ZEBULON
NORTH CAROLINA

Zebulon Public Safety Station

201 W Judd St
Zebulon, NC 27597

Stormwater Management Design Narrative & Calculations

2nd Submittal
June 2025

NORTH CAROLINA PROFESSIONAL SEAL 022625 ENGINEER STEVEN J. MILLER

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Stormwater Management Design Narrative
Zebulon Public Safety Station
CLH Project No.: 22-154
June 2025

PROJECT DESCRIPTION

The Zebulon Public Safety Station project site is located on a 11.13-acre property in Zebulon, NC. This project proposes dividing the existing property and extending the street right-of-way, creating a new 4.93-acre property for the construction of a new emergency responder facility. The proposed construction includes a new building and associated parking, curb and gutter, sidewalks, storm drainage, utilities, landscaping, etc. The construction area is currently undeveloped. The proposed elements will result in a Built-Upon Area (BUA) of 1.97-acres, approximately 40% of the new property.

Soils on the site consist mostly of Wedowee-Urban land complex (WgB – Hydrologic Soil Group B).

The site is located within the Neuse river basin and stormwater runoff from the property discharges southwest towards Little River (Stream Index: 27-57-(8.5), Classification WS-V;NSW).

FEMA FIRM #3720270500K, dated 07/19/2022, indicates that the site does not reside within any flood hazard areas. The FEMA map is provided for reference.

VOLUME MANAGEMENT / DOWNSTREAM IMPACT ANALYSIS

The site is designed to meet the Wake County stormwater requirements for peak runoff flow. Our analysis splits the site into two drainage areas. Drainage area A is located on the western side of the property and drains towards the existing wetlands. Drainage area B is located on the eastern side of the property and drains into the road's stormwater drainage pipe system. A constructed wetland SCM will be installed in both drainage areas, labeled SCM-1 and SCM-2. These SCM's have sufficient treatment volume for the first 1" of rain and enough detention to allow their respective drainage areas to meet the overall pre-development flow rates for the 1-yr, 2-yr, and 10-yr 24-hr storm events.

The time of concentrations were calculated using the TR-55 method, refer to calculations. The TR-55 flow paths are shown on sheets C302 & C303. The stormwater flow calculations were performed with Hydraflow Hydrographs Extension for AutoCAD Civil 3D software which utilizes the SCS method.

The summary of the Hydraflow routing is as follows. Refer to Pre/Post Development Analysis and Hydraflow Calculations for more details.

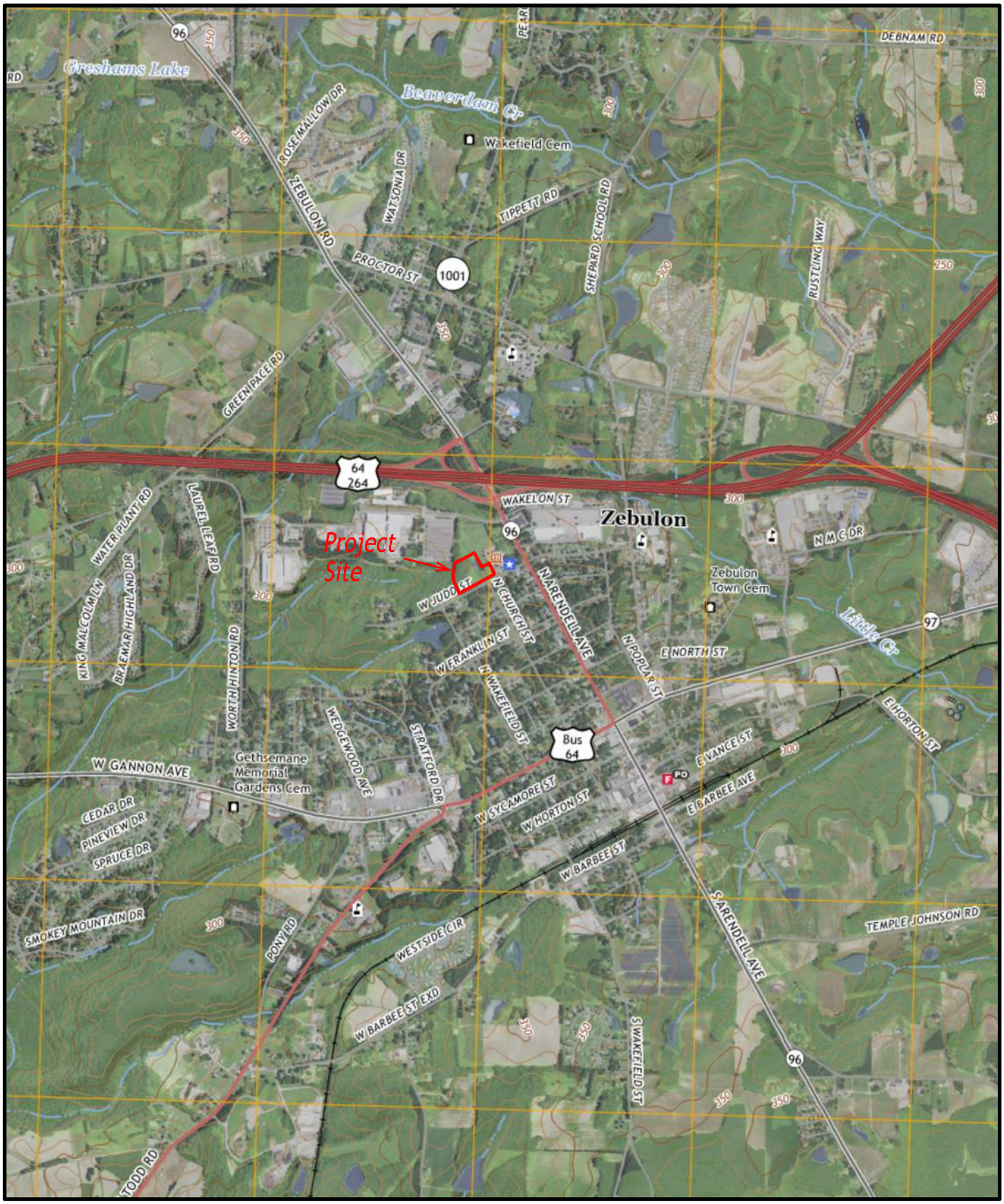
Area A Stormwater Peak Flow Summary	Pre-Development	Post-Development (without detention)	Post-Development (with detention)	Pre/Post Volume Reduction?
1-yr, 24-hr Storm	0.438 cfs	2.199 cfs	0.396 cfs	Yes
2-yr, 24-hr Storm	1.205 cfs	3.637 cfs	1.116 cfs	Yes
10-yr, 24-hr Storm	4.634 cfs	8.259 cfs	4.279 cfs	Yes

Area B Stormwater Peak Flow Summary	Pre-Development	Post-Development (without detention)	Post-Development (with detention)	Pre/Post Volume Reduction?
1-yr, 24-hr Storm	6.816 cfs	10.17 cfs	6.655 cfs	Yes
2-yr, 24-hr Storm	10.05 cfs	14.14 cfs	9.108 cfs	Yes
10-yr, 24-hr Storm	19.96 cfs	25.99 cfs	17.72 cfs	Yes

NUTRIENT CONTROL

This project proposes reducing nitrogen export by utilizing two wetland SCM's. Refer to Wake County Municipal Stormwater Tool. The runoff from approximately 2.16-ac of impervious areas will be directed to the wetlands for treatment. This will reduce the on-site nitrogen loading rate to 8.89 lbs/ac/yr, see Wake County Municipal Stormwater Tool. The target nitrogen loading rate is 3.60-lb/ac/yr, thus an offset fee will be required.

Maps

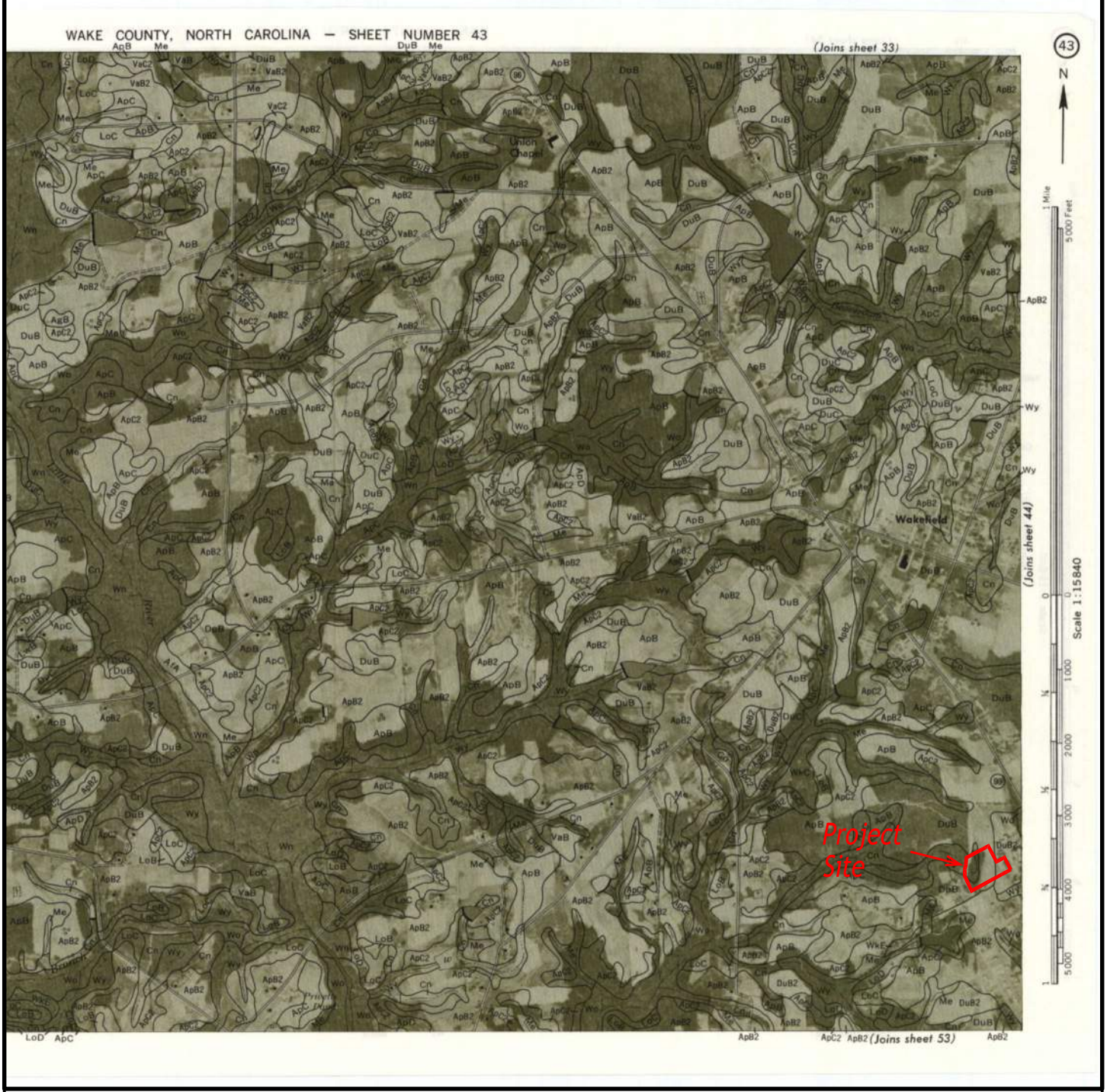


Town of Zebulon
Zebulon Public Safety Station

North
Scale: 1" = 2,000'

