

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	2.59	2.59

MRC BMP INFORMATION

MRC BMP Type: **SS-7 – MRC Subsurface Inf. Basin 7** Stormwater BMP Manual Section: **6.4.3**

Will the BMP Include Vegetation? ☐ Yes ☒ No

If Yes, Identify Proposed Vegetation: _____

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

If Yes, Identify Proposed Pre- or Post-Treatment: **Snout, Flexstorm Inlet Filter Bags**

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:

The 2 year – 24 hour Post Development Peak Rate is greater than the 1 year – 24 hour Pre-Development Rate as well as the 100 year – 24 hour Post Development Peak Rate is greater than the Pre-Development Rate. The orifice has been sized to the required size to meet the release rate of 0.01 cfs / acre of equivalent impervious. If the orifice is reduced in size, the dewatering time requirement of a maximum of 7 days will not be met. Without impacting the utilities in and around the subsurface infiltration basin, the basin size can not be increased. In the model, the existing cover is modeled as meadow, which is conservative compared to the actual existing ground cover of row crops. This deviation will not cause accelerated erosion of the existing flow path with the use of rip rap at the outlet pipe. This will slow the flow and spread it out to prevent erosion. O&M instructions are provided on the plan for rip rap to ensure that the rip rap operates as intended. The overall site still has a reduction in outflow from Pre-Development to Post-Development.

With the use of pre-treatment in the form of Flexstorm inlet filter bags, sumps, and snouts, the water quality of the runoff will be treated prior to entering the subsurface basin. With this pre-treatment, the runoff will be at the required water quality prior to either infiltration or discharge from the subsurface basin.

MRC BMP DESIGN VALUES AND STANDARDS		
Parameter	Design Value	Design Standard
Actual Contributing Impervious Area to BMP (acres)	2.59	
Equivalent Contributing Impervious Area to BMP (acres)	2.55	
Total Drainage Area to BMP (acres)	2.59	
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)	34,251	
Bottom BMP Elevation (Native Soils) (ft)	603.00	
2-Yr/24-Hr Storm Ponding Depth (ft)	1.10	<i>1 ft (recommended) (2 ft max)</i>
Maximum Ponding Depth (ft)	2.45	<i>4 ft (max)</i>
Overflow Bypass Elevation (ft)	605.00	
Media Depth (ft)	3.5	<i>2 ft (min) – 4 ft (max)</i>
Media Void Space (%)	100/30/15	
Internal Water Storage (IWS) Depth (ft)	1.0	<i>1 ft recommended</i>
Top of IWS Elevation (ft)	604.00	
Underdrain Pipe Diameter (in)	18.0	
Underdrain Orifice Diameter (in)	1.1	
Underdrain Outlet Elevation (ft)	604.00	
IWS Available for Routing (%)	50 – in stone	<i>50% max</i>
Separation Distance (Groundwater) (ft)	>1.0	<i>1 ft (min) (2 ft recommended)</i>
Infiltration Rate (in/hr)	0.00	
Volume of Overflow During 1.2-Inch/2-Hour Storm (cf)	0	<i>0 (No overflow allowed)</i>
1-Yr/24-Hr Pre -Development Peak Rate (cfs)	0.05	
2-Yr/24-Hr Post -Development Peak Rate (cfs)	0.14	<i>1-Yr/24-Hr Pre-Development Peak Rate (or per approved Act 167 Plan)</i>
10-Yr/24-Hr Post -Development Peak Rate (cfs)	1.04	<i>10-Yr/24-Hr Pre-Development Peak Rate</i>
50-Yr/24-Hr Post -Development Peak Rate (cfs)	7.60	<i>50-Yr/24-Hr Pre-Development Peak Rate</i>
100-Yr/24-Hr Post -Development Peak Rate (cfs)	13.36	<i>100-Yr/24-Hr Pre-Development Peak Rate</i>
Total 2-Yr/24-Hr Runoff Volume Managed by BMP (cf)	16,161	
Ponding Time @ 2-Yr/24-Hr Storm (hrs)	158.9	<i>72 hrs (surface), 7 days (underground)</i>
Ponding Time @ 10-Yr/24-Hr Storm (hrs)	158.9	<i>72 hrs (surface), 7 days (underground)</i>
Ponding Time @ 50-Yr/24-Hr Storm (hrs)	159.7	<i>72 hrs (surface), 7 days (underground)</i>
Ponding Time @ 100-Yr/24-Hr Storm (hrs)	159.7	<i>72 hrs (surface), 7 days (underground)</i>

Justin T. Doty

Licensed P.E. Name

Licensed P.E. Signature

PE080613

License No.

