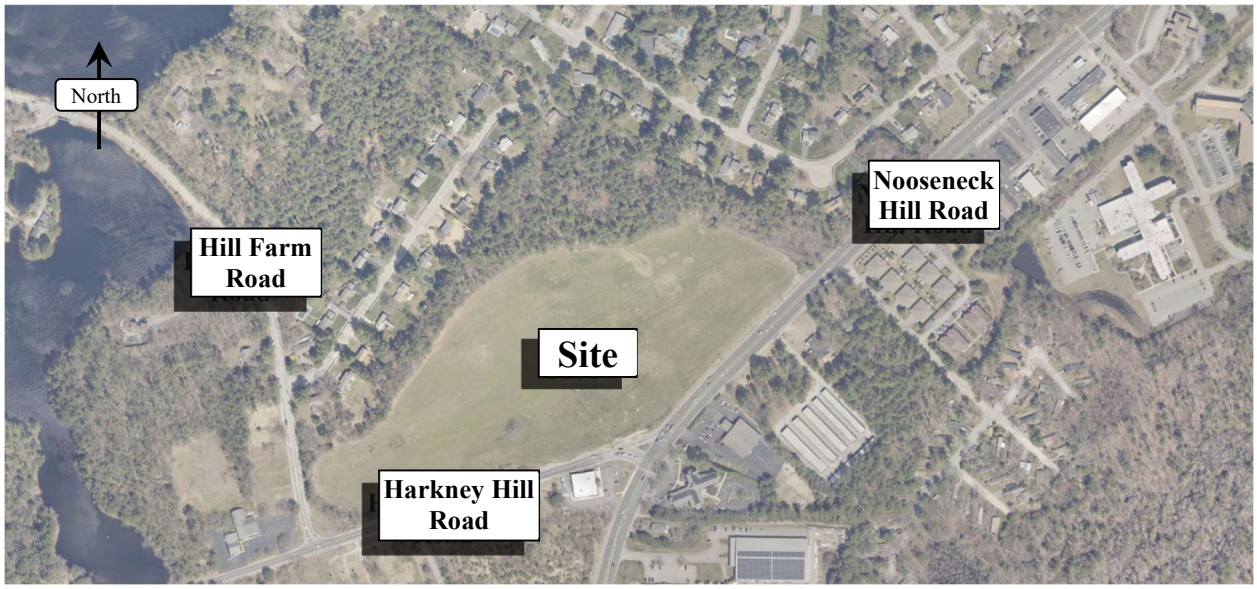


Figure 3. Aerial Image

2.2 Soils

The *Soil Survey of Rhode Island* prepared by the US Department of Agriculture, Soil Conservation Service depicts the underlying soils of the project site to be comprised of Merrimac fine sandy loam and Sudbury sandy loam. Merrimac fine sandy loam and Sudbury sandy loam are classified as hydrologic soil group 'A' and 'B', respectively. See Appendix D for on-site soil evaluations.

Map Unit Symbol	Percent of Site	Map Unit Name	Hydrologic Soil Group
MmA	73.4%	Merrimac fine sandy loam	A
Ss	26.6%	Sudbury sandy loam	B

Figure 4. NRCS Soils Map

2.3 FEMA

The project area is located within Zone "X" (areas of 1% annual chance flood with average depth less than one foot), as shown on F.E.M.A. Flood Insurance Rate Map for the Town of Coventry, Providence County, Rhode Island, Community Panel No. 44003C0111H, having an effective date of October 2, 2015.

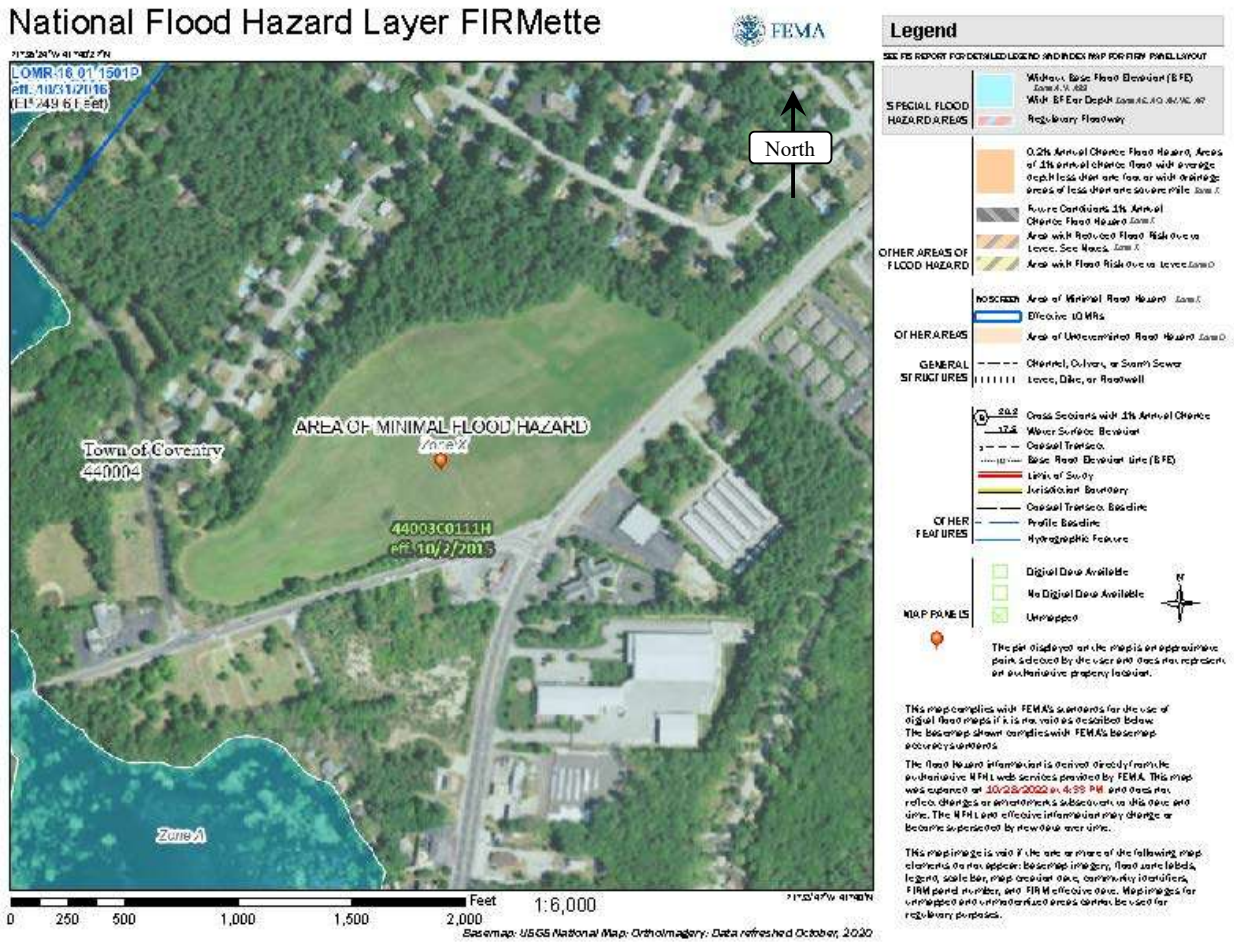


Figure 5. FEMA Flood Map

2.4 Wetland Resources

A replicated wetland area (RIDEM File No. 94-0525) delineated by flag series WF100 to WF107 is present in the northeastern portion of the property. Wetland delineation performed on June 14, 2022 and December 29, 2023 by McCue Environmental, LLC classifies this replicated wetland area as a Pond < 1/4 acre. Current freshwater wetland regulations assign a 100-foot Jurisdictional Area and 25-foot buffer zone to this wetland area. See Appendix D for Wetland Delineation Report dated January 2, 2024.

2.5 Natural Resource Inventory

The project site is documented by the Rhode Island Department of Environmental Management (RIDEM) Geographic Information System (GIS) Mapping as being within a Natural Heritage Area.

III. DRAINAGE ANALYSIS

3.1 Methodology

The project's stormwater management system has been designed to mitigate the impacts of stormwater runoff generated by the proposed site and comply with the development standards and performance criteria of the Town of Coventry and the RISDISM using low-impact development (LID) techniques and best management practices (BMP's).

A single design point has been used in the analysis. Design Point 1 is a closed drainage system within Nooseneck Hill Road (Route 3), located immediately northeast of the proposed development area. The project will maintain existing drainage patterns while addressing the requirements of the RISDISM and Fresh Water Wetlands Act. Specifically, the developed site will provide recharge, water quality treatment, and runoff attenuation by directing stormwater flow into surface infiltration BMPs.

3.2 Existing Conditions

Existing stormwater conditions have been evaluated using five (5) sub-watershed areas that include the project area within the property as well as upstream off-site areas.

EWS-1: This existing sub-watershed area includes central and western portions of the existing property, and is entirely pervious. This portion of the site contains both open fields and wooded areas. Stormwater generally flows northeast over very mild grades, ponding and infiltrating within a natural depression located within the northwest portion of the property. This subwatershed area also contains an existing stormwater basin along the western property line that receives storm flows from Subwatershed E-OSW (described below). Overflows from this basin discharge to the above-mentioned natural depression, which then overflows farther eastward into EWS-2 during larger storm events.

EWS-2: This existing sub-watershed area includes open field and wooded areas within the eastern portion of the site, and is entirely pervious. Stormwater flows northeast through this area over mild grades and ultimately into a natural depression within the northeastern corner of the property. Stormwater overflows from this depression during larger storm events into Nooseneck Hill Road (Route 3) and is collected by the closed drainage system within Nooseneck Hill Road. This subwatershed area also contains a replicated wetland area upstream of the natural depression (See Appendix D for Wetland Delineation Report).

E-OSW: This existing sub-watershed area accounts for off-site areas to the west of the property. This area is upgradient of the site and therefore contributes stormwater flow to the project area. This area includes both residential and wooded areas. Stormwater generally flows southeast over mild and moderate grades, crosses beneath Wisteria Drive through a culvert and ultimately discharges into an existing detention basin located on-site along the northwestern portion of the property within EWS-1 (see Appendix D for Wetland Delineation Report).

E-OSN: This existing sub-watershed area accounts for off-site areas to the north of the property. Stormwater generally flows south over mild grades and is ultimately captured within the existing replicated wetland area and natural depression within EWS-2.

E-OSE: This existing sub-watershed area accounts for off-site drainage within Harkney Hill Road and Nooseneck Hill Road along the southern and eastern property boundary. Stormwater within these roadways generally flows northwest over mild grades and into the existing property where it is ultimately collected by the natural ponding areas within EWS-1 and EWS-2.

3.3 Proposed Conditions

The proposed site conditions have been analyzed using nine (9) total sub-watershed areas. Sub-watershed PWS-1, 2A, 2B, 3A, 3B & 4 account for the project area itself, while sub-watersheds P-OSW, P-OSN & P-OSE account for the same off-site contributing drainage areas as previously described in section 3.2.

PWS-1: This proposed sub-watershed area includes the southwestern portion of the site, and is comprised of single-family units and associated roadways, driveways, and sidewalks. Stormwater is collected within the roadways by a closed drainage system and conveyed to an infiltration basin (BMP-1). Overflows from this system discharge northeast beneath the proposed western site access and ultimately into the proposed stormwater 'Compensation Area' (see PWS-2B) along the northern property line.

PWS-2A: This proposed sub-watershed area accounts for the central area of the development, and contains single-family units and duplexes along with associated roadways, driveways, and sidewalks. Stormwater is collected within the roadways by a closed drainage system and conveyed

to an infiltration basin (BMP-2). Overflows from this system discharge directly north and into the proposed stormwater 'Compensation Area' (see PWS-2B) along the northern property line.

PWS-2B: This proposed sub-watershed area accounts for pervious areas along the western and northern property line outside of development areas, along with a proposed stormwater 'Compensation Area'. This stormwater 'Compensation Area' is proposed as a graded depression along the entire northern property line to replicate the natural ponding storage within the existing property that will be displaced by the proposed development. Stormwater flows over mild grades through this area and ponds within the 'Compensation Area.' The 'Compensation Area' has been designed to discharge northeast to the Nooseneck Hill closed drainage system during storm events larger than the 100-year storm in the same manner as the natural ponding areas overflow under existing conditions.

PWS-3A: This sub-watershed area is located within the northeast portion of the property and includes the proposed commercial building and parking field, along with roadway areas directly north of the commercial building. Stormwater is collected within a closed drainage system and conveyed into a proposed infiltration basin (BMP-3). Large storm overflows from this system discharge to farther north to the proposed 'Compensation Area.'

PWS-3B: This proposed sub-watershed area accounts for pervious areas along the southern property line. This area is entirely pervious under proposed conditions, and ultimately discharges north and into the proposed 'Compensation Area.'

PWS-4: This proposed sub-watershed area includes the proposed eastern entrance area to the development. Stormwater is collected within a closed drainage system within this area and discharges to a proposed infiltration basin (BMP-4). Overflows from this system discharge directly north into the proposed 'Compensation Area.'

3.4 Runoff Summary

The following is a comparison summary of the peak discharge rates and total discharge volumes for the existing and proposed site. Design Point 1 retains all stormwater runoff on-site under proposed conditions. See *Appendix A Checklist: Table 5-1 'Hydraulic Analyis Summary'* (under separate cover).

	Peak Discharge Rate (cfs)		
	1 yr	10 yr	100 yr
Design Point 1			
Existing Runoff	0.00	0.00	0.00
Proposed Runoff	0.00	0.00	0.00
ΔQ	*-0.00*	*-0.00*	*-0.00*
	Total Discharge Volume (cf)		
	1 yr	10 yr	100 yr
Design Point 1			
Existing Runoff	0	0	0
Proposed Runoff	0	0	0
ΔQ	*-0*	*-0*	*-0*

Table 1. Watershed Runoff Summary

3.5 Water Quality

The design proposes surface infiltration basins that satisfy the water quality treatment requirements of the development standard. See Appendix D for RIDEM Water Quality Volume Calculation Worksheet.

3.6 Pre-treatment

Pre-treatment for the proposed infiltration systems is provided within sediment forebays.

Proposed Subwatershed	Pre-Treatment Required	Pre-Treatment Provided
PWS-1	1,245 CF	**2,980 CF**
PWS-2A	3,017 CF	**9,950 CF**
PWS-3A	1,240 CF	**3,095 CF**
PWS-4	167 CF	**168 CF**

IV. STORMWATER STANDARDS:

The proposed development has been designed to meet all of the minimum standards identified in the RISDISM through utilization of infiltration practices and maintenance planning.

4.1 Standard 1: LID Planning and Design Strategies

LID site planning and design strategies must be used to the maximum extent practicable.

Standard Met – LID site planning and strategies have been employed to the maximum extent possible.

4.2 Standard 2: Groundwater Recharge

Stormwater must be recharged within the same sub-watershed to maintain base flow at pre-development recharge levels to the maximum extent practicable.

Standard Met – Recharge will be provided on-site through the proposed infiltration systems (BMP-1, 2, 3 & 4). The weighted average soil recharge factor for the project is 0.53 (73.4% Hydrologic Soil Group 'A' and 26.6% Hydrologic Soil Group 'B')

Design Point 1

Impervious Coverage:	482,019 SF
Required Recharge Volume:	(482,019 SF x 0.53 / 12 in./ft) = 21,289 CF
Total Provided Recharge:	283,285 CF > 21,289 CF

(See Appendix C for groundwater recharge volumes provided within each BMP)

4.3 Standard 3: Water Quality

Stormwater runoff must be treated prior to discharge.

Standard Met – Water quality treatment will be provided on site through the proposed infiltration systems (BMP-1, 2, 3, & 4).

Design Point 1

Impervious Coverage:	482,019 SF
Required Water Quality Treatment Volume:	(482,019 SF / 12 in./ft) = 40,168 CF
Total Provided Water Quality Volume:	283,285 CF > 40,168 CF

(See Appendix C for water quality volumes provided within each BMP)

4.4 Standard 4: Conveyance and Natural Channel Protection

This standard is designed to prevent erosive flow within natural channels and drainage ways.

Design Point 1

Standard Met – The post-development 1-year, 24-Hour Type III runoff volume is completely retained within the proposed infiltration systems. See Table-1 Watershed Runoff Summary.

4.5 Standard 5: Overbank Flood Protection

Downstream overbank flood protection must be provided by attenuating the post development peak discharge rate to the pre-development levels for the 10-year and 100-year, Type III design storm events

Standard Met – Post-development peak discharge rates have been mitigated within the proposed infiltration systems and brought below pre-development levels during the 10-year and 100-year Type III storm events (see Table-1 Watershed Runoff Summary). Note that a downstream analysis for the project has not been provided, as the proposed development wholly retains the entire 100-year storm event.

4.6 Standard 6: Redevelopment and Infill Projects

For redevelopment sites with 40% or more existing impervious surface coverage and infill sites, only Standards 2, 3, and 7-11 must be addressed.

Standard Not Met – Total existing impervious surface coverage is < 40% of the site size.

(See Appendix D for RIDEM Water Quality Volume Calculation Worksheet)

4.7 Standard 7: Pollution Prevention

All development sites require the use of source control and pollution prevention measures to minimize the impact that the land use may have on stormwater runoff quality.

Standard Met – A Soil Erosion and Sediment Control (SESC) Plan has been prepared for the project and stormwater measures are proposed that comply with the Standard.

4.8 Standard 8: Land Uses with Higher Potential Pollutant Loads

Stormwater discharges from land uses with higher potential pollutant loads (LUHPPLs) require the use of specific source control and pollution prevention measures and the specific stormwater BMPs approved for such use.

Standard is not applicable – No LUHPPLs on site.

4.9 Standard 9: Illicit Discharges

All illicit discharges to stormwater management systems are prohibited, including discharges from OWTS, sub-drains and French drains near any OWTS that does not meet the State's OWTS Rules.

Standard Met – There are no known illicit discharges at the site and none are proposed as part of this project.

4.10 Standard 10: Construction and Erosion Sedimentation Control

Erosion and sedimentation control practices must be utilized during the construction phase as well as during any land disturbing activities

Standard Met - Soil Erosion and Sediment Control Practices will be employed to avoid and minimize impacts to the existing stormwater systems. Detailed notes area included in the plans as well as within an Erosion and Sediment Control Report to ensure effective implementation of erosion and sedimentation controls.

4.11 Standard 11: Stormwater Management System Operation and Maintenance

The stormwater management system, including all structural stormwater controls and conveyances, must have an operation and maintenance plan to ensure that it continues to function as designed.

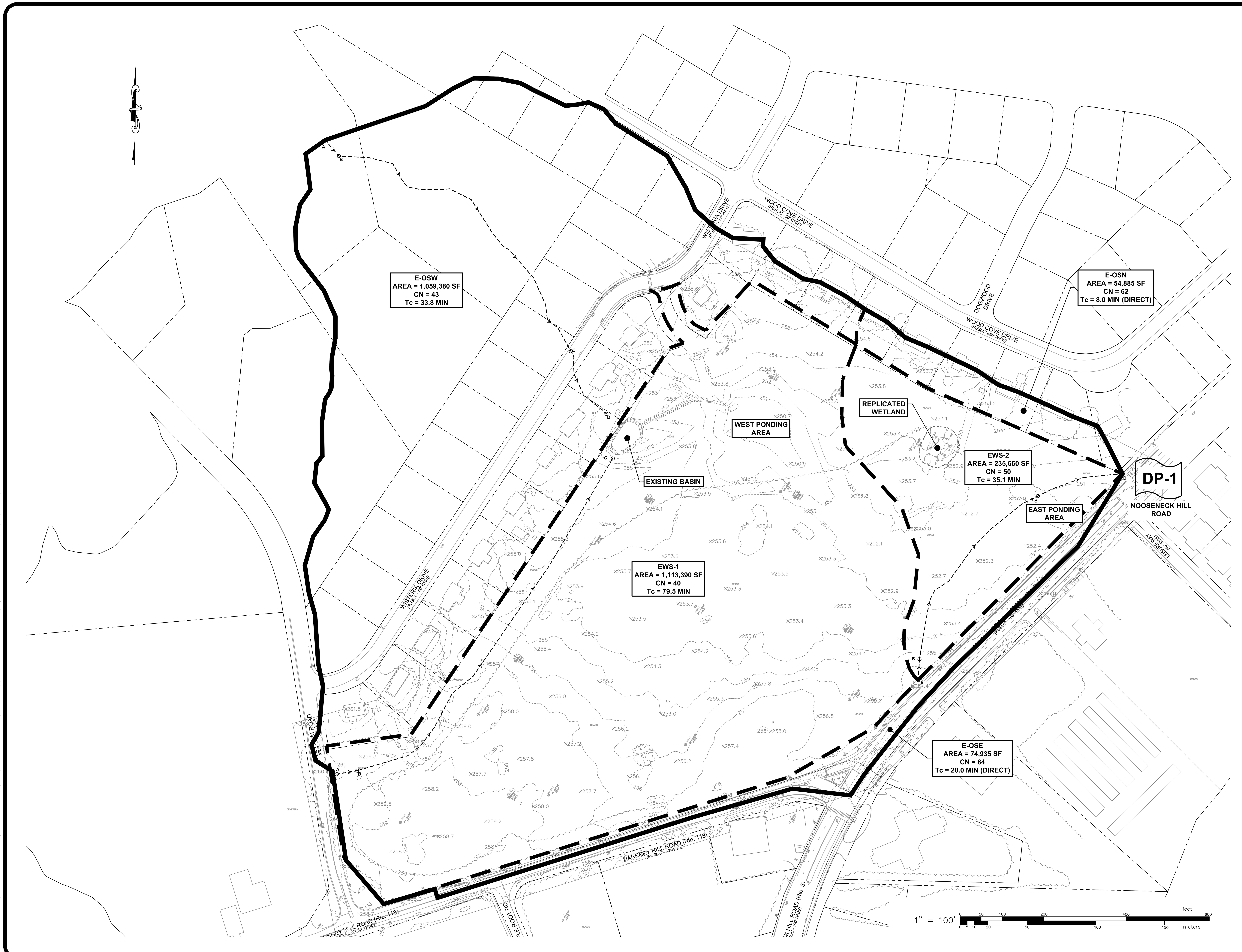
Standard Met - A long-term Stormwater Operation and Maintenance Plan has been prepared for the development in accordance with the Manual, and is provided as a separate document.

V. CONCLUSION

This project has been designed to mitigate the water quality impacts and runoff rates from the proposed development. Water quality treatment for proposed development areas is provided in accordance with the development standards and performance criteria of the Town of Coventry and the *State of Rhode Island Stormwater Design and Installation Standards Manual*. The project design has incorporated all wetland avoidance and impact minimization measures required under the Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act. Finally, Best Management Practices will be employed to control temporary discharges associated with construction activities in accordance with the standards outlined in the *Rhode Island Soil and Erosion Sediment Control Handbook*.

Appendix A

Watershed Maps



EXISTING CONDITIONS WATERSHED MAP

FOR

COVENTRY CROSSINGS

(A.P.10, LOT 29 & A.P.18 LOT 86)

SITUATED AT

HARKNEY HILL ROAD

COVENTRY, RI

PREPARED FOR

KREG REALTY (MANAGEMENT)

39 NOOSENECK HILLE ROAD

WEST GREENWICH, RI 02817

NO.	REVISION	BY	DATE

GAROFALO

GAROFALO & ASSOCIATES, INC.

CIVIL & STRUCTURAL ENGINEERS|SURVEYORS

LAND PLANNERS|ENVIRONMENTAL SCIENTISTS

85 CORLISS STREET

P.O. BOX 6145

PROVIDENCE, R.I. 02940

TEL. 401-273-6000

JOB NO. 7398-00

DWG. NO. 7398-00-EWS.dwg

SCALE: AS SHOWN

DRAWN BY R.A.S.

CHECK BY S.S.H.

APPROVED S.B.G.