Portion of USGS Quad Map

Zebulon, NC - 2022

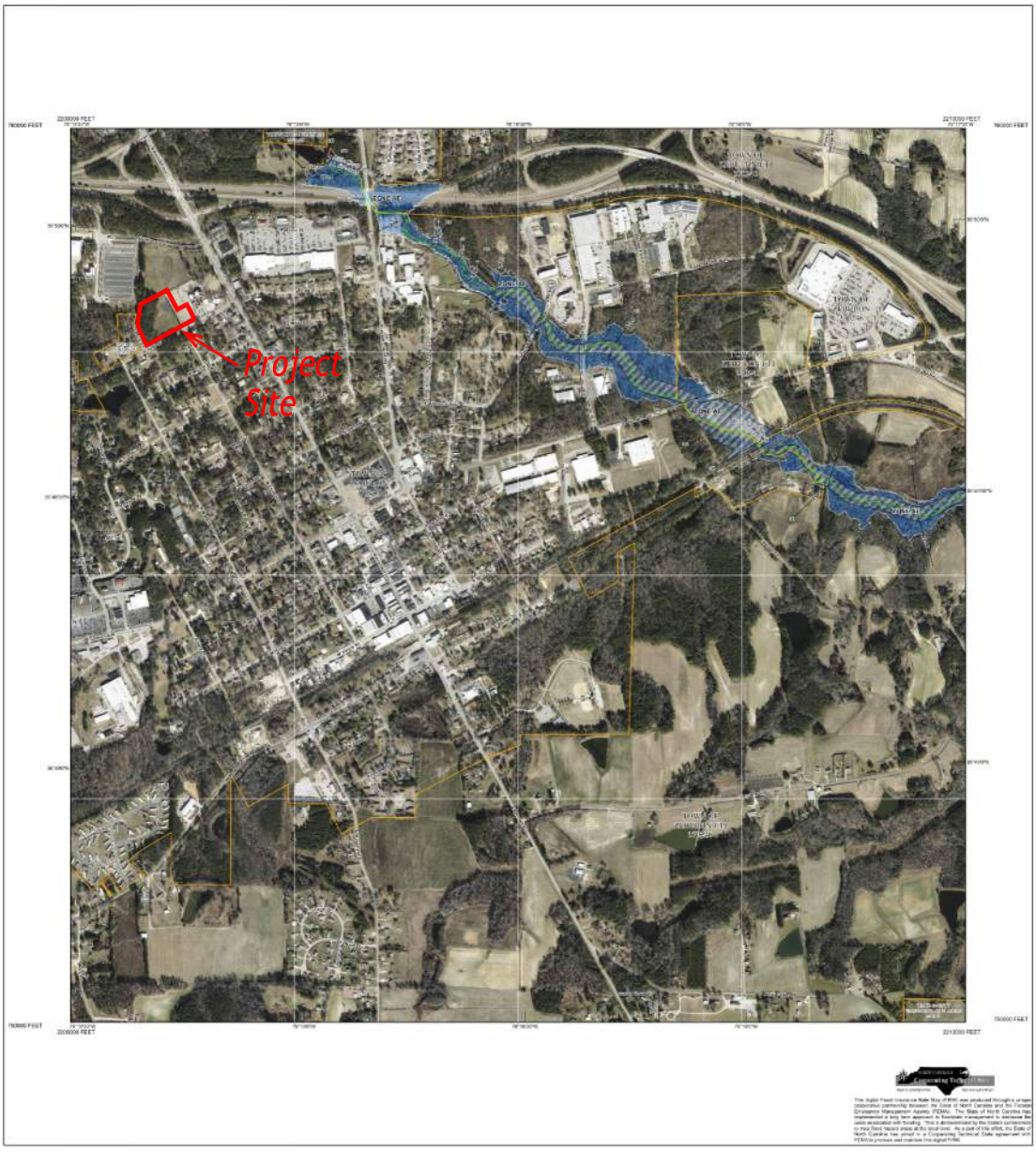


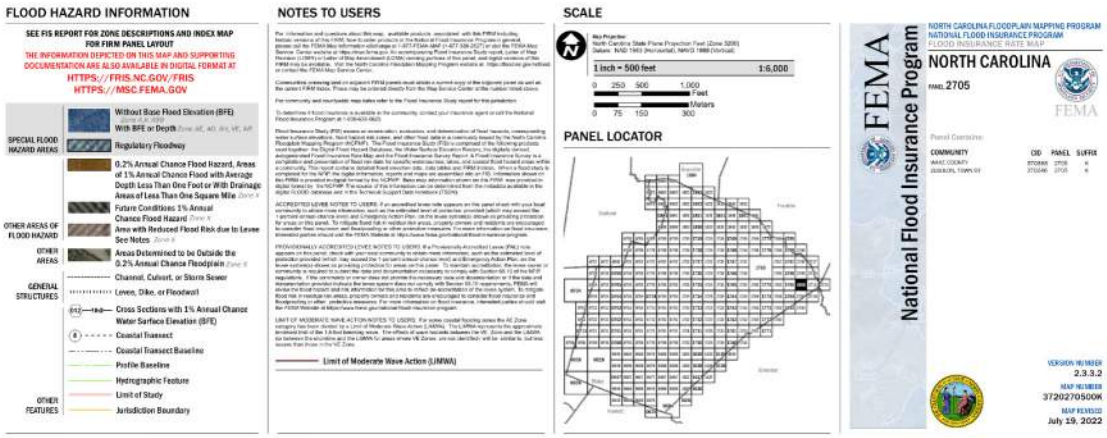
Town of Zebulon
Zebulon Public Safety Station

North
Scale: 1" = 2,000'

Portion of NRCS Soil Map

Wake County, NC - #43





Town of Zebulon
Zebulon Public Safety Station

North
Scale: 1" = 2,000'

Portion of FEMA FIRM Panel
#3720270500K

Supporting Calculations

STORMWATER PRE/POST DEVELOPMENT ANALYSIS	DATE 5/13/2025	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

STORMWATER ANALYSIS POINT: 'A'

Runoff Calculations

Pre-Development On-Site:

Site Area =	3.33 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	1.75 ac	CN=	55
Impervious Area:	0.00 ac	CN=	98
Lawn Area:	1.58 ac	CN=	61
Weighted CN:			57.8

Pre-Development Off-Site:

Site Area =	0.46 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.05 ac	CN=	98
Lawn Area:	0.41 ac	CN=	61
Weighted CN:			65.0

Post-Development On-Site:

Site Area =	3.10 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	1.32 ac	CN=	55
Impervious Area:	1.00 ac	CN=	98
Lawn Area:	0.78 ac	CN=	61
Future Impervious:	0.00 ac	CN=	98
Weighted CN:			70.4

Post-Development Off-Site:

Site Area =	0.45 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.16 ac	CN=	98
Lawn Area:	0.29 ac	CN=	61
Future Impervious:	0.00 ac	CN=	98
Weighted CN:			74.2

STORMWATER PRE/POST DEVELOPMENT ANALYSIS	DATE 5/13/2025	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

STORMWATER ANALYSIS POINT: 'SCM-2 & Bypass'

Runoff Calculations

SCM-1 On-Site:

Site Area =	1.53 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	1.00 ac	CN=	98
Lawn Area:	0.53 ac	CN=	61
Weighted CN:			85.2

SCM-1 Off-Site:

Site Area =	0.18 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.16 ac	CN=	98
Lawn Area:	0.02 ac	CN=	61
Future Impervious:	0.00 ac	CN=	98
Weighted CN:			93.9

Area A On-Site Bypass:

Site Area =	1.57 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.00 ac	CN=	98
Lawn Area:	1.57 ac	CN=	61
Weighted CN:			61.0

Area A Off-Site Bypass:

Site Area =	0.27 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.00 ac	CN=	98
Lawn Area:	0.27 ac	CN=	61
Future Impervious:	0.00 ac	CN=	98
Weighted CN:			61.0

STORMWATER PRE/POST DEVELOPMENT ANALYSIS	DATE 5/13/2025	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

STORMWATER ANALYSIS POINT: 'B'

Runoff Calculations

Pre-Development On-Site:

Site Area =	1.60 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.00 ac	CN=	98
Lawn Area:	1.60 ac	CN=	61
Weighted CN:			61.0

Pre-Development Off-Site:

Site Area =	3.22 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	1.65 ac	CN=	98
Lawn Area:	1.57 ac	CN=	61
Weighted CN:			80.0

Post-Development On-Site:

Site Area =	1.83 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.97 ac	CN=	98
Lawn Area:	0.86 ac	CN=	61
Future Impervious:	0.00 ac	CN=	98
Weighted CN:			80.6

Post-Development Off-Site:

Site Area =	3.21 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	1.76 ac	CN=	98
Lawn Area:	1.45 ac	CN=	61
Future Impervious:	0.00 ac	CN=	98
Weighted CN:			81.3

STORMWATER PRE/POST DEVELOPMENT ANALYSIS	DATE 5/13/2025	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

STORMWATER ANALYSIS POINT: 'SCM-2 & Bypass'

Runoff Calculations

SCM-2 On-Site:

Site Area =	1.25 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.87 ac	CN=	98
Lawn Area:	0.38 ac	CN=	61
Weighted CN:			86.8

SCM-2 Off-Site:

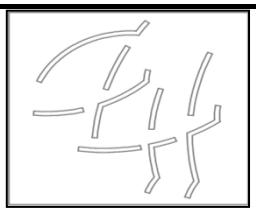
Site Area =	0.74 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.13 ac	CN=	98
Lawn Area:	0.61 ac	CN=	61
Future Impervious:	0.00 ac	CN=	98
Weighted CN:			67.5

Area B On-Site Bypass:

Site Area =	0.58 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	0.10 ac	CN=	98
Lawn Area:	0.48 ac	CN=	61
Weighted CN:			67.4

Area B Off-Site Bypass:

Site Area =	2.47 ac		
Site Soils:	(Hydrologic Soil Group B)		
Wooded Area:	0.00 ac	CN=	55
Impervious Area:	1.63 ac	CN=	98
Lawn Area:	0.84 ac	CN=	61
Future Impervious:	0.00 ac	CN=	98
Weighted CN:			85.4

TIME OF CONCENTRATION TR-55	DATE 5/13/2025	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

BASIN: **A**

Pre- and Post-development

Sheet Flow

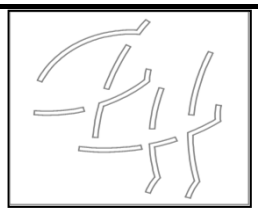
Manning's Coefficient (n)	0.24
Flow Length	100 ft
2-yr, 24-hr Rainfall Depth	3.46 in
Hydraulic Change in Elevation	2.25 ft
Slope	0.023 ft/ft
Time of Concentration ($T_{c)}$	13.1 min

Shallow Concentrated Flow

Flow Length	132 ft	
Hydraulic Change in Elevation	5.0 ft	
Watercourse Slope	0.038 ft/ft	
Average Velocity	3.2 ft/s	(From TR-55 Figure 3.1,2nd Ed. 1986)
Time of Concentration ($T_{c)}$	0.7 min	

Channel Flow	**No. 1** Channel	**No. 2** Pipe	**No. 3** Channel
Side Slope	20		20
Depth	3.0 ft		3.0 ft
Channel Base / Pipe Dia.	40.0 ft	1.25 ft	40.0 ft
Cross Sectional Area	300.00 sf	1.23 sf	300.00 sf
Wetted Perimeter	160.15 ft	3.93 ft	160.15 ft
Hydraulic Radius	1.87 ft	0.31 ft	1.87 ft
Channel/Pipe Slope	0.0119 ft/ft	0.0056 ft/ft	0.0119 ft/ft
Hydraulic Change in Elevation	4.32 ft	0.85 ft	4.32 ft
Manning's Coefficient (n)	0.24	0.013	0.025
Velocity	1.03 ft/s	3.92 ft/s	9.84 ft/s
Flow Length	364 ft	153 ft	364 ft
Time of Concentration ($T_{c)}$	5.9 min	0.6 min	0.6 min

Area T_c **21.0 min**

TIME OF CONCENTRATION TR-55	DATE 5/13/2025	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

BASIN: **SCM-1**

Sheet Flow

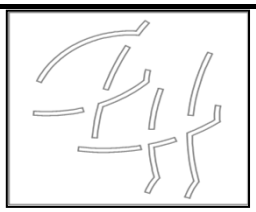
Manning's Coefficient (n)	0.24
Flow Length	53 ft
2-yr, 24-hr Rainfall Depth	3.46 in
Hydraulic Change in Elevation	1.50 ft
Slope	0.028 ft/ft
Time of Concentration ($T_{c)}$	7.2 min

Shallow Concentrated Flow

Flow Length	0 ft	
Hydraulic Change in Elevation	0.0 ft	
Watercourse Slope	10 ft/ft	
Average Velocity	0.0 ft/s	(From TR-55 Figure 3.1,2nd Ed. 1986)
Time of Concentration ($T_{c)}$	N/A	

Channel Flow	**No. 1** Pipe	**No. 2** Pipe
Side Slope		
Depth		
Channel Base / Pipe Dia.	1.25 ft	1.25 ft
Cross Sectional Area	1.23 sf	1.23 sf
Wetted Perimeter	3.93 ft	3.93 ft
Hydraulic Radius	0.31 ft	0.31 ft
Channel/Pipe Slope	0.0072 ft/ft	0.0071 ft/ft
Hydraulic Change in Elevation	3.30 ft	0.20 ft
Manning's Coefficient (n)	0.013	0.013
Velocity	4.46 ft/s	4.45 ft/s
Flow Length	460 ft	28 ft
Time of Concentration ($T_{c)}$	1.7 min	0.1 min

Area T_c **9.0 min**

TIME OF CONCENTRATION TR-55	DATE 5/13/2025	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

BASIN: **B**

Pre-development

Sheet Flow

Manning's Coefficient (n)	0.013
Flow Length	100 ft
2-yr, 24-hr Rainfall Depth	3.46 in
Hydraulic Change in Elevation	1.50 ft
Slope	0.015 ft/ft
Time of Concentration ($T_{c)}$	1.5 min

Shallow Concentrated Flow

Flow Length	153 ft	
Hydraulic Change in Elevation	4.4 ft	
Watercourse Slope	0.029 ft/ft	
Average Velocity	2.8 ft/s	(From TR-55 Figure 3.1,2nd Ed. 1986)
Time of Concentration ($T_{c)}$	0.9 min	

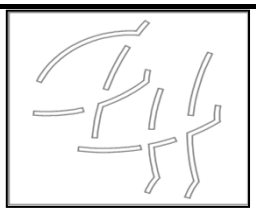
Channel Flow **No. 1**

Pipe

Side Slope	
Depth	
Channel Base / Pipe Dia.	1.25 ft
Cross Sectional Area	1.23 sf
Wetted Perimeter	3.93 ft
Hydraulic Radius	0.31 ft
Channel/Pipe Slope	0.0106 ft/ft
Hydraulic Change in Elevation	3.52 ft
Manning's Coefficient (n)	0.013
Velocity	5.43 ft/s
Flow Length	331 ft
Time of Concentration ($T_{c)}$	1.0 min

Area T_c **3.4 min**

Note: Calculated Tc is < 5 minutes. 5 minutes was used as the Tc for peak flow analysis.

TIME OF CONCENTRATION TR-55	DATE 5/13/2025	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

BASIN: **B**

Post-development

Sheet Flow

Manning's Coefficient (n)	0.013
Flow Length	100 ft
2-yr, 24-hr Rainfall Depth	3.46 in
Hydraulic Change in Elevation	1.50 ft
Slope	0.015 ft/ft
Time of Concentration ($T_{c)}$	1.5 min

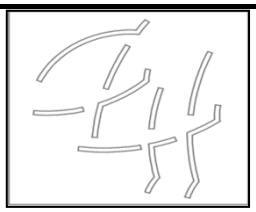
Shallow Concentrated Flow

Flow Length	153 ft	
Hydraulic Change in Elevation	4.4 ft	
Watercourse Slope	0.029 ft/ft	
Average Velocity	2.8 ft/s	(From TR-55 Figure 3.1,2nd Ed. 1986)
Time of Concentration ($T_{c)}$	0.9 min	

Channel Flow	**No. 1** Pipe	**No. 2** Pipe	**No. 3** Pipe
Side Slope			
Depth			
Channel Base / Pipe Dia.	1.25 ft	2.00 ft	1.25 ft
Cross Sectional Area	1.23 sf	3.14 sf	1.23 sf
Wetted Perimeter	3.93 ft	6.28 ft	3.93 ft
Hydraulic Radius	0.31 ft	0.50 ft	0.31 ft
Channel/Pipe Slope	0.0084 ft/ft	0.0045 ft/ft	0.0070 ft/ft
Hydraulic Change in Elevation	2.84 ft	0.10 ft	0.37 ft
Manning's Coefficient (n)	0.013	0.013	0.013
Velocity	4.83 ft/s	4.85 ft/s	4.40 ft/s
Flow Length	337 ft	22 ft	53 ft
Time of Concentration ($T_{c)}$	1.2 min	0.1 min	0.2 min

Area T_c **3.8 min**

Note: Calculated Tc is < 5 minutes. 5 minutes was used as the Tc for peak flow analysis.

TIME OF CONCENTRATION TR-55	DATE 5/13/2025	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

BASIN: **SCM-2**

Sheet Flow

Manning's Coefficient (n)	0.013
Flow Length	100 ft
2-yr, 24-hr Rainfall Depth	3.46 in
Hydraulic Change in Elevation	1.50 ft
Slope	0.015 ft/ft
Time of Concentration ($T_{c)}$	1.5 min

Shallow Concentrated Flow

Flow Length	260 ft	
Hydraulic Change in Elevation	5.3 ft	
Watercourse Slope	0.020 ft/ft	
Average Velocity	2.8 ft/s	(From TR-55 Figure 3.1,2nd Ed. 1986)
Time of Concentration ($T_{c)}$	1.5 min	

Channel Flow	**No. 1** Pipe	**No. 2** Pipe
Side Slope		
Depth		
Channel Base / Pipe Dia.	1.25 ft	1.50 ft
Cross Sectional Area	1.23 sf	1.77 sf
Wetted Perimeter	3.93 ft	4.71 ft
Hydraulic Radius	0.31 ft	0.38 ft
Channel/Pipe Slope	0.0062 ft/ft	0.0076 ft/ft
Hydraulic Change in Elevation	0.60 ft	0.25 ft
Manning's Coefficient (n)	0.013	0.013
Velocity	4.14 ft/s	5.17 ft/s
Flow Length	97 ft	33 ft
Time of Concentration ($T_{c)}$	0.4 min	0.1 min

Area T_c **3.5 min**

Note: Calculated Tc is < 5 minutes. 5 minutes was used as the Tc for peak flow analysis.

