

MANAGED RELEASE CONCEPT (MRC) DESIGN SUMMARY

Complete One Design Summary Sheet for Each BMP Designed for MRC

GENERAL INFORMATION

Applicant Name: **AAMPA Holdings, LLC** Project Name: **AAMPA Holdings – Ritner Hwy**
Applicant Address: **1514 Commerce Ave, Suite 203** Municipality: **West Pennsboro Township**
City, State, Zip: **Carlisle PA 17013** County: **Cumberland**
Permit Type: ☐ NPDES PAG-02 ☒ NPDES IP ☐ ESCGP ☐ ESP

	Pre-Development	Post-Development	Change
Impervious Area (acres):	0.00	2.57	2.57

MRC BMP INFORMATION

MRC BMP Type: **P-2 – MRC Bioretention Pond 2** Stormwater BMP Manual Section: **6.4.5**

Will the BMP Include Vegetation? ☒ Yes ☐ No

If Yes, Identify Proposed Vegetation: **Mixed grasses, Shrubs, Plugs (Details of species' on Plan Sheet C-706)**

For Non-Vegetated BMPs Will There Be Pre- or Post-Treatment? ☐ Yes (Pre-) ☐ Yes (Post-) ☒ No

If Yes, Identify Proposed Pre- or Post-Treatment: _____

Name of Surface Water to Receive MRC BMP Discharges: **Big Spring Creek**

Designated Use of Surface Water: **HQ - CWF** Existing Use of Surface Water (if different): _____

Is the Surface Water Impaired? ☒ Yes ☐ No

If Yes, Identify Cause(s): **Organic Enrichment / Oxygen Depletion**

Will the BMP have an impermeable liner? ☐ Yes ☒ No

If Yes, explain why a liner is proposed: _____

BMP Media Description: **See PCSM Plan**

Are Any Deviations from MRC Design Standards Proposed? ☐ Yes ☒ No

If Yes, Identify Deviations: _____

MRC BMP DESIGN VALUES AND STANDARDS

Parameter	Design Value	Design Standard
Actual Contributing Impervious Area to BMP (acres)	2.57	
Equivalent Contributing Impervious Area to BMP (acres)	2.54	
Total Drainage Area to BMP (acres)	7.37	
MRC BMP Release Rate (cfs)	0.03	<i>No greater than 0.01 cfs / acre of equivalent contributing impervious</i>
Underdrain Outflow Rate During 1.2-Inch/2-Hour Storm (cfs)	0.00	<i><= MRC BMP Release Rate (cfs)</i>
Maximum Storm Event Routed to MRC BMP	100-yr/24-hr	

MRC BMP Design Summary
Revised, August 25, 2020

Parameter	Design Value	Design Standard
BMP Footprint Area (ft ²)	31,190	
Bottom BMP Elevation (Native Soils) (ft)	620.00	
2-Yr/24-Hr Storm Ponding Depth (ft)	0.00	1 ft (recommended) (2 ft max)
Maximum Ponding Depth (ft)	1.11	4 ft (max)
Overflow Bypass Elevation (ft)	622.35	
Media Depth (ft)	2.0	2 ft (min) – 4 ft (max)
Media Void Space (%)	15	
Internal Water Storage (IWS) Depth (ft)	2.0	1 ft recommended
Top of IWS Elevation (ft)	622.00	
Underdrain Pipe Diameter (in)	4.0	
Underdrain Orifice Diameter (in)	3.0	
Underdrain Outlet Elevation (ft)	622.00	
IWS Available for Routing (%)	50 – in stone	50% max
Separation Distance (Groundwater) (ft)	>1.0	1 ft (min) (2 ft recommended)
Infiltration Rate (in/hr)	0.34	
Volume of Overflow During 1.2-Inch/2-Hour Storm (cf)	0	0 (No overflow allowed)
1-Yr/24-Hr Pre -Development Peak Rate (cfs)	0.13	
2-Yr/24-Hr Post -Development Peak Rate (cfs)	0.00	1-Yr/24-Hr Pre-Development Peak Rate (or per approved Act 167 Plan)
10-Yr/24-Hr Post -Development Peak Rate (cfs)	0.37	10-Yr/24-Hr Pre-Development Peak Rate
50-Yr/24-Hr Post -Development Peak Rate (cfs)	4.35	50-Yr/24-Hr Pre-Development Peak Rate
100-Yr/24-Hr Post -Development Peak Rate (cfs)	6.98	100-Yr/24-Hr Pre-Development Peak Rate
Total 2-Yr/24-Hr Runoff Volume Managed by BMP (cf)	20,604	
Ponding Time @ 2-Yr/24-Hr Storm (hrs)	0	72 hrs (surface), 7 days (underground)
Ponding Time @ 10-Yr/24-Hr Storm (hrs)	57.9	72 hrs (surface), 7 days (underground)
Ponding Time @ 50-Yr/24-Hr Storm (hrs)	58.2	72 hrs (surface), 7 days (underground)
Ponding Time @ 100-Yr/24-Hr Storm (hrs)	58.8	72 hrs (surface), 7 days (underground)