DATE: JANUARY, 2024

SHEET

EWS

1 OF 2 SHEETS

P-OSW
AREA = 1,059,380 SF
CN = 43
Tc = 33.8 MIN

P-OSN
AREA = 54,885 SF
CN = 62
Tc = 8.0 MIN (DIRECT)

COMPENSATION AREA

BMP-2
INFILTRATION BASIN

PWS-2B (NORTH BYPASS)
AREA = 272,441 SF
CN = 39
Tc = 10.0 MIN (DIRECT)

PWS-2A
AREA = 352,191 SF
CN = 68
Tc = 10 MIN
(DIRECT)

PWS-1
AREA = 282,908 SF
CN = 60
Tc = 10 MIN
(DIRECT)

DP-1
NOOSENECK HILL ROAD

BMP-4
INFILTRATION BASIN

PWS-4
AREA = 16,050 SF
CN = 79
Tc = 6 MIN
(DIRECT)

PWS-3A
AREA = 643,775 AC
CN = 75
Tc = 10 MIN
(DIRECT)

BMP-3
INFILTRATION BASIN

P-OSE
AREA = 81,950 SF
CN = 80
Tc = 20.0 MIN (DIRECT)

PWS-3B (SOUTH BYPASS)
AREA = 74,670 SF
CN = 48
Tc = 10.0 MIN (DIRECT)

BMP-1
INFILTRATION BASIN

WISTERIA DRIVE (PUBLIC - 50' WIDE)
WOOD COVE DRIVE (PUBLIC - 50' WIDE)
DOGWOOD DRIVE
HARKNEY HILL ROAD (Rte. 118) (PUBLIC - 60' WIDE)
MAPLE ROOT RD.
NECK HILL ROAD (Rte. 3) (PUBLIC - 100' WIDE)
CEMETERY
WOODS
GRASS

1" = 100'

PROPOSED CONDITIONS WATERSHED MAP

FOR

COVENTRY CROSSINGS
(A.P.10, LOT 29 & A.P.18 LOT 86)

SITUATED AT

HARKNEY HILL ROAD
COVENTRY, RI

PREPARED FOR

KREG REALTY (MANAGEMENT)
39 NOOSENECK HILLE ROAD
WEST GREENWICH, RI 02817

NO.	REVISION	BY	DATE

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DWG. NO. 7398-00-PWS.dwg
SCALE: AS SHOWN
DRAWN BY R.A.S.
CHECK BY S.S.H.
APPROVED S.B.G.
DATE: JANUARY, 2024

SHEET

PWS

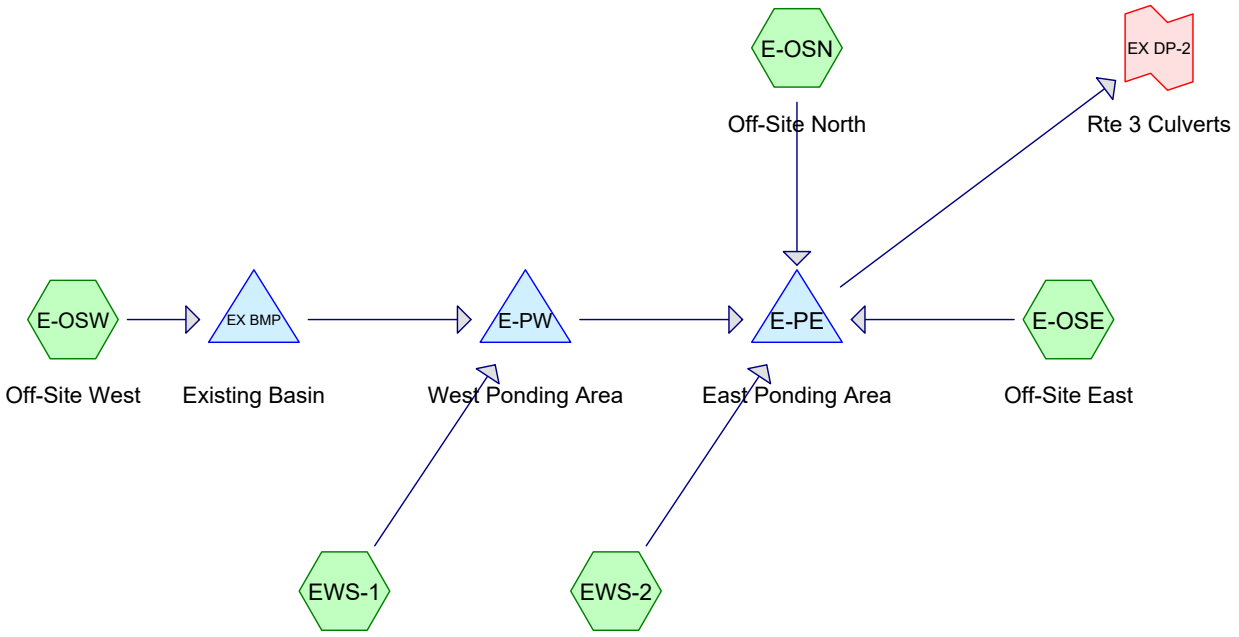
2 OF 2 SHEETS

L:\7398-00 Harkney Hill (KREG) - Coventry, RI\documents\reports\RIDEM\STM Narrative\Appendices\Appendix A - Watershed Mapping\7398-00 Watershed Mapping (OWTS).dwg 08/27/2024 shemenway 18:09

Appendix B

Stormwater Analysis

Existing Conditions



Subcat Reach Pond Link

Routing Diagram for 7398-00 HydroCAD
Prepared by Garofalo & Associates, Inc, Printed 1/3/2024

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-OSE: Off-Site East Runoff Area=74,935 sf 75.57% Impervious Runoff Depth=0.74"
Tc=20.0 min CN=39/98 Runoff=0.97 cfs 4,651 cf

Subcatchment E-OSN: Off-Site North Runoff Area=54,885 sf 25.00% Impervious Runoff Depth=0.25"
Tc=8.0 min CN=50/98 Runoff=0.32 cfs 1,127 cf

Subcatchment E-OSW: Off-Site West Runoff Area=1,059,380 sf 14.03% Impervious Runoff Depth=0.14"
Flow Length=1,155' Tc=66.7 min CN=35/98 Runoff=1.40 cfs 12,210 cf

Subcatchment EWS-1: Runoff Area=1,113,390 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=1,050' Tc=79.5 min CN=40/0 Runoff=0.00 cfs 0 cf

Subcatchment EWS-2: Runoff Area=235,660 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=775' Tc=35.1 min CN=50/0 Runoff=0.00 cfs 0 cf

Pond E-PE: East Ponding Area Peak Elev=251.11' Storage=980 cf Inflow=1.15 cfs 5,778 cf
Discarded=0.57 cfs 5,779 cf Primary=0.00 cfs 0 cf Outflow=0.57 cfs 5,779 cf

Pond E-PW: West Ponding Area Peak Elev=251.00' Storage=0 cf Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Pond EX BMP: Existing Basin Peak Elev=251.07' Storage=4,843 cf Inflow=1.40 cfs 12,210 cf
Discarded=0.30 cfs 12,209 cf Primary=0.00 cfs 0 cf Outflow=0.30 cfs 12,209 cf

Link EX DP-2: Rte 3 Culverts Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 2,538,250 sf Runoff Volume = 17,988 cf Average Runoff Depth = 0.09"
91.37% Pervious = 2,319,252 sf 8.63% Impervious = 218,998 sf

Summary for Subcatchment E-OSE: Off-Site East

Runoff = 0.97 cfs @ 12.26 hrs, Volume= 4,651 cf, Depth= 0.74"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
18,307	39	>75% Grass cover, Good, HSG A
56,628	98	Paved parking, HSG A
74,935	84	Weighted Average
18,307	39	24.43% Pervious Area
56,628	98	75.57% Impervious Area

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

Summary for Subcatchment E-OSN: Off-Site North

Runoff = 0.32 cfs @ 12.11 hrs, Volume= 1,127 cf, Depth= 0.25"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
27,442	54	1/2 acre lots, 25% imp, HSG A
27,443	70	1/2 acre lots, 25% imp, HSG B
54,885	62	Weighted Average
41,164	50	75.00% Pervious Area
13,721	98	25.00% Impervious Area

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

Summary for Subcatchment E-OSW: Off-Site West

Runoff = 1.40 cfs @ 12.86 hrs, Volume= 12,210 cf, Depth= 0.14"
Routed to Pond EX BMP : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
594,595	54	1/2 acre lots, 25% imp, HSG A
464,785	30	Woods, Good, HSG A
1,059,380	43	Weighted Average
910,731	35	85.97% Pervious Area
148,649	98	14.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.9	150	0.0200	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.30"
15.5	805	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	200	0.0100	9.88	48.47	**Pipe Channel, C-D** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
66.7	1,155	Total			

Summary for Subcatchment EWS-1:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond E-PW : West Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
550,598	39	>75% Grass cover, Good, HSG A
354,578	30	Woods, Good, HSG A
208,214	61	>75% Grass cover, Good, HSG B
1,113,390	40	Weighted Average
1,113,390	40	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	50	0.0010	0.03		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.30"
52.7	1,000	0.0040	0.32		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
79.5	1,050	Total			

Summary for Subcatchment EWS-2:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
31,799	39	>75% Grass cover, Good, HSG A
54,886	30	Woods, Good, HSG A
106,722	61	>75% Grass cover, Good, HSG B
42,253	55	Woods, Good, HSG B
235,660	50	Weighted Average
235,660	50	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0320	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.30"
19.3	512	0.0040	0.44		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
11.2	213	0.0040	0.32		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.1	775	Total			

Summary for Pond E-PE: East Ponding Area

Inflow Area = 2,538,250 sf, 8.63% Impervious, Inflow Depth = 0.03" for 1.2-Inch event
Inflow = 1.15 cfs @ 12.24 hrs, Volume= 5,778 cf
Outflow = 0.57 cfs @ 12.57 hrs, Volume= 5,779 cf, Atten= 50%, Lag= 20.4 min
Discarded = 0.57 cfs @ 12.57 hrs, Volume= 5,779 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link EX DP-2 : Rte 3 Culverts

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 251.11' @ 12.57 hrs Surf.Area= 10,228 sf Storage= 980 cf

Plug-Flow detention time= 13.1 min calculated for 5,769 cf (100% of inflow)
Center-of-Mass det. time= 13.1 min (806.0 - 792.8)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	107,715 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	8,000	0	0
252.00	28,715	18,358	18,358
253.00	150,000	89,358	107,715

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	253.50'	**10.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.57 cfs @ 12.57 hrs HW=251.11' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.57 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond E-PW: West Ponding Area

Inflow Area = 2,172,770 sf, 6.84% Impervious, Inflow Depth = 0.00" for 1.2-Inch event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond E-PE : East Ponding Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 251.00' @ 0.00 hrs Surf.Area= 19,000 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	120,475 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	19,000	0	0
252.00	50,700	34,850	34,850
253.00	120,550	85,625	120,475

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.50'	**50.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
1=Exfiltration (Passes 0.00 cfs of 1.06 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond EX BMP: Existing Basin

Inflow Area = 1,059,380 sf, 14.03% Impervious, Inflow Depth = 0.14" for 1.2-Inch event
Inflow = 1.40 cfs @ 12.86 hrs, Volume= 12,210 cf
Outflow = 0.30 cfs @ 14.48 hrs, Volume= 12,209 cf, Atten= 78%, Lag= 97.0 min
Discarded = 0.30 cfs @ 14.48 hrs, Volume= 12,209 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond E-PW : West Ponding Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 251.07' @ 14.48 hrs Surf.Area= 5,438 sf Storage= 4,843 cf

Plug-Flow detention time= 148.3 min calculated for 12,209 cf (100% of inflow)
Center-of-Mass det. time= 148.1 min (986.4 - 838.3)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	30,075 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	3,850	0	0
251.00	5,120	4,485	4,485
252.00	9,800	7,460	11,945
253.00	26,460	18,130	30,075

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**10.0' long + 5.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

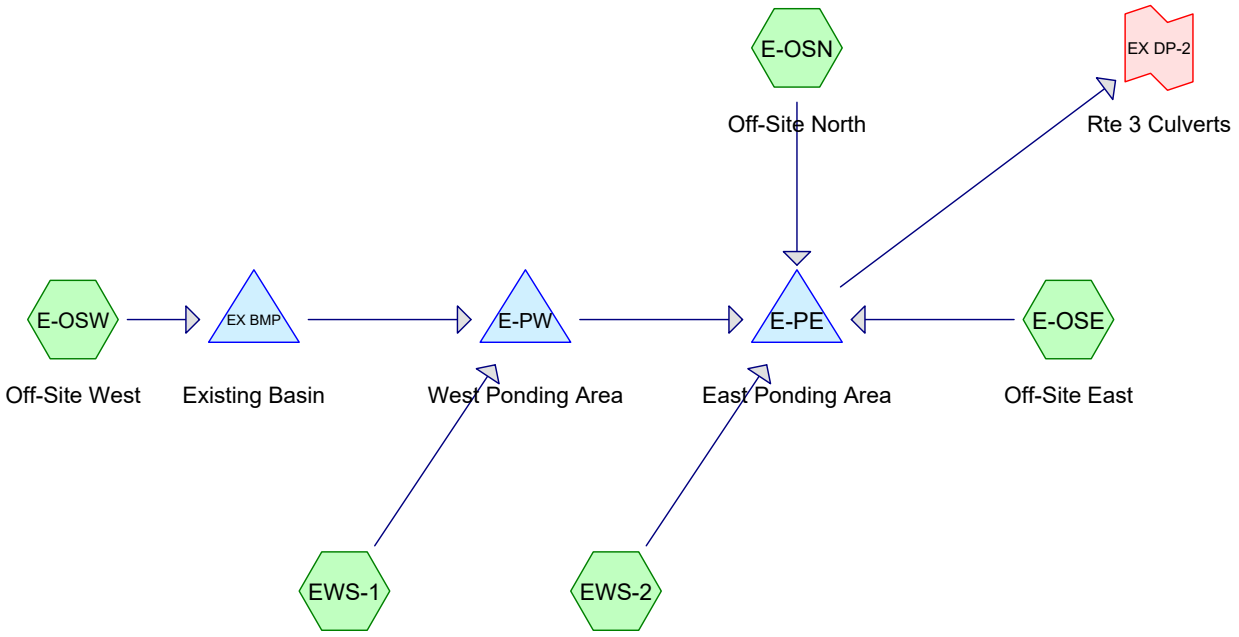
Discarded OutFlow Max=0.30 cfs @ 14.48 hrs HW=251.07' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.30 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=250.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link EX DP-2: Rte 3 Culverts

Inflow Area = 2,538,250 sf, 8.63% Impervious, Inflow Depth = 0.00" for 1.2-Inch event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



Subcat Reach Pond Link

Routing Diagram for 7398-00 HydroCAD
Prepared by Garofalo & Associates, Inc, Printed 1/3/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.70	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.90	2
3	100-Year	Type III 24-hr		Default	24.00	1	8.70	2

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-OSE: Off-Site East Runoff Area=74,935 sf 75.57% Impervious Runoff Depth=1.27"
Tc=20.0 min CN=84 Runoff=1.71 cfs 7,951 cf

Subcatchment E-OSN: Off-Site North Runoff Area=54,885 sf 25.00% Impervious Runoff Depth=0.29"
Tc=8.0 min CN=62 Runoff=0.18 cfs 1,307 cf

Subcatchment E-OSW: Off-Site West Runoff Area=1,059,380 sf 14.03% Impervious Runoff Depth=0.00"
Flow Length=1,155' Tc=66.7 min CN=43 Runoff=0.00 cfs 16 cf

Subcatchment EWS-1: Runoff Area=1,113,390 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=1,050' Tc=79.5 min CN=40 Runoff=0.00 cfs 0 cf

Subcatchment EWS-2: Runoff Area=235,660 sf 0.00% Impervious Runoff Depth=0.05"
Flow Length=775' Tc=35.1 min CN=50 Runoff=0.03 cfs 899 cf

Pond E-PE: East Ponding Area Peak Elev=251.21' Storage=2,098 cf Inflow=1.89 cfs 10,158 cf
Discarded=0.69 cfs 10,158 cf Primary=0.00 cfs 0 cf Outflow=0.69 cfs 10,158 cf

Pond E-PW: West Ponding Area Peak Elev=251.00' Storage=0 cf Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Pond EX BMP: Existing Basin Peak Elev=250.00' Storage=1 cf Inflow=0.00 cfs 16 cf
Discarded=0.00 cfs 16 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 16 cf

Link EX DP-2: Rte 3 Culverts Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 2,538,250 sf Runoff Volume = 10,173 cf Average Runoff Depth = 0.05"
91.37% Pervious = 2,319,252 sf 8.63% Impervious = 218,998 sf

Summary for Subcatchment E-OSE: Off-Site East

Runoff = 1.71 cfs @ 12.28 hrs, Volume= 7,951 cf, Depth= 1.27"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
18,307	39	>75% Grass cover, Good, HSG A
56,628	98	Paved parking, HSG A
74,935	84	Weighted Average
18,307	39	24.43% Pervious Area
56,628	98	75.57% Impervious Area

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

Summary for Subcatchment E-OSN: Off-Site North

Runoff = 0.18 cfs @ 12.20 hrs, Volume= 1,307 cf, Depth= 0.29"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
27,442	54	1/2 acre lots, 25% imp, HSG A
27,443	70	1/2 acre lots, 25% imp, HSG B
54,885	62	Weighted Average
41,164	50	75.00% Pervious Area
13,721	98	25.00% Impervious Area

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

Summary for Subcatchment E-OSW: Off-Site West

Runoff = 0.00 cfs @ 24.42 hrs, Volume= 16 cf, Depth= 0.00"
Routed to Pond EX BMP : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
594,595	54	1/2 acre lots, 25% imp, HSG A
464,785	30	Woods, Good, HSG A
1,059,380	43	Weighted Average
910,731	35	85.97% Pervious Area
148,649	98	14.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.9	150	0.0200	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.30"
15.5	805	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	200	0.0100	9.88	48.47	**Pipe Channel, C-D** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
66.7	1,155	Total			

Summary for Subcatchment EWS-1:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond E-PW : West Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
550,598	39	>75% Grass cover, Good, HSG A
354,578	30	Woods, Good, HSG A
208,214	61	>75% Grass cover, Good, HSG B
1,113,390	40	Weighted Average
1,113,390	40	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	50	0.0010	0.03		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.30"
52.7	1,000	0.0040	0.32		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
79.5	1,050	Total			

Summary for Subcatchment EWS-2:

Runoff = 0.03 cfs @ 15.56 hrs, Volume= 899 cf, Depth= 0.05"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
31,799	39	>75% Grass cover, Good, HSG A
54,886	30	Woods, Good, HSG A
106,722	61	>75% Grass cover, Good, HSG B
42,253	55	Woods, Good, HSG B
235,660	50	Weighted Average
235,660	50	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0320	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.30"
19.3	512	0.0040	0.44		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
11.2	213	0.0040	0.32		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.1	775	Total			

Summary for Pond E-PE: East Ponding Area

Inflow Area = 2,538,250 sf, 8.63% Impervious, Inflow Depth = 0.05" for 1-Year event
Inflow = 1.89 cfs @ 12.28 hrs, Volume= 10,158 cf
Outflow = 0.69 cfs @ 12.75 hrs, Volume= 10,158 cf, Atten= 64%, Lag= 28.2 min
Discarded = 0.69 cfs @ 12.75 hrs, Volume= 10,158 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link EX DP-2 : Rte 3 Culverts

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 251.21' @ 12.75 hrs Surf.Area= 12,286 sf Storage= 2,098 cf

Plug-Flow detention time= 22.2 min calculated for 10,141 cf (100% of inflow)
Center-of-Mass det. time= 22.2 min (907.0 - 884.9)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	107,715 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	8,000	0	0
252.00	28,715	18,358	18,358
253.00	150,000	89,358	107,715

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	253.50'	**10.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.69 cfs @ 12.75 hrs HW=251.21' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.69 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond E-PW: West Ponding Area

Inflow Area = 2,172,770 sf, 6.84% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond E-PE : East Ponding Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 251.00' @ 0.00 hrs Surf.Area= 19,000 sf Storage= 0 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	120,475 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	19,000	0	0
252.00	50,700	34,850	34,850
253.00	120,550	85,625	120,475

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.50'	**50.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
1=Exfiltration (Passes 0.00 cfs of 1.06 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond EX BMP: Existing Basin

Inflow Area = 1,059,380 sf, 14.03% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 24.42 hrs, Volume= 16 cf
Outflow = 0.00 cfs @ 24.54 hrs, Volume= 16 cf, Atten= 3%, Lag= 7.4 min
Discarded = 0.00 cfs @ 24.54 hrs, Volume= 16 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond E-PW : West Ponding Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 250.00' @ 24.54 hrs Surf.Area= 3,850 sf Storage= 1 cf

Plug-Flow detention time= 8.9 min calculated for 16 cf (100% of inflow)
Center-of-Mass det. time= 8.9 min (1,470.7 - 1,461.8)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	30,075 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	3,850	0	0
251.00	5,120	4,485	4,485
252.00	9,800	7,460	11,945
253.00	26,460	18,130	30,075

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**10.0' long + 5.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.21 cfs @ 24.54 hrs HW=250.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.21 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=250.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link EX DP-2: Rte 3 Culverts

Inflow Area = 2,538,250 sf, 8.63% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-OSE: Off-Site East Runoff Area=74,935 sf 75.57% Impervious Runoff Depth=3.18"
Tc=20.0 min CN=84 Runoff=4.30 cfs 19,852 cf

Subcatchment E-OSN: Off-Site North Runoff Area=54,885 sf 25.00% Impervious Runoff Depth=1.38"
Tc=8.0 min CN=62 Runoff=1.69 cfs 6,298 cf

Subcatchment E-OSW: Off-Site West Runoff Area=1,059,380 sf 14.03% Impervious Runoff Depth=0.33"
Flow Length=1,155' Tc=66.7 min CN=43 Runoff=1.47 cfs 28,795 cf

Subcatchment EWS-1: Runoff Area=1,113,390 sf 0.00% Impervious Runoff Depth=0.21"
Flow Length=1,050' Tc=79.5 min CN=40 Runoff=0.76 cfs 19,819 cf

Subcatchment EWS-2: Runoff Area=235,660 sf 0.00% Impervious Runoff Depth=0.65"
Flow Length=775' Tc=35.1 min CN=50 Runoff=1.45 cfs 12,803 cf

Pond E-PE: East Ponding Area Peak Elev=251.78' Storage=12,552 cf Inflow=5.85 cfs 38,953 cf
Discarded=1.35 cfs 38,953 cf Primary=0.00 cfs 0 cf Outflow=1.35 cfs 38,953 cf

Pond E-PW: West Ponding Area Peak Elev=251.01' Storage=266 cf Inflow=0.76 cfs 19,819 cf
Discarded=0.76 cfs 19,819 cf Primary=0.00 cfs 0 cf Outflow=0.76 cfs 19,819 cf

Pond EX BMP: Existing Basin Peak Elev=251.91' Storage=11,098 cf Inflow=1.47 cfs 28,795 cf
Discarded=0.52 cfs 26,272 cf Primary=0.00 cfs 0 cf Outflow=0.52 cfs 26,272 cf

Link EX DP-2: Rte 3 Culverts Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 2,538,250 sf Runoff Volume = 87,568 cf Average Runoff Depth = 0.41"
91.37% Pervious = 2,319,252 sf 8.63% Impervious = 218,998 sf

Summary for Subcatchment E-OSE: Off-Site East

Runoff = 4.30 cfs @ 12.27 hrs, Volume= 19,852 cf, Depth= 3.18"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
18,307	39	>75% Grass cover, Good, HSG A
56,628	98	Paved parking, HSG A
74,935	84	Weighted Average
18,307	39	24.43% Pervious Area
56,628	98	75.57% Impervious Area

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

Summary for Subcatchment E-OSN: Off-Site North

Runoff = 1.69 cfs @ 12.13 hrs, Volume= 6,298 cf, Depth= 1.38"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
27,442	54	1/2 acre lots, 25% imp, HSG A
27,443	70	1/2 acre lots, 25% imp, HSG B
54,885	62	Weighted Average
41,164	50	75.00% Pervious Area
13,721	98	25.00% Impervious Area

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

Summary for Subcatchment E-OSW: Off-Site West

Runoff = 1.47 cfs @ 13.40 hrs, Volume= 28,795 cf, Depth= 0.33"
Routed to Pond EX BMP : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
594,595	54	1/2 acre lots, 25% imp, HSG A
464,785	30	Woods, Good, HSG A
1,059,380	43	Weighted Average
910,731	35	85.97% Pervious Area
148,649	98	14.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.9	150	0.0200	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.30"
15.5	805	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	200	0.0100	9.88	48.47	**Pipe Channel, C-D** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
66.7	1,155	Total			

Summary for Subcatchment EWS-1:

Runoff = 0.76 cfs @ 14.56 hrs, Volume= 19,819 cf, Depth= 0.21"
Routed to Pond E-PW : West Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
550,598	39	>75% Grass cover, Good, HSG A
354,578	30	Woods, Good, HSG A
208,214	61	>75% Grass cover, Good, HSG B
1,113,390	40	Weighted Average
1,113,390	40	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	50	0.0010	0.03		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.30"
52.7	1,000	0.0040	0.32		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
79.5	1,050	Total			

Summary for Subcatchment EWS-2:

Runoff = 1.45 cfs @ 12.65 hrs, Volume= 12,803 cf, Depth= 0.65"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
31,799	39	>75% Grass cover, Good, HSG A
54,886	30	Woods, Good, HSG A
106,722	61	>75% Grass cover, Good, HSG B
42,253	55	Woods, Good, HSG B
235,660	50	Weighted Average
235,660	50	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0320	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.30"
19.3	512	0.0040	0.44		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
11.2	213	0.0040	0.32		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.1	775	Total			

Summary for Pond E-PE: East Ponding Area

Inflow Area = 2,538,250 sf, 8.63% Impervious, Inflow Depth = 0.18" for 10-Year event
Inflow = 5.85 cfs @ 12.28 hrs, Volume= 38,953 cf
Outflow = 1.35 cfs @ 13.46 hrs, Volume= 38,953 cf, Atten= 77%, Lag= 70.4 min
Discarded = 1.35 cfs @ 13.46 hrs, Volume= 38,953 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link EX DP-2 : Rte 3 Culverts

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 251.78' @ 13.46 hrs Surf.Area= 24,166 sf Storage= 12,552 cf

Plug-Flow detention time= 98.8 min calculated for 38,888 cf (100% of inflow)
Center-of-Mass det. time= 98.6 min (970.3 - 871.6)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	107,715 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	8,000	0	0
252.00	28,715	18,358	18,358
253.00	150,000	89,358	107,715

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	253.50'	**10.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=1.35 cfs @ 13.46 hrs HW=251.78' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond E-PW: West Ponding Area

Inflow Area = 2,172,770 sf, 6.84% Impervious, Inflow Depth = 0.11" for 10-Year event
Inflow = 0.76 cfs @ 14.56 hrs, Volume= 19,819 cf
Outflow = 0.76 cfs @ 14.64 hrs, Volume= 19,819 cf, Atten= 0%, Lag= 4.7 min
Discarded = 0.76 cfs @ 14.64 hrs, Volume= 19,819 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond E-PE : East Ponding Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 251.01' @ 14.64 hrs Surf.Area= 19,439 sf Storage= 266 cf

Plug-Flow detention time= 5.9 min calculated for 19,819 cf (100% of inflow)
Center-of-Mass det. time= 5.9 min (1,077.0 - 1,071.1)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	120,475 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	19,000	0	0
252.00	50,700	34,850	34,850
253.00	120,550	85,625	120,475

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.50'	**50.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=1.08 cfs @ 14.64 hrs HW=251.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond EX BMP: Existing Basin