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

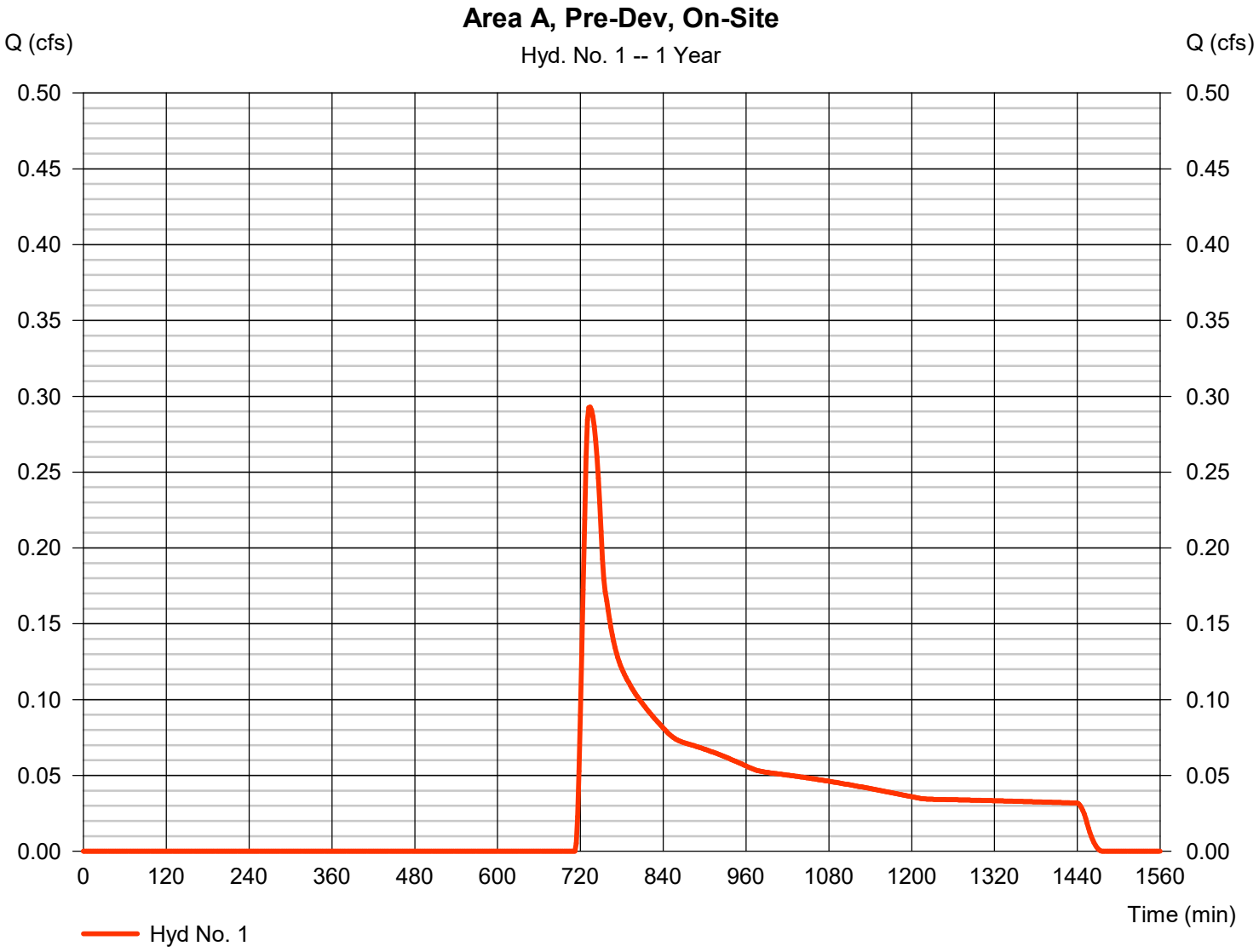
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.293	2	734	2,734	------	------	------	Area A, Pre-Dev, On-Site
2	SCS Runoff	0.150	2	730	746	------	------	------	Area A, Pre-Dev, Off-Site
3	Combine	0.438	2	732	3,481	1, 2	------	------	Area A, Pre-Dev
4	SCS Runoff	0.582	2	718	1,686	------	------	------	Area B, Pre-Dev, On-Site
5	SCS Runoff	6.234	2	718	12,477	------	------	------	Area B, Pre-Dev, Off-Site
6	Combine	6.816	2	718	14,163	4, 5	------	------	Area B, Pre-Dev
8	SCS Runoff	1.834	2	728	7,441	------	------	------	Area A, Post-Dev, On-Site
9	SCS Runoff	0.365	2	728	1,371	------	------	------	Area A, Post-Dev, Off-Site
10	Combine	2.199	2	728	8,811	8, 9	------	------	Area A, Post-Dev
11	SCS Runoff	3.543	2	718	7,091	------	------	------	Area B, Post-Dev, On-Site
12	SCS Runoff	6.631	2	718	13,304	------	------	------	Area B, Post-Dev, Off-Site
13	Combine	10.17	2	718	20,395	11, 12	------	------	Area B, Post-Dev
15	SCS Runoff	3.586	2	718	8,204	------	------	------	SCM-1 DA On-Site
16	SCS Runoff	0.598	2	718	1,435	------	------	------	SCM-1 DA Off-Site
17	Combine	4.184	2	718	9,639	15, 16	------	------	SCM-1 Drainage Area
18	Reservoir	0.186	2	814	9,463	17	326.07	5,807	SCM-1
19	SCS Runoff	0.275	2	730	1,796	------	------	------	Area A On-Site Bypass
20	SCS Runoff	0.047	2	730	309	------	------	------	Area A Off-Site Bypass
21	Combine	0.396	2	732	11,568	18, 19, 20	------	------	Area A, Post-Dev w/ Detention
23	SCS Runoff	3.341	2	716	6,780	------	------	------	SCM-2 On-Site
24	SCS Runoff	0.617	2	718	1,338	------	------	------	SCM-2 Off-Site
25	Combine	3.916	2	718	8,118	23, 24	------	------	SCM-2 Drainage Area
26	Reservoir	0.169	2	810	8,005	25	327.65	4,766	SCM-2
27	SCS Runoff	0.479	2	718	1,041	------	------	------	Area B On-Site Bypass
28	SCS Runoff	6.199	2	716	12,537	------	------	------	Area B Off-Site Bypass
29	Combine	6.655	2	718	21,583	26, 27, 28	------	------	Area B, Post-Dev w/ Detention

Hydrograph Report

Hyd. No. 1

Area A, Pre-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.293 cfs
Storm frequency	=	1 yrs	Time to peak	=	734 min
Time interval	=	2 min	Hyd. volume	=	2,734 cuft
Drainage area	=	3.330 ac	Curve number	=	57.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

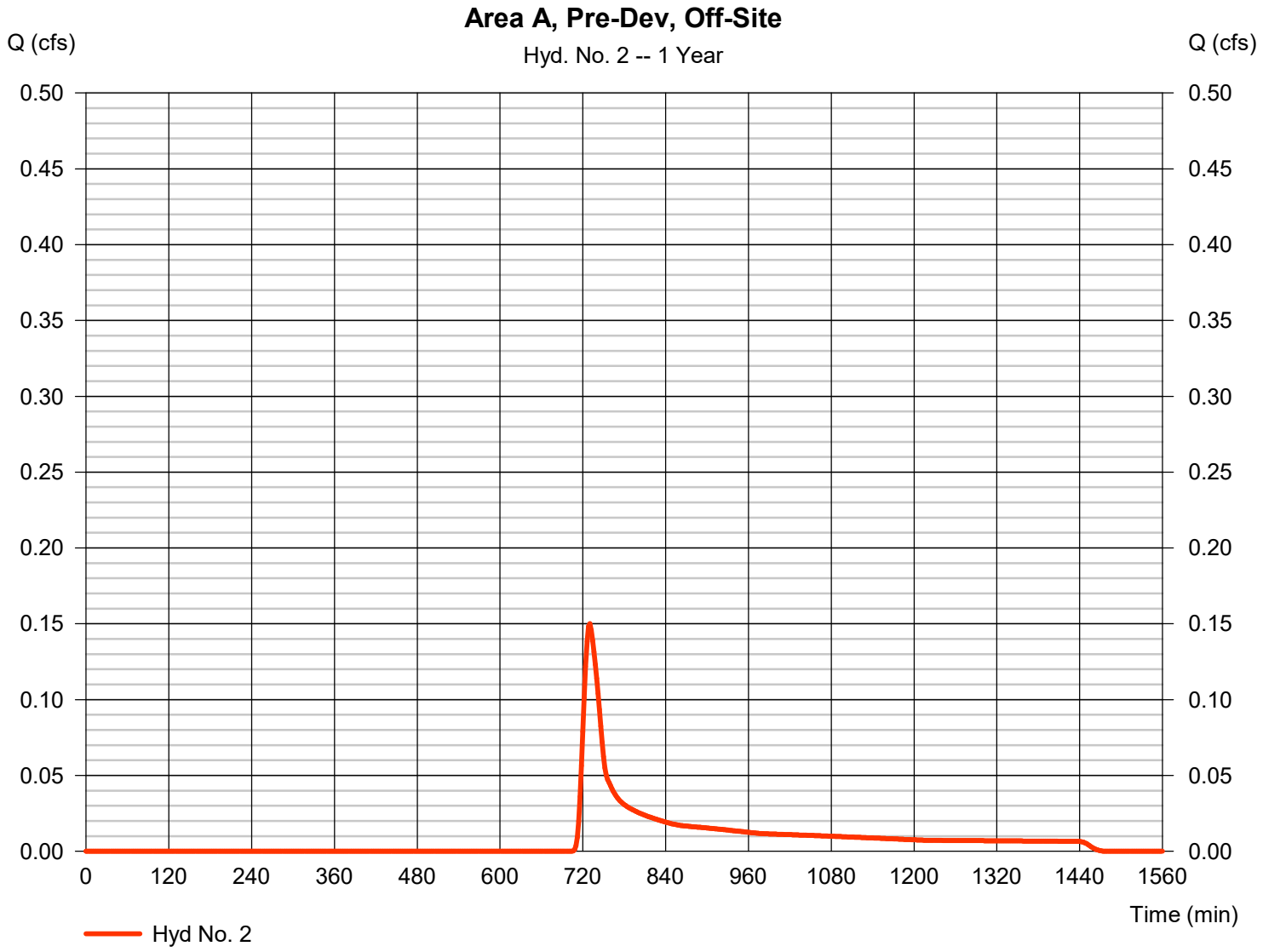


Hydrograph Report

Hyd. No. 2

Area A, Pre-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.150 cfs
Storm frequency	= 1 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 746 cuft
Drainage area	= 0.460 ac	Curve number	= 65
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