Justin T. Doty

Licensed P.E. Name

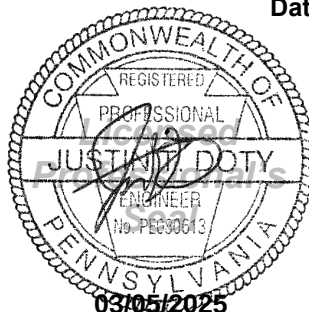
Licensed P.E. Signature

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License No.

03-05-25

Date



Summary for Subcatchment WS-3: WS-3

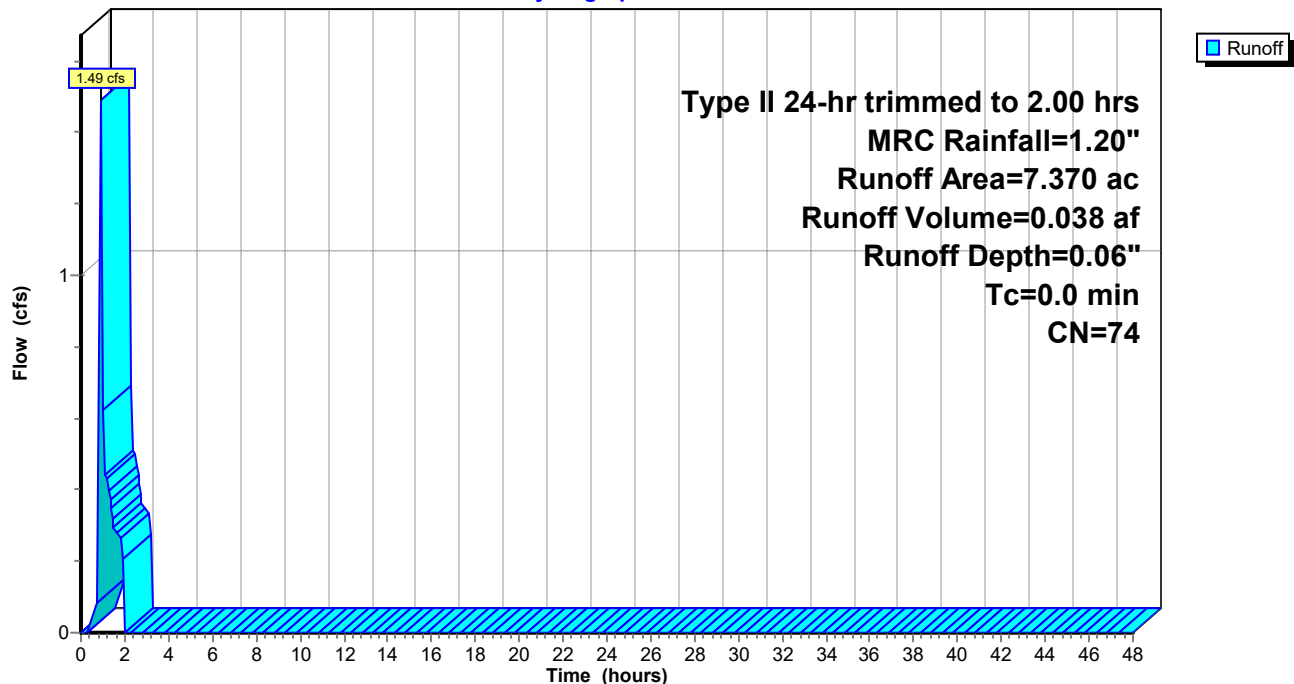
Runoff = 1.49 cfs @ 0.95 hrs, Volume= 0.038 af, Depth= 0.06"
Routed to Pond P-2 : P-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr trimmed to 2.00 hrs MRC Rainfall=1.20"

Area (ac)	CN	Description
0.720	58	Meadow, non-grazed, HSG B
2.570	98	Paved parking, HSG B
4.080	61	>75% Grass cover, Good, HSG B
7.370	74	Weighted Average
4.800		65.13% Pervious Area
2.570		34.87% Impervious Area