03-05-25

Date



Summary for Subcatchment WS-12: WS-12

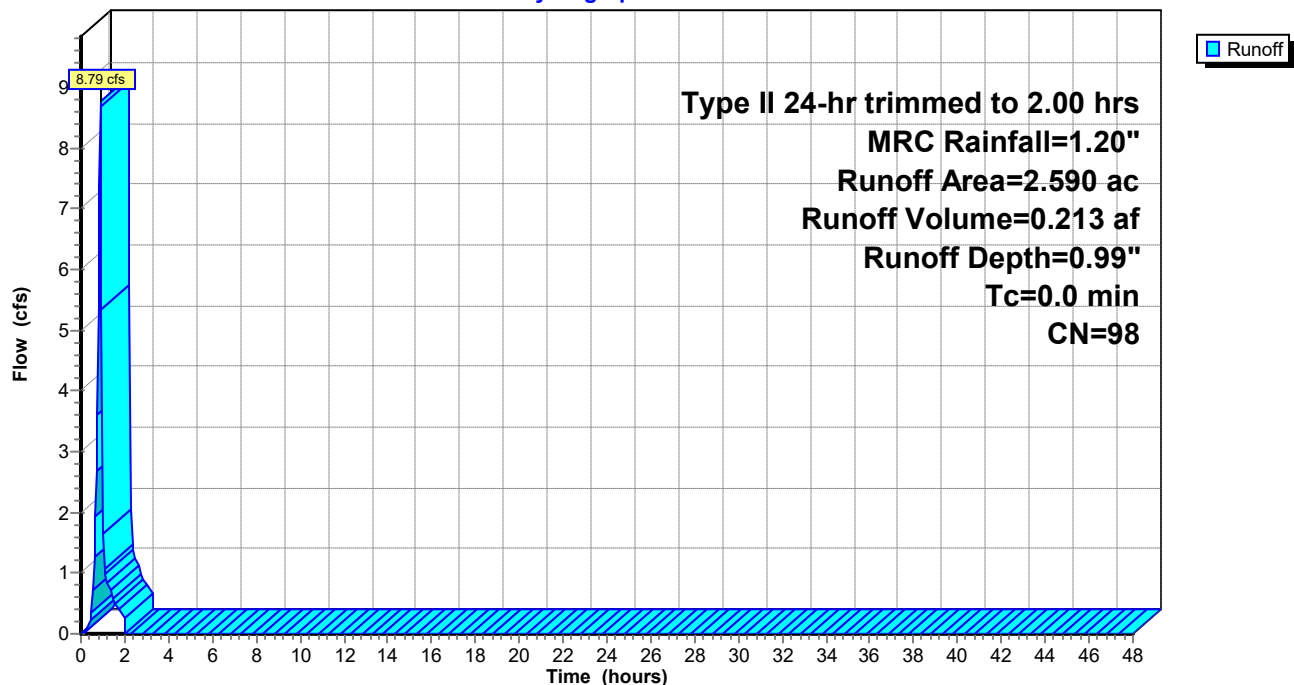
Runoff = 8.79 cfs @ 0.89 hrs, Volume= 0.213 af, Depth= 0.99"
Routed to Pond SS-7 : SS-7

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
2.590	98	Paved parking, HSG B
2.590		100.00% Impervious Area

Subcatchment WS-12: WS-12

Hydrograph



Summary for Pond SS-7: SS-7

Inflow Area = 2.590 ac, 100.00% Impervious, Inflow Depth = 0.99" for MRC event
 Inflow = 8.79 cfs @ 0.89 hrs, Volume= 0.213 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Reach OUT-C : BYPASS PIPE C OUTLET

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 603.98' @ 2.05 hrs Surf.Area= 0.790 ac Storage= 0.213 af

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

Volume	Invert	Avail.Storage	Storage Description
#1	603.00'	0.250 af	Custom Stage Data (Prismatic) Listed below (Recalc) 1.185 af Overall - 0.074 af Embedded = 1.111 af x 22.5% Voids
#2	603.00'	0.074 af	18.0" Round Pipe Storage Inside #1 L= 1,813.0'
#3	604.50'	0.474 af	Custom Stage Data (Prismatic) Listed below (Recalc) 1.580 af Overall x 30.0% Voids
#4	606.50'	0.434 af	Custom Stage Data (Prismatic) Listed below (Recalc)
		1.232 af	Total Available Storage