Inflow Area = 1,059,380 sf, 14.03% Impervious, Inflow Depth = 0.33" for 10-Year event
Inflow = 1.47 cfs @ 13.40 hrs, Volume= 28,795 cf
Outflow = 0.52 cfs @ 18.43 hrs, Volume= 26,272 cf, Atten= 64%, Lag= 301.7 min
Discarded = 0.52 cfs @ 18.43 hrs, Volume= 26,272 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond E-PW : West Ponding Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 251.91' @ 18.43 hrs Surf.Area= 9,387 sf Storage= 11,098 cf

Plug-Flow detention time= 274.5 min calculated for 26,272 cf (91% of inflow)
Center-of-Mass det. time= 235.1 min (1,259.4 - 1,024.4)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	30,075 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	3,850	0	0
251.00	5,120	4,485	4,485
252.00	9,800	7,460	11,945
253.00	26,460	18,130	30,075

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**10.0' long + 5.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.52 cfs @ 18.43 hrs HW=251.91' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.52 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=250.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Link EX DP-2: Rte 3 Culverts

Inflow Area = 2,538,250 sf, 8.63% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-OSE: Off-Site East Runoff Area=74,935 sf 75.57% Impervious Runoff Depth=6.77"
Tc=20.0 min CN=84 Runoff=8.92 cfs 42,271 cf

Subcatchment E-OSN: Off-Site North Runoff Area=54,885 sf 25.00% Impervious Runoff Depth=4.11"
Tc=8.0 min CN=62 Runoff=5.56 cfs 18,783 cf

Subcatchment E-OSW: Off-Site West Runoff Area=1,059,380 sf 14.03% Impervious Runoff Depth=1.90"
Flow Length=1,155' Tc=66.7 min CN=43 Runoff=16.64 cfs 167,322 cf

Subcatchment EWS-1: Runoff Area=1,113,390 sf 0.00% Impervious Runoff Depth=1.57"
Flow Length=1,050' Tc=79.5 min CN=40 Runoff=12.00 cfs 145,628 cf

Subcatchment EWS-2: Runoff Area=235,660 sf 0.00% Impervious Runoff Depth=2.69"
Flow Length=775' Tc=35.1 min CN=50 Runoff=8.37 cfs 52,788 cf

Pond E-PE: East Ponding Area Peak Elev=252.64' Storage=61,424 cf Inflow=17.64 cfs 165,906 cf
Discarded=5.92 cfs 165,907 cf Primary=0.00 cfs 0 cf Outflow=5.92 cfs 165,907 cf

Pond E-PW: West Ponding Area Peak Elev=252.64' Storage=81,925 cf Inflow=26.65 cfs 267,503 cf
Discarded=5.34 cfs 215,446 cf Primary=8.32 cfs 52,065 cf Outflow=13.66 cfs 267,511 cf

Pond EX BMP: Existing Basin Peak Elev=252.58' Storage=20,461 cf Inflow=16.64 cfs 167,322 cf
Discarded=1.09 cfs 40,498 cf Primary=14.69 cfs 121,875 cf Outflow=15.77 cfs 162,373 cf

Link EX DP-2: Rte 3 Culverts Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 2,538,250 sf Runoff Volume = 426,792 cf Average Runoff Depth = 2.02"
91.37% Pervious = 2,319,252 sf 8.63% Impervious = 218,998 sf

Summary for Subcatchment E-OSE: Off-Site East

Runoff = 8.92 cfs @ 12.27 hrs, Volume= 42,271 cf, Depth= 6.77"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
18,307	39	>75% Grass cover, Good, HSG A
56,628	98	Paved parking, HSG A
74,935	84	Weighted Average
18,307	39	24.43% Pervious Area
56,628	98	75.57% Impervious Area

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

Summary for Subcatchment E-OSN: Off-Site North

Runoff = 5.56 cfs @ 12.12 hrs, Volume= 18,783 cf, Depth= 4.11"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
27,442	54	1/2 acre lots, 25% imp, HSG A
27,443	70	1/2 acre lots, 25% imp, HSG B
54,885	62	Weighted Average
41,164	50	75.00% Pervious Area
13,721	98	25.00% Impervious Area

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

Summary for Subcatchment E-OSW: Off-Site West

Runoff = 16.64 cfs @ 13.02 hrs, Volume= 167,322 cf, Depth= 1.90"
Routed to Pond EX BMP : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
594,595	54	1/2 acre lots, 25% imp, HSG A
464,785	30	Woods, Good, HSG A
1,059,380	43	Weighted Average
910,731	35	85.97% Pervious Area
148,649	98	14.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.9	150	0.0200	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.30"
15.5	805	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	200	0.0100	9.88	48.47	**Pipe Channel, C-D** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
66.7	1,155	Total			

Summary for Subcatchment EWS-1:

Runoff = 12.00 cfs @ 13.26 hrs, Volume= 145,628 cf, Depth= 1.57"
Routed to Pond E-PW : West Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
550,598	39	>75% Grass cover, Good, HSG A
354,578	30	Woods, Good, HSG A
208,214	61	>75% Grass cover, Good, HSG B
1,113,390	40	Weighted Average
1,113,390	40	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.8	50	0.0010	0.03		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.30"
52.7	1,000	0.0040	0.32		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
79.5	1,050	Total			

Summary for Subcatchment EWS-2:

Runoff = 8.37 cfs @ 12.53 hrs, Volume= 52,788 cf, Depth= 2.69"
Routed to Pond E-PE : East Ponding Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
31,799	39	>75% Grass cover, Good, HSG A
54,886	30	Woods, Good, HSG A
106,722	61	>75% Grass cover, Good, HSG B
42,253	55	Woods, Good, HSG B
235,660	50	Weighted Average
235,660	50	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0320	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.30"
19.3	512	0.0040	0.44		**Shallow Concentrated Flow, B-C** Short Grass Pasture Kv= 7.0 fps
11.2	213	0.0040	0.32		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
35.1	775	Total			

Summary for Pond E-PE: East Ponding Area

Inflow Area = 2,538,250 sf, 8.63% Impervious, Inflow Depth = 0.78" for 100-Year event
Inflow = 17.64 cfs @ 12.33 hrs, Volume= 165,906 cf
Outflow = 5.92 cfs @ 15.42 hrs, Volume= 165,907 cf, Atten= 66%, Lag= 185.9 min
Discarded = 5.92 cfs @ 15.42 hrs, Volume= 165,907 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link EX DP-2 : Rte 3 Culverts

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 252.64' @ 15.42 hrs Surf.Area= 106,166 sf Storage= 61,424 cf

Plug-Flow detention time= 151.2 min calculated for 165,631 cf (100% of inflow)
Center-of-Mass det. time= 151.2 min (1,017.0 - 865.7)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	107,715 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	8,000	0	0
252.00	28,715	18,358	18,358
253.00	150,000	89,358	107,715

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	253.50'	**10.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=5.92 cfs @ 15.42 hrs HW=252.64' (Free Discharge)
1=Exfiltration (Exfiltration Controls 5.92 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond E-PW: West Ponding Area

Inflow Area = 2,172,770 sf, 6.84% Impervious, Inflow Depth = 1.48" for 100-Year event
Inflow = 26.65 cfs @ 13.21 hrs, Volume= 267,503 cf
Outflow = 13.66 cfs @ 14.25 hrs, Volume= 267,511 cf, Atten= 49%, Lag= 62.3 min
Discarded = 5.34 cfs @ 14.25 hrs, Volume= 215,446 cf
Primary = 8.32 cfs @ 14.25 hrs, Volume= 52,065 cf
Routed to Pond E-PE : East Ponding Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 252.64' @ 14.25 hrs Surf.Area= 95,639 sf Storage= 81,925 cf

Plug-Flow detention time= 171.1 min calculated for 267,066 cf (100% of inflow)
Center-of-Mass det. time= 171.2 min (1,121.0 - 949.7)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	120,475 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	19,000	0	0
252.00	50,700	34,850	34,850
253.00	120,550	85,625	120,475

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.50'	**50.0' long + 100.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=5.34 cfs @ 14.25 hrs HW=252.64' (Free Discharge)
1=Exfiltration (Exfiltration Controls 5.34 cfs)

Primary OutFlow Max=8.31 cfs @ 14.25 hrs HW=252.64' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 8.31 cfs @ 0.90 fps)

Summary for Pond EX BMP: Existing Basin

Inflow Area = 1,059,380 sf, 14.03% Impervious, Inflow Depth = 1.90" for 100-Year event
Inflow = 16.64 cfs @ 13.02 hrs, Volume= 167,322 cf
Outflow = 15.77 cfs @ 13.20 hrs, Volume= 162,373 cf, Atten= 5%, Lag= 10.5 min
Discarded = 1.09 cfs @ 13.20 hrs, Volume= 40,498 cf
Primary = 14.69 cfs @ 13.20 hrs, Volume= 121,875 cf
Routed to Pond E-PW : West Ponding Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 252.58' @ 13.20 hrs Surf.Area= 19,488 sf Storage= 20,461 cf

Plug-Flow detention time= 70.3 min calculated for 162,103 cf (97% of inflow)
Center-of-Mass det. time= 54.8 min (997.3 - 942.4)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	30,075 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	3,850	0	0
251.00	5,120	4,485	4,485
252.00	9,800	7,460	11,945
253.00	26,460	18,130	30,075

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**10.0' long + 5.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=1.09 cfs @ 13.20 hrs HW=252.58' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.09 cfs)

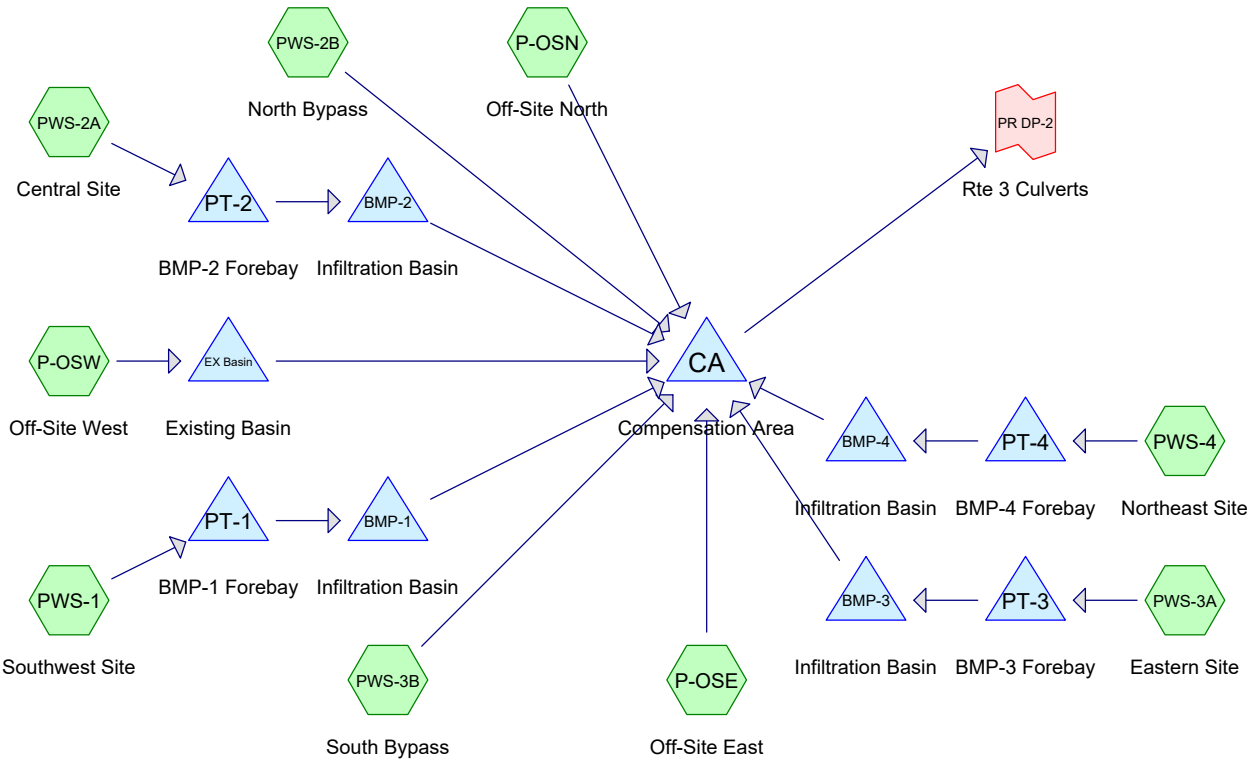
Primary OutFlow Max=14.68 cfs @ 13.20 hrs HW=252.58' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 14.68 cfs @ 1.96 fps)

Summary for Link EX DP-2: Rte 3 Culverts

Inflow Area = 2,538,250 sf, 8.63% Impervious, Inflow Depth = 0.00" for 100-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Appendix C
Stormwater Analysis
Proposed Conditions



Subcat Reach Pond Link

Routing Diagram for 7398-00 HydroCAD
Prepared by Garofalo & Associates, Inc, Printed 1/5/2024

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv.
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-OSE: Off-Site East Runoff Area=81,950 sf 69.10% Impervious Runoff Depth=0.68"
Tc=20.0 min CN=39/98 Runoff=0.97 cfs 4,651 cf

Subcatchment P-OSN: Off-Site North Runoff Area=54,885 sf 25.00% Impervious Runoff Depth=0.25"
Tc=8.0 min CN=50/98 Runoff=0.32 cfs 1,127 cf

Subcatchment P-OSW: Off-Site West Runoff Area=1,059,380 sf 14.03% Impervious Runoff Depth=0.14"
Flow Length=1,155' Tc=66.7 min CN=35/98 Runoff=1.40 cfs 12,210 cf

Subcatchment PWS-1: Southwest Site Runoff Area=287,200 sf 37.56% Impervious Runoff Depth=0.37"
Tc=10.0 min CN=37/98 Runoff=2.35 cfs 8,860 cf

Subcatchment PWS-2A: Central Site Runoff Area=592,540 sf 49.64% Impervious Runoff Depth=0.49"
Tc=10.0 min CN=48/98 Runoff=6.39 cfs 24,159 cf

Subcatchment PWS-2B: North Bypass Runoff Area=237,250 sf 0.00% Impervious Runoff Depth=0.00"
Tc=10.0 min CN=39/0 Runoff=0.00 cfs 0 cf

Subcatchment PWS-3A: Eastern Site Runoff Area=123,410 sf 58.35% Impervious Runoff Depth=0.58"
Tc=10.0 min CN=55/98 Runoff=1.57 cfs 5,915 cf

Subcatchment PWS-3B: South Bypass Runoff Area=76,625 sf 0.00% Impervious Runoff Depth=0.00"
Tc=10.0 min CN=48/0 Runoff=0.00 cfs 0 cf

Subcatchment PWS-4: Northeast Site Runoff Area=16,090 sf 49.84% Impervious Runoff Depth=0.49"
Tc=6.0 min CN=61/98 Runoff=0.20 cfs 659 cf

Pond BMP-1: Infiltration Basin Peak Elev=253.02' Storage=332 cf Inflow=1.95 cfs 4,923 cf
Discarded=1.59 cfs 4,923 cf Primary=0.00 cfs 0 cf Outflow=1.59 cfs 4,923 cf

Pond BMP-2: Infiltration Basin Peak Elev=253.00' Storage=185 cf Inflow=2.28 cfs 10,360 cf
Discarded=1.57 cfs 10,360 cf Primary=0.00 cfs 0 cf Outflow=1.57 cfs 10,360 cf

Pond BMP-3: Infiltration Basin Peak Elev=253.00' Storage=58 cf Inflow=0.65 cfs 2,412 cf
Discarded=0.49 cfs 2,412 cf Primary=0.00 cfs 0 cf Outflow=0.49 cfs 2,412 cf

Pond BMP-4: Infiltration Basin Peak Elev=253.00' Storage=15 cf Inflow=0.20 cfs 500 cf
Discarded=0.19 cfs 500 cf Primary=0.00 cfs 0 cf Outflow=0.19 cfs 500 cf

Pond CA: Compensation Area Peak Elev=251.01' Storage=536 cf Inflow=1.15 cfs 5,778 cf
Discarded=1.00 cfs 5,778 cf Primary=0.00 cfs 0 cf Outflow=1.00 cfs 5,778 cf

Pond EX Basin: Existing Basin Peak Elev=251.22' Storage=5,191 cf Inflow=1.40 cfs 12,210 cf
Discarded=0.25 cfs 12,209 cf Primary=0.00 cfs 0 cf Outflow=0.25 cfs 12,209 cf

Pond PT-1: BMP-1 Forebay Peak Elev=253.03' Storage=2,980 cf Inflow=2.35 cfs 8,860 cf
Outflow=1.95 cfs 4,923 cf

Pond PT-2: BMP-2 Forebay Peak Elev=253.01' Storage=9,950 cf Inflow=6.39 cfs 24,159 cf
Outflow=2.28 cfs 10,360 cf

Pond PT-3: BMP-3 Forebay Peak Elev=253.02' Storage=3,095 cf Inflow=1.57 cfs 5,915 cf
Outflow=0.65 cfs 2,412 cf

Pond PT-4: BMP-4 Forebay Peak Elev=253.01' Storage=168 cf Inflow=0.20 cfs 659 cf
Outflow=0.20 cfs 500 cf

Link PR DP-2: Rte 3 Culverts Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 2,529,330 sf Runoff Volume = 57,580 cf Average Runoff Depth = 0.27"
72.28% Pervious = 1,828,313 sf 27.72% Impervious = 701,017 sf

Summary for Subcatchment P-OSE: Off-Site East

Runoff = 0.97 cfs @ 12.26 hrs, Volume= 4,651 cf, Depth= 0.68"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
25,322	39	>75% Grass cover, Good, HSG A
56,628	98	Paved parking, HSG A
81,950	80	Weighted Average
25,322	39	30.90% Pervious Area
56,628	98	69.10% Impervious Area

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

Summary for Subcatchment P-OSN: Off-Site North

Runoff = 0.32 cfs @ 12.11 hrs, Volume= 1,127 cf, Depth= 0.25"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
27,442	54	1/2 acre lots, 25% imp, HSG A
27,443	70	1/2 acre lots, 25% imp, HSG B
54,885	62	Weighted Average
41,164	50	75.00% Pervious Area
13,721	98	25.00% Impervious Area

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

Summary for Subcatchment P-OSW: Off-Site West

Runoff = 1.40 cfs @ 12.86 hrs, Volume= 12,210 cf, Depth= 0.14"
Routed to Pond EX Basin : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
594,595	54	1/2 acre lots, 25% imp, HSG A
464,785	30	Woods, Good, HSG A
1,059,380	43	Weighted Average
910,731	35	85.97% Pervious Area
148,649	98	14.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.9	150	0.0200	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.30"
15.5	805	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	200	0.0100	9.88	48.47	**Pipe Channel, C-D** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
66.7	1,155	Total			

Summary for Subcatchment PWS-1: Southwest Site

Runoff = 2.35 cfs @ 12.14 hrs, Volume= 8,860 cf, Depth= 0.37"
Routed to Pond PT-1 : BMP-1 Forebay

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
48,125	98	Roofs, HSG A
59,740	98	Paved parking, HSG A
37,000	30	Woods, Good, HSG A
142,335	39	>75% Grass cover, Good, HSG A
287,200	60	Weighted Average
179,335	37	62.44% Pervious Area
107,865	98	37.56% Impervious Area

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

Summary for Subcatchment PWS-2A: Central Site

Runoff = 6.39 cfs @ 12.14 hrs, Volume= 24,159 cf, Depth= 0.49"
Routed to Pond PT-2 : BMP-2 Forebay

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
149,308	98	Roofs, HSG A
144,816	98	Paved parking, HSG A
178,568	39	>75% Grass cover, Good, HSG A
119,848	61	>75% Grass cover, Good, HSG B
592,540	73	Weighted Average
298,416	48	50.36% Pervious Area
294,124	98	49.64% Impervious Area

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

Summary for Subcatchment PWS-2B: North Bypass

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
77,955	30	Woods, Good, HSG A
14,325	55	Woods, Good, HSG B
118,595	39	>75% Grass cover, Good, HSG A
26,375	61	>75% Grass cover, Good, HSG B
237,250	39	Weighted Average
237,250	39	100.00% Pervious Area

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

Summary for Subcatchment PWS-3A: Eastern Site

Runoff = 1.57 cfs @ 12.14 hrs, Volume= 5,915 cf, Depth= 0.58"
Routed to Pond PT-3 : BMP-3 Forebay

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
16,640	98	Paved parking, HSG A
42,870	98	Paved parking, HSG B
12,886	39	>75% Grass cover, Good, HSG A
38,514	61	>75% Grass cover, Good, HSG B
123,410	80	Weighted Average
51,400	55	41.65% Pervious Area
72,010	98	58.35% Impervious Area

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

Summary for Subcatchment PWS-3B: South Bypass

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
45,695	39	>75% Grass cover, Good, HSG A
30,930	61	>75% Grass cover, Good, HSG B
76,625	48	Weighted Average
76,625	48	100.00% Pervious Area

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

Summary for Subcatchment PWS-4: Northeast Site

Runoff = 0.20 cfs @ 12.09 hrs, Volume= 659 cf, Depth= 0.49"
Routed to Pond PT-4 : BMP-4 Forebay

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1.2-Inch Rainfall=1.20"

Area (sf)	CN	Description
8,020	98	Paved parking, HSG B
8,070	61	>75% Grass cover, Good, HSG B
16,090	79	Weighted Average
8,070	61	50.16% Pervious Area
8,020	98	49.84% Impervious Area

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

Summary for Pond BMP-1: Infiltration Basin

Inflow Area = 287,200 sf, 37.56% Impervious, Inflow Depth = 0.21" for 1.2-Inch event
Inflow = 1.95 cfs @ 12.14 hrs, Volume= 4,923 cf
Outflow = 1.59 cfs @ 12.21 hrs, Volume= 4,923 cf, Atten= 18%, Lag= 4.3 min
Discarded = 1.59 cfs @ 12.21 hrs, Volume= 4,923 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.02' @ 12.21 hrs Surf.Area= 16,663 sf Storage= 332 cf

Plug-Flow detention time= 3.5 min calculated for 4,914 cf (100% of inflow)
Center-of-Mass det. time= 3.5 min (885.7 - 882.3)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	79,780 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	16,630	0	0
257.00	23,260	79,780	79,780

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 252.00' / 252.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	256.25'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=3.19 cfs @ 12.21 hrs HW=253.02' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 3.19 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 2.54 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond BMP-2: Infiltration Basin

Inflow Area = 592,540 sf, 49.64% Impervious, Inflow Depth = 0.21" for 1.2-Inch event
Inflow = 2.28 cfs @ 12.16 hrs, Volume= 10,360 cf
Outflow = 1.57 cfs @ 12.20 hrs, Volume= 10,360 cf, Atten= 31%, Lag= 2.4 min
Discarded = 1.57 cfs @ 12.20 hrs, Volume= 10,360 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.00' @ 12.20 hrs Surf.Area= 74,881 sf Storage= 185 cf

Plug-Flow detention time= 2.0 min calculated for 10,342 cf (100% of inflow)
Center-of-Mass det. time= 2.0 min (929.4 - 927.4)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	175,089 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	74,875	0	0
255.25	80,760	175,089	175,089

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	254.25'	**50.0' long + 3.0 '/' SideZ x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=14.33 cfs @ 12.20 hrs HW=253.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 14.33 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond BMP-3: Infiltration Basin

Inflow Area = 123,410 sf, 58.35% Impervious, Inflow Depth = 0.23" for 1.2-Inch event
Inflow = 0.65 cfs @ 12.32 hrs, Volume= 2,412 cf
Outflow = 0.49 cfs @ 12.36 hrs, Volume= 2,412 cf, Atten= 24%, Lag= 2.9 min
Discarded = 0.49 cfs @ 12.36 hrs, Volume= 2,412 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.00' @ 12.36 hrs Surf.Area= 17,290 sf Storage= 58 cf

Plug-Flow detention time= 2.0 min calculated for 2,408 cf (100% of inflow)
Center-of-Mass det. time= 2.0 min (939.3 - 937.4)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	46,423 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	17,280	0	0
255.25	23,985	46,423	46,423

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	254.25'	**40.0' long + 3.0 '/' SideZ x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=3.31 cfs @ 12.36 hrs HW=253.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 3.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond BMP-4: Infiltration Basin

Inflow Area = 16,090 sf, 49.84% Impervious, Inflow Depth = 0.37" for 1.2-Inch event
Inflow = 0.20 cfs @ 12.09 hrs, Volume= 500 cf
Outflow = 0.19 cfs @ 12.11 hrs, Volume= 500 cf, Atten= 4%, Lag= 1.1 min
Discarded = 0.19 cfs @ 12.11 hrs, Volume= 500 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.00' @ 12.11 hrs Surf.Area= 6,258 sf Storage= 15 cf

Plug-Flow detention time= 1.3 min calculated for 500 cf (100% of inflow)
Center-of-Mass det. time= 1.3 min (839.2 - 837.9)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	10,774 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	6,255	0	0
254.50	8,110	10,774	10,774

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	253.50'	**30.0' long + 3.0 '/' SideZ x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=1.20 cfs @ 12.11 hrs HW=253.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond CA: Compensation Area

Inflow Area = 2,529,330 sf, 27.72% Impervious, Inflow Depth = 0.03" for 1.2-Inch event
Inflow = 1.15 cfs @ 12.24 hrs, Volume= 5,778 cf
Outflow = 1.00 cfs @ 12.36 hrs, Volume= 5,778 cf, Atten= 13%, Lag= 7.5 min
Discarded = 1.00 cfs @ 12.36 hrs, Volume= 5,778 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link PR DP-2 : Rte 3 Culverts

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 251.01' @ 12.36 hrs Surf.Area= 63,102 sf Storage= 536 cf