Subcatchment WS-3: WS-3

Hydrograph



Summary for Pond P-2: P-2

Inflow Area = 7.370 ac, 34.87% Impervious, Inflow Depth = 0.06" for MRC event
 Inflow = 1.49 cfs @ 0.95 hrs, Volume= 0.038 af
 Outflow = 0.26 cfs @ 1.79 hrs, Volume= 0.038 af, Atten= 82%, Lag= 50.1 min
 Discarded = 0.26 cfs @ 1.79 hrs, Volume= 0.038 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach R-A1 : BYPASS PIPE A

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 620.14' @ 1.79 hrs Surf.Area= 0.720 ac Storage= 0.015 af

Plug-Flow detention time= 32.0 min calculated for 0.038 af (100% of inflow)
 Center-of-Mass det. time= 31.8 min (109.8 - 78.1)

Volume	Invert	Avail.Storage	Storage Description	
#1	620.00'	5.756 af	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
620.00	0.720	0.0	0.000	0.000
622.00	0.720	15.0	0.216	0.216
625.00	0.980	100.0	2.550	2.766
626.00	5.000	100.0	2.990	5.756

Device	Routing	Invert	Outlet Devices
#1	Discarded	620.00'	0.340 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 618.00'
#2	Device 5	622.00'	3.0" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Device 5	622.35'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#4	Device 5	623.00'	45.2" x 24.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#5	Primary	620.00'	15.0" Round Culvert L= 12.0' Ke= 1.000 Inlet / Outlet Invert= 620.00' / 619.88' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.26 cfs @ 1.79 hrs HW=620.14' (Free Discharge)

↑ **1=Exfiltration** (Controls 0.26 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=620.00' (Free Discharge)

↑ **5=Culvert** (Controls 0.00 cfs)

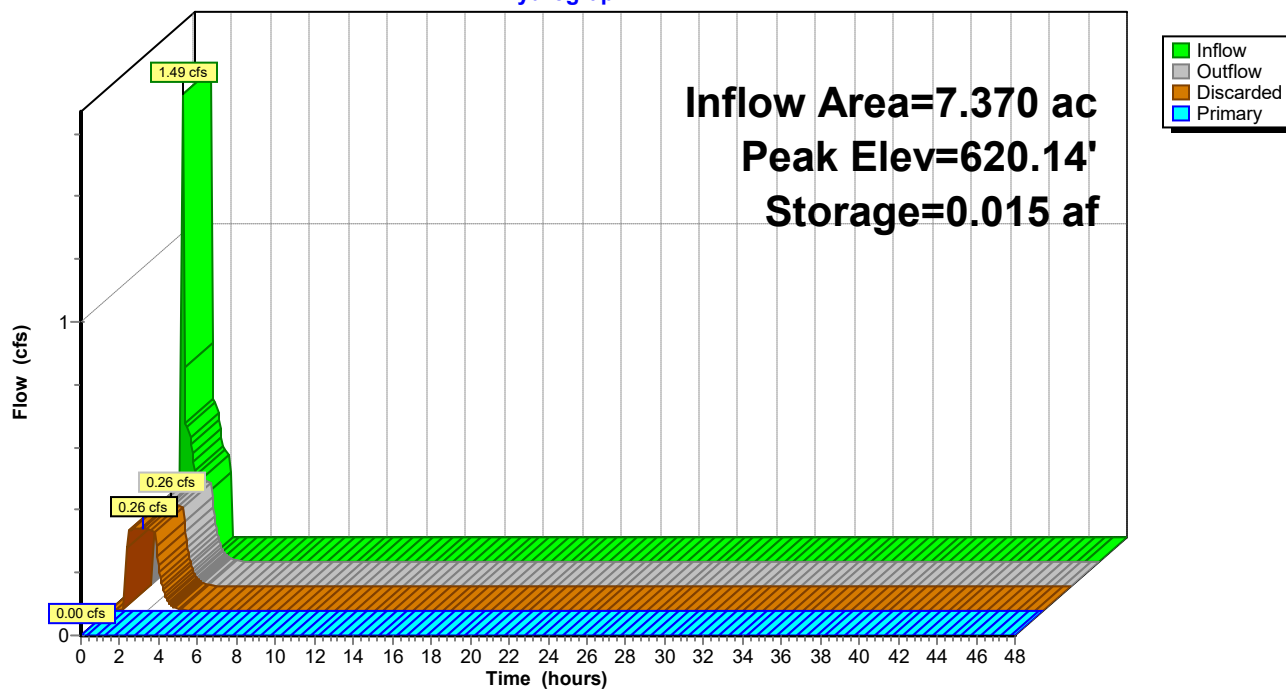
↑ **2=Orifice/Grate** (Controls 0.00 cfs)