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
603.00	0.790	0.000	0.000
604.50	0.790	1.185	1.185

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
604.50	0.790	0.000	0.000
606.50	0.790	1.580	1.580

Elevation (feet)	Surf.Area (acres)	Voids (%)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
606.50	0.790	0.0	0.000	0.000
607.85	0.790	0.0	0.000	0.000
608.00	5.000	100.0	0.434	0.434

Device	Routing	Invert	Outlet Devices
#1	Device 4	604.00'	1.1" Vert. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#2	Device 4	605.00'	1.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s) 0.7' Crest Height
#3	Device 4	605.70'	4.0' long Sharp-Crested Rectangular Weir 2 End Contraction(s)
#4	Primary	603.00'	24.0" Round Culvert L= 86.0' Ke= 1.000 Inlet / Outlet Invert= 603.00' / 600.34' S= 0.0309 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=603.00' (Free Discharge)

4=Culvert (Controls 0.00 cfs)

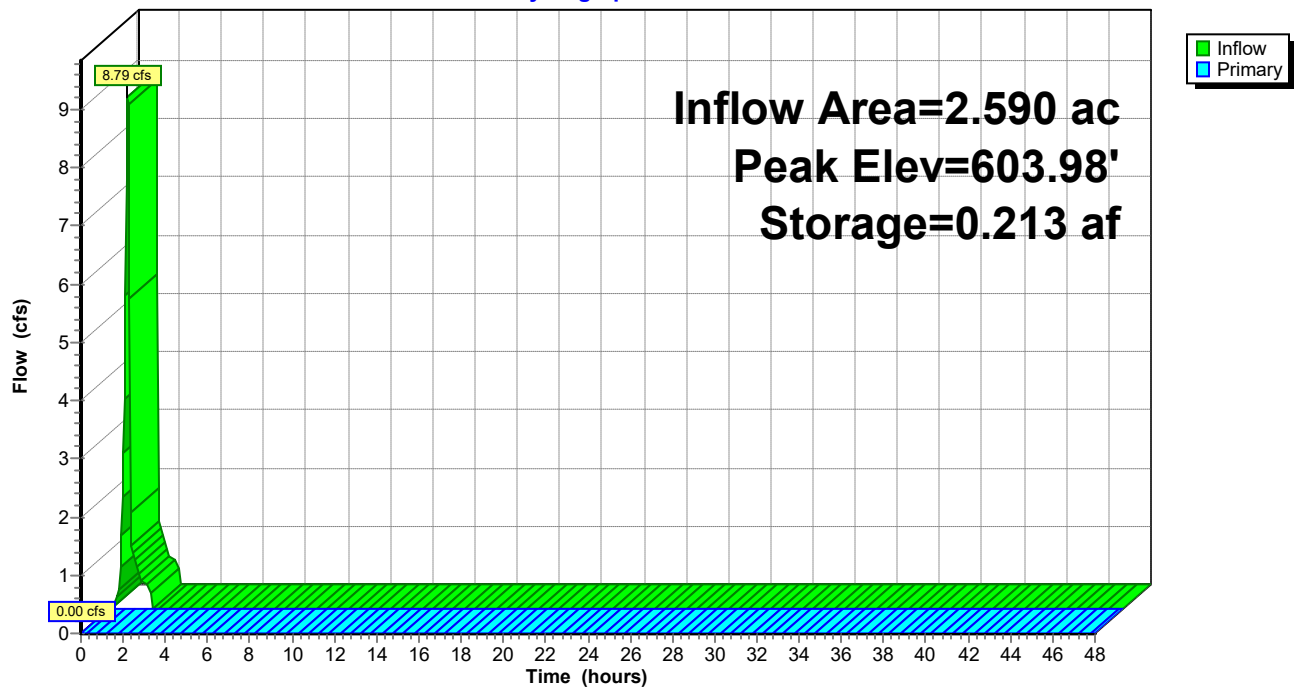
1=Orifice/Grate (Controls 0.00 cfs)