Plug-Flow detention time= 9.1 min calculated for 5,778 cf (100% of inflow)
Center-of-Mass det. time= 8.9 min (801.8 - 792.8)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	236,188 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	63,020	0	0
252.00	72,620	67,820	67,820
253.00	84,690	78,655	146,475
254.00	94,735	89,713	236,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	253.25'	**30.0' long + 3.0 '/' SideZ x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=3.52 cfs @ 12.36 hrs HW=251.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 3.52 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond EX Basin: Existing Basin

Inflow Area = 1,059,380 sf, 14.03% Impervious, Inflow Depth = 0.14" for 1.2-Inch event
Inflow = 1.40 cfs @ 12.86 hrs, Volume= 12,210 cf
Outflow = 0.25 cfs @ 14.78 hrs, Volume= 12,209 cf, Atten= 82%, Lag= 115.1 min
Discarded = 0.25 cfs @ 14.78 hrs, Volume= 12,209 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 251.22' @ 14.78 hrs Surf.Area= 4,512 sf Storage= 5,191 cf

Plug-Flow detention time= 184.6 min calculated for 12,189 cf (100% of inflow)
Center-of-Mass det. time= 184.3 min (1,022.6 - 838.3)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	60,380 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	4,000	0	0
252.00	4,840	8,840	8,840
254.00	13,350	18,190	27,030
256.00	20,000	33,350	60,380

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**10.0' long + 5.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.25 cfs @ 14.78 hrs HW=251.22' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.25 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=250.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond PT-1: BMP-1 Forebay

Inflow Area = 287,200 sf, 37.56% Impervious, Inflow Depth = 0.37" for 1.2-Inch event
Inflow = 2.35 cfs @ 12.14 hrs, Volume= 8,860 cf
Outflow = 1.95 cfs @ 12.14 hrs, Volume= 4,923 cf, Atten= 17%, Lag= 0.0 min
Primary = 1.95 cfs @ 12.14 hrs, Volume= 4,923 cf
Routed to Pond BMP-1 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.03' @ 12.14 hrs Surf.Area= 1,935 sf Storage= 2,980 cf

Plug-Flow detention time= 203.8 min calculated for 4,914 cf (55% of inflow)
Center-of-Mass det. time= 96.5 min (882.3 - 785.7)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	2,980 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	1,045	0	0
253.00	1,935	2,980	2,980

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**90.0' long x 1.0' 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
			Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=1.86 cfs @ 12.14 hrs HW=253.03' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.86 cfs @ 0.53 fps)

Summary for Pond PT-2: BMP-2 Forebay

Inflow Area = 592,540 sf, 49.64% Impervious, Inflow Depth = 0.49" for 1.2-Inch event
Inflow = 6.39 cfs @ 12.14 hrs, Volume= 24,159 cf
Outflow = 2.28 cfs @ 12.16 hrs, Volume= 10,360 cf, Atten= 64%, Lag= 1.4 min
Primary = 2.28 cfs @ 12.16 hrs, Volume= 10,360 cf
Routed to Pond BMP-2 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.01' @ 12.15 hrs Surf.Area= 7,025 sf Storage= 9,950 cf

Plug-Flow detention time= 266.1 min calculated for 10,342 cf (43% of inflow)
Center-of-Mass det. time= 141.7 min (927.4 - 785.7)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	9,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	2,925	0	0
253.00	7,025	9,950	9,950

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**325.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=1.81 cfs @ 12.16 hrs HW=253.01' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.81 cfs @ 0.34 fps)

Summary for Pond PT-3: BMP-3 Forebay

Inflow Area = 123,410 sf, 58.35% Impervious, Inflow Depth = 0.58" for 1.2-Inch event
Inflow = 1.57 cfs @ 12.14 hrs, Volume= 5,915 cf
Outflow = 0.65 cfs @ 12.32 hrs, Volume= 2,412 cf, Atten= 59%, Lag= 10.7 min
Primary = 0.65 cfs @ 12.32 hrs, Volume= 2,412 cf
Routed to Pond BMP-3 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.02' @ 12.30 hrs Surf.Area= 2,030 sf Storage= 3,095 cf

Plug-Flow detention time= 279.6 min calculated for 2,408 cf (41% of inflow)
Center-of-Mass det. time= 151.6 min (937.4 - 785.7)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	3,095 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	1,065	0	0
253.00	2,030	3,095	3,095

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**50.0' long + 3.0 '/' SideZ x 1.0' 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

Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.54 cfs @ 12.32 hrs HW=253.02' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.54 cfs @ 0.43 fps)

Summary for Pond PT-4: BMP-4 Forebay

Inflow Area = 16,090 sf, 49.84% Impervious, Inflow Depth = 0.49" for 1.2-Inch event
Inflow = 0.20 cfs @ 12.09 hrs, Volume= 659 cf
Outflow = 0.20 cfs @ 12.09 hrs, Volume= 500 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.09 hrs, Volume= 500 cf
Routed to Pond BMP-4 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.01' @ 12.09 hrs Surf.Area= 315 sf Storage= 168 cf

Plug-Flow detention time= 138.5 min calculated for 500 cf (76% of inflow)
Center-of-Mass det. time= 55.8 min (837.9 - 782.0)

Volume	Invert	Avail.Storage	Storage Description
#1	252.00'	168 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
252.00	20	0	0
253.00	315	168	168

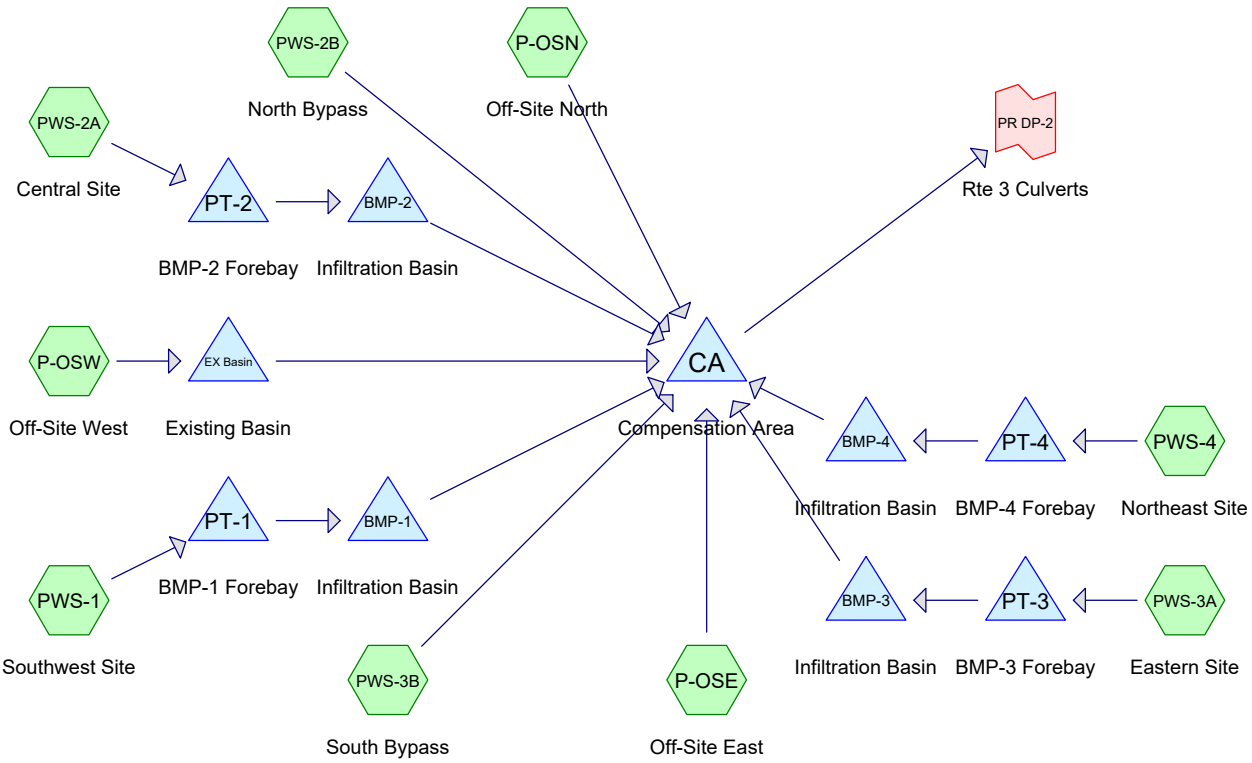
Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**35.0' long + 3.0 '/' SideZ x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.19 cfs @ 12.09 hrs HW=253.01' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.19 cfs @ 0.34 fps)

Summary for Link PR DP-2: Rte 3 Culverts

Inflow Area = 2,529,330 sf, 27.72% Impervious, Inflow Depth = 0.00" for 1.2-Inch event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs



Subcat Reach Pond Link

Routing Diagram for 7398-00 HydroCAD
Prepared by Garofalo & Associates, Inc, Printed 1/5/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type III 24-hr		Default	24.00	1	2.70	2
2	10-Year	Type III 24-hr		Default	24.00	1	4.90	2
3	100-Year	Type III 24-hr		Default	24.00	1	8.70	2

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-OSE: Off-Site East Runoff Area=81,950 sf 69.10% Impervious Runoff Depth=1.03"
Tc=20.0 min CN=80 Runoff=1.48 cfs 7,033 cf

Subcatchment P-OSN: Off-Site North Runoff Area=54,885 sf 25.00% Impervious Runoff Depth=0.29"
Tc=8.0 min CN=62 Runoff=0.18 cfs 1,307 cf

Subcatchment P-OSW: Off-Site West Runoff Area=1,059,380 sf 14.03% Impervious Runoff Depth=0.00"
Flow Length=1,155' Tc=66.7 min CN=43 Runoff=0.00 cfs 16 cf

Subcatchment PWS-1: Southwest Site Runoff Area=287,200 sf 37.56% Impervious Runoff Depth=0.23"
Tc=10.0 min CN=60 Runoff=0.65 cfs 5,565 cf

Subcatchment PWS-2A: Central Site Runoff Area=592,540 sf 49.64% Impervious Runoff Depth=0.68"
Tc=10.0 min CN=73 Runoff=8.27 cfs 33,530 cf

Subcatchment PWS-2B: North Bypass Runoff Area=237,250 sf 0.00% Impervious Runoff Depth=0.00"
Tc=10.0 min CN=39 Runoff=0.00 cfs 0 cf

Subcatchment PWS-3A: Eastern Site Runoff Area=123,410 sf 58.35% Impervious Runoff Depth=1.03"
Tc=10.0 min CN=80 Runoff=2.87 cfs 10,591 cf

Subcatchment PWS-3B: South Bypass Runoff Area=76,625 sf 0.00% Impervious Runoff Depth=0.03"
Tc=10.0 min CN=48 Runoff=0.01 cfs 160 cf

Subcatchment PWS-4: Northeast Site Runoff Area=16,090 sf 49.84% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=79 Runoff=0.40 cfs 1,306 cf

Pond BMP-1: Infiltration Basin Peak Elev=253.00' Storage=31 cf Inflow=0.16 cfs 2,602 cf
Discarded=0.15 cfs 2,602 cf Primary=0.00 cfs 0 cf Outflow=0.15 cfs 2,602 cf

Pond BMP-2: Infiltration Basin Peak Elev=253.01' Storage=903 cf Inflow=9.30 cfs 28,492 cf
Discarded=7.69 cfs 28,492 cf Primary=0.00 cfs 0 cf Outflow=7.69 cfs 28,492 cf

Pond BMP-3: Infiltration Basin Peak Elev=253.01' Storage=213 cf Inflow=2.28 cfs 6,553 cf
Discarded=1.82 cfs 6,553 cf Primary=0.00 cfs 0 cf Outflow=1.82 cfs 6,553 cf

Pond BMP-4: Infiltration Basin Peak Elev=253.01' Storage=31 cf Inflow=0.42 cfs 1,164 cf
Discarded=0.40 cfs 1,164 cf Primary=0.00 cfs 0 cf Outflow=0.40 cfs 1,164 cf

Pond CA: Compensation Area Peak Elev=251.01' Storage=751 cf Inflow=1.66 cfs 8,500 cf
Discarded=1.40 cfs 8,500 cf Primary=0.00 cfs 0 cf Outflow=1.40 cfs 8,500 cf

Pond EX Basin: Existing Basin Peak Elev=250.00' Storage=3 cf Inflow=0.00 cfs 16 cf
Discarded=0.00 cfs 16 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 16 cf

Pond PT-1: BMP-1 Forebay Peak Elev=253.00' Storage=2,973 cf Inflow=0.65 cfs 5,565 cf
Outflow=0.16 cfs 2,602 cf

Pond PT-2: BMP-2 Forebay Peak Elev=253.03' Storage=9,950 cf Inflow=8.27 cfs 33,530 cf
Outflow=9.30 cfs 28,492 cf

Pond PT-3: BMP-3 Forebay Peak Elev=253.05' Storage=3,095 cf Inflow=2.87 cfs 10,591 cf
Outflow=2.28 cfs 6,553 cf

Pond PT-4: BMP-4 Forebay Peak Elev=253.02' Storage=168 cf Inflow=0.40 cfs 1,306 cf
Outflow=0.42 cfs 1,164 cf

Link PR DP-2: Rte 3 Culverts Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 2,529,330 sf Runoff Volume = 59,507 cf Average Runoff Depth = 0.28"
72.28% Pervious = 1,828,313 sf 27.72% Impervious = 701,017 sf

Summary for Subcatchment P-OSE: Off-Site East

Runoff = 1.48 cfs @ 12.29 hrs, Volume= 7,033 cf, Depth= 1.03"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
25,322	39	>75% Grass cover, Good, HSG A
56,628	98	Paved parking, HSG A
81,950	80	Weighted Average
25,322	39	30.90% Pervious Area
56,628	98	69.10% Impervious Area

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

Summary for Subcatchment P-OSN: Off-Site North

Runoff = 0.18 cfs @ 12.20 hrs, Volume= 1,307 cf, Depth= 0.29"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
27,442	54	1/2 acre lots, 25% imp, HSG A
27,443	70	1/2 acre lots, 25% imp, HSG B
54,885	62	Weighted Average
41,164	50	75.00% Pervious Area
13,721	98	25.00% Impervious Area

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

Summary for Subcatchment P-OSW: Off-Site West

Runoff = 0.00 cfs @ 24.42 hrs, Volume= 16 cf, Depth= 0.00"
Routed to Pond EX Basin : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
594,595	54	1/2 acre lots, 25% imp, HSG A
464,785	30	Woods, Good, HSG A
1,059,380	43	Weighted Average
910,731	35	85.97% Pervious Area
148,649	98	14.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.9	150	0.0200	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.30"
15.5	805	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	200	0.0100	9.88	48.47	**Pipe Channel, C-D** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
66.7	1,155	Total			

Summary for Subcatchment PWS-1: Southwest Site

Runoff = 0.65 cfs @ 12.38 hrs, Volume= 5,565 cf, Depth= 0.23"
Routed to Pond PT-1 : BMP-1 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
48,125	98	Roofs, HSG A
59,740	98	Paved parking, HSG A
37,000	30	Woods, Good, HSG A
142,335	39	>75% Grass cover, Good, HSG A
287,200	60	Weighted Average
179,335	37	62.44% Pervious Area
107,865	98	37.56% Impervious Area

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

Summary for Subcatchment PWS-2A: Central Site

Runoff = 8.27 cfs @ 12.16 hrs, Volume= 33,530 cf, Depth= 0.68"
Routed to Pond PT-2 : BMP-2 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
149,308	98	Roofs, HSG A
144,816	98	Paved parking, HSG A
178,568	39	>75% Grass cover, Good, HSG A
119,848	61	>75% Grass cover, Good, HSG B
592,540	73	Weighted Average
298,416	48	50.36% Pervious Area
294,124	98	49.64% Impervious Area

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

Summary for Subcatchment PWS-2B: North Bypass

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
77,955	30	Woods, Good, HSG A
14,325	55	Woods, Good, HSG B
118,595	39	>75% Grass cover, Good, HSG A
26,375	61	>75% Grass cover, Good, HSG B
237,250	39	Weighted Average
237,250	39	100.00% Pervious Area

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

Summary for Subcatchment PWS-3A: Eastern Site

Runoff = 2.87 cfs @ 12.15 hrs, Volume= 10,591 cf, Depth= 1.03"
Routed to Pond PT-3 : BMP-3 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
16,640	98	Paved parking, HSG A
42,870	98	Paved parking, HSG B
12,886	39	>75% Grass cover, Good, HSG A
38,514	61	>75% Grass cover, Good, HSG B
123,410	80	Weighted Average
51,400	55	41.65% Pervious Area
72,010	98	58.35% Impervious Area

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

Summary for Subcatchment PWS-3B: South Bypass

Runoff = 0.01 cfs @ 16.82 hrs, Volume= 160 cf, Depth= 0.03"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
45,695	39	>75% Grass cover, Good, HSG A
30,930	61	>75% Grass cover, Good, HSG B
76,625	48	Weighted Average
76,625	48	100.00% Pervious Area

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

Summary for Subcatchment PWS-4: Northeast Site

Runoff = 0.40 cfs @ 12.10 hrs, Volume= 1,306 cf, Depth= 0.97"
Routed to Pond PT-4 : BMP-4 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-Year Rainfall=2.70"

Area (sf)	CN	Description
8,020	98	Paved parking, HSG B
8,070	61	>75% Grass cover, Good, HSG B
16,090	79	Weighted Average
8,070	61	50.16% Pervious Area
8,020	98	49.84% Impervious Area

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

Summary for Pond BMP-1: Infiltration Basin

Inflow Area = 287,200 sf, 37.56% Impervious, Inflow Depth = 0.11" for 1-Year event
Inflow = 0.16 cfs @ 15.25 hrs, Volume= 2,602 cf
Outflow = 0.15 cfs @ 15.43 hrs, Volume= 2,602 cf, Atten= 4%, Lag= 10.7 min
Discarded = 0.15 cfs @ 15.43 hrs, Volume= 2,602 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.00' @ 15.43 hrs Surf.Area= 16,633 sf Storage= 31 cf

Plug-Flow detention time= 3.5 min calculated for 2,597 cf (100% of inflow)
Center-of-Mass det. time= 3.5 min (1,133.5 - 1,130.0)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	79,780 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	16,630	0	0
257.00	23,260	79,780	79,780

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 252.00' / 252.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	256.25'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=3.18 cfs @ 15.43 hrs HW=253.00' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 3.18 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 2.54 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond BMP-2: Infiltration Basin

Inflow Area = 592,540 sf, 49.64% Impervious, Inflow Depth = 0.58" for 1-Year event
Inflow = 9.30 cfs @ 12.42 hrs, Volume= 28,492 cf
Outflow = 7.69 cfs @ 12.47 hrs, Volume= 28,492 cf, Atten= 17%, Lag= 3.1 min
Discarded = 7.69 cfs @ 12.47 hrs, Volume= 28,492 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.01' @ 12.47 hrs Surf.Area= 74,907 sf Storage= 903 cf

Plug-Flow detention time= 2.0 min calculated for 28,445 cf (100% of inflow)
Center-of-Mass det. time= 2.0 min (916.9 - 915.0)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	175,089 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	74,875	0	0
255.25	80,760	175,089	175,089

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	254.25'	**50.0' long + 3.0 '/' SideZ x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=14.34 cfs @ 12.47 hrs HW=253.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 14.34 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond BMP-3: Infiltration Basin

Inflow Area = 123,410 sf, 58.35% Impervious, Inflow Depth = 0.64" for 1-Year event
Inflow = 2.28 cfs @ 12.27 hrs, Volume= 6,553 cf
Outflow = 1.82 cfs @ 12.32 hrs, Volume= 6,553 cf, Atten= 20%, Lag= 3.2 min
Discarded = 1.82 cfs @ 12.32 hrs, Volume= 6,553 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.01' @ 12.32 hrs Surf.Area= 17,317 sf Storage= 213 cf

Plug-Flow detention time= 2.0 min calculated for 6,542 cf (100% of inflow)
Center-of-Mass det. time= 2.0 min (926.2 - 924.2)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	46,423 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	17,280	0	0
255.25	23,985	46,423	46,423

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	254.25'	**40.0' long + 3.0 '/' SideZ x 25.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=3.31 cfs @ 12.32 hrs HW=253.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 3.31 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond BMP-4: Infiltration Basin

Inflow Area = 16,090 sf, 49.84% Impervious, Inflow Depth = 0.87" for 1-Year event
Inflow = 0.42 cfs @ 12.10 hrs, Volume= 1,164 cf
Outflow = 0.40 cfs @ 12.12 hrs, Volume= 1,164 cf, Atten= 4%, Lag= 1.5 min
Discarded = 0.40 cfs @ 12.12 hrs, Volume= 1,164 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.01' @ 12.12 hrs Surf.Area= 6,261 sf Storage= 31 cf

Plug-Flow detention time= 1.3 min calculated for 1,164 cf (100% of inflow)
Center-of-Mass det. time= 1.3 min (876.4 - 875.1)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	10,774 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	6,255	0	0
254.50	8,110	10,774	10,774

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	253.50'	**30.0' long + 3.0 '/' SideZ x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=1.20 cfs @ 12.12 hrs HW=253.00' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 1.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond CA: Compensation Area

Inflow Area = 2,529,330 sf, 27.72% Impervious, Inflow Depth = 0.04" for 1-Year event
Inflow = 1.66 cfs @ 12.29 hrs, Volume= 8,500 cf
Outflow = 1.40 cfs @ 12.43 hrs, Volume= 8,500 cf, Atten= 15%, Lag= 8.5 min
Discarded = 1.40 cfs @ 12.43 hrs, Volume= 8,500 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link PR DP-2 : Rte 3 Culverts

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 251.01' @ 12.43 hrs Surf.Area= 63,134 sf Storage= 751 cf

Plug-Flow detention time= 8.9 min calculated for 8,486 cf (100% of inflow)
Center-of-Mass det. time= 8.9 min (889.9 - 881.0)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	236,188 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	63,020	0	0
252.00	72,620	67,820	67,820
253.00	84,690	78,655	146,475
254.00	94,735	89,713	236,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	253.25'	**30.0' long + 3.0 '/' SideZ x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=3.52 cfs @ 12.43 hrs HW=251.01' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 3.52 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond EX Basin: Existing Basin

Inflow Area = 1,059,380 sf, 14.03% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 24.42 hrs, Volume= 16 cf
Outflow = 0.00 cfs @ 24.63 hrs, Volume= 16 cf, Atten= 9%, Lag= 12.8 min
Discarded = 0.00 cfs @ 24.63 hrs, Volume= 16 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 250.00' @ 24.63 hrs Surf.Area= 4,000 sf Storage= 3 cf

Plug-Flow detention time= 17.9 min calculated for 16 cf (100% of inflow)
Center-of-Mass det. time= 17.9 min (1,479.7 - 1,461.8)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	60,380 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	4,000	0	0
252.00	4,840	8,840	8,840
254.00	13,350	18,190	27,030
256.00	20,000	33,350	60,380

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**10.0' long + 5.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.22 cfs @ 24.63 hrs HW=250.00' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=250.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond PT-1: BMP-1 Forebay

Inflow Area = 287,200 sf, 37.56% Impervious, Inflow Depth = 0.23" for 1-Year event
Inflow = 0.65 cfs @ 12.38 hrs, Volume= 5,565 cf
Outflow = 0.16 cfs @ 15.25 hrs, Volume= 2,602 cf, Atten= 76%, Lag= 172.5 min
Primary = 0.16 cfs @ 15.25 hrs, Volume= 2,602 cf
Routed to Pond BMP-1 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.00' @ 15.25 hrs Surf.Area= 1,933 sf Storage= 2,973 cf

Plug-Flow detention time= 345.6 min calculated for 2,597 cf (47% of inflow)
Center-of-Mass det. time= 178.0 min (1,130.0 - 952.0)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	2,980 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	1,045	0	0
253.00	1,935	2,980	2,980

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**90.0' long x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.13 cfs @ 15.25 hrs HW=253.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.13 cfs @ 0.22 fps)

Summary for Pond PT-2: BMP-2 Forebay

Inflow Area = 592,540 sf, 49.64% Impervious, Inflow Depth = 0.68" for 1-Year event
Inflow = 8.27 cfs @ 12.16 hrs, Volume= 33,530 cf
Outflow = 9.30 cfs @ 12.42 hrs, Volume= 28,492 cf, Atten= 0%, Lag= 15.7 min
Primary = 9.30 cfs @ 12.42 hrs, Volume= 28,492 cf
Routed to Pond BMP-2 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.03' @ 12.40 hrs Surf.Area= 7,025 sf Storage= 9,950 cf

Plug-Flow detention time= 100.7 min calculated for 28,445 cf (85% of inflow)
Center-of-Mass det. time= 33.8 min (915.0 - 881.2)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	9,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	2,925	0	0
253.00	7,025	9,950	9,950

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**325.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=8.06 cfs @ 12.42 hrs HW=253.03' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 8.06 cfs @ 0.56 fps)

Summary for Pond PT-3: BMP-3 Forebay

Inflow Area = 123,410 sf, 58.35% Impervious, Inflow Depth = 1.03" for 1-Year event
Inflow = 2.87 cfs @ 12.15 hrs, Volume= 10,591 cf
Outflow = 2.28 cfs @ 12.27 hrs, Volume= 6,553 cf, Atten= 21%, Lag= 7.1 min
Primary = 2.28 cfs @ 12.27 hrs, Volume= 6,553 cf
Routed to Pond BMP-3 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.05' @ 12.25 hrs Surf.Area= 2,030 sf Storage= 3,095 cf

Plug-Flow detention time= 183.3 min calculated for 6,553 cf (62% of inflow)
Center-of-Mass det. time= 68.6 min (924.2 - 855.6)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	3,095 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	1,065	0	0
253.00	2,030	3,095	3,095

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**50.0' long + 3.0 '/' SideZ x 1.0' 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

Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=1.97 cfs @ 12.27 hrs HW=253.05' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.97 cfs @ 0.66 fps)