↑ **3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Pond P-2: P-2

Hydrograph



2022-0251 HydroCAD A

Type II 24-hr trimmed to 2.00 hrs MRC Rainfall=1.20"

Prepared by Frederick, Seibert & Associates

Printed 3/4/2025

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Stage-Discharge for Pond P-2: P-2

Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)	Elevation (feet)	Discharge (cfs)	Discarded (cfs)	Primary (cfs)
620.00	0.00	0.00	0.00	625.20	10.77	1.29	9.48
620.10	0.26	0.26	0.00	625.30	11.02	1.44	9.58
620.20	0.27	0.27	0.00	625.40	11.28	1.60	9.68
620.30	0.28	0.28	0.00	625.50	11.54	1.76	9.78
620.40	0.30	0.30	0.00	625.60	11.81	1.92	9.88
620.50	0.31	0.31	0.00	625.70	12.07	2.09	9.98
620.60	0.32	0.32	0.00	625.80	12.33	2.25	10.08
620.70	0.33	0.33	0.00	625.90	12.60	2.42	10.18
620.80	0.35	0.35	0.00	626.00	12.86	2.59	10.27
620.90	0.36	0.36	0.00				
621.00	0.37	0.37	0.00				
621.10	0.38	0.38	0.00				
621.20	0.39	0.39	0.00				
621.30	0.41	0.41	0.00				
621.40	0.42	0.42	0.00				
621.50	0.43	0.43	0.00				
621.60	0.44	0.44	0.00				
621.70	0.46	0.46	0.00				
621.80	0.47	0.47	0.00				
621.90	0.48	0.48	0.00				
622.00	0.49	0.49	0.00				
622.10	0.53	0.51	0.02				
622.20	0.59	0.52	0.06				
622.30	0.64	0.54	0.10				
622.40	0.83	0.56	0.27				
622.50	1.47	0.57	0.90				
622.60	2.36	0.59	1.78				
622.70	3.44	0.60	2.84				
622.80	4.67	0.62	4.05				
622.90	6.03	0.63	5.40				
623.00	7.48	0.65	6.83				
623.10	7.64	0.67	6.97				
623.20	7.79	0.68	7.11				
623.30	7.95	0.70	7.25				
623.40	8.10	0.71	7.38				
623.50	8.24	0.73	7.51				
623.60	8.39	0.75	7.64				
623.70	8.53	0.76	7.77				
623.80	8.68	0.78	7.90				
623.90	8.82	0.80	8.02				
624.00	8.95	0.81	8.14				
624.10	9.09	0.83	8.26				
624.20	9.22	0.85	8.38				
624.30	9.36	0.86	8.50				
624.40	9.49	0.88	8.61				
624.50	9.62	0.90	8.72				
624.60	9.75	0.91	8.84				
624.70	9.88	0.93	8.95				
624.80	10.00	0.95	9.06				
624.90	10.13	0.96	9.16				
625.00	10.25	0.98	9.27				
625.10	10.51	1.13	9.37				

Stage-Area-Storage for Pond P-2: P-2

Elevation (feet)	Surface (acres)	Storage (acre-feet)	Elevation (feet)	Surface (acres)	Storage (acre-feet)
620.00	0.720	0.000	625.20	1.784	3.042
620.10	0.720	0.011	625.30	2.186	3.241
620.20	0.720	0.022	625.40	2.588	3.480
620.30	0.720	0.032	625.50	2.990	3.759
620.40	0.720	0.043	625.60	3.392	4.078
620.50	0.720	0.054	625.70	3.794	4.437
620.60	0.720	0.065	625.80	4.196	4.836
620.70	0.720	0.076	625.90	4.598	5.276
620.80	0.720	0.086	626.00	5.000	5.756
620.90	0.720	0.097			
621.00	0.720	0.108			
621.10	0.720	0.119			
621.20	0.720	0.130			
621.30	0.720	0.140			
621.40	0.720	0.151			
621.50	0.720	0.162			
621.60	0.720	0.173			
621.70	0.720	0.184			
621.80	0.720	0.194			
621.90	0.720	0.205			
622.00	0.720	0.216			
622.10	0.729	0.288			
622.20	0.737	0.362			
622.30	0.746	0.436			
622.40	0.755	0.511			
622.50	0.763	0.587			
622.60	0.772	0.664			
622.70	0.781	0.741			
622.80	0.789	0.820			
622.90	0.798	0.899			
623.00	0.807	0.979			
623.10	0.815	1.060			
623.20	0.824	1.142			
623.30	0.833	1.225			
623.40	0.841	1.309			
623.50	0.850	1.393			
623.60	0.859	1.479			
623.70	0.867	1.565			
623.80	0.876	1.652			
623.90	0.885	1.740			
624.00	0.893	1.829			
624.10	0.902	1.919			
624.20	0.911	2.010			
624.30	0.919	2.101			
624.40	0.928	2.194			
624.50	0.937	2.287			
624.60	0.945	2.381			
624.70	0.954	2.476			
624.80	0.963	2.572			
624.90	0.971	2.668			
625.00	0.980	2.766			
625.10	1.382	2.884			