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

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

Pond SS-7: SS-7

Hydrograph



Stage-Discharge for Pond SS-7: SS-7

Elevation (feet)	Primary (cfs)	Elevation (feet)	Primary (cfs)
603.00	0.00	605.60	1.52
603.05	0.00	605.65	1.70
603.10	0.00	605.70	1.89
603.15	0.00	605.75	2.23
603.20	0.00	605.80	2.69
603.25	0.00	605.85	3.24
603.30	0.00	605.90	3.85
603.35	0.00	605.95	4.52
603.40	0.00	606.00	5.23
603.45	0.00	606.05	6.00
603.50	0.00	606.10	6.80
603.55	0.00	606.15	7.63
603.60	0.00	606.20	8.51
603.65	0.00	606.25	9.41
603.70	0.00	606.30	10.35
603.75	0.00	606.35	11.31
603.80	0.00	606.40	12.30
603.85	0.00	606.45	13.31
603.90	0.00	606.50	14.34
603.95	0.00	606.55	15.40
604.00	0.00	606.60	16.47
604.05	0.00	606.65	17.57
604.10	0.01	606.70	18.64
604.15	0.01	606.75	18.81
604.20	0.01	606.80	18.98
604.25	0.01	606.85	19.15
604.30	0.02	606.90	19.32
604.35	0.02	606.95	19.49
604.40	0.02	607.00	19.65
604.45	0.02	607.05	19.81
604.50	0.02	607.10	19.97
604.55	0.02	607.15	20.14
604.60	0.02	607.20	20.29
604.65	0.02	607.25	20.45
604.70	0.03	607.30	20.61
604.75	0.03	607.35	20.76
604.80	0.03	607.40	20.92
604.85	0.03	607.45	21.07
604.90	0.03	607.50	21.22
604.95	0.03	607.55	21.38
605.00	0.03	607.60	21.53
605.05	0.07	607.65	21.67
605.10	0.14	607.70	21.82
605.15	0.22	607.75	21.97
605.20	0.32	607.80	22.12
605.25	0.44	607.85	22.26
605.30	0.57	607.90	22.40
605.35	0.70	607.95	22.55
605.40	0.85	608.00	22.69
605.45	1.01		
605.50	1.17		
605.55	1.34		

Stage-Area-Storage for Pond SS-7: SS-7

Elevation (feet)	Storage (acre-feet)	Elevation (feet)	Storage (acre-feet)
603.00	0.000	605.60	0.584
603.05	0.009	605.65	0.596
603.10	0.019	605.70	0.608
603.15	0.030	605.75	0.620
603.20	0.040	605.80	0.632
603.25	0.051	605.85	0.644
603.30	0.061	605.90	0.655
603.35	0.072	605.95	0.667
603.40	0.083	606.00	0.679
603.45	0.094	606.05	0.691
603.50	0.106	606.10	0.703
603.55	0.117	606.15	0.715
603.60	0.128	606.20	0.727
603.65	0.139	606.25	0.738
603.70	0.151	606.30	0.750
603.75	0.162	606.35	0.762
603.80	0.173	606.40	0.774
603.85	0.184	606.45	0.786
603.90	0.196	606.50	0.798
603.95	0.207	606.55	0.798
604.00	0.218	606.60	0.798
604.05	0.229	606.65	0.798
604.10	0.240	606.70	0.798
604.15	0.251	606.75	0.798
604.20	0.262	606.80	0.798
604.25	0.273	606.85	0.798
604.30	0.284	606.90	0.798
604.35	0.294	606.95	0.798
604.40	0.304	607.00	0.798
604.45	0.314	607.05	0.798
604.50	0.324	607.10	0.798
604.55	0.335	607.15	0.798
604.60	0.347	607.20	0.798
604.65	0.359	607.25	0.798
604.70	0.371	607.30	0.798
604.75	0.383	607.35	0.798
604.80	0.395	607.40	0.798
604.85	0.407	607.45	0.798
604.90	0.418	607.50	0.798
604.95	0.430	607.55	0.798
605.00	0.442	607.60	0.798
605.05	0.454	607.65	0.798
605.10	0.466	607.70	0.798
605.15	0.478	607.75	0.798
605.20	0.490	607.80	0.798
605.25	0.501	607.85	0.798
605.30	0.513	607.90	0.872
605.35	0.525	607.95	1.017
605.40	0.537	608.00	1.232
605.45	0.549		
605.50	0.561		
605.55	0.572		

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

SS-7:

BMP Invert: 603.00

Overflow Discharge Invert: 605.70

Total Volume Depth Below Overflow: **2.70'**

Volume at Elevation 605.70 (from HydroCAD): **0.371 ac-ft**

$$\mathbf{0.371\ ac\text{-}ft * 43,560\ cu\text{-}ft = \underline{16,161\ ft^3}}$$

WORKSHEET 4 - EQUIVALENT IMPERVIOUS AREA CALCULATIONS

PROJECT AAMPA Holdings - Ritner Hwy
 Drainage Area: WS-12 MRC
 1.2in-2hr Rainfall 1.20 in

Managed Area 2.59 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	0	0.00	58	7.24	1.45	0.01	0
Impervious	B	112820	2.59	98	0.20	0.04	0.99	9267
Open Space	B	0	0.00	61	6.39	1.28	0.00	0
Total			2.59					9267

Equivalent Impervious Area:

9,267 / (0.0833 ft. * 43,560 sq. ft. / acre)

2.55 acres

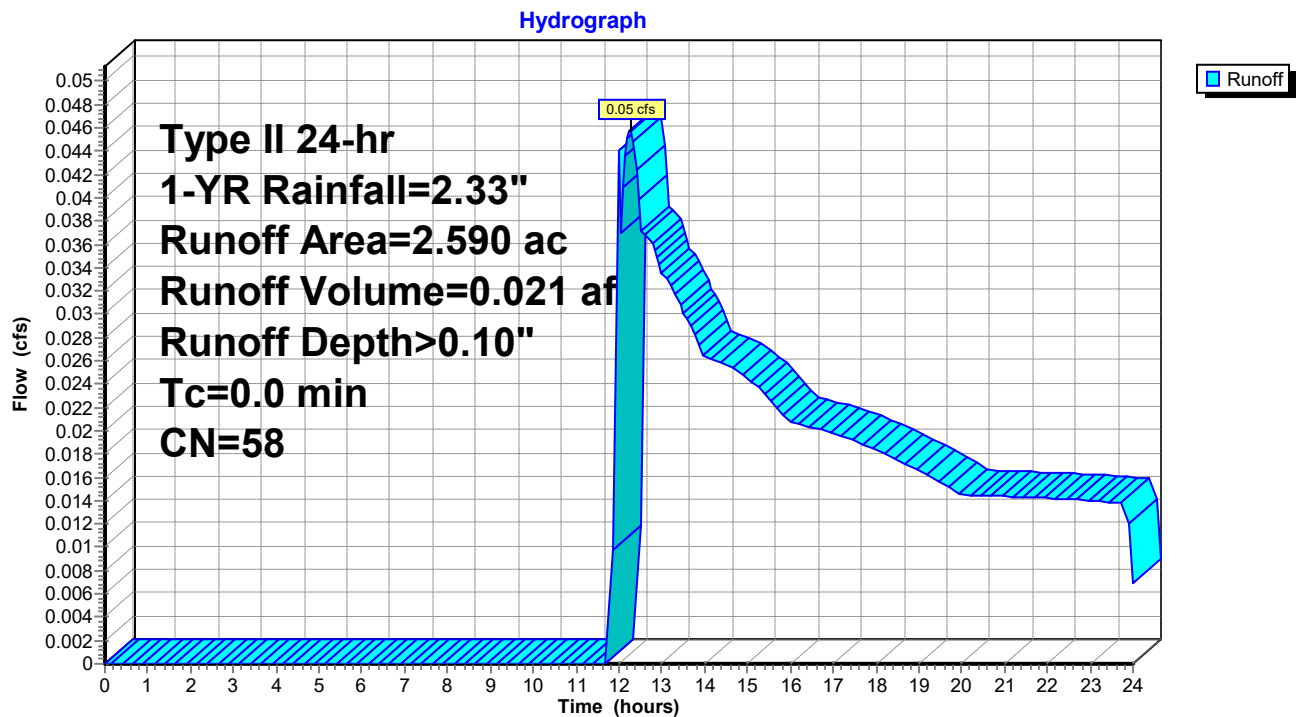
Summary for Subcatchment WS-12: WS-12 SS-7

Runoff = 0.05 cfs @ 12.26 hrs, Volume= 0.021 af, Depth> 0.10"
Routed to nonexistent node SS-7

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
2.590	58	Meadow, non-grazed, HSG B
2.590		100.00% Pervious Area