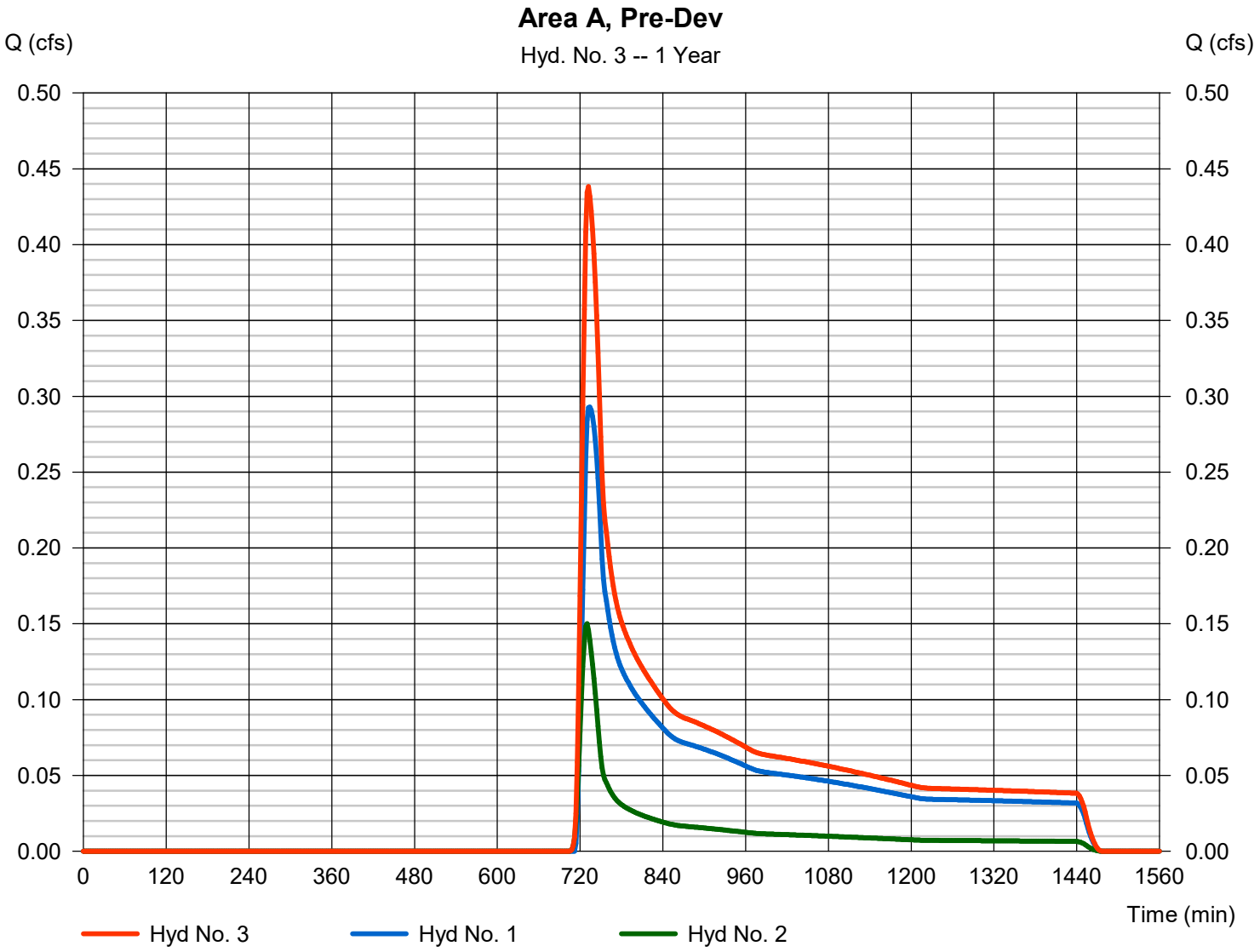


Hydrograph Report

Hyd. No. 3

Area A, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 0.438 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 3,481 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.790 ac

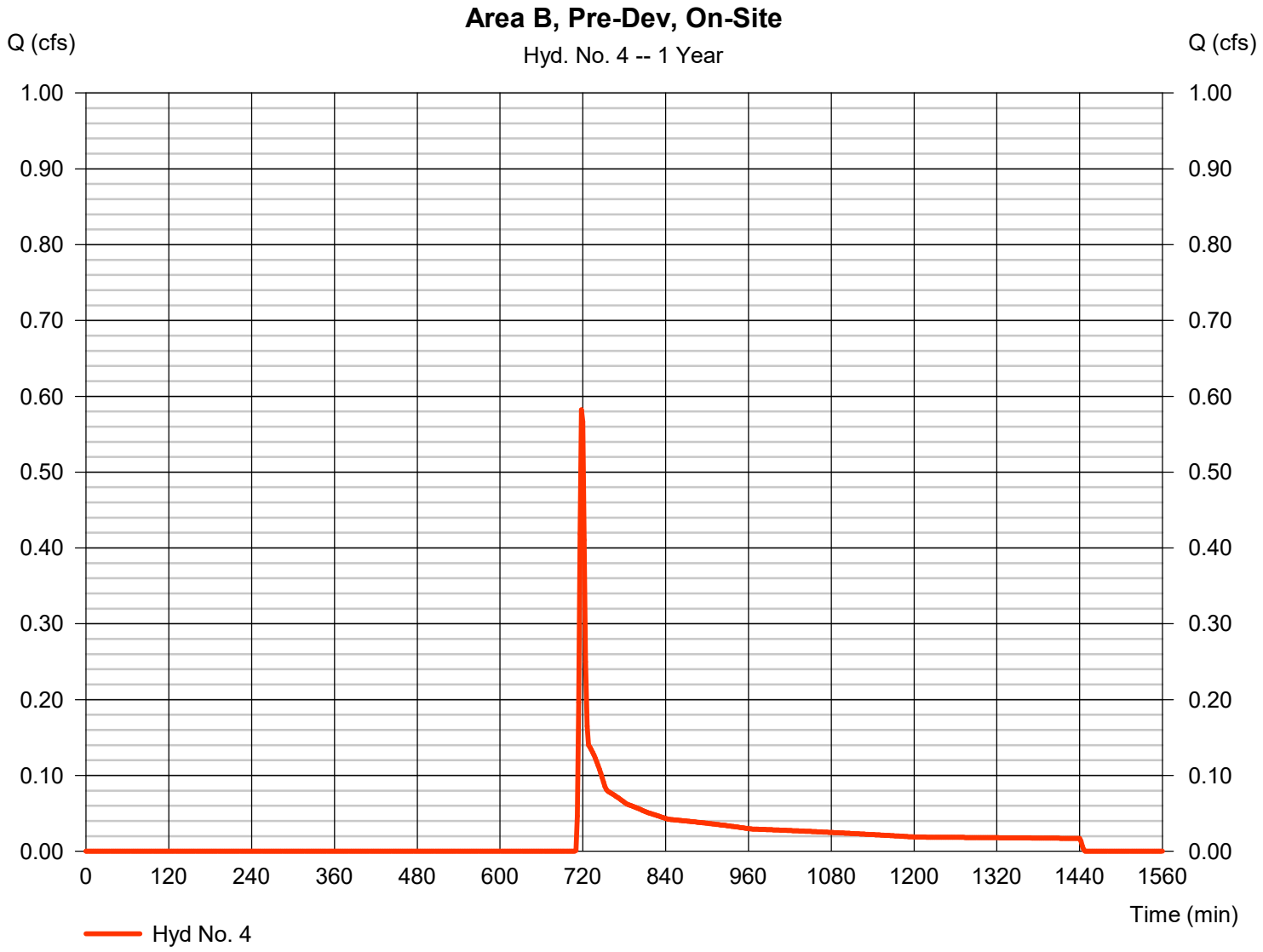


Hydrograph Report

Hyd. No. 4

Area B, Pre-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.582 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 1,686 cuft
Drainage area	= 1.600 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