**MRC BMP 2-YR/24-HR RUNOFF VOLUME MANAGED BY BMP
CALCULATIONS:**

P-2:

BMP Invert: 620.00

Overflow Discharge Invert: 622.35

Total Volume Depth Below Overflow: **2.35'**

Volume at Elevation 622.35 (from HydroCAD): **0.473 ac-ft**

$$\mathbf{0.473\ ac\text{-}ft * 43,560\ cu\text{-}ft = \underline{20,604\ ft^3}}$$

WORKSHEET 4 - EQUIVALENT IMPERVIOUS AREA CALCULATIONS

PROJECT AAMPA Holdings - Rinter Hwy
 Drainage Area: WS-3 MRC
 1.2in-2hr Rainfall 1.20 in

Managed Area 7.37 acres

Developed Conditions:

Cover Type/Condition	Soil Type	Area (sf)	Area (Ac)	CN	S	Ia (0.2*S)	Q Runoff (In)	Runoff Volume (ft3)
Meadow	B	31363	0.72	58	7.24	1.45	0.01	23
Impervious	B	111949	2.57	98	0.20	0.04	0.99	9195
Open Space	B	177725	4.08	61	6.39	1.28	0.00	15
Total			7.37					9233

Equivalent Impervious Area:

9,233 / (0.0833 ft. * 43,560 sq. ft. / acre)

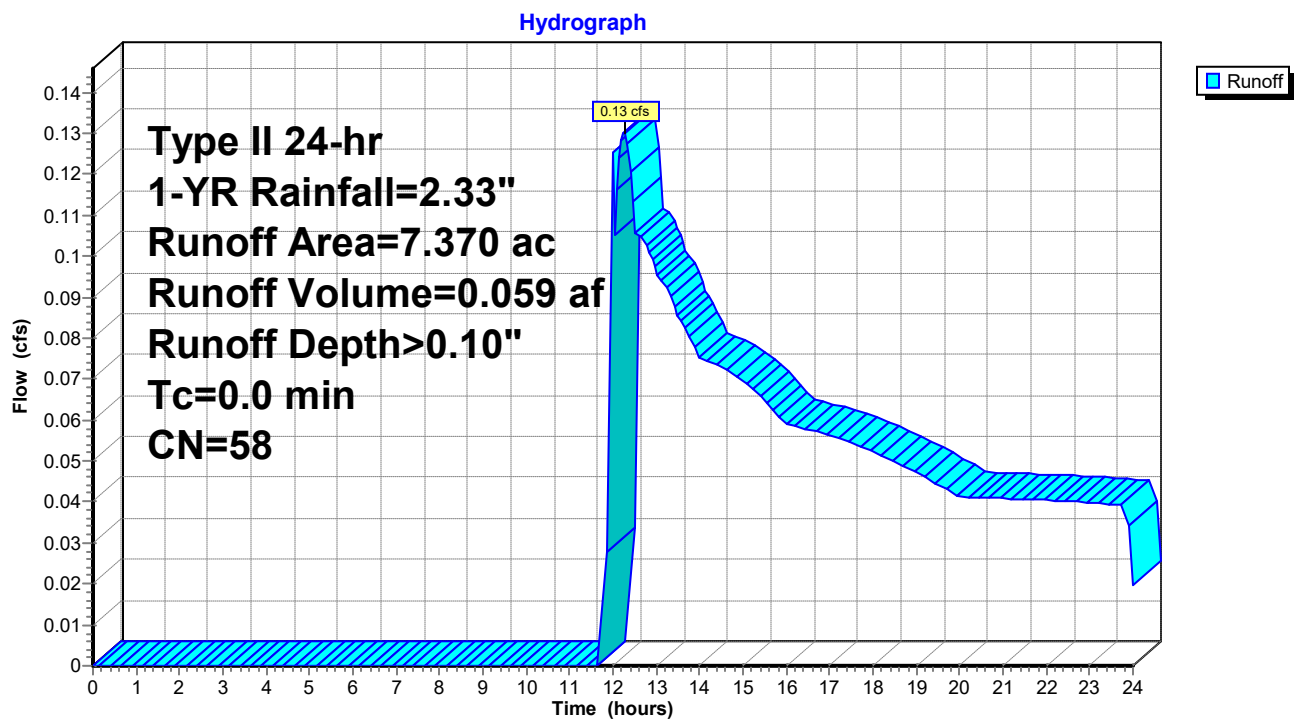
2.54 acres

Summary for Subcatchment WS-3: WS-3 P-2

Runoff = 0.13 cfs @ 12.26 hrs, Volume= 0.059 af, Depth> 0.10"
 Routed to nonexistent node P-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
 Type II 24-hr 1-YR Rainfall=2.33"