Subcatchment WS-12: WS-12 SS-7

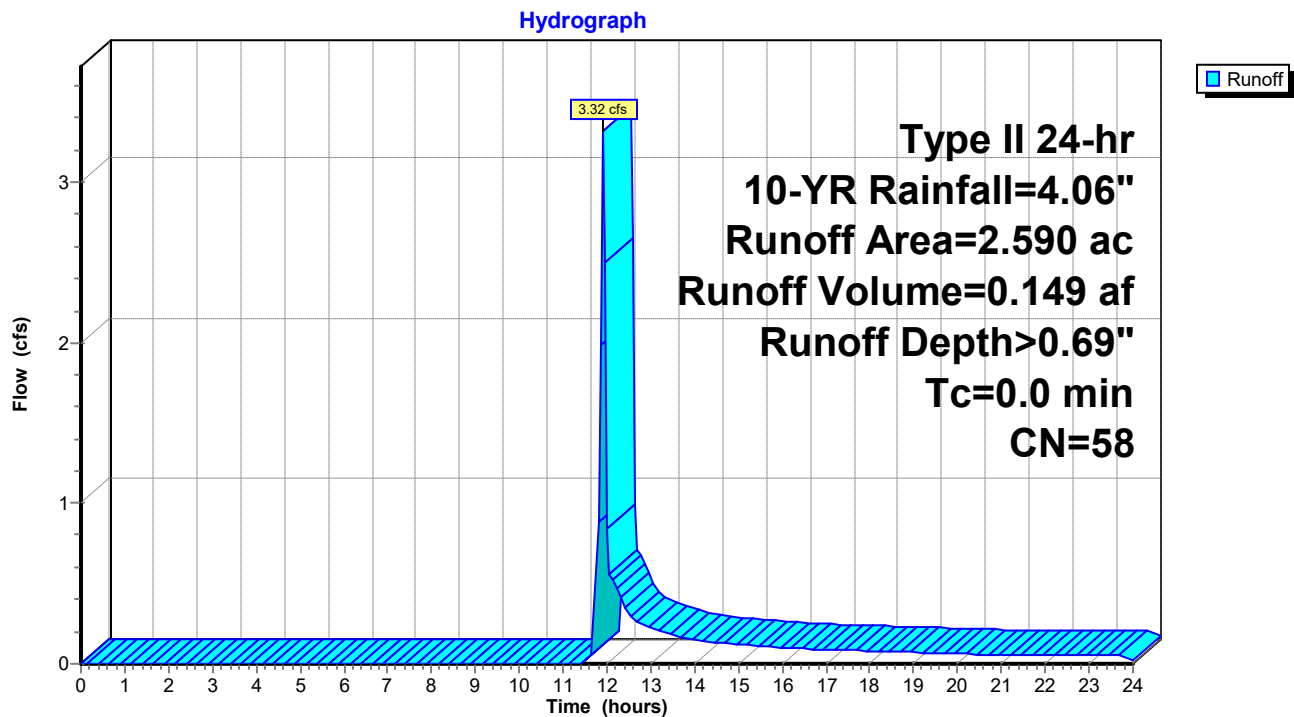


Summary for Subcatchment WS-12: WS-12 SS-7

Runoff = 3.32 cfs @ 11.91 hrs, Volume= 0.149 af, Depth> 0.69"
 Routed to nonexistent node SS-7

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
2.590	58	Meadow, non-grazed, HSG B
2.590		100.00% Pervious Area