Summary for Pond PT-4: BMP-4 Forebay

Inflow Area = 16,090 sf, 49.84% Impervious, Inflow Depth = 0.97" for 1-Year event
Inflow = 0.40 cfs @ 12.10 hrs, Volume= 1,306 cf
Outflow = 0.42 cfs @ 12.10 hrs, Volume= 1,164 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.42 cfs @ 12.10 hrs, Volume= 1,164 cf
Routed to Pond BMP-4 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.02' @ 12.10 hrs Surf.Area= 315 sf Storage= 168 cf

Plug-Flow detention time= 71.6 min calculated for 1,164 cf (89% of inflow)
Center-of-Mass det. time= 19.6 min (875.1 - 855.4)

Volume	Invert	Avail.Storage	Storage Description
#1	252.00'	168 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
252.00	20	0	0
253.00	315	168	168

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**35.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.41 cfs @ 12.10 hrs HW=253.02' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.41 cfs @ 0.44 fps)

Summary for Link PR DP-2: Rte 3 Culverts

Inflow Area = 2,529,330 sf, 27.72% Impervious, Inflow Depth = 0.00" for 1-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-OSE: Off-Site East Runoff Area=81,950 sf 69.10% Impervious Runoff Depth=2.81"
Tc=20.0 min CN=80 Runoff=4.16 cfs 19,161 cf

Subcatchment P-OSN: Off-Site North Runoff Area=54,885 sf 25.00% Impervious Runoff Depth=1.38"
Tc=8.0 min CN=62 Runoff=1.69 cfs 6,298 cf

Subcatchment P-OSW: Off-Site West Runoff Area=1,059,380 sf 14.03% Impervious Runoff Depth=0.33"
Flow Length=1,155' Tc=66.7 min CN=43 Runoff=1.47 cfs 28,795 cf

Subcatchment PWS-1: Southwest Site Runoff Area=287,200 sf 37.56% Impervious Runoff Depth=1.24"
Tc=10.0 min CN=60 Runoff=7.35 cfs 29,752 cf

Subcatchment PWS-2A: Central Site Runoff Area=592,540 sf 49.64% Impervious Runoff Depth=2.20"
Tc=10.0 min CN=73 Runoff=30.05 cfs 108,747 cf

Subcatchment PWS-2B: North Bypass Runoff Area=237,250 sf 0.00% Impervious Runoff Depth=0.18"
Tc=10.0 min CN=39 Runoff=0.14 cfs 3,564 cf

Subcatchment PWS-3A: Eastern Site Runoff Area=123,410 sf 58.35% Impervious Runoff Depth=2.81"
Tc=10.0 min CN=80 Runoff=8.05 cfs 28,855 cf

Subcatchment PWS-3B: South Bypass Runoff Area=76,625 sf 0.00% Impervious Runoff Depth=0.55"
Tc=10.0 min CN=48 Runoff=0.50 cfs 3,516 cf

Subcatchment PWS-4: Northeast Site Runoff Area=16,090 sf 49.84% Impervious Runoff Depth=2.72"
Tc=6.0 min CN=79 Runoff=1.15 cfs 3,641 cf

Pond BMP-1: Infiltration Basin Peak Elev=253.05' Storage=826 cf Inflow=5.22 cfs 13,241 cf
Discarded=3.20 cfs 13,255 cf Primary=0.00 cfs 0 cf Outflow=3.20 cfs 13,255 cf

Pond BMP-2: Infiltration Basin Peak Elev=253.35' Storage=26,438 cf Inflow=37.02 cfs 140,699 cf
Discarded=14.51 cfs 140,610 cf Primary=0.00 cfs 0 cf Outflow=14.51 cfs 140,610 cf

Pond BMP-3: Infiltration Basin Peak Elev=253.28' Storage=5,010 cf Inflow=8.58 cfs 33,833 cf
Discarded=3.47 cfs 33,854 cf Primary=0.00 cfs 0 cf Outflow=3.47 cfs 33,854 cf

Pond BMP-4: Infiltration Basin Peak Elev=253.01' Storage=86 cf Inflow=1.15 cfs 3,475 cf
Discarded=1.10 cfs 3,475 cf Primary=0.00 cfs 0 cf Outflow=1.10 cfs 3,475 cf

Pond CA: Compensation Area Peak Elev=251.06' Storage=3,827 cf Inflow=5.80 cfs 40,265 cf
Discarded=3.55 cfs 40,265 cf Primary=0.00 cfs 0 cf Outflow=3.55 cfs 40,265 cf

Pond EX Basin: Existing Basin Peak Elev=252.08' Storage=9,257 cf Inflow=1.47 cfs 28,795 cf
Discarded=0.29 cfs 16,814 cf Primary=0.65 cfs 7,724 cf Outflow=0.94 cfs 24,538 cf

Pond PT-1: BMP-1 Forebay Peak Elev=253.06' Storage=2,980 cf Inflow=7.35 cfs 29,752 cf
Outflow=5.22 cfs 13,241 cf

Pond PT-2: BMP-2 Forebay Peak Elev=253.11' Storage=9,950 cf Inflow=30.05 cfs 108,747 cf
Outflow=37.02 cfs 140,699 cf

Pond PT-3: BMP-3 Forebay Peak Elev=253.15' Storage=3,095 cf Inflow=8.05 cfs 28,855 cf
Outflow=8.58 cfs 33,833 cf

Pond PT-4: BMP-4 Forebay Peak Elev=253.04' Storage=168 cf Inflow=1.15 cfs 3,641 cf
Outflow=1.15 cfs 3,475 cf

Link PR DP-2: Rte 3 Culverts Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 2,529,330 sf Runoff Volume = 232,331 cf Average Runoff Depth = 1.10"
72.28% Pervious = 1,828,313 sf 27.72% Impervious = 701,017 sf

Summary for Subcatchment P-OSE: Off-Site East

Runoff = 4.16 cfs @ 12.28 hrs, Volume= 19,161 cf, Depth= 2.81"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
25,322	39	>75% Grass cover, Good, HSG A
56,628	98	Paved parking, HSG A
81,950	80	Weighted Average
25,322	39	30.90% Pervious Area
56,628	98	69.10% Impervious Area

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

Summary for Subcatchment P-OSN: Off-Site North

Runoff = 1.69 cfs @ 12.13 hrs, Volume= 6,298 cf, Depth= 1.38"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
27,442	54	1/2 acre lots, 25% imp, HSG A
27,443	70	1/2 acre lots, 25% imp, HSG B
54,885	62	Weighted Average
41,164	50	75.00% Pervious Area
13,721	98	25.00% Impervious Area

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

Summary for Subcatchment P-OSW: Off-Site West

Runoff = 1.47 cfs @ 13.40 hrs, Volume= 28,795 cf, Depth= 0.33"
Routed to Pond EX Basin : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
594,595	54	1/2 acre lots, 25% imp, HSG A
464,785	30	Woods, Good, HSG A
1,059,380	43	Weighted Average
910,731	35	85.97% Pervious Area
148,649	98	14.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.9	150	0.0200	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.30"
15.5	805	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	200	0.0100	9.88	48.47	**Pipe Channel, C-D** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
66.7	1,155	Total			

Summary for Subcatchment PWS-1: Southwest Site

Runoff = 7.35 cfs @ 12.16 hrs, Volume= 29,752 cf, Depth= 1.24"
Routed to Pond PT-1 : BMP-1 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
48,125	98	Roofs, HSG A
59,740	98	Paved parking, HSG A
37,000	30	Woods, Good, HSG A
142,335	39	>75% Grass cover, Good, HSG A
287,200	60	Weighted Average
179,335	37	62.44% Pervious Area
107,865	98	37.56% Impervious Area

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

Summary for Subcatchment PWS-2A: Central Site

Runoff = 30.05 cfs @ 12.15 hrs, Volume= 108,747 cf, Depth= 2.20"
Routed to Pond PT-2 : BMP-2 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
149,308	98	Roofs, HSG A
144,816	98	Paved parking, HSG A
178,568	39	>75% Grass cover, Good, HSG A
119,848	61	>75% Grass cover, Good, HSG B
592,540	73	Weighted Average
298,416	48	50.36% Pervious Area
294,124	98	49.64% Impervious Area

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

Summary for Subcatchment PWS-2B: North Bypass

Runoff = 0.14 cfs @ 12.92 hrs, Volume= 3,564 cf, Depth= 0.18"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
77,955	30	Woods, Good, HSG A
14,325	55	Woods, Good, HSG B
118,595	39	>75% Grass cover, Good, HSG A
26,375	61	>75% Grass cover, Good, HSG B
237,250	39	Weighted Average
237,250	39	100.00% Pervious Area

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

Summary for Subcatchment PWS-3A: Eastern Site

Runoff = 8.05 cfs @ 12.14 hrs, Volume= 28,855 cf, Depth= 2.81"
Routed to Pond PT-3 : BMP-3 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
16,640	98	Paved parking, HSG A
42,870	98	Paved parking, HSG B
12,886	39	>75% Grass cover, Good, HSG A
38,514	61	>75% Grass cover, Good, HSG B
123,410	80	Weighted Average
51,400	55	41.65% Pervious Area
72,010	98	58.35% Impervious Area

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

Summary for Subcatchment PWS-3B: South Bypass

Runoff = 0.50 cfs @ 12.27 hrs, Volume= 3,516 cf, Depth= 0.55"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
45,695	39	>75% Grass cover, Good, HSG A
30,930	61	>75% Grass cover, Good, HSG B
76,625	48	Weighted Average
76,625	48	100.00% Pervious Area

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

Summary for Subcatchment PWS-4: Northeast Site

Runoff = 1.15 cfs @ 12.09 hrs, Volume= 3,641 cf, Depth= 2.72"
Routed to Pond PT-4 : BMP-4 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.90"

Area (sf)	CN	Description
8,020	98	Paved parking, HSG B
8,070	61	>75% Grass cover, Good, HSG B
16,090	79	Weighted Average
8,070	61	50.16% Pervious Area
8,020	98	49.84% Impervious Area

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

Summary for Pond BMP-1: Infiltration Basin

Inflow Area = 287,200 sf, 37.56% Impervious, Inflow Depth = 0.55" for 10-Year event
Inflow = 5.22 cfs @ 12.17 hrs, Volume= 13,241 cf
Outflow = 3.20 cfs @ 12.25 hrs, Volume= 13,255 cf, Atten= 39%, Lag= 4.7 min
Discarded = 3.20 cfs @ 12.25 hrs, Volume= 13,255 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.05' @ 12.27 hrs Surf.Area= 16,712 sf Storage= 826 cf

Plug-Flow detention time= 2.8 min calculated for 13,233 cf (100% of inflow)
Center-of-Mass det. time= 3.3 min (988.5 - 985.3)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	79,780 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	16,630	0	0
257.00	23,260	79,780	79,780

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 252.00' / 252.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	256.25'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=3.20 cfs @ 12.25 hrs HW=253.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 3.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 2.54 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond BMP-2: Infiltration Basin

Inflow Area = 592,540 sf, 49.64% Impervious, Inflow Depth = 2.85" for 10-Year event
Inflow = 37.02 cfs @ 12.15 hrs, Volume= 140,699 cf
Outflow = 14.51 cfs @ 12.60 hrs, Volume= 140,610 cf, Atten= 61%, Lag= 27.0 min
Discarded = 14.51 cfs @ 12.60 hrs, Volume= 140,610 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.35' @ 12.60 hrs Surf.Area= 75,793 sf Storage= 26,438 cf

Plug-Flow detention time= 12.5 min calculated for 140,610 cf (100% of inflow)
Center-of-Mass det. time= 12.1 min (852.9 - 840.8)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	175,089 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	74,875	0	0
255.25	80,760	175,089	175,089

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	254.25'	**50.0' long + 3.0 '/' SideZ x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=14.51 cfs @ 12.60 hrs HW=253.35' (Free Discharge)
1=Exfiltration (Exfiltration Controls 14.51 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond BMP-3: Infiltration Basin

Inflow Area = 123,410 sf, 58.35% Impervious, Inflow Depth = 3.29" for 10-Year event
Inflow = 8.58 cfs @ 12.14 hrs, Volume= 33,833 cf
Outflow = 3.47 cfs @ 12.49 hrs, Volume= 33,854 cf, Atten= 60%, Lag= 20.5 min
Discarded = 3.47 cfs @ 12.49 hrs, Volume= 33,854 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.28' @ 12.49 hrs Surf.Area= 18,123 sf Storage= 5,010 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 8.2 min (857.1 - 848.9)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	46,423 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	17,280	0	0
255.25	23,985	46,423	46,423

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	254.25'	**40.0' long + 3.0 '/' SideZ x 25.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=3.47 cfs @ 12.49 hrs HW=253.28' (Free Discharge)
1=Exfiltration (Exfiltration Controls 3.47 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond BMP-4: Infiltration Basin

Inflow Area = 16,090 sf, 49.84% Impervious, Inflow Depth = 2.59" for 10-Year event
Inflow = 1.15 cfs @ 12.09 hrs, Volume= 3,475 cf
Outflow = 1.10 cfs @ 12.11 hrs, Volume= 3,475 cf, Atten= 5%, Lag= 1.1 min
Discarded = 1.10 cfs @ 12.11 hrs, Volume= 3,475 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.01' @ 12.11 hrs Surf.Area= 6,272 sf Storage= 86 cf

Plug-Flow detention time= 1.3 min calculated for 3,469 cf (100% of inflow)
Center-of-Mass det. time= 1.3 min (837.4 - 836.1)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	10,774 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	6,255	0	0
254.50	8,110	10,774	10,774

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	253.50'	**30.0' long + 3.0 '/' SideZ x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=1.20 cfs @ 12.11 hrs HW=253.01' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond CA: Compensation Area

Inflow Area = 2,529,330 sf, 27.72% Impervious, Inflow Depth = 0.19" for 10-Year event
Inflow = 5.80 cfs @ 12.25 hrs, Volume= 40,265 cf
Outflow = 3.55 cfs @ 12.55 hrs, Volume= 40,265 cf, Atten= 39%, Lag= 17.9 min
Discarded = 3.55 cfs @ 12.55 hrs, Volume= 40,265 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link PR DP-2 : Rte 3 Culverts

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 251.06' @ 12.55 hrs Surf.Area= 63,600 sf Storage= 3,827 cf

Plug-Flow detention time= 10.3 min calculated for 40,198 cf (100% of inflow)
Center-of-Mass det. time= 10.3 min (923.3 - 912.9)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	236,188 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	63,020	0	0
252.00	72,620	67,820	67,820
253.00	84,690	78,655	146,475
254.00	94,735	89,713	236,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	253.25'	**30.0' long + 3.0 '/' SideZ x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=3.55 cfs @ 12.55 hrs HW=251.06' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 3.55 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond EX Basin: Existing Basin

Inflow Area = 1,059,380 sf, 14.03% Impervious, Inflow Depth = 0.33" for 10-Year event
Inflow = 1.47 cfs @ 13.40 hrs, Volume= 28,795 cf
Outflow = 0.94 cfs @ 15.73 hrs, Volume= 24,538 cf, Atten= 36%, Lag= 139.8 min
Discarded = 0.29 cfs @ 15.73 hrs, Volume= 16,814 cf
Primary = 0.65 cfs @ 15.73 hrs, Volume= 7,724 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 252.08' @ 15.73 hrs Surf.Area= 5,194 sf Storage= 9,257 cf

Plug-Flow detention time= 253.2 min calculated for 24,538 cf (85% of inflow)
Center-of-Mass det. time= 189.6 min (1,214.0 - 1,024.4)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	60,380 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	4,000	0	0
252.00	4,840	8,840	8,840
254.00	13,350	18,190	27,030
256.00	20,000	33,350	60,380

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**10.0' long + 5.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.29 cfs @ 15.73 hrs HW=252.08' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.29 cfs)

Primary OutFlow Max=0.62 cfs @ 15.73 hrs HW=252.08' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.62 cfs @ 0.71 fps)

Summary for Pond PT-1: BMP-1 Forebay

Inflow Area = 287,200 sf, 37.56% Impervious, Inflow Depth = 1.24" for 10-Year event
Inflow = 7.35 cfs @ 12.16 hrs, Volume= 29,752 cf
Outflow = 5.22 cfs @ 12.17 hrs, Volume= 13,241 cf, Atten= 29%, Lag= 0.6 min
Primary = 5.22 cfs @ 12.17 hrs, Volume= 13,241 cf
Routed to Pond BMP-1 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.06' @ 12.15 hrs Surf.Area= 1,935 sf Storage= 2,980 cf

Plug-Flow detention time= 248.2 min calculated for 13,241 cf (45% of inflow)
Center-of-Mass det. time= 104.6 min (985.3 - 880.6)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	2,980 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	1,045	0	0
253.00	1,935	2,980	2,980

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**90.0' long x 1.0' 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
			Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=4.58 cfs @ 12.17 hrs HW=253.06' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 4.58 cfs @ 0.72 fps)

Summary for Pond PT-2: BMP-2 Forebay

Inflow Area = 592,540 sf, 49.64% Impervious, Inflow Depth = 2.20" for 10-Year event
Inflow = 30.05 cfs @ 12.15 hrs, Volume= 108,747 cf
Outflow = 37.02 cfs @ 12.15 hrs, Volume= 140,699 cf, Atten= 0%, Lag= 0.0 min
Primary = 37.02 cfs @ 12.15 hrs, Volume= 140,699 cf
Routed to Pond BMP-2 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.11' @ 12.15 hrs Surf.Area= 7,025 sf Storage= 9,950 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	9,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	2,925	0	0
253.00	7,025	9,950	9,950

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**325.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=36.82 cfs @ 12.15 hrs HW=253.11' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 36.82 cfs @ 0.94 fps)

Summary for Pond PT-3: BMP-3 Forebay

Inflow Area = 123,410 sf, 58.35% Impervious, Inflow Depth = 2.81" for 10-Year event
Inflow = 8.05 cfs @ 12.14 hrs, Volume= 28,855 cf
Outflow = 8.58 cfs @ 12.14 hrs, Volume= 33,833 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.58 cfs @ 12.14 hrs, Volume= 33,833 cf
Routed to Pond BMP-3 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.15' @ 12.14 hrs Surf.Area= 2,030 sf Storage= 3,095 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 22.5 min (848.9 - 826.4)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	3,095 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	1,065	0	0
253.00	2,030	3,095	3,095

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**50.0' long + 3.0 '/' SideZ x 1.0' 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

Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=8.49 cfs @ 12.14 hrs HW=253.15' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 8.49 cfs @ 1.07 fps)

Summary for Pond PT-4: BMP-4 Forebay

Inflow Area = 16,090 sf, 49.84% Impervious, Inflow Depth = 2.72" for 10-Year event
Inflow = 1.15 cfs @ 12.09 hrs, Volume= 3,641 cf
Outflow = 1.15 cfs @ 12.09 hrs, Volume= 3,475 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.15 cfs @ 12.09 hrs, Volume= 3,475 cf
Routed to Pond BMP-4 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.04' @ 12.09 hrs Surf.Area= 315 sf Storage= 168 cf

Plug-Flow detention time= 35.6 min calculated for 3,469 cf (95% of inflow)
Center-of-Mass det. time= 10.7 min (836.1 - 825.4)

Volume	Invert	Avail.Storage	Storage Description
#1	252.00'	168 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
252.00	20	0	0
253.00	315	168	168

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**35.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=1.13 cfs @ 12.09 hrs HW=253.04' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 1.13 cfs @ 0.61 fps)

Summary for Link PR DP-2: Rte 3 Culverts

Inflow Area = 2,529,330 sf, 27.72% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-OSE: Off-Site East Runoff Area=81,950 sf 69.10% Impervious Runoff Depth=6.28"
Tc=20.0 min CN=80 Runoff=9.19 cfs 42,915 cf

Subcatchment P-OSN: Off-Site North Runoff Area=54,885 sf 25.00% Impervious Runoff Depth=4.11"
Tc=8.0 min CN=62 Runoff=5.56 cfs 18,783 cf

Subcatchment P-OSW: Off-Site West Runoff Area=1,059,380 sf 14.03% Impervious Runoff Depth=1.90"
Flow Length=1,155' Tc=66.7 min CN=43 Runoff=16.64 cfs 167,322 cf

Subcatchment PWS-1: Southwest Site Runoff Area=287,200 sf 37.56% Impervious Runoff Depth=3.87"
Tc=10.0 min CN=60 Runoff=25.55 cfs 92,552 cf

Subcatchment PWS-2A: Central Site Runoff Area=592,540 sf 49.64% Impervious Runoff Depth=5.43"
Tc=10.0 min CN=73 Runoff=74.60 cfs 268,370 cf

Subcatchment PWS-2B: North Bypass Runoff Area=237,250 sf 0.00% Impervious Runoff Depth=1.46"
Tc=10.0 min CN=39 Runoff=5.77 cfs 28,935 cf

Subcatchment PWS-3A: Eastern Site Runoff Area=123,410 sf 58.35% Impervious Runoff Depth=6.28"
Tc=10.0 min CN=80 Runoff=17.67 cfs 64,627 cf

Subcatchment PWS-3B: South Bypass Runoff Area=76,625 sf 0.00% Impervious Runoff Depth=2.46"
Tc=10.0 min CN=48 Runoff=4.01 cfs 15,694 cf

Subcatchment PWS-4: Northeast Site Runoff Area=16,090 sf 49.84% Impervious Runoff Depth=6.16"
Tc=6.0 min CN=79 Runoff=2.57 cfs 8,263 cf

Pond BMP-1: Infiltration Basin Peak Elev=254.73' Storage=31,181 cf Inflow=25.49 cfs 86,873 cf
Discarded=3.73 cfs 86,864 cf Primary=0.00 cfs 0 cf Outflow=3.73 cfs 86,864 cf

Pond BMP-2: Infiltration Basin Peak Elev=253.94' Storage=71,688 cf Inflow=73.39 cfs 216,080 cf
Discarded=14.81 cfs 215,940 cf Primary=0.00 cfs 0 cf Outflow=14.81 cfs 215,940 cf

Pond BMP-3: Infiltration Basin Peak Elev=253.98' Storage=18,389 cf Inflow=17.96 cfs 73,186 cf
Discarded=3.87 cfs 73,161 cf Primary=0.00 cfs 0 cf Outflow=3.87 cfs 73,161 cf

Pond BMP-4: Infiltration Basin Peak Elev=253.13' Storage=802 cf Inflow=2.57 cfs 8,095 cf
Discarded=1.23 cfs 8,110 cf Primary=0.00 cfs 0 cf Outflow=1.23 cfs 8,110 cf

Pond CA: Compensation Area Peak Elev=252.56' Storage=110,225 cf Inflow=22.38 cfs 249,344 cf
Discarded=4.43 cfs 249,344 cf Primary=0.00 cfs 0 cf Outflow=4.43 cfs 249,344 cf

Pond EX Basin: Existing Basin Peak Elev=252.61' Storage=12,610 cf Inflow=16.64 cfs 167,322 cf
Discarded=0.42 cfs 19,438 cf Primary=16.14 cfs 143,017 cf Outflow=16.56 cfs 162,455 cf

Pond PT-1: BMP-1 Forebay Peak Elev=253.21' Storage=2,980 cf Inflow=25.55 cfs 92,552 cf
Outflow=25.49 cfs 86,873 cf

Pond PT-2: BMP-2 Forebay Peak Elev=253.18' Storage=9,950 cf Inflow=74.60 cfs 268,370 cf
Outflow=73.39 cfs 216,080 cf

Pond PT-3: BMP-3 Forebay Peak Elev=253.25' Storage=3,095 cf Inflow=17.67 cfs 64,627 cf
Outflow=17.96 cfs 73,186 cf

Pond PT-4: BMP-4 Forebay Peak Elev=253.08' Storage=168 cf Inflow=2.57 cfs 8,263 cf
Outflow=2.57 cfs 8,095 cf

Link PR DP-2: Rte 3 Culverts Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 2,529,330 sf Runoff Volume = 707,461 cf Average Runoff Depth = 3.36"
72.28% Pervious = 1,828,313 sf 27.72% Impervious = 701,017 sf

Summary for Subcatchment P-OSE: Off-Site East

Runoff = 9.19 cfs @ 12.27 hrs, Volume= 42,915 cf, Depth= 6.28"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
25,322	39	>75% Grass cover, Good, HSG A
56,628	98	Paved parking, HSG A
81,950	80	Weighted Average
25,322	39	30.90% Pervious Area
56,628	98	69.10% Impervious Area

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

Summary for Subcatchment P-OSN: Off-Site North

Runoff = 5.56 cfs @ 12.12 hrs, Volume= 18,783 cf, Depth= 4.11"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
27,442	54	1/2 acre lots, 25% imp, HSG A
27,443	70	1/2 acre lots, 25% imp, HSG B
54,885	62	Weighted Average
41,164	50	75.00% Pervious Area
13,721	98	25.00% Impervious Area

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

Summary for Subcatchment P-OSW: Off-Site West

Runoff = 16.64 cfs @ 13.02 hrs, Volume= 167,322 cf, Depth= 1.90"
Routed to Pond EX Basin : Existing Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
594,595	54	1/2 acre lots, 25% imp, HSG A
464,785	30	Woods, Good, HSG A
1,059,380	43	Weighted Average
910,731	35	85.97% Pervious Area
148,649	98	14.03% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.9	150	0.0200	0.05		**Sheet Flow, A-B** Woods: Dense underbrush n= 0.800 P2= 3.30"
15.5	805	0.0300	0.87		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.3	200	0.0100	9.88	48.47	**Pipe Channel, C-D** 30.0" Round Area= 4.9 sf Perim= 7.9' r= 0.63' n= 0.011 Concrete pipe, straight & clean
66.7	1,155	Total			