Area (ac)	CN	Description
7.370	58	Meadow, non-grazed, HSG B
7.370		100.00% Pervious Area

Subcatchment WS-3: WS-3 P-2

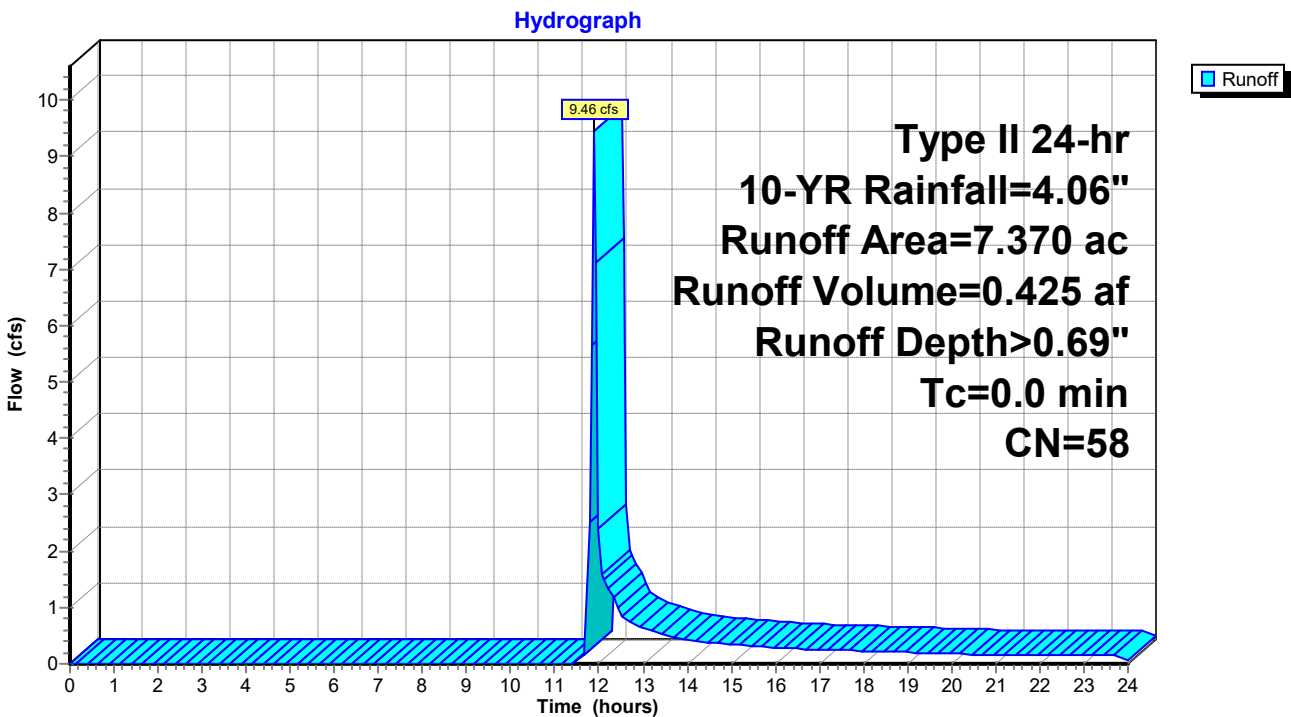
Summary for Subcatchment WS-3: WS-3 P-2

Runoff = 9.46 cfs @ 11.91 hrs, Volume= 0.425 af, Depth> 0.69"
Routed to nonexistent node P-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-YR Rainfall=4.06"

Area (ac)	CN	Description
7.370	58	Meadow, non-grazed, HSG B
7.370		100.00% Pervious Area