Subcatchment WS-12: WS-12 SS-7

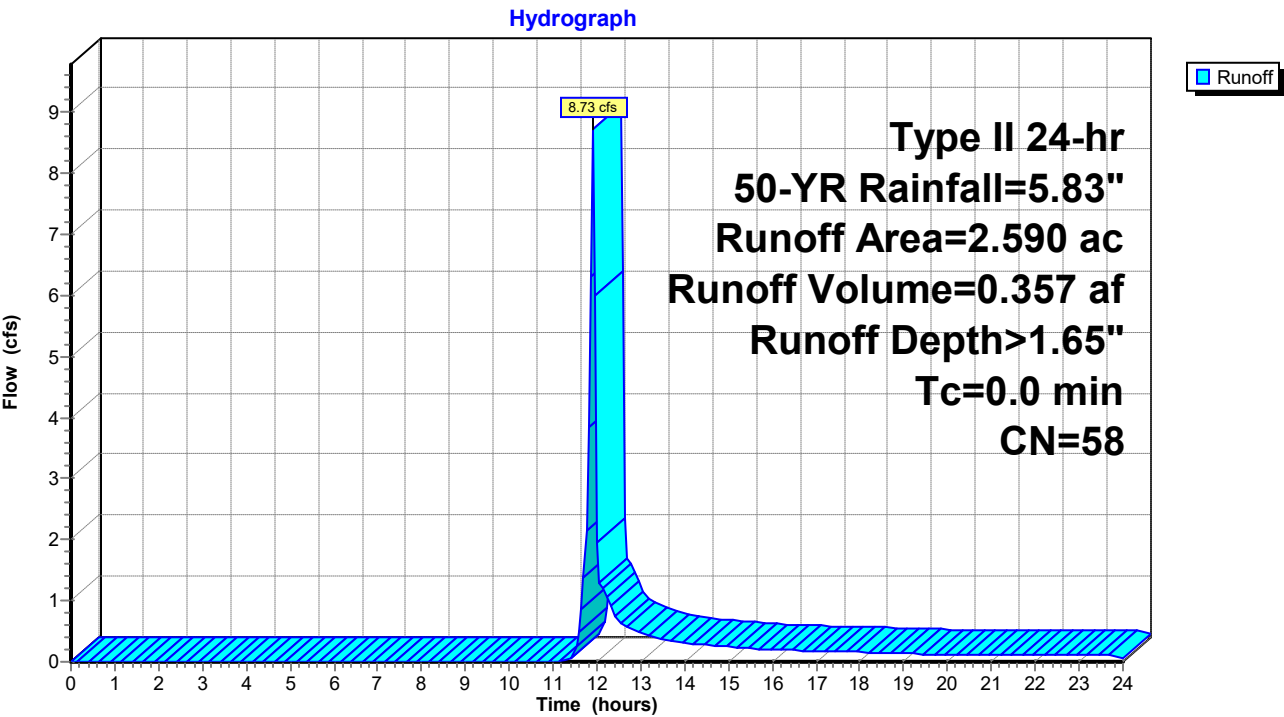
Summary for Subcatchment WS-12: WS-12 SS-7

Runoff = 8.73 cfs @ 11.90 hrs, Volume= 0.357 af, Depth> 1.65"
Routed to nonexistent node SS-7

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
2.590	58	Meadow, non-grazed, HSG B
2.590		100.00% Pervious Area