Summary for Subcatchment PWS-1: Southwest Site

Runoff = 25.55 cfs @ 12.15 hrs, Volume= 92,552 cf, Depth= 3.87"
Routed to Pond PT-1 : BMP-1 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
48,125	98	Roofs, HSG A
59,740	98	Paved parking, HSG A
37,000	30	Woods, Good, HSG A
142,335	39	>75% Grass cover, Good, HSG A
287,200	60	Weighted Average
179,335	37	62.44% Pervious Area
107,865	98	37.56% Impervious Area

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

Summary for Subcatchment PWS-2A: Central Site

Runoff = 74.60 cfs @ 12.14 hrs, Volume= 268,370 cf, Depth= 5.43"
Routed to Pond PT-2 : BMP-2 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
149,308	98	Roofs, HSG A
144,816	98	Paved parking, HSG A
178,568	39	>75% Grass cover, Good, HSG A
119,848	61	>75% Grass cover, Good, HSG B
592,540	73	Weighted Average
298,416	48	50.36% Pervious Area
294,124	98	49.64% Impervious Area

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

Summary for Subcatchment PWS-2B: North Bypass

Runoff = 5.77 cfs @ 12.18 hrs, Volume= 28,935 cf, Depth= 1.46"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
77,955	30	Woods, Good, HSG A
14,325	55	Woods, Good, HSG B
118,595	39	>75% Grass cover, Good, HSG A
26,375	61	>75% Grass cover, Good, HSG B
237,250	39	Weighted Average
237,250	39	100.00% Pervious Area

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

Summary for Subcatchment PWS-3A: Eastern Site

Runoff = 17.67 cfs @ 12.14 hrs, Volume= 64,627 cf, Depth= 6.28"
Routed to Pond PT-3 : BMP-3 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
12,500	98	Roofs, HSG B
16,640	98	Paved parking, HSG A
42,870	98	Paved parking, HSG B
12,886	39	>75% Grass cover, Good, HSG A
38,514	61	>75% Grass cover, Good, HSG B
123,410	80	Weighted Average
51,400	55	41.65% Pervious Area
72,010	98	58.35% Impervious Area

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

Summary for Subcatchment PWS-3B: South Bypass

Runoff = 4.01 cfs @ 12.16 hrs, Volume= 15,694 cf, Depth= 2.46"
Routed to Pond CA : Compensation Area

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
45,695	39	>75% Grass cover, Good, HSG A
30,930	61	>75% Grass cover, Good, HSG B
76,625	48	Weighted Average
76,625	48	100.00% Pervious Area

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

Summary for Subcatchment PWS-4: Northeast Site

Runoff = 2.57 cfs @ 12.09 hrs, Volume= 8,263 cf, Depth= 6.16"
Routed to Pond PT-4 : BMP-4 Forebay

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=8.70"

Area (sf)	CN	Description
8,020	98	Paved parking, HSG B
8,070	61	>75% Grass cover, Good, HSG B
16,090	79	Weighted Average
8,070	61	50.16% Pervious Area
8,020	98	49.84% Impervious Area

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

Summary for Pond BMP-1: Infiltration Basin

Inflow Area = 287,200 sf, 37.56% Impervious, Inflow Depth = 3.63" for 100-Year event
Inflow = 25.49 cfs @ 12.15 hrs, Volume= 86,873 cf
Outflow = 3.73 cfs @ 12.89 hrs, Volume= 86,864 cf, Atten= 85%, Lag= 44.8 min
Discarded = 3.73 cfs @ 12.89 hrs, Volume= 86,864 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 254.73' @ 12.89 hrs Surf.Area= 19,492 sf Storage= 31,181 cf

Plug-Flow detention time= 73.0 min calculated for 86,864 cf (100% of inflow)
Center-of-Mass det. time= 72.9 min (918.3 - 845.4)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	79,780 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	16,630	0	0
257.00	23,260	79,780	79,780

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**24.0" Round Culvert** L= 85.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 252.00' / 252.00' S= 0.0000 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#3	Device 2	256.25'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=3.73 cfs @ 12.89 hrs HW=254.73' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 3.73 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 2.54 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Pond BMP-2: Infiltration Basin

Inflow Area = 592,540 sf, 49.64% Impervious, Inflow Depth = 4.38" for 100-Year event
Inflow = 73.39 cfs @ 12.14 hrs, Volume= 216,080 cf
Outflow = 14.81 cfs @ 12.62 hrs, Volume= 215,940 cf, Atten= 80%, Lag= 28.6 min
Discarded = 14.81 cfs @ 12.62 hrs, Volume= 215,940 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.94' @ 12.62 hrs Surf.Area= 77,339 sf Storage= 71,688 cf

Plug-Flow detention time= 34.5 min calculated for 215,940 cf (100% of inflow)
Center-of-Mass det. time= 34.0 min (843.8 - 809.7)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	175,089 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	74,875	0	0
255.25	80,760	175,089	175,089

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	254.25'	**50.0' long + 3.0 '/' SideZ x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Discarded OutFlow Max=14.80 cfs @ 12.62 hrs HW=253.94' (Free Discharge)
1=Exfiltration (Exfiltration Controls 14.80 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond BMP-3: Infiltration Basin

Inflow Area = 123,410 sf, 58.35% Impervious, Inflow Depth = 7.12" for 100-Year event
Inflow = 17.96 cfs @ 12.14 hrs, Volume= 73,186 cf
Outflow = 3.87 cfs @ 12.62 hrs, Volume= 73,161 cf, Atten= 78%, Lag= 28.9 min
Discarded = 3.87 cfs @ 12.62 hrs, Volume= 73,161 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.98' @ 12.62 hrs Surf.Area= 20,204 sf Storage= 18,389 cf

Plug-Flow detention time= 29.9 min calculated for 73,040 cf (100% of inflow)
Center-of-Mass det. time= 29.6 min (868.0 - 838.4)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	46,423 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	17,280	0	0
255.25	23,985	46,423	46,423

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	254.25'	**40.0' long + 3.0 '/' SideZ x 25.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=3.87 cfs @ 12.62 hrs HW=253.98' (Free Discharge)
1=Exfiltration (Exfiltration Controls 3.87 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond BMP-4: Infiltration Basin

Inflow Area = 16,090 sf, 49.84% Impervious, Inflow Depth = 6.04" for 100-Year event
Inflow = 2.57 cfs @ 12.09 hrs, Volume= 8,095 cf
Outflow = 1.23 cfs @ 12.26 hrs, Volume= 8,110 cf, Atten= 52%, Lag= 10.3 min
Discarded = 1.23 cfs @ 12.26 hrs, Volume= 8,110 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.13' @ 12.26 hrs Surf.Area= 6,412 sf Storage= 802 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 3.4 min (812.4 - 809.1)

Volume	Invert	Avail.Storage	Storage Description
#1	253.00'	10,774 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
253.00	6,255	0	0
254.50	8,110	10,774	10,774

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	253.50'	**30.0' long + 3.0 '/' SideZ x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Discarded OutFlow Max=1.23 cfs @ 12.26 hrs HW=253.13' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.23 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond CA: Compensation Area

Inflow Area = 2,529,330 sf, 27.72% Impervious, Inflow Depth = 1.18" for 100-Year event
Inflow = 22.38 cfs @ 12.18 hrs, Volume= 249,344 cf
Outflow = 4.43 cfs @ 16.34 hrs, Volume= 249,344 cf, Atten= 80%, Lag= 250.0 min
Discarded = 4.43 cfs @ 16.34 hrs, Volume= 249,344 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link PR DP-2 : Rte 3 Culverts

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 252.56' @ 16.34 hrs Surf.Area= 79,356 sf Storage= 110,225 cf

Plug-Flow detention time= 273.6 min calculated for 248,929 cf (100% of inflow)
Center-of-Mass det. time= 273.5 min (1,176.8 - 903.2)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	236,188 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	63,020	0	0
252.00	72,620	67,820	67,820
253.00	84,690	78,655	146,475
254.00	94,735	89,713	236,188

Device	Routing	Invert	Outlet Devices
#1	Discarded	251.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	253.25'	**30.0' long + 3.0 '/' SideZ x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=4.43 cfs @ 16.34 hrs HW=252.56' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 4.43 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=251.00' (Free Discharge)
↑**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond EX Basin: Existing Basin

Inflow Area = 1,059,380 sf, 14.03% Impervious, Inflow Depth = 1.90" for 100-Year event
Inflow = 16.64 cfs @ 13.02 hrs, Volume= 167,322 cf
Outflow = 16.56 cfs @ 13.07 hrs, Volume= 162,455 cf, Atten= 1%, Lag= 3.1 min
Discarded = 0.42 cfs @ 13.07 hrs, Volume= 19,438 cf
Primary = 16.14 cfs @ 13.07 hrs, Volume= 143,017 cf
Routed to Pond CA : Compensation Area

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 3
Peak Elev= 252.61' @ 13.07 hrs Surf.Area= 7,450 sf Storage= 12,610 cf

Plug-Flow detention time= 49.0 min calculated for 162,185 cf (97% of inflow)
Center-of-Mass det. time= 33.8 min (976.2 - 942.4)

Volume	Invert	Avail.Storage	Storage Description
#1	250.00'	60,380 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
250.00	4,000	0	0
252.00	4,840	8,840	8,840
254.00	13,350	18,190	27,030
256.00	20,000	33,350	60,380

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	252.00'	**10.0' long + 5.0 '/' SideZ x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.42 cfs @ 13.07 hrs HW=252.61' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.42 cfs)

Primary OutFlow Max=16.13 cfs @ 13.07 hrs HW=252.61' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 16.13 cfs @ 2.01 fps)

Summary for Pond PT-1: BMP-1 Forebay

Inflow Area = 287,200 sf, 37.56% Impervious, Inflow Depth = 3.87" for 100-Year event
Inflow = 25.55 cfs @ 12.15 hrs, Volume= 92,552 cf
Outflow = 25.49 cfs @ 12.15 hrs, Volume= 86,873 cf, Atten= 0%, Lag= 0.0 min
Primary = 25.49 cfs @ 12.15 hrs, Volume= 86,873 cf
Routed to Pond BMP-1 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.21' @ 12.15 hrs Surf.Area= 1,935 sf Storage= 2,980 cf

Plug-Flow detention time= 31.9 min calculated for 86,728 cf (94% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	2,980 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	1,045	0	0
253.00	1,935	2,980	2,980

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**90.0' long x 1.0' 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
			Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=25.39 cfs @ 12.15 hrs HW=253.21' (Free Discharge)
└**1=Broad-Crested Rectangular Weir** (Weir Controls 25.39 cfs @ 1.27 fps)

Summary for Pond PT-2: BMP-2 Forebay

Inflow Area = 592,540 sf, 49.64% Impervious, Inflow Depth = 5.43" for 100-Year event
Inflow = 74.60 cfs @ 12.14 hrs, Volume= 268,370 cf
Outflow = 73.39 cfs @ 12.14 hrs, Volume= 216,080 cf, Atten= 2%, Lag= 0.0 min
Primary = 73.39 cfs @ 12.14 hrs, Volume= 216,080 cf
Routed to Pond BMP-2 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.18' @ 12.14 hrs Surf.Area= 7,025 sf Storage= 9,950 cf

Plug-Flow detention time= 65.8 min calculated for 215,720 cf (80% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	9,950 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	2,925	0	0
253.00	7,025	9,950	9,950

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**325.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=72.47 cfs @ 12.14 hrs HW=253.18' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 72.47 cfs @ 1.17 fps)

Summary for Pond PT-3: BMP-3 Forebay

Inflow Area = 123,410 sf, 58.35% Impervious, Inflow Depth = 6.28" for 100-Year event
Inflow = 17.67 cfs @ 12.14 hrs, Volume= 64,627 cf
Outflow = 17.96 cfs @ 12.14 hrs, Volume= 73,186 cf, Atten= 0%, Lag= 0.0 min
Primary = 17.96 cfs @ 12.14 hrs, Volume= 73,186 cf
Routed to Pond BMP-3 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.25' @ 12.14 hrs Surf.Area= 2,030 sf Storage= 3,095 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 34.9 min (838.4 - 803.5)

Volume	Invert	Avail.Storage	Storage Description
#1	251.00'	3,095 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
251.00	1,065	0	0
253.00	2,030	3,095	3,095

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**50.0' long + 3.0 '/' SideZ x 1.0' 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

Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=17.69 cfs @ 12.14 hrs HW=253.25' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 17.69 cfs @ 1.36 fps)

Summary for Pond PT-4: BMP-4 Forebay

Inflow Area = 16,090 sf, 49.84% Impervious, Inflow Depth = 6.16" for 100-Year event
Inflow = 2.57 cfs @ 12.09 hrs, Volume= 8,263 cf
Outflow = 2.57 cfs @ 12.09 hrs, Volume= 8,095 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.57 cfs @ 12.09 hrs, Volume= 8,095 cf
Routed to Pond BMP-4 : Infiltration Basin

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 253.08' @ 12.09 hrs Surf.Area= 315 sf Storage= 168 cf

Plug-Flow detention time= 19.1 min calculated for 8,081 cf (98% of inflow)
Center-of-Mass det. time= 7.0 min (809.1 - 802.0)

Volume	Invert	Avail.Storage	Storage Description
#1	252.00'	168 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
252.00	20	0	0
253.00	315	168	168

Device	Routing	Invert	Outlet Devices
#1	Primary	252.99'	**35.0' long + 3.0 '/' SideZ x 1.0' 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 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=2.51 cfs @ 12.09 hrs HW=253.08' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 2.51 cfs @ 0.80 fps)

Summary for Link PR DP-2: Rte 3 Culverts

Inflow Area = 2,529,330 sf, 27.72% Impervious, Inflow Depth = 0.00" for 100-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Appendix D
Supporting Documentation

Version: 4/2015

Project Name: Harkney Hill Mixed Use

Date: Dec 2023

Water Quality Volume Calculation WorkSheet

This worksheet is designed to assist the project engineer with a determination of the required water quality treatment area. The worksheet leads the designer through redevelopment applicability first and then receiving water requirements. This tool is intended to compliment to the Redevelopment Criteria Guidance and the Water Quality Guidance and assist both the designer and the permit application reviewer towards consistent results. Enter information into only the YELLOW Boxes.

Redevelopment Criteria Guidance

Water Quality Goals "Stormwater Compensation Method"

Step 1 - Determine which office in OWR you are applying to: Application Guidance

Step 2 - Site Information		value/calculation	units
Total Site Area (total area of project parcels)	TSA	30.96	acres
Total Jurisdictional Wetlands and/or floodplain within the above TSA	JW1=	0.00	acres
Existing impervious also within the Jurisdictonal Wetlands	-JW2=	0.00	acres
Conservation Land within the TSA	CL	0.00	acres
Site Size = (TSA)-(JW1-JW2)-CL	**SS=**	**30.96**	acres

Step 3 - Redevelopment Applicability			
Total Impervious Area (pre-construction)	TIA=	0.00	acres
% Impervious (if ≥40% - redevelopment standard 3.2.6 applies)		**0.00**	

REPEAT IF NECESSARY Steps 4, 5 and 6 for EACH Waterbody ID (RIVER-ID as found in the GIS Map Server)

Step 4 - Receiving waterbody information

Waterbody ID or RIVER ID from GIS Map Server	
Waterbody Name from GIS Map Server	
Name the sub-watersheds (design-points) contributing to this Waterbody ID	
Is this Waterbody Impaired/TMDL for any Phosphorus, Metals or Bacteria?	NO
Is this Waterbody Impaired for Nitrogen?	NO

Step 5 - Pre-Post Construction Conditions to the Waterbody

Total Pre-Construction Impervious Surface to this Waterbody ID	0.00	acres
Total Disturbed Existing Impervious (DI)	0.00	acres
Total Post-Construction Impervious to this Waterbody ID	11.07	acres
Net Increased Impervious (NII)	11.07	acres

Step 6 - Infiltration and BMP information - Note: Increasing infiltration will likely decrease stormwater treatment area for Metals, Bacteria and Phosporus

I am proposing to infiltrate this percentage WQv to this WBID	100%	%
I am proposing this number of BMP's	4	#

RESULTS - Select the Larger Number of the 2 numbers provided

Applicable Condition	**Min Water Quality Treatment Area**	**Min Treatment w/o WQ consideration**
No Impairement or TMDL - New Development	11.07	11.07
No Impairment or TMDL - Redevelopment		
Only Phosphorus, Metals or Bacteria Impairment - New Development		
Only Phosphorus, Metals or Bacteria Impairment - Redevelopment		
Nitrogen Impairment - New Development		
Nitrogen Impairment - Redevelopment		
REQUIRED STORMWATER TREATMENT AREA	**11.1** acres	

* Enter the name of the STP (both type and label) which has been designed to treat this particular Rev or Rea.

COVENTRY CROSSINGS

JN 7398-00
January 3, 2024

BMP-1

Mounding analysis completed using Hantush equation for groundwater mounding beneath an infiltration basin (1967), released by the United Stated Geological Survey.

Parameters for the equation are determined as follows:

Recharge/Infiltration: **16.6 ft/day**
RIDSISM

Specific Yield: **0.27**
Based on boring logs, underlying soils are primarily gravely sand, which based on the report "Specific Yield, Compilation of Specific Yield for Various Materials," USGS, 1966, correlates to a specific yield of 0.27

Horizontal Hydraulic Conductivity: **1660 ft/day**
Based on field soil analysis, underlying soil textures are primarily gravely sands. Design rate 8.3 in/hr infiltration rate (Rawls, page 5-27 of RISDISM).
Vertical HC = 8.3 in/hr = 16.6 ft/day
Horizontal HC = 10 x VHC = 1660 ft/day

Duration of Infiltration Period: **1.0 day**
Based on HYDROCAD routing.

Estimated Saturated Zone: **139.00 feet**
Based on USGS Data, average well depth in Coventry is 142.00' (exclusive of wells in bedrock). Therefore, the strata extends 142.00' below the existing grade at BMP-1, with a water table depth of 3.00' to bottom of proposed system.
Estimated Saturated Zone = 142.00' - 3.00' = 139.00'

	Description	*Maximum Allowable Mounding*	*Calculated Mounding*
BMP-1	*Center of Infiltration Basin*	*3.00' to bottom*	*0.94'*

Summary:
Groundwater mounding under the infiltration basin is anticipated to occur during rainfall events for a duration of approximately 1 day. Mounding during the 10-year event (pond full condition) is NOT anticipated to breakout where established with 3' groundwater separation.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
16.6000	***R***	**Recharge (infiltration) rate (feet/day)**
0.270	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
1660.00	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
120.000	**x**	**1/2 length of basin (x direction, in feet)**
55.000	**y**	**1/2 width of basin (y direction, in feet)**
1.000	**t**	**duration of infiltration period (days)**
139.000	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

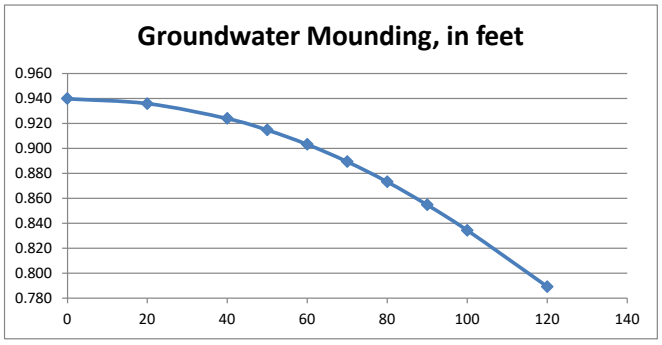
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

139.940	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.940	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.940	**0**
0.936	**20**
0.924	**40**
0.915	**50**
0.903	**60**
0.889	**70**
0.873	**80**
0.855	**90**
0.834	**100**
0.789	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

COVENTRY CROSSINGS

JN 7398-00
January 3, 2024

BMP-2

Mounding analysis completed using Hantush equation for groundwater mounding beneath an infiltration basin (1967), released by the United Stated Geological Survey.

Parameters for the equation are determined as follows:

Recharge/Infiltration: **16.6 ft/day**
RIDSISM

Specific Yield: **0.27**
Based on boring logs, underlying soils are primarily gravely sand, which based on the report "Specific Yield, Compilation of Specific Yield for Various Materials," USGS, 1966, correlates to a specific yield of 0.27

Horizontal Hydraulic Conductivity: **1660 ft/day**
Based on field soil analysis, underlying soil textures are primarily gravely sands. Design rate 8.3 in/hr infiltration rate (Rawls, page 5-27 of RISDISM).
Vertical HC = 8.3 in/hr = 16.6 ft/day
Horizontal HC = 10 x VHC = 1660 ft/day

Duration of Infiltration Period: **1.0 day**
Based on HYDROCAD routing.

Estimated Saturated Zone: **138.80 feet**
Based on USGS Data, average well depth in Coventry is 142.00' (exclusive of wells in bedrock). Therefore, the strata extends 142.00' below the existing grade at BMP-2, with a water table depth of 3.20' to bottom of proposed system.
Estimated Saturated Zone = 142.00' - 3.20' = 138.80'

	Description	*Maximum Allowable Mounding*	*Calculated Mounding*
BMP-2	*Center of Infiltration Basin*	*3.20' to bottom*	*3.12'*

Summary:
Groundwater mounding under the infiltration basin is anticipated to occur during rainfall events for a duration of approximately 1 day. Mounding during the 10-year event (pond full condition) is NOT anticipated to breakout where established with 3' groundwater separation.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
16.6000	***R***	**Recharge (infiltration) rate (feet/day)**
0.270	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
1660.00	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
115.000	**x**	**1/2 length of basin (x direction, in feet)**
250.000	**y**	**1/2 width of basin (y direction, in feet)**
1.000	**t**	**duration of infiltration period (days)**
138.800	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

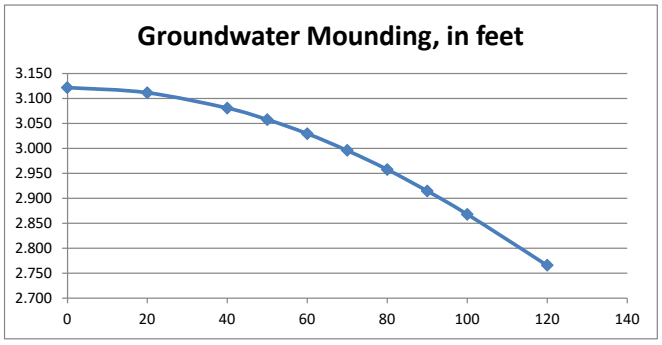
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

141.922	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
3.122	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
3.122	**0**
3.112	**20**
3.081	**40**
3.058	**50**
3.029	**60**
2.996	**70**
2.958	**80**
2.915	**90**
2.868	**100**
2.766	**120**

Re-Calculate Now



Disclaimer

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COVENTRY CROSSINGS

JN 7398-00
January 3, 2024

BMP-3

Mounding analysis completed using Hantush equation for groundwater mounding beneath an infiltration basin (1967), released by the United Stated Geological Survey.

Parameters for the equation are determined as follows:

Recharge/Infiltration: **16.6 ft/day**
RIDSISM

Specific Yield: **0.27**
Based on boring logs, underlying soils are primarily gravely sand, which based on the report "Specific Yield, Compilation of Specific Yield for Various Materials," USGS, 1966, correlates to a specific yield of 0.27

Horizontal Hydraulic Conductivity: **1660 ft/day**
Based on field soil analysis, underlying soil textures are primarily gravely sands. Design rate 8.3 in/hr infiltration rate (Rawls, page 5-27 of RISDISM).
Vertical HC = 8.3 in/hr = 16.6 ft/day
Horizontal HC = 10 x VHC = 1660 ft/day

Duration of Infiltration Period: **1.0 day**
Based on HYDROCAD routing.

Estimated Saturated Zone: **139.00 feet**
Based on USGS Data, average well depth in Coventry is 142.00' (exclusive of wells in bedrock). Therefore, the strata extends 142.00' below the existing grade at BMP-3, with a water table depth of 3.00' to bottom of proposed system.
Estimated Saturated Zone = 142.00' - 3.00' = 139.00'

	Description	*Maximum Allowable Mounding*	*Calculated Mounding*
BMP-3	*Center of Infiltration Basin*	*3.00' to bottom*	*1.81'*

Summary:
Groundwater mounding under the infiltration basin is anticipated to occur during rainfall events for a duration of approximately 1 day. Mounding during the 10-year event (pond full condition) is NOT anticipated to breakout where established with 3' groundwater separation.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
16.6000	*R*	**Recharge (infiltration) rate (feet/day)**
0.270	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
1660.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
95.000	x	**1/2 length of basin (x direction, in feet)**
150.000	y	**1/2 width of basin (y direction, in feet)**
1.000	t	**duration of infiltration period (days)**
139.000	hi(0)	**initial thickness of saturated zone (feet)**

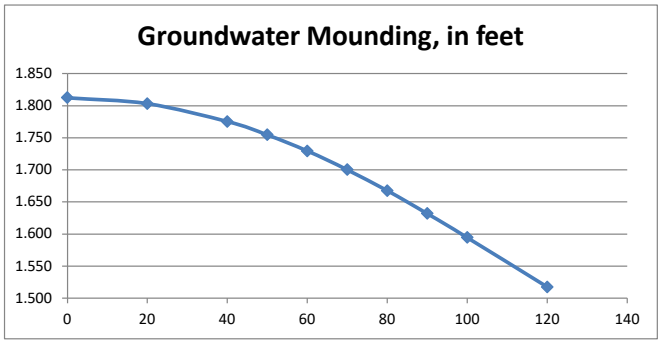
Conversion Table		
inch/hour	**feet/day**	
0.67	1.33	
2.00	4.00	
hours	**days**	
36	1.50	

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

140.812	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.812	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.812	**0**
1.803	**20**
1.775	**40**
1.755	**50**
1.729	**60**
1.700	**70**
1.667	**80**
1.632	**90**
1.595	**100**
1.517	**120**

Re-Calculate Now



Disclaimer

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COVENTRY CROSSINGS

JN 7398-00
January 3, 2024

BMP-4

Mounding analysis completed using Hantush equation for groundwater mounding beneath an infiltration basin (1967), released by the United Stated Geological Survey.