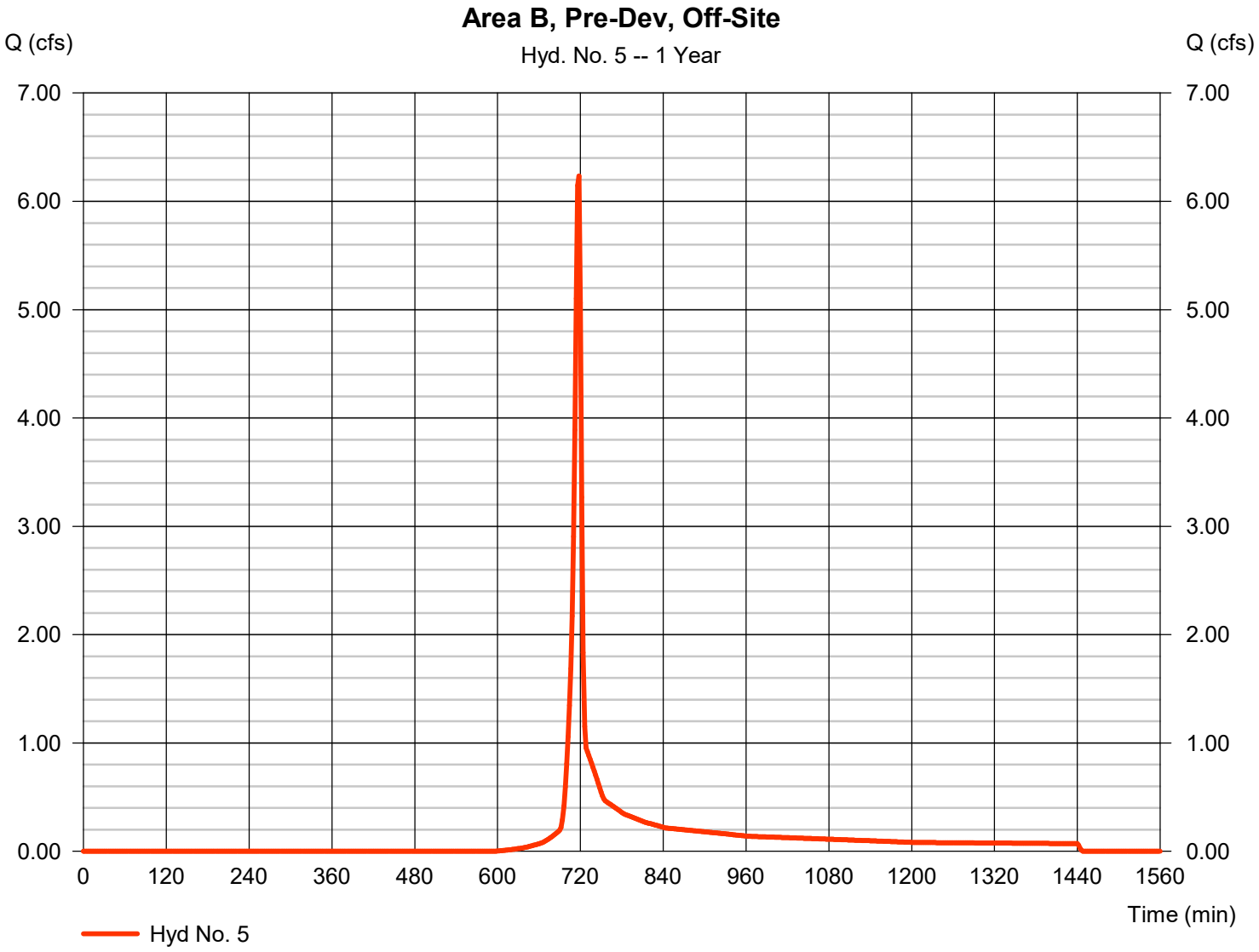


Hydrograph Report

Hyd. No. 5

Area B, Pre-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 6.234 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 12,477 cuft
Drainage area	= 3.220 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

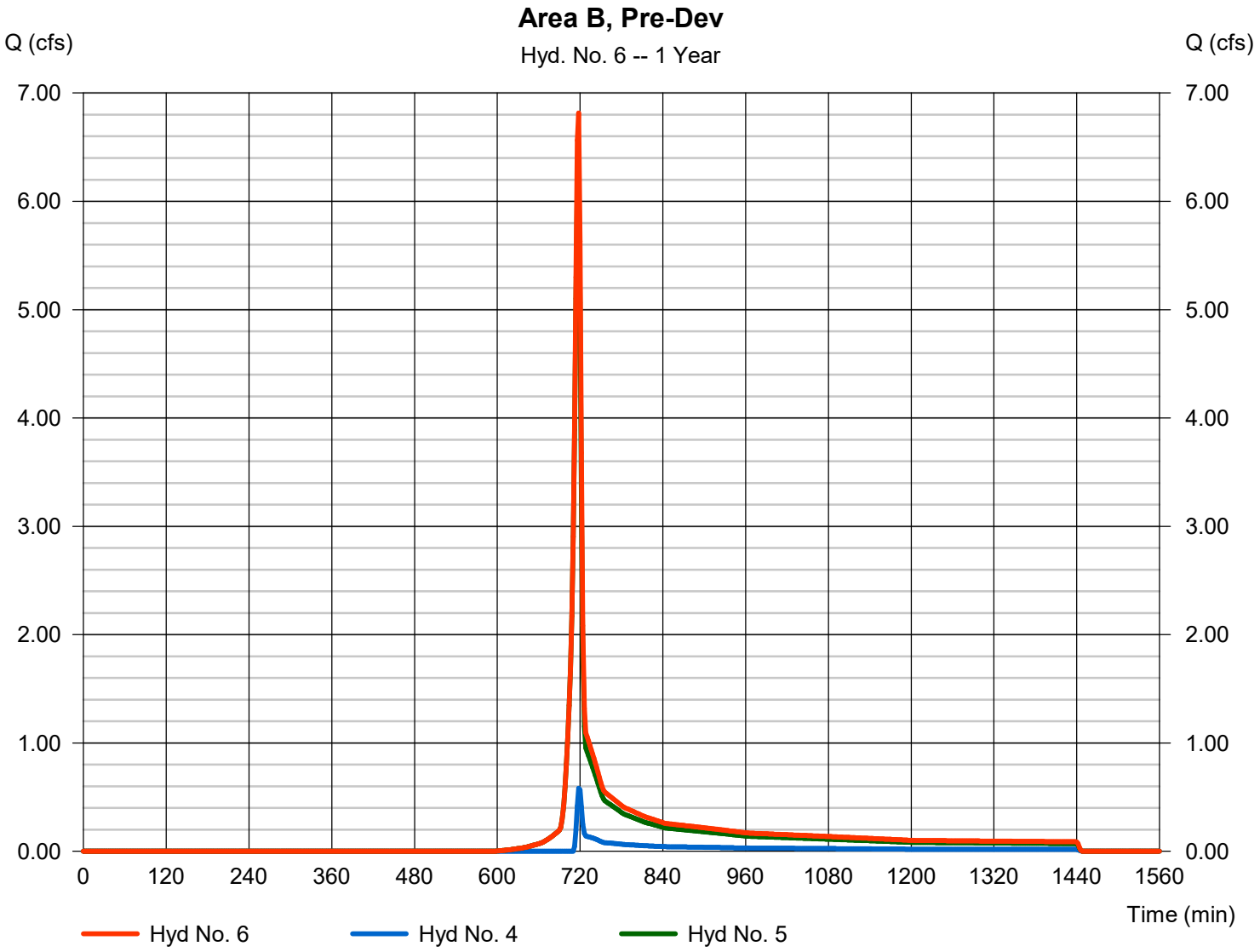


Hydrograph Report

Hyd. No. 6

Area B, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 6.816 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 14,163 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 4.820 ac

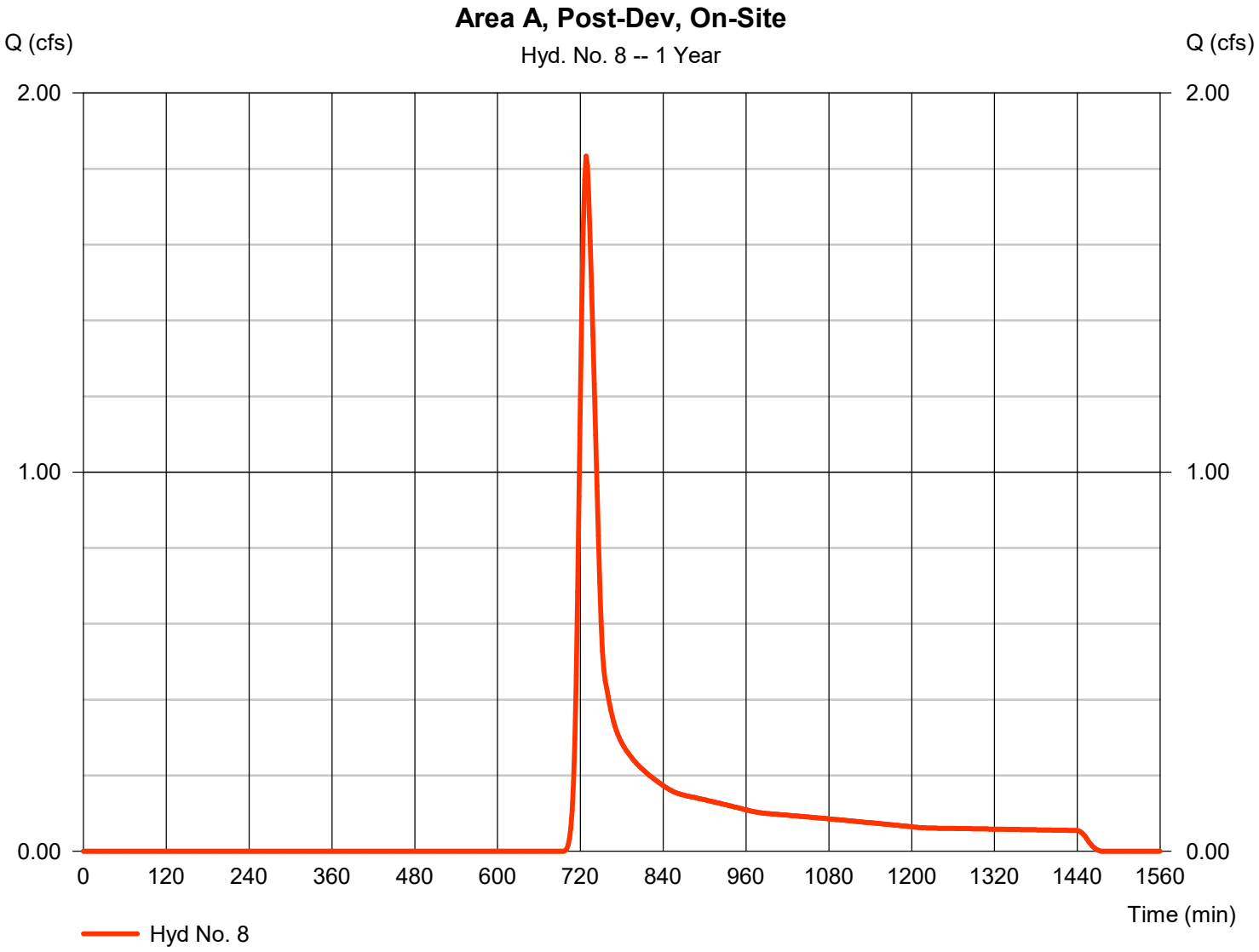


Hydrograph Report

Hyd. No. 8

Area A, Post-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.834 cfs
Storm frequency	=	1 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	7,441 cuft
Drainage area	=	3.100 ac	Curve number	=	70.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