Subcatchment WS-12: WS-12 SS-7

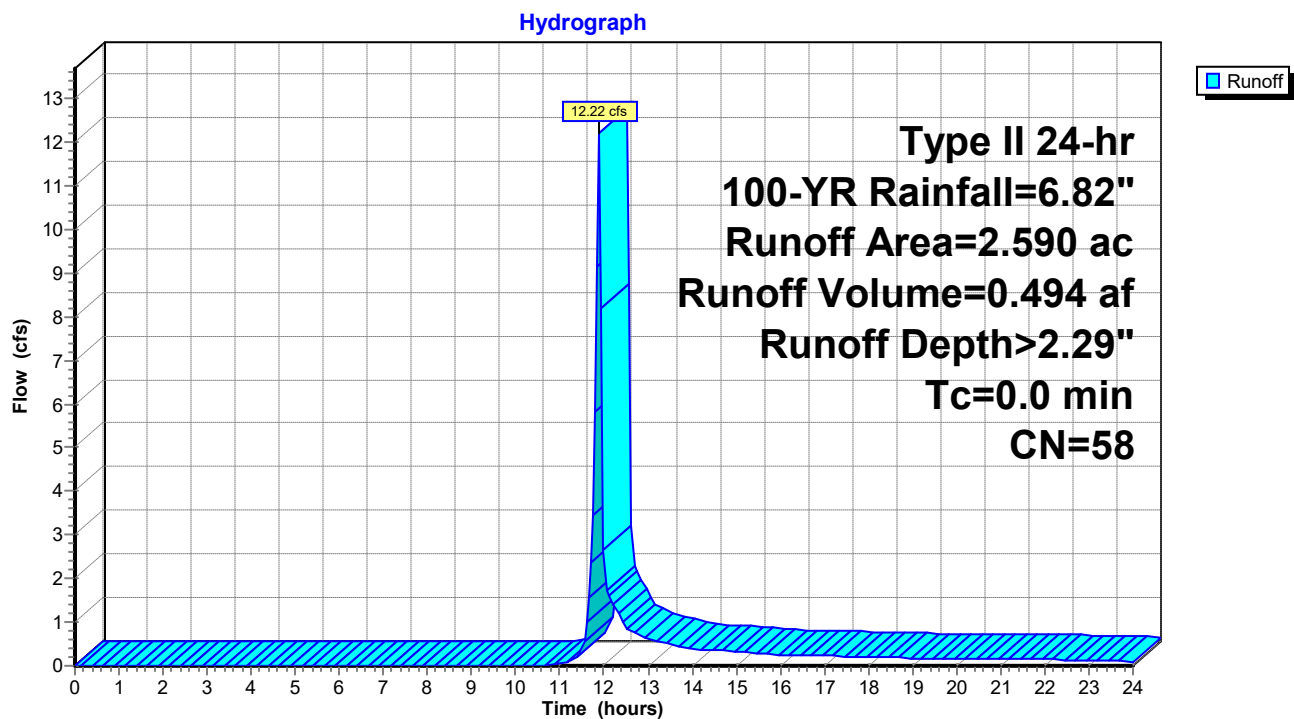


Summary for Subcatchment WS-12: WS-12 SS-7

Runoff = 12.22 cfs @ 11.90 hrs, Volume= 0.494 af, Depth> 2.29"
Routed to nonexistent node SS-7

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
2.590	58	Meadow, non-grazed, HSG B
2.590		100.00% Pervious Area

Subcatchment WS-12: WS-12 SS-7

AAMPA Holdings - Ritner Hwy

SS-7 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.)
604.00		9496.1		0.00			0.0
			2874.9		0.01	79.86	
604.30		12371.0		0.02			79.9
			1742.4		0.02	24.20	
604.50		14113.4		0.02			104.1
			2047.3		0.025	22.75	
604.70		16160.7		0.03			126.8
			3092.8		0.03	28.6	
605.00		19253.5		0.03			155.4
			1045.43		0.085	3.416438	
605.10		20298.93		0.14			158.9

AAMPA Holdings - Ritner Hwy

SS-7 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.)
604.00		9496.1		0.00			0.0
			2874.9		0.01	79.86	
604.30		12371.0		0.02			79.9
			1742.4		0.02	24.20	
604.50		14113.4		0.02			104.1
			2047.3		0.025	22.75	
604.70		16160.7		0.03			126.8
			3092.8		0.03	28.6	
605.00		19253.5		0.03			155.4
			3092.8		0.3	2.863704	
605.30		22346.3		0.57			158.3
			1655.2		0.805	0.571153	
605.46		24001.5		1.04			158.9

AAMPA Holdings - Ritner Hwy

SS-7 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.)
604.00		9496.1		0.00			0.0
			2874.9		0.01	79.86	
604.30		12371.0		0.02			79.9
			1742.4		0.02	24.20	
604.50		14113.4		0.02			104.1
			2047.3		0.025	22.75	
604.70		16160.7		0.03			126.8
			3092.8		0.03	28.6	
605.00		19253.5		0.03			155.4
			3092.8		0.3	2.863704	
605.30		22346.3		0.57			158.3
			2090.8		0.87	0.667561	
605.50		24437.1		1.17			159.0
			2047.3		1.53	0.37	
605.70		26484.4		1.89			159.3
			3072.8		3.56	0.24	
606.00		29557.2		5.23			159.6
			1675.3		6.43	0.1	
606.15		31232.47		7.63			159.7

AAMPA Holdings - Ritner Hwy

SS-7 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.)
604.00		9496.1		0.00			0.0
			2874.9		0.01	79.86	
604.30		12371.0		0.02			79.9
			1742.4		0.02	24.20	
604.50		14113.4		0.02			104.1
			2047.3		0.025	22.75	
604.70		16160.7		0.03			126.8
			3092.8		0.03	28.6	
605.00		19253.5		0.03			155.4
			3092.8		0.3	2.863704	
605.30		22346.3		0.57			158.3
			2090.8		0.87	0.667561	
605.50		24437.1		1.17			159.0
			2047.3		1.53	0.37	
605.70		26484.4		1.89			159.3
			3072.8		3.56	0.24	
606.00		29557.2		5.23			159.6
			3112.8		7.79	0.1	
606.30		32670.0		10.35			159.7
			1568.1		11.83	0.03682	
606.45		34238.1		13.31			159.7