Subcatchment WS-3: WS-3 P-2



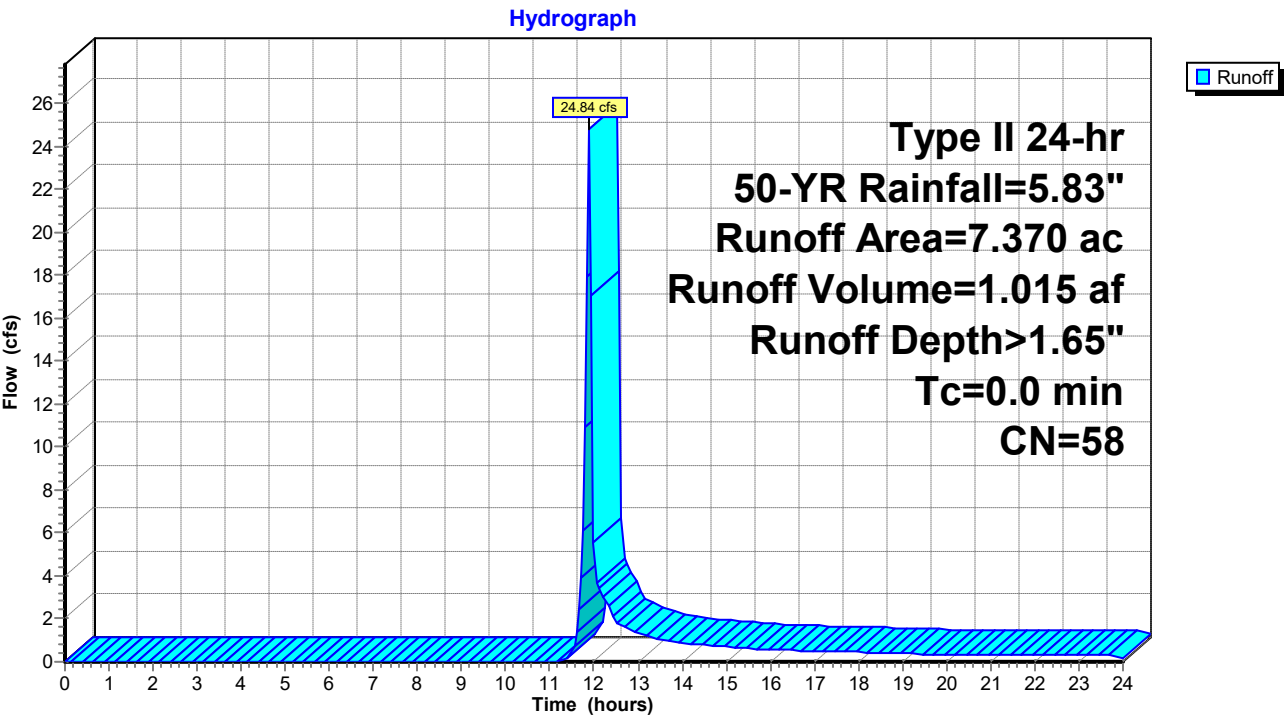
Summary for Subcatchment WS-3: WS-3 P-2

Runoff = 24.84 cfs @ 11.90 hrs, Volume= 1.015 af, Depth> 1.65"
Routed to nonexistent node P-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 50-YR Rainfall=5.83"

Area (ac)	CN	Description
7.370	58	Meadow, non-grazed, HSG B
7.370		100.00% Pervious Area

Subcatchment WS-3: WS-3 P-2



Summary for Subcatchment WS-3: WS-3 P-2

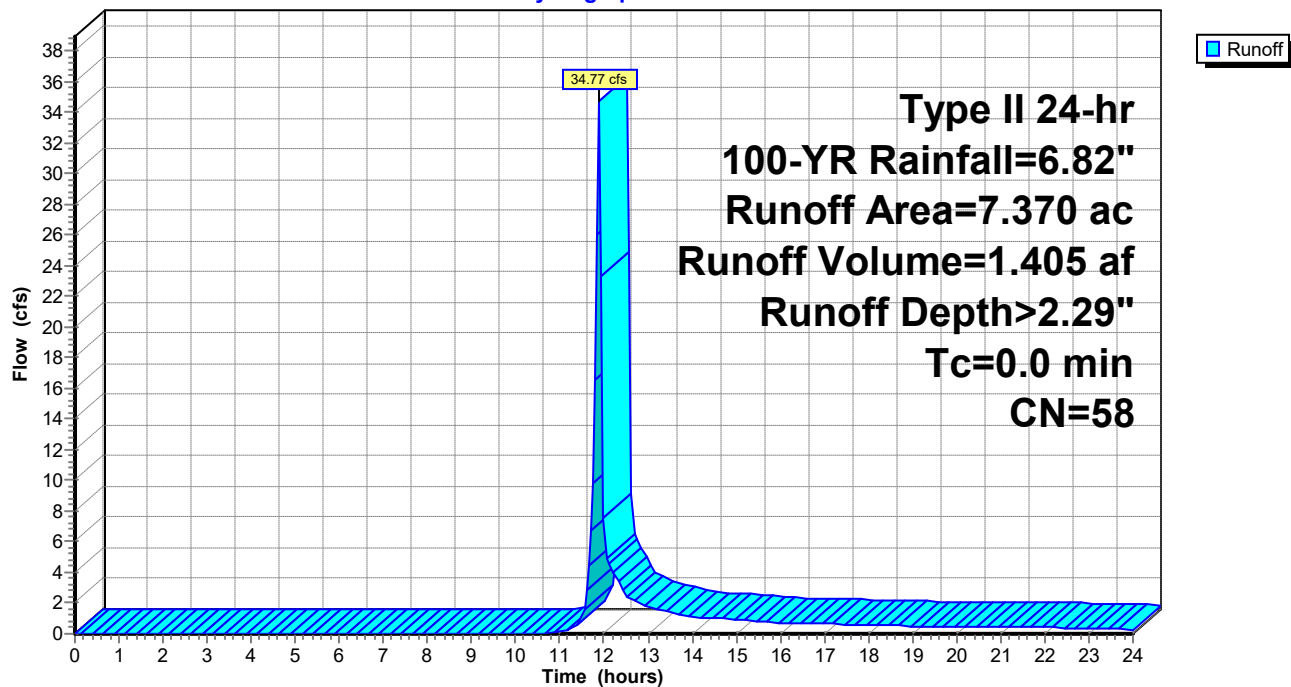
Runoff = 34.77 cfs @ 11.90 hrs, Volume= 1.405 af, Depth> 2.29"
Routed to nonexistent node P-2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-YR Rainfall=6.82"