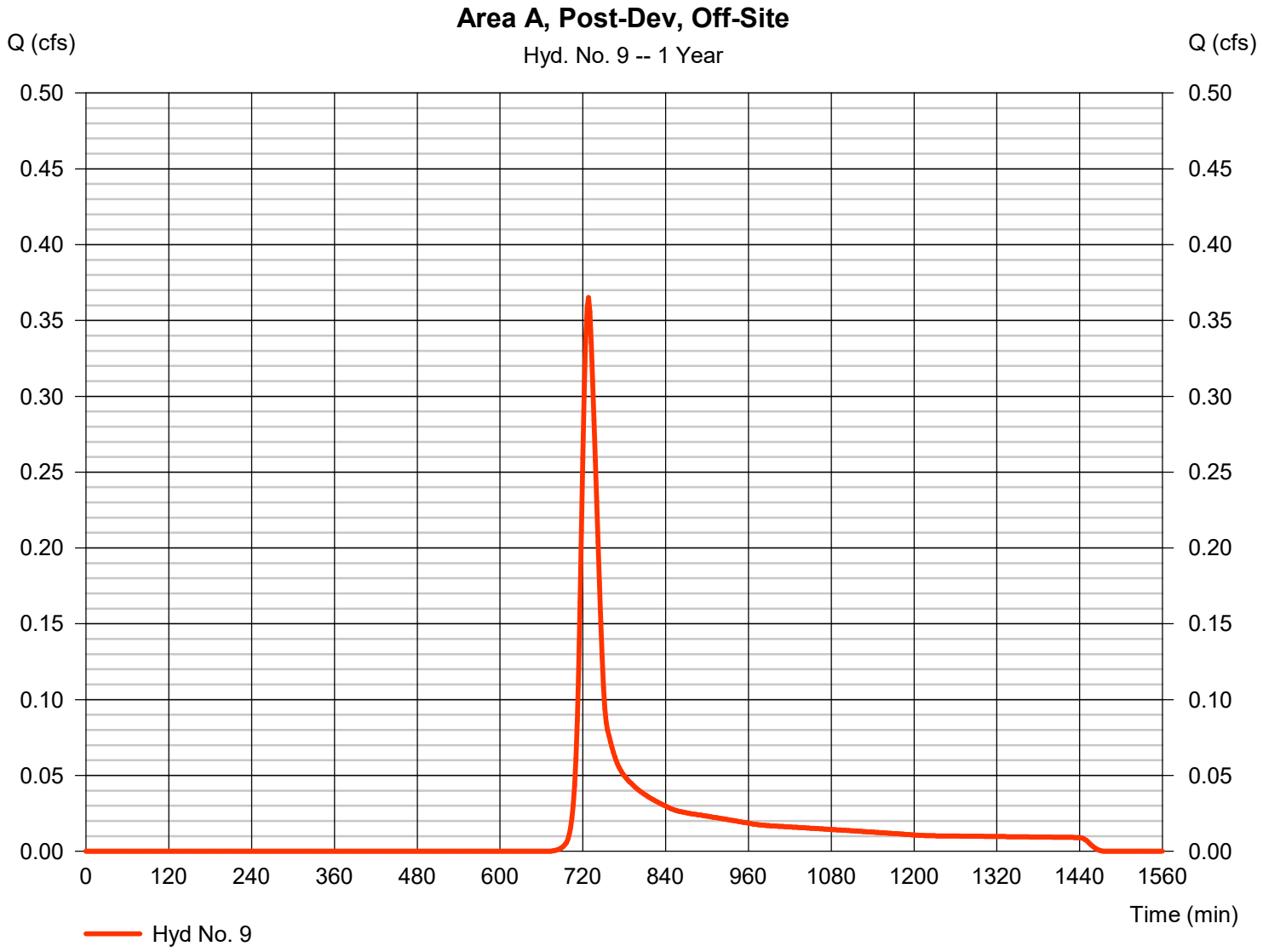


Hydrograph Report

Hyd. No. 9

Area A, Post-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.365 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 1,371 cuft
Drainage area	= 0.450 ac	Curve number	= 74.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

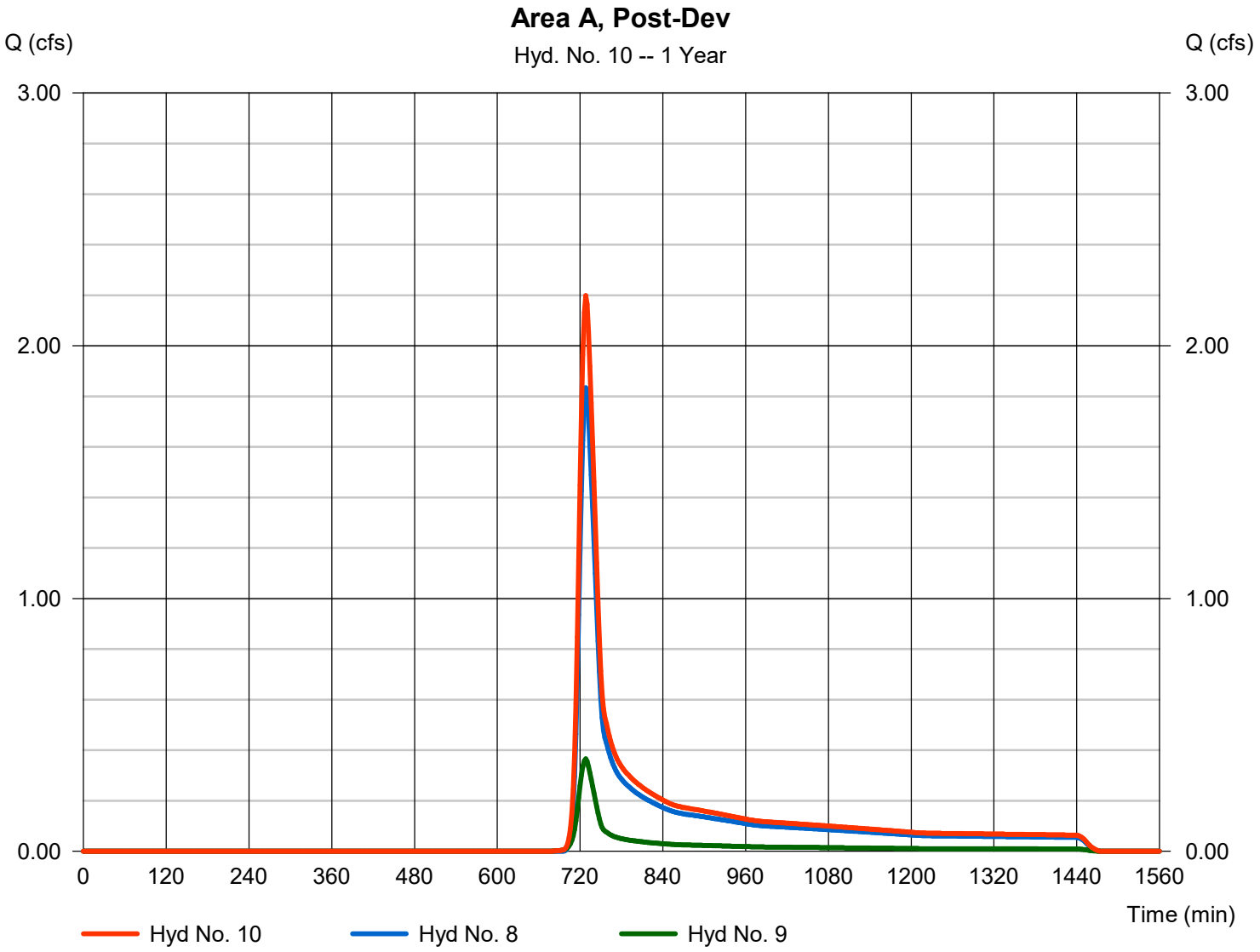


Hydrograph Report

Hyd. No. 10

Area A, Post-Dev

Hydrograph type	= Combine	Peak discharge	= 2.199 cfs
Storm frequency	= 1 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 8,811 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 3.550 ac