Parameters for the equation are determined as follows:

Recharge/Infiltration: **16.6 ft/day**
RIDSISM

Specific Yield: **0.27**
Based on boring logs, underlying soils are primarily gravely sand, which based on the report "Specific Yield, Compilation of Specific Yield for Various Materials," USGS, 1966, correlates to a specific yield of 0.27

Horizontal Hydraulic Conductivity: **1660 ft/day**
Based on field soil analysis, underlying soil textures are primarily gravely sands. Design rate 8.3 in/hr infiltration rate (Rawls, page 5-27 of RISDISM).
Vertical HC = 8.3 in/hr = 16.6 ft/day
Horizontal HC = 10 x VHC = 1660 ft/day

Duration of Infiltration Period: **1.0 day**
Based on HYDROCAD routing.

Estimated Saturated Zone: **138.90 feet**
Based on USGS Data, average well depth in Coventry is 142.00' (exclusive of wells in bedrock). Therefore, the strata extends 142.00' below the existing grade at BMP-4, with a water table depth of 3.10' to bottom of proposed system.
Estimated Saturated Zone = 142.00' - 3.10' = 138.90'

	Description	*Maximum Allowable Mounding*	*Calculated Mounding*
BMP-4	*Center of Infiltration Basin*	*3.10' to bottom*	*0.40'*

Summary:
Groundwater mounding under the infiltration basin is anticipated to occur during rainfall events for a duration of approximately 1 day. Mounding during the 10-year event (pond full condition) is NOT anticipated to breakout where established with 3' groundwater separation.

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
16.6000	***R***	**Recharge (infiltration) rate (feet/day)**
0.270	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
1660.00	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
40.000	**x**	**1/2 length of basin (x direction, in feet)**
60.000	**y**	**1/2 width of basin (y direction, in feet)**
1.000	**t**	**duration of infiltration period (days)**
138.900	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	feet/day
0.67	1.33
2.00	4.00

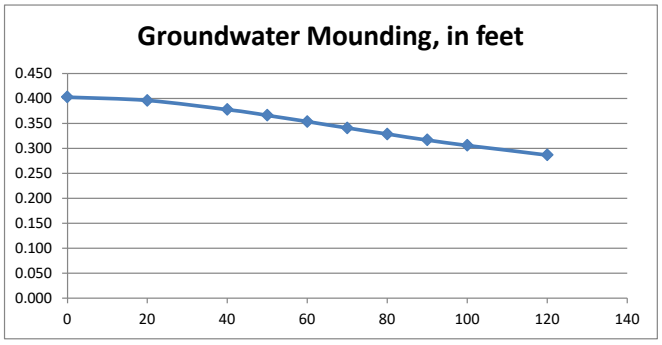
hours	days
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

139.303	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
0.403	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	Distance from center of basin in x direction, in feet
0.403	**0**
0.396	**20**
0.378	**40**
0.366	**50**
0.354	**60**
0.341	**70**
0.329	**80**
0.317	**90**
0.306	**100**
0.287	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Simulation of Groundwater Mounding Beneath Hypothetical Stormwater Infiltration Basins

By Glen B. Carleton

Prepared in cooperation with the
New Jersey Department of Environmental Protection

Scientific Investigations Report 2010–5102

U.S. Department of the Interior
U.S. Geological Survey

were not changed and to estimate groundwater mounding at sites for which properties are substantially different than those used in this study.

Use of Analytical Equations to Estimate Groundwater Mounding

Analytical equations (partial differential equations with initial and boundary conditions that mathematically describe, in this case, groundwater flow) can be used to estimate the magnitude and radius of groundwater mounding beneath an infiltration basin or dry well, but the accuracy of the results is limited by simplifying assumptions that are inherent to solving the non-linear differential equations. A number of solutions have been presented over the past 50 years; the most widely cited is that by Hantush (1967).

Description of Hantush Equation

Hantush (1967) proposed a solution of an equation describing the "growth and decay of groundwater mounds in response to uniform percolation." The Hantush and similar equations are widely implemented (for example, Finnemore, 1995; Zomorodi, 2005) to estimate water-table mounding beneath septic systems and other similar infiltration structures that can reasonably be considered steady-state (infiltration is constant over time). However, few implementations have included the more challenging transient condition (infiltration occurs over a limited duration, then ceases) which is addressed in this study.

Hantush (1967) assumes a water-table aquifer of infinite extent and finite thickness with a horizontal, impermeable base. The solution also includes the Dupuit assumptions of horizontal flow and negligible change of transmissivity with a change in head. The solution Hantush derived making these assumptions provides results that correspond well with similar analytical solutions and some field measurements.

Hunt (1971) proposed a solution that mathematically includes the vertical component of the flow vector that can be significant in groundwater mounding, but the solution has substantial limitations, including a non-solvable integral at the center of the infiltration basin and numerical oscillations beyond the outer edge of the infiltration basin. Hunt's solution does not account for vertical anisotropy of permeability.

Finite-difference numerical simulations of groundwater mounding show that vertical anisotropy can lead to simulated groundwater-mound heights on the order of 15 percent higher than those simulated in either a 1-layer finite-difference model or analytical solution with the assumption that flow is strictly horizontal flow (see the following section of this report "Comparison of Analytical and Finite-Difference Estimates of Groundwater Mounding and Effect of Vertical Layering"). Also, simulations that include storage in, and delayed yield from, the unsaturated zone result in groundwater mounding less than that obtained by neglecting the unsaturated zone (Sumner and others, 1999). Therefore, the height of groundwater mounding is underestimated by the Hantush equation where vertical anisotropy is present and overestimated where an unsaturated zone is present.

Hantush (1967) solves the general two-dimensional groundwater flow equation by making assumptions to create boundary conditions that allow the use of a Laplace transform with respect to time and the Fourier cosine transform with respect to x and then y to derive an integral that can be solved. The resulting equation is

$$h^2 - h_i^2 = (w/2k)(vt)\{S^*(\frac{l+x}{\sqrt{4vt}}, \frac{a+y}{\sqrt{4vt}}) + S^*(\frac{l+x}{\sqrt{4vt}}, \frac{a-y}{\sqrt{4vt}}) +$$

$$S^*(\frac{l-x}{\sqrt{4vt}}, \frac{a+y}{\sqrt{4vt}}) + S^*(\frac{l-x}{\sqrt{4vt}}, \frac{a-y}{\sqrt{4vt}})\}$$

$$\text{where } S^*(\alpha,\beta) = \int_0^1 erf(\frac{\alpha}{\sqrt{\tau}})\ erf(\frac{\beta}{\sqrt{\tau}})\ d\tau \quad ,$$

where

h = head at a given time after recharge begins;
h_i = initial head (height of the water table above the base of the aquifer);
w = recharge (infiltration) rate;
K = horizontal hydraulic conductivity;
v = diffusivity, where $v = Kb/Sy$;
$\underline{b}$ = average aquifer thickness;
S_y = specific yield;
t = time elapsed since recharge began;
l = half-length of the recharge basin;
a = half-width of the recharge basin;
x = distance from the center of the recharge basin in the x direction;
y = distance from the center of the recharge basin in the y direction;
$\alpha = \frac{l+x}{\sqrt{4vt}}\ or\ \frac{l-x}{\sqrt{4vt}}$;
$\beta = \frac{a+y}{\sqrt{4vt}}\ or\ \frac{a-y}{\sqrt{4vt}}$;
τ = dummy variable of integration; and
erf = error function.

The integral in the above equation cannot be solved explicitly and is solved using iterative numerical methods.

Spreadsheet for Solving Hantush Equation

As part of this study, a spreadsheet was developed to use the Hantush equation (1967) to calculate the magnitude of groundwater mounding. The required input values (aquifer thickness, horizontal hydraulic conductivity, specific yield, basin size, and recharge rate and duration) are straightforward and can be measured or estimated from published values. The

difficulty of solving the Hantush equation for transient (non-steady state) flow has prevented it from being widely applied in groundwater-mounding applications. This report provides a tool using readily available software to solve the integrals and allow users to specify input variables and generate reasonable, quantified, reproducible estimates of groundwater mounding beneath stormwater infiltration structures.

The numerical solution used in the Microsoft Excel spreadsheet presented in this report was written by Dr. Arthur Baehr (U.S. Geological Survey (retired), written commun., 2009) to solve the above equation using the numerical integration techniques Simpsons Rule and the Trapezoidal Rule (Chapra and Canale, 1998). Users specify the recharge rate, specific yield, horizontal hydraulic conductivity, basin width and length, and duration of recharge, and the spreadsheet software calculates the maximum height of groundwater mounding and the mounding at user-specified distances from the center of the mound.

The user executes an Excel macro to recalculate water levels if any values are changed, so macros need to be enabled. Although a change entered for any input variable will cause the spreadsheet to automatically recalculate values, the results will not be correct until the macro is executed because the numerical integration requires an estimate of the final result as an input. The macro uses the Excel function "Goal Seek" to converge on a solution where the estimated and calculated water levels are within 0.0001. The numerical integration uses the error function, which the user may need to add by following the Excel help instructions for ERF:

> If this function is not available, and returns the #NAME? error, install and load the Analysis ToolPak add-in.
>
> On the Tools menu, click Add-Ins.
> In the Add-Ins available list, select the Analysis ToolPak box, and then click OK.
> If necessary, follow the instructions in the setup program.

The values highlighted in yellow/orange in the user interface page of the spreadsheet (fig. 10) are user-specified input values of aquifer and basin characteristics and the distances from the center of the basin for which groundwater-mounding (thickness of the saturated zone) estimates are desired. The

	A	B	D	J	K
5			use consistent units (e.g. feet & days **or** inches & hours)	**Conversion Table**	
6	Input Values			**inch/hour**	**feet/day**
7	***1.3330***	***R***	**Recharge (infiltration) rate (feet/day)**	0.67	1.33
8	***0.085***	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**		
9	**4.00**	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***	2.00	4.00
10	**33.630**	**x**	**1/2 length of basin (x direction, in feet)**		
11	**33.630**	**y**	**1/2 width of basin (y direction, in feet)**	**hours**	**days**
12	**1.500**	**t**	**duration of infiltration period (days)**	36	1.50
13	**10.000**	**hi(0)**	**initial thickness of saturated zone (feet)**		
14					
15	32.633	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**		
16	22.633	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**		

*In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

17	**Ground-water Mounding, in feet**	**Distance from center of basin in x direction, in feet**
18	12.633	0
19	12.554	5
20	12.315	10
21	11.906	20
22	9.408	30
23	6.629	40
24	4.289	50
25	2.562	60
26	0.775	80
27	0.194	100

Re-Calculate Now

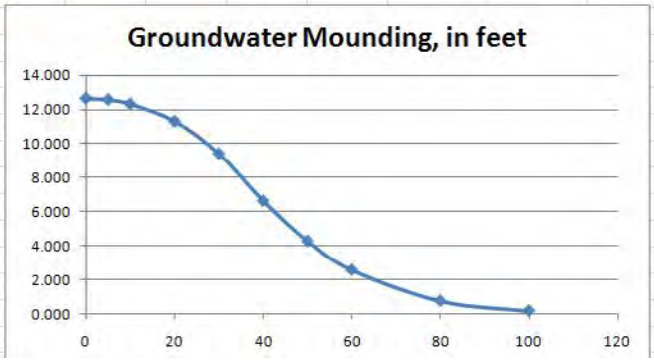


Figure 10. User interface page of spreadsheet for solving the Hantush (1967) equation that describes groundwater mounding beneath an infiltration basin with example input and output.

values highlighted in red are the calculated maximum height of the groundwater mound, maximum change in water level, and groundwater-mound heights at user-specified distances from the center of the basin. The graph shows the height of the groundwater mound (y axis) above the bottom of the aquifer (datum of zero) in relation to distance (x axis) from the center of the infiltration basin. Each time a value in the spreadsheet is changed, the user must click on the blue button to recalculate the saturated thickness at each of the user-specified points to get valid results.

Comparison of Analytical and Finite-Difference Estimates of Groundwater Mounding and Effect of Vertical Layering

Results of groundwater-mounding calculations from the spreadsheet described in the preceding section were compared to results from other methods, including the MODFLOW simulations done for this study, to determine accuracy of the methods (table 4, fig. 11). Nicholas Trainor (Rutgers University, Dept. of Applied Mathematics, written commun., 2009) used the mathematical software MAPLE to numerically integrate the Hantush equation (1967) and calculated results identical to those from the spreadsheet solution described in this report. Trainor also solved the Hantush equation in radial coordinates for a circular basin of the same area with similar results. A FORTRAN program, originally written by Sunada and others (1983) and modified by Warner and others (1989), that numerically integrates the Hantush (1967) equation yields maximum groundwater-mound heights that are as much as 15 percent different from those generated for this report with the same input values. The reasons for the discrepancy are not known but may be that the FORTRAN program was written to minimize run-times on 1980s-era personal computers, and the approximations from the numerical integrations introduce more numerical error than those used for this study. Results from numerical integration of the Hunt (1971) equation by Baehr (U.S. Geological Survey, written commun., 2009) show that the Hunt equation cannot be solved at the center of the basin. Also, close to the center of the basin, groundwater-mound heights calculated using Hunt's solution increase with distance from the center of the basin (out to 16.4 ft) instead of decrease and do not correspond closely to values calculated using the Hantush equation (table 4). At distances beyond the edge of the user-specified infiltration basin, groundwater-mound heights calculated using the Hunt and Hantush equations are similar.

For comparison with the analytical solution described in the preceding paragraph, finite-difference model (MODFLOW) simulations were conducted with recharge only at the infiltration basin (as opposed to simulations of hypothetical 10-acre developments described earlier in this report for which recharge was applied over the entire model domain at different rates). For the simulations listed in table 4, a 2-ft-deep infiltration basin was modeled that drains at a steady rate over 1.5 days (1.33 ft/d). Specific yield was 8.5 percent; the initial saturated aquifer thickness was 10 ft; and the infiltration basin was square with an area of about 4,500 ft^2 (67 ft on a side). Five MODFLOW models were constructed with 1, 3, 6, 9, and 15 layers to test the sensitivity of results to finer vertical discretization. The 1-layer model is analogous to the Hantush solution, neither of which includes a vertical component of flow. Horizontal hydraulic conductivity was 4 ft/d and the ratio of vertical anisotropy was 10:1 (vertical hydraulic conductivity (soil permeability) was 0.2 in/hr, which is equivalent to 0.4 ft/d, one-tenth horizontal hydraulic conductivity).

The maximum groundwater-mound height simulated by a finite-difference model that is analogous to the Hantush solution (one layer, two-dimensional flow, recharge applied only over the area of the infiltration basin) is within 3 percent of that from the Hantush equation (table 4). The maximum groundwater-mound height simulated with a 3-layer model is 8 percent (1.1 ft) higher than that from the 1-layer model. The maximum groundwater-mound heights simulated with the 6-, 9-, and 15-layer models are 12, 14, and 15 percent (1.5, 1.7, and 1.8 ft) higher, respectively. The maximum groundwater-mound heights from the 6-, 9-, and 15-layer models are 3, 4, and 5 percent (0.4, 0.6, and 0.7 ft) higher, respectively, than that from the 3-layer model. In contrast, because the volume of the groundwater mound is constant, the simulated maximum extent of groundwater mounding is greater for models with fewer vertical layers than for models with more vertical layers. Figure 11 shows the sensitivity of the simulated height of the groundwater mound in the hypothetical 10-acre development to the number of layers used in the simulation. The MODFLOW model results are the same at about 45 ft from the center of the basin: between 0 and 45 ft the models with more vertical layers yield higher mound heights than models with less vertical layers; beyond 45 ft models with more vertical layers yield lower mound heights than models with less vertical layers. Input values for aquifer and stormwater-runoff characteristics other than those used to obtain the results shown in table 4 and figure 11 could yield larger departures of mound heights from the analytical and 3-layer models, but the input variables for simulations shown were chosen to obtain a high groundwater mound, and most values for input variables would yield smaller mound-height differences (although potentially larger percentage differences) than shown. These results indicate how sensitive simulated results can be to vertical anisotropy and how results achieved under field conditions could be affected by horizontal low-permeability layers.

Simulations of groundwater mounding beneath infiltration basins will underestimate the maximum height of mounding if vertical anisotropy is not included. Horizontal layers of lower permeability material are common in many geologic environments and have a substantial effect on vertical flow (but have less effect on horizontal flow than over- or underlying higher-permeability layers). Beneath and near an

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SPECIFIC YIELD --

COMPILATION OF SPECIFIC YIELDS

FOR VARIOUS MATERIALS

By A. I. Johnson

PREPARED IN COOPERATION WITH THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

U.S. Geological Survey Open-File Report

Denver, Colorado
1963
Revised 1966

Table 28.--Compilation of specific yield for various materials

[All values rounded off to nearest whole percentage]

Material	Valley fill, Calif. (Eckis, 1934)	Mokelumne Area, Calif. (Piper and others, 1939)	Santa Ynez River Basin, Calif. (Upson and Thomasson, 1951)	Sacramento Valley, Calif. (Poland and others, 1949)	Smith River Plain, Calif. (Back, 1957)	Ventura County, Calif. (Calif. Water Resources Board, 1956)	Santa Margarita Valley, Calif. (Calif. Dept. Public Works, 1956)	Tia Juana Basin, Calif. (Calif. Water Rights Board, 1957)	San Luis Obispo County, Calif. (Calif. Water Resources Board, 1958)	San Joaquin Valley, Calif. (Davis and others, 1959)	Eureka area, Calif. (Evenson, 1959)	Santa Ynez Basin, Calif. (Wilson, 1959)	Rechna Doab, Pakistan (Kazmi, 1961)	Napa-Sonoma Valleys, Calif. (Kunkel and Upson, 1960)	Humboldt River Valley, Nev. (Cohen, 1963)	Unconsolidated Alluvium (Preuss and Todd, 1963)	Little Bighorn River Valley, Mont. (Moulder and others, 1960)	Average specific yield
Clay	1	4	2	3	1	0	1	1	3	3	3	5	3	3	0.5	--	--	2
Silt	10	4	12	3	--	3	10	10	5	5	10	5	5	5	19	4	17	8
Sandy clay	10	4	12	3	5	5	5	5	5	5	10	--	--	10	----	--	--	7
Fine sand	21	26	12	10	10	25	28	25	25	10	20	20	27	20	26	23	32	21
Medium sand	31	26	30	20	15	25	28	30	25	25	20	30	28	20	28	28	32	26
Coarse sand	31	35	35	20	25	25	28	32	25	25	20	30	23	20	27	28	32	27
Gravelly sand	31	35	35	20	25	21	22	28	21	25	20	--	23	20	----	22	32	25
Fine gravel	27	35	35	25	25	21	22	26	21	25	25	25	26	25	19	17	25	25
Medium gravel	21	--	--	25	25	21	22	23	21	25	25	25	26	25	----	13	25	23
Coarse gravel	14	--	--	25	25	21	22	18	21	25	25	25	26	25	----	12	--	22

12 DETERMINING THE SATURATED HYDRAULIC CONDUCTIVITY

R.J. Oosterbaan and H.J. Nijland

On web site www.waterlog.info

Chapter 12 in: H.P.Ritzema (Ed.), Drainage Principles and Applications. International Institute for Land Reclamation and Improvement (ILRI), Publication 16, second revised edition, 1994, Wageningen, The Netherlands. ISBN 90 70754 3 39

12.5.2. Correlation methods

The correlation methods for determining K-values in drainage surveys are frequently based on relationships between the K-value and one or more of the following soil properties: texture, pore-size distribution, grain-size distribution, or with the soil mapping unit. Details of soil properties were given in Chapter 3.

Soil Texture

Soil texture refers to the percentage of sand, silt, and clay particles in the soil. Texture or textural class is often used for the correlation of K- values with other hydraulic properties of the soil (e.g. water-holding capacity and drainable pore space) (Wösten, 1990).

Aronovici (1947) presented a correlation between the content of silt and clay of subsoil materials in the Imperial Valley in California, U.S.A., and the results of hydraulic laboratory tests. Smedema and Rycroft (1983) give generalized tables with ranges of K-values for certain soil textures (Table 12.3). Such tables (See also Chapter 7, Table 7.2), however, should be handled with care. Smedema and Rycroft warn that: "Soils with identical texture may have quite different K-values due to differences in structure" and "Some heavy clay soils have well-developed structures and much higher K-values than those indicated in the table".

Table 12.3 Range of K-values by soil texture (Smedema and Rycroft 1983)

Texture	K (m/day)		
Gravelly course sand	10	-	50
Medium sand	1	-	5
Sandy loam, fine sand	1	-	3
Loam, well structured clay loam and clay	0.5	-	2
Very fine sandy loam	0.2	-	0.5
Poorly structured clay loam and clay	0.002	-	0.2
Dense clay (no cracks, no pores)	< 0.002		

Pore-Size Distribution of the Soil

The pore-size distribution, the regularity of the pores, and their continuity has a great influence on the soil's K-values. Nevertheless, the study and characterization of the porosity aiming at an assessment of the K-values is not sufficiently advanced to be practical on a large scale.

An example of the complexity of such a study using micromorphometric data is given by Bouma et al. (1979) for clay soils. Another example is given by Marshall (1957), who determined the pore-size distribution using the relationship between soil-water content and matric head (Chapter 3). Applying Poiseuille's Law to a number of fractions of the pF-curve, he was able to calculate the K-value. Marshall's method is mainly applicable to granular (sandy) soils having no systematic continuous pores.

Grain-Size Distribution of the Soil

In sandy soils, which have no systematic continuous pores, the soil permeability is related to the grain-size distribution. Determining the K- value from the grain-size distribution uses the specific surface ratio (U) of the various grain-size classes. This U-ratio is defined as the total surface area of the soil particles per unit mass of soil, divided by the total surface area of a unit soil mass consisting of spherical particles of 1 cm diameter. The U-ratio, the porosity, and a shape factor for the particles and the voids allow us to calculate the hydraulic conductivity.

This method is seldom used in land drainage practice because the homogeneous, isotropic, purely-granular soils to which it applies are rare. An example of its use for deep aquifers is given in de Ridder and Wit (1965).