Area (ac)	CN	Description
7.370	58	Meadow, non-grazed, HSG B
7.370		100.00% Pervious Area

Subcatchment WS-3: WS-3 P-2

Hydrograph



AAMPA Holdings - Ritner Hwy

P-2 MRC Dewatering Time 2 Year Storm Event

*WATER SURFACE ELEVATION	STORAGE VOLUME (Ac. FT.)	STORAGE VOLUME (CU. FT.)	INCREMENTAL STORAGE VOLUME (CF)	** DISCHARGE (CFS)	AVERAGE DISCHARGE (CFS)	TIME (HRS.)	ACCUMULATED TIME (HRS.)
622.00		9408.9		0.00			0.0

AAMPA Holdings - Ritner Hwy

P-2 MRC Dewatering Time 10 Year Storm Event

*WATER SURFACE ELEVATION	STORAGE VOLUME (Ac. FT.)	STORAGE VOLUME (CU. FT.)	INCREMENTAL STORAGE VOLUME (CF)	** DISCHARGE (CFS)	AVERAGE DISCHARGE (CFS)	TIME (HRS.)	ACCUMULATED TIME (HRS.)
622.00		9408.9		0.00			0.0
			9583.2		0.05	53.24	
622.30		18992.1		0.10			53.2
			3920.4		0.24	4.63	
622.42		22912.5		0.37			57.9

AAMPA Holdings - Ritner Hwy

P-2 MRC Dewatering Time 50 Year Storm Event

*WATER SURFACE ELEVATION	STORAGE VOLUME (Ac. FT.)	STORAGE VOLUME (CU. FT.)	INCREMENTAL STORAGE VOLUME (CF)	** DISCHARGE (CFS)	AVERAGE DISCHARGE (CFS)	TIME (HRS.)	ACCUMULATED TIME (HRS.)
622.00		9408.9		0.00			0.0
			9583.2		0.05	53.24	
622.30		18992.1		0.10			53.2
			6577.5		0.50	3.65	
622.50		25569.6		0.90			56.9
			6708.3		1.87	1.00	
622.70		32277.9		2.84			57.9
			4138.2		3.58	0.3	
622.82		36416.1		4.31			58.2

AAMPA Holdings - Ritner Hwy

P-2 MRC Dewatering Time 100 Year Storm Event

*WATER SURFACE ELEVATION	STORAGE VOLUME (Ac. FT.)	STORAGE VOLUME (CU. FT.)	INCREMENTAL STORAGE VOLUME (CF)	** DISCHARGE (CFS)	AVERAGE DISCHARGE (CFS)	TIME (HRS.)	ACCUMULATED TIME (HRS.)
622.00		9408.9		0.00			0.0
			9583.2		0.05	53.24	
622.30		18992.1		0.10			53.2
			6577.5		0.50	3.65	
622.50		25569.6		0.90			56.9
			6708.3		1.87	1.00	
622.70		32277.9		2.84			57.9
			10367.3		4.02	0.7	
623.00		42645.2		5.20			58.6
			3920.37		6.095	0.17867	
623.11		46565.6		6.99			58.8