Map Scale: 1:3,840 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Rhode Island: Bristol, Kent, Newport, Providence, and Washington Counties
Survey Area Data: Version 22, Sep 12, 2022

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

Date(s) aerial images were photographed: May 24, 2020—Jul 18, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
MmA	Merrimac fine sandy loam, 0 to 3 percent slopes	A	22.8	73.4%
Ss	Sudbury sandy loam	B	8.3	26.6%
Totals for Area of Interest			**31.1**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program

D·E·M

Site Evaluation Form
Part A – Soil Profile Description

Application Number 2206-1492

Property Owner: KREG Realty Management
Property Location: Harkney Hill Road & Moosneck Hill Road, Exeter
Date of Test Hole: December 8, 2022
Soil Evaluator: Steven Henry License Number: D402Lo
Weather: Clear 45° Shaded: Yes ☐ No ☑ Time: 7-11 AM

TH 1 Horizon	Depth	Horizon Boundaries: Dist	Horizon Boundaries: Topo	Soil Colors: Matrix	Soil Colors: Re-Dox Features	Re-Dox: Ab. S. Contr.	Texture	Structure	Consistence	Soil Category	
Ap	0-9"	Ab	S	10YR 3/2			FSL-SL	F-mgr WSBK	VFR	4	.61
Bw1	9"-18"	CL	W	10YR 5/4			SL	" "	VFR	3	.70
Bw2	18"-24"	CL	W	10YR 5/6	none visible		GrSL	F-mgr ØSG	L	1	.61
C	24"-10'+			2.5Y 6/3-4	10YR 5/8	Many prom Conc @ 30"	GrS, COS	ØSG	L	1M	.61
		SIDEWALLS KEPT COLLAPSING									

TH 2 Horizon	Depth	Horizon Boundaries: Dist	Horizon Boundaries: Topo	Soil Colors: Matrix	Soil Colors: Re-Dox Features	Re-Dox: Ab. S. Contr.	Texture	Structure	Consistence	Soil Category
A	0-4"	CL	W	10YR 2/2			FSL	F-mgr	VFr	4
Bw1	4"-14"	"	"	10YR 3/3	none visible		SL	F-mgr	VFr	3
Bw2	14"-22"	"	"	10YR 4/6			SL	F-mgr	VFr	3
C	22"-10'+			2.5Y 6/3	7.5YR 5/8	Many prom Conc @ 3/4±	GrS, COS	ØSG	L	1M

TH 1 Soil Class "C" Total Depth 10'+ Impervious/Limiting Layer Depth N/A (og) GW Seepage Depth Steady flow @ 7' SHWT 24" (og)
TH 2 Soil Class "C" Total Depth 10'+ Impervious/Limiting Layer Depth N/A (og) GW Seepage Depth 6'6" SHWT 20" (og)

Comments: piped

Revised 11/25/18

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program

Site Evaluation Form
Part A - Soil Profile Description

Application Number: 2206-1492

Property Owner: KREG Realty Management
Property Location: Harkney Hill Road & Nooseneck Hill Road, Coventry
Date of Test Hole: December 8, 2022
Soil Evaluator: Steven Henry License Number: D401Z6
Weather: 45° clear Shaded: Yes ☐ No ☑ Time: 9-11 AM

TH 3 Horizon	Depth	Horizon Boundaries: Dist	Horizon Boundaries: Topo	Soil Colors: Matrix	Soil Colors: Re-Dox Features	Re-Dox: Ab. S. Contr.	Texture	Structure	Consistence	Soil Category	
Ap	0-8"	Ab	S	10YR 3/3			SL	F.mgr	VFr	3	.70
Bw	8"-21"	CL	W	10YR 5/6	None Visible		SL, LS	F-mgr	VFr	3	
C	21"-12'+			2.5Y 6/3-4			Gr S, COS	ØSG	L	Im	.01
				Stratified							

TH 4 Horizon	Depth	Horizon Boundaries: Dist	Horizon Boundaries: Topo	Soil Colors: Matrix	Soil Colors: Re-Dox Features	Re-Dox: Ab. S. Contr.	Texture	Structure	Consistence	Soil Category	
Ap	0-9"	Ab	S	10YR 3/2			FSL SL	F-mgr wspbk	VFr	4	.04
Bw1	9-18"	CL	W	10YR 5/4			SL	" "	VFr	3	.70
Bw2	18"-24"	CL	W	10YR 5/4-6	MW - Obvious Visible		Gr SL	F-mgr ØSG	L	3	.01
C	24"-10'+			2.5Y 6/4-6			Gr S COS	ØSG	L	Im	
				Sidewalls kept Collapsing							

TH 3 Soil Class "C" Total Depth 12'+ Impervious/Limiting Layer Depth N/A (bg) GW Seepage Depth 7'6" Steady Flow @ SHWT 60" (og)

TH 4 Soil Class "C" Total Depth 10'+ Impervious/Limiting Layer Depth N/A (bg) GW Seepage Depth 5'0" SHWT 24" (og)

Comments: Piped

Revised 11/25/18

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program

Site Evaluation Form
Part A – Soil Profile Description

Application Number: 2206-1492

Property Owner: KREG Realty Management
Property Location: Harkney Hill Road & Nooseneck Hill Road, Coventry
Date of Test Hole: December 8, 2022
Soil Evaluator: Steven Henry License Number: D4026
Weather: 45° clear Shaded: Yes ☐ No ☑ Time: 7-11 AM

TH 5 Horizon	Depth	Horizon Boundaries: Dist	Horizon Boundaries: Topo	Soil Colors: Matrix	Soil Colors: Re-Dox Features	Re-Dox: Ab. S. Contr.	Texture	Structure	Consistence	Soil Category	
Ap	0-6"	Ab	S	10YR 3/3			SL	F-mgr	VFr	3	-70
Bw	6"-18"	CL	W	10YR 5/6		none apparent	SL, LS	F-mgr	VFr	3	
C	18"-12'+			2.5Y 6/3-4			Grs COS	ØSG	L	1 m	-Cd
				Stratified							

TH C6 Horizon	Depth	Horizon Boundaries: Dist	Horizon Boundaries: Topo	Soil Colors: Matrix	Soil Colors: Re-Dox Features	Re-Dox: Ab. S. Contr.	Texture	Structure	Consistence	Soil Category
Ap	0-8"	Ab	S	10YR 3/3			SL	F-mgr	VFr	3
Bw	8"-20"	CL	W	10YR 5/6		none apparent	SL, LS	F-mgr	VFr	3
C	20"-12'+			2.5 6/3-4			Grs COS	ØSG	L	1M
				Stratified						

TH 5 Soil Class "C" Total Depth 12'+ Impervious/Limiting Layer Depth N/A (og) GW Seepage Depth 11' SHWT 7'0" (og)
TH C6 Soil Class "C" Total Depth 12'+ Impervious/Limiting Layer Depth N/A (og) GW Seepage Depth None @12' SHWT 8'0" (og)

Comments: piped

Revised 11/25/18

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program

Site Evaluation Form
Part A – Soil Profile Description

Application Number 2206-1492

Property Owner: KREG Realty Management
Property Location: Harkney Hill Road & Looseneck Hill Road, Coventry
Date of Test Hole: December 8, 2022
Soil Evaluator: Steven Henry License Number: D4026
Weather: 45° Clear Shaded: Yes ☐ No ☒ Time: 7-11 AM

TH 7 Horizon	Depth	Horizon Boundaries: Dist	Horizon Boundaries: Topo	Soil Colors: Matrix	Soil Colors: Re-Dox Features	Re-Dox: Ab. S. Contr.	Texture	Structure	Consistence	Soil Category	
Ap	0-10"	Ab	S	10yr 3/2			SL	F-Mgr	VFr	3	.70
Bw	10"-24"	CL	W	10yr 5/4			SL	F-Mgr	VFr	3	
C	24"-10'+			2.5Y 6/3-4	10yr 5/6	Few-Many Concc	3± GrS CoS	Sg	L	1M	.61
				Sidewalls Kept Collapsing							

TH ____ Horizon	Depth	Horizon Boundaries: Dist	Horizon Boundaries: Topo	Soil Colors: Matrix	Soil Colors: Re-Dox Features	Re-Dox: Ab. S. Contr.	Texture	Structure	Consistence	Soil Category

TH 7 Soil Class "C" Total Depth 10'+ Impervious/Limiting Layer Depth N/A (og) GW Seepage Depth Steady Flow @ 7'6" SHWT 36" (og)

TH ____ Soil Class ____ Total Depth ____ Impervious/Limiting Layer Depth ____ (og) GW Seepage Depth ____ SHWT ____ (og)

Comments: Piped

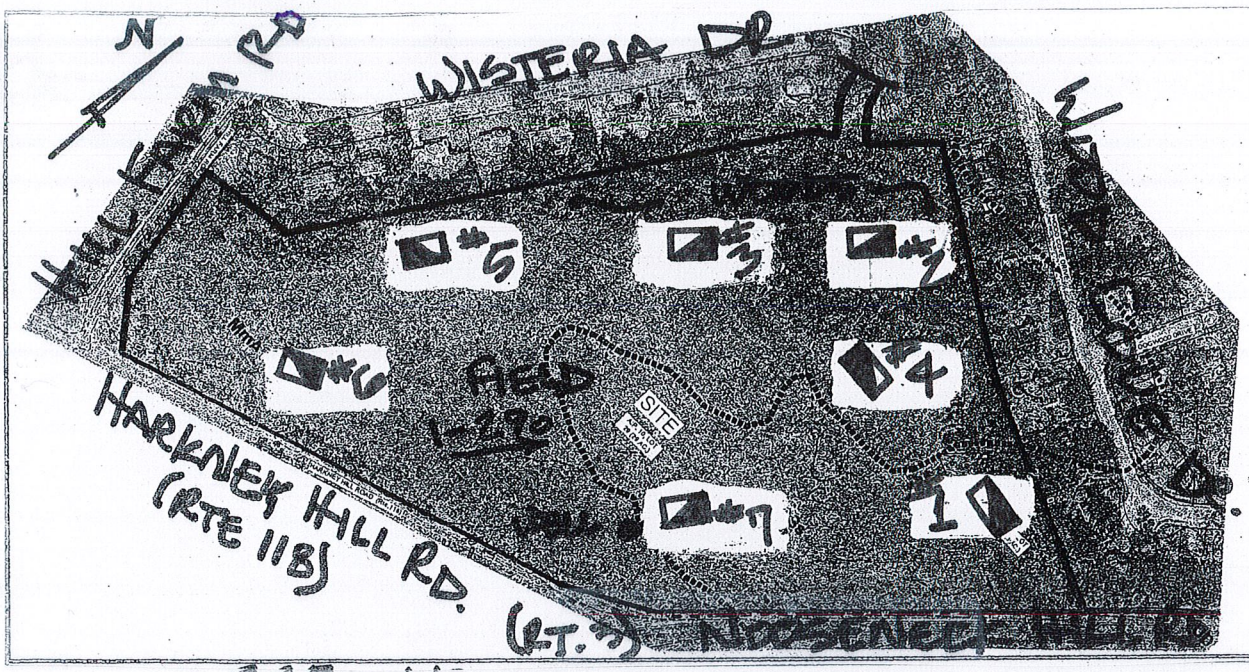
Revised 11/25/18

Site Evaluation – to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:

1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*
   *OFFSETS MUST BE SHOWN

- Approximate location of test holes
- Approximate location of bedrock test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north



Bedrock THs	
TH	Depth

1. Relief and Slope: < 2% NNE
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO ☐ YES ☑
3. Restrictive Layer or Bedrock within 4' below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO ☑ YES ☐
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO ☑ YES ☐
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO ☑ YES ☐
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42? NO ☑ YES ☐
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. NO ☑ YES ☐
8. Site's potential for flooding or ponding: NONE ☑ SLIGHT ☐ MODERATE ☐ SEVERE ☐
9. Landscape position: outwash plain
10. Vegetation: #1 in field, #2 in woods
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site: monitoring during wet season recommended – ESHWT's indicated are considered to be conservative

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: [signature] License # D4026 Part B prepared by: [signature] License #

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur ☐ Inconclusive ☐ Disclaim ☐

Unwitnessed Soil Evaluations Decision: Accept ☐ Inconclusive ☐ Disclaim ☐

Wet Season Determination required ☐ Additional Field Review Required ☐

Explanation: _____

Signature Authorized Agent Date

Revised 11/25/18

S.F.M. ENGINEERING ASSOCIATES
410 TIOGUE AVENUE
COVENTRY, R.I., 02816
(401) 826-3736

PROJECT LOCATION: CO. ENTRY CROSSING
A.P. 10 LOT 29
COVENTRY, R.I.
SHT. NO. 1 of 1

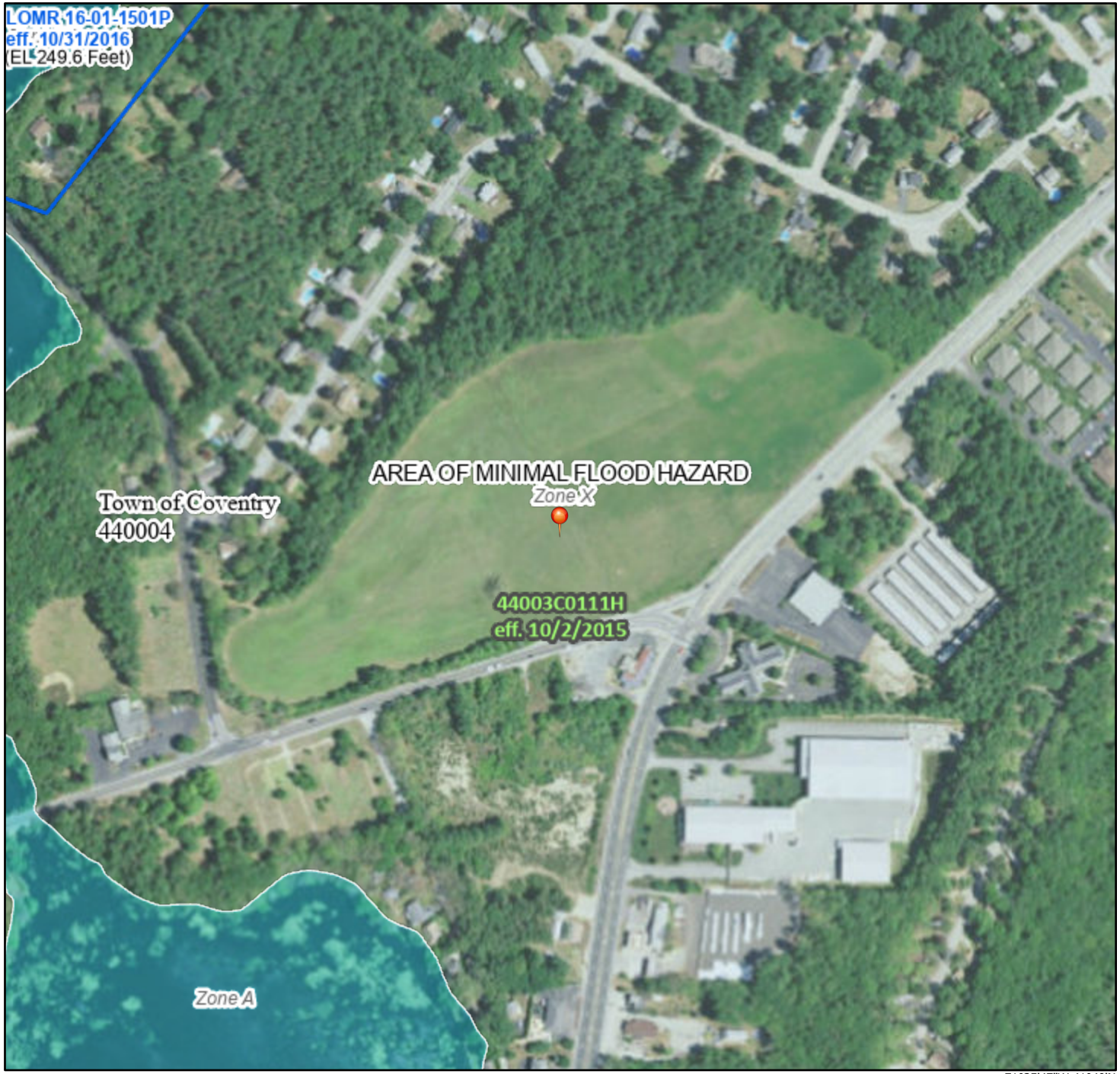
TH - No.	GROUND WATER READINGS								
	GR. EL.	1-13-94	2-2-94	3-2-94	3-25-94	4-6-94		G.W. ELEV.	
94-1	259.4	DRY 9.5'	DRY 9.5'	DRY 9.5'	DRY 9.0'	DRY 9.0'		250.4	
94-2	259.2	DRY 9.4'	DRY 9.4'	DRY 9.4'	DRY, 9.2'	DRY 9.2'		250.0	
94-3	258.6	DRY 9.6'	DRY 9.6'	DRY 9.6'	DRY, 8.7'	DRY, 8.7'		249.9	
94-4	257.7	DRY 9.5'	DRY 9.3'	DRY 9.3'	8.1'	DRY, 8.3'		249.6	
94-5	254.6	8.0'	7.0'	7.2'	5.0'	5.2'		249.6	
94-6	255.3	8.5'	7.5'	7.7'	5.4'	5.5'		249.9	
94-7	253.1	6.5'	5.7'	6.0'	3.7'	3.9'		249.4	
94-8	255.1	8.5'	7.6'	7.8'	5.6'	5.8'		249.5	
94-9	254.4	8.5'	7.5'	7.6'	5.3'	5.3'		249.1	
94-10	253.3	7.5'	6.4'	6.6'	4.4'	4.4'		248.9	
94-11	253.6	7.7'	6.8'	7.0'	4.7'	4.8'		248.9	
94-12	256.5	DRY 9.4'	DRY 9.4'	DRY 9.4'	7.5'	7.6'		249.0	
EXIST. "POND"							3-28-94	249.0	
EXIST. ET. BASIN							3-28-94	250.0	

SCOTT F. MOOREHEAD
STATE OF RHODE ISLAND
No 4298
REGISTERED PROFESSIONAL ENGINEER

National Flood Hazard Layer FIRMette

FEMA

71°36'24"W 41°40'27"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

71°35'47"W 41°40'N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/28/2022 at 4:33 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

McCUE ENVIRONMENTAL, LLC
LAFAYETTE MILL COMPLEX, 650 TEN ROD ROAD, NORTH KINGSTOWN, RI 02852
CONSULTING AND WETLAND PERMITTING SERVICES
(401) 595-4276

January 2, 2024

Samuel S. Hemenway, PE
Garofalo & Associates, Inc.
85 Corliss Street
Providence, Rhode Island 02940

Subject: REVISED Wetland Delineation Report for Harkney Hill Road, AP 10, Lot 29, Coventry, RI

Dear Mr. Hemenway:

This letter presents my findings regarding wetlands investigation at the above referenced project in Coventry, Rhode Island. The investigation was done in accordance with the Rhode Island Freshwater Wetlands Act (R.I.G.L. 2-1-18 et. seq.) and associated Rhode Island Department of Environmental Management (RIDEM) Rules and Regulations governing the Administration and Enforcement of the Freshwater Wetlands Act (adopted July 1, 2022 (250-RICR-150-15-2)) (hereinafter referred to as RIDEM Rules). My qualifications include over 27 years' experience in the practice of wetland science and environmental impact assessment. I am a Professional Soil Scientist with the Society of Soil Scientists of Southern New England (SSSSNE) and a Professional Wetland Scientist (#2010) certified by the Society of Wetland Scientists (SWS).

The subject property is located on the north side of Harkney Hill Road, west of the Nooseneck Hill Road intersection, on AP 10, Lot 29 in Coventry, Rhode Island. I originally conducted the site reconnaissance for wetlands on June 14, 2022; at that time, I delineated a single area of wetland and observed a stormwater detention basin. I performed a second on-site investigation on December 29, 2023 to review the rea noted on Figure 2 where shallow, standing water was present. The Web Soil Survey available online at http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx) and the Rhode Island Geographic Information System (RIGIS) were consulted as a part of this effort.

The identified wetland, represented by flag series WF100 – WF107. This wetland is a replicated wetland area approved under DEM File # 94-0525. At the time of my inspection, there was standing water in the wetland with duckweed indicating the prolonged presence of standing water, and I did not observe breeding evidence of amphibians. It is unlikely that this wetland is a vernal pool. Therefore, it is my opinion that this wetland should be classified as a Pond < 1/4 acre. Vegetation observed in the Pond includes pussy willow (*Salix discolor*), Russian olive (*Elaeagnus umbellata*), sensitive fern (*Onoclea sensibilis*), winterberry (*Ilex verticillata*), three-way sedge (*Dulichium arundinaceum*), glossy buckthorn (*Rhamnus frangula*), woolgrass bulrush (*Scirpus cyperinus)* and duckweed (*Lemna* sp.)

The area of upland includes forest habitat and agricultural field. Although there are some wetland indicator vegetative species located in the forested upland habitat, the soil profiles observed throughout the site contain strong indicators of upland soils, with a B-horizon matrix color of 10YR 5/6. Therefore, in my opinion, there are no freshwater wetlands located anywhere else on the subject property. Vegetation observed throughout the forested upland areas include red oak (*Quercus rubra*), white oak (*Quercus alba*), glossy buckthorn, multiflora rose (*Rosa multiflora*), Russian olive, early sedge (*Carex pensylvanica*), Canada mayflower (*Maianthemum canadense*) and Asiatic bittersweet (*Celastrus orbiculatus*).

As noted, there is a constructed stormwater detention basin at the western portion of the property that collects stormwater runoff from the Wisteria Drive neighborhood (See Figure 2). This should not be classified as a wetland feature as it was constructed as a stormwater basin. There is a previously

excavated channel that exists this detention pond, and directs excess water from the pond where it discharges into a forested low point of the property. During an investigation on December 29, 2023, this low area contained shallow standing water. It is noted that over an inch of rain fell one day prior to this inspection, and December had 7.42 inches of rain through the 28th of December.

I reviewed several soil profiles in this area, both during this inspection and my original inspection for the delineation. The soils in this depressed area are also non-hydric, like the soils found in the remaining areas of the property. The B-horizon was noted to have a 10YR 5/6 matrix color, with no reducing conditions observed. Large white pine trees occupy this area, and buckthorn, hay-scented fern, highbush blueberry, and red maple are present. It is my opinion that although this low area does receive excess stormwater from the detention pond, there are no areas in this location that should be considered jurisdictional wetland because the water does not come from jurisdictional wetland, nor are there characteristics of prolonged wetland hydrology.

Pursuant to the Rules, a 'Jurisdictional Area' of either 100- or 200-feet is applied to all wetlands, and Buffer Zones are applied to each wetland depending on its type, in what Region of the State it is in, and other various factors including whether a property falls within a public water drinking supply watershed.

This property is within River Region 2 and is not located within a drinking water supply watershed. Therefore, the following table identifies each identified wetland, their Jurisdictional Areas, and the designated Buffer Zones:

	Jurisdictional Areas and Buffer Zones Effective July 1, 2022	
Wetland	Jurisdictional Area	Buffer Zones*
WF100 – WF107 Pond < 1/4 acre	100 ft.	25 ft. (see below & Figure 2)

*The RIDEM Rules define 'Existing Conditions. An existing area is defined as "*A condition that was a.) a condition that was present as of the enactment of the Act (July 1971) or its applicable amendments and that has continually remained in the same condition; or b. A condition that is present and was approved under the Act (July 1971) or its applicable amendments; or c. A condition that was present on the effective date of these Rules that was in a previously non-regulated area and which is now, pursuant to these Rules, a regulated area; or d. A condition that has naturally occurred and is currently present*." The agricultural field has been existing, maintained and used for agricultural purposes since well before the enactment of the Rules in 1971.

In addition, it further states in **2.5.8 Existing Conditions:** *A. The continued existing use of property located within a jurisdictional area as established by these Rules is not affected, provided the use conforms to the definition of existing in § 2.4(A)(24) of this Part, and provided such condition or activity does not otherwise constitute a violation of these Rules*.

Please note that only the Director of RIDEM can determine what is to be known as Freshwater Wetland in Rhode Island. As such, the information provided herein represents the best professional judgment of McCue Environmental, LLC, and should not be construed to represent the finding of any regulatory agency.

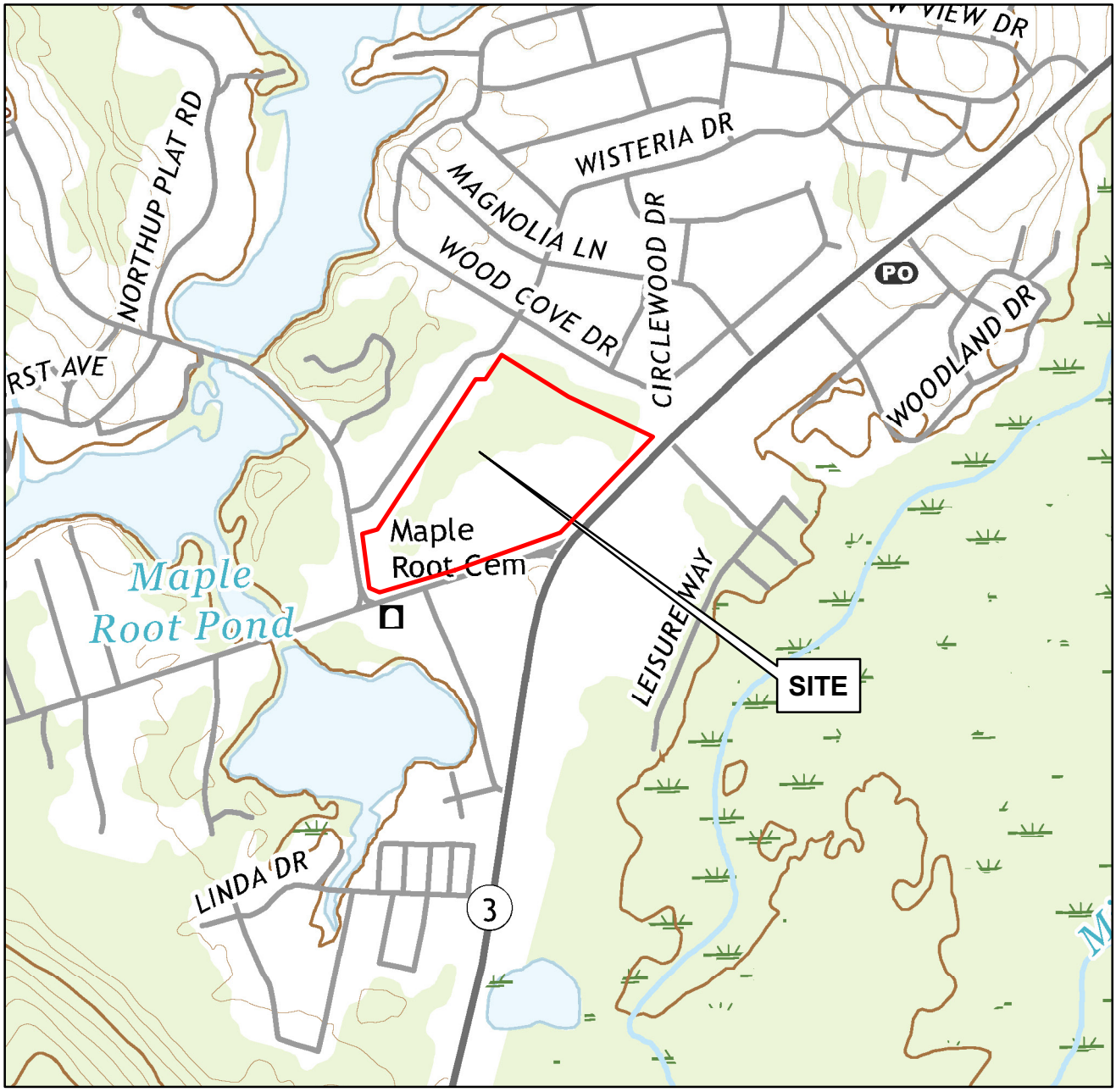
Thank you for the opportunity to work with you on this project. Please contact me at (401) 595-4276) if you have any questions regarding this work, or if you require additional information.

Sincerely yours,
MCCUE ENVIRONMENTAL, LLC

Joseph P. McCue, PWS
President
Principal Environmental Scientist

Attachments:

Figure 1: Site Location
Figure 2: Approximate Location of Wetlands



Source: 2021 USGS Topographic Map for Crompton, RI

Approximate Location:

Project Area

N
W E
S

0 500 1,000

Feet

Approximate Scale

Harkney Hill Road, AP 10, Lot 29
Coventry, RI

McCUE ENVIRONMENTAL, LLC
CONSULTING & WETLAND PERMITTING SERVICES
(401) 595-4276

SITE LOCATION

Project No. 220603

Figure 1

Sources: 2021 RIDEM Digital Color Orthophotography

Approximate Location of:

- Property Boundaries
- Approximate Wetland Edge
- Designated Buffer Zone
- 100-ft. Jurisdictional Area
- Coventry Parcels
- Observed non-hydric Soil Plots (12/29/23)
- Prev. Excavated channel from the Detention Pond (Non-wetland)
- Area shallow standing water (non-wetland) (12/29/23)

N W E S

0 150 300 Feet

Approximate Scale

Harkney Hill Road, AP 10, Lot 29
Coventry, RI

APPROXIMATE LOCATION OF WETLANDS

McCUE ENVIRONMENTAL, LLC
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(401) 595-4276

Project No. 220603

Figure 2