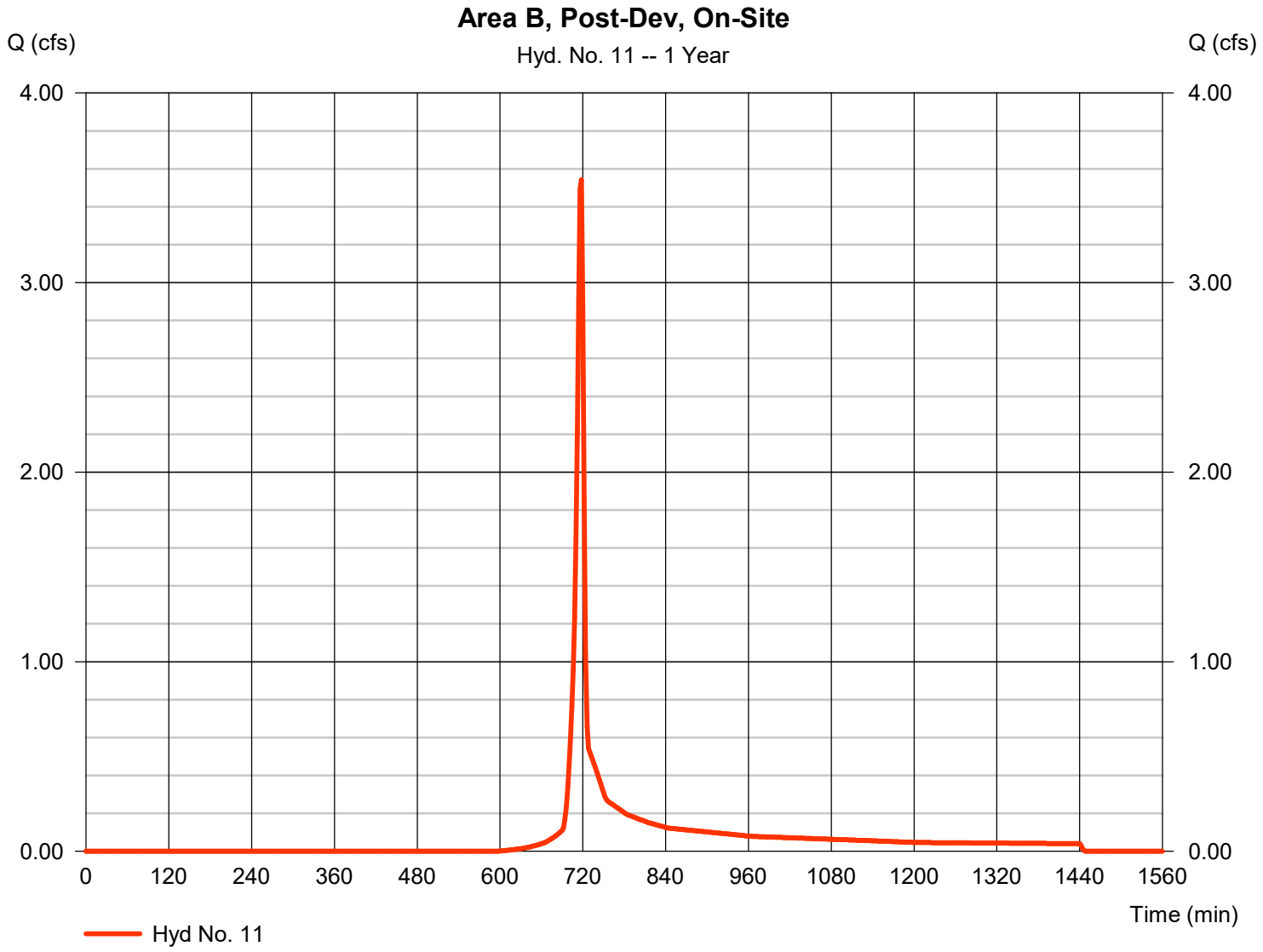


Hydrograph Report

Hyd. No. 11

Area B, Post-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 3.543 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 7,091 cuft
Drainage area	= 1.830 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.85 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

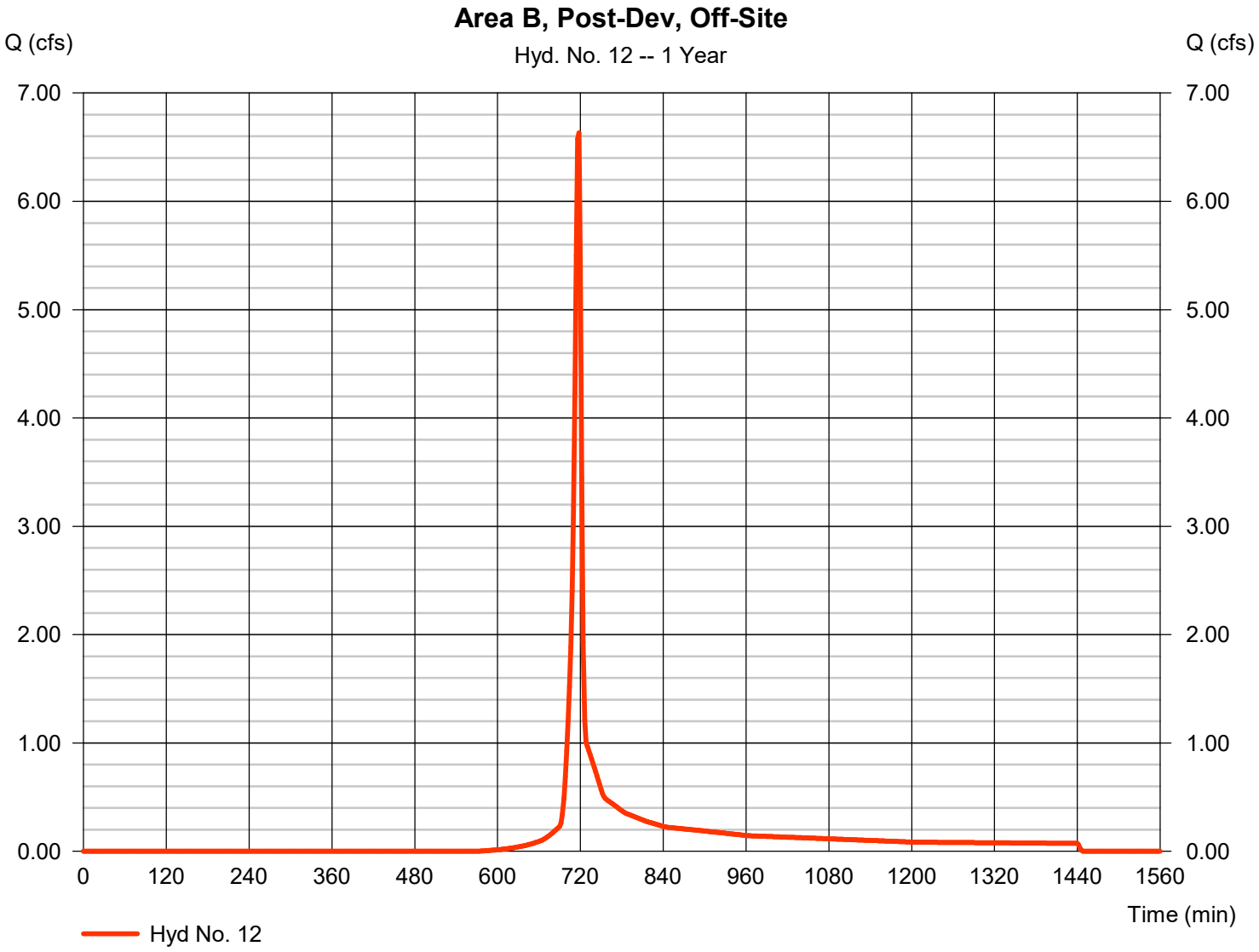


Hydrograph Report

Hyd. No. 12

Area B, Post-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.631 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	13,304 cuft
Drainage area	=	3.210 ac	Curve number	=	81.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

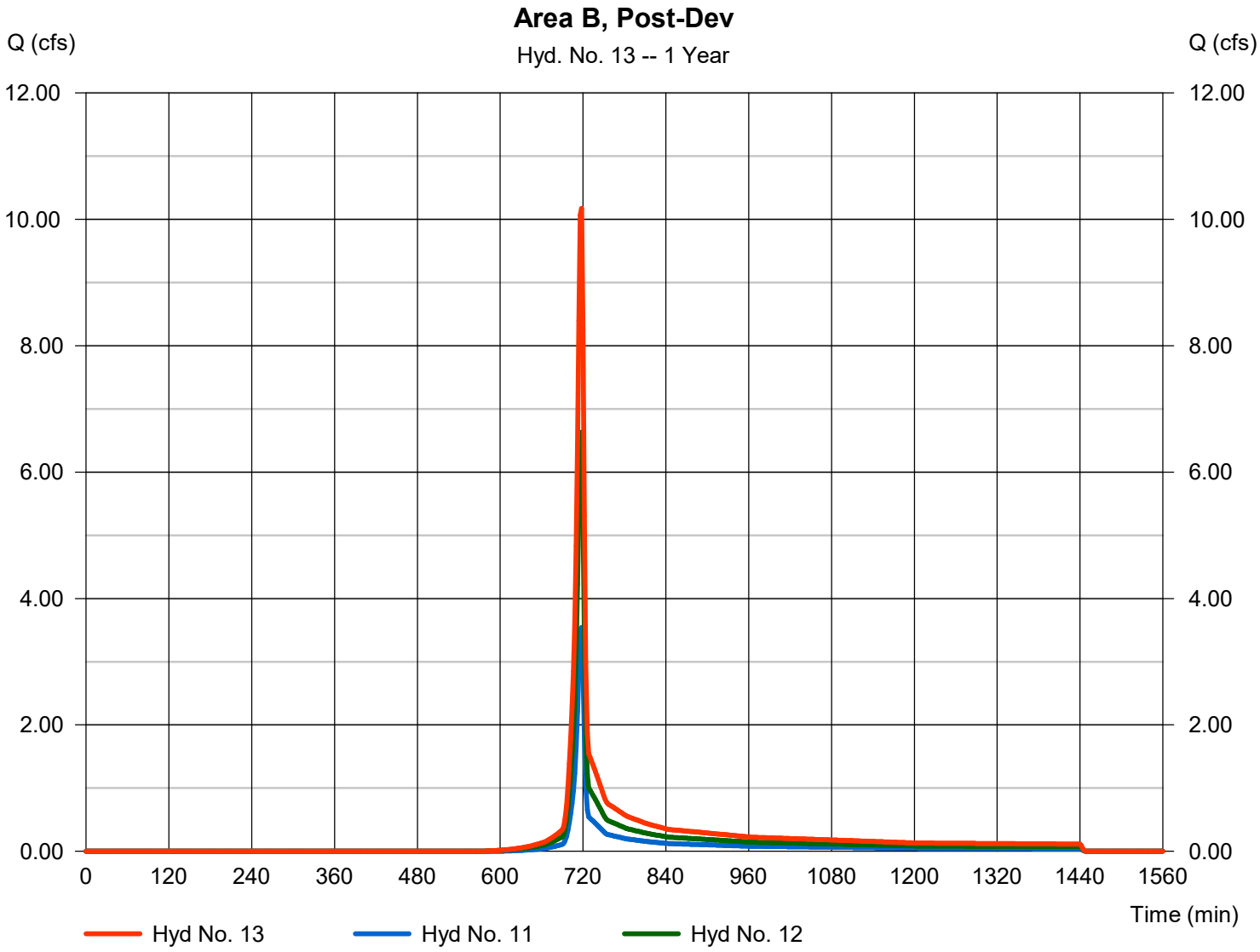


Hydrograph Report

Hyd. No. 13

Area B, Post-Dev

Hydrograph type	= Combine	Peak discharge	= 10.17 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 20,395 cuft
Inflow hyds.	= 11, 12	Contrib. drain. area	= 5.040 ac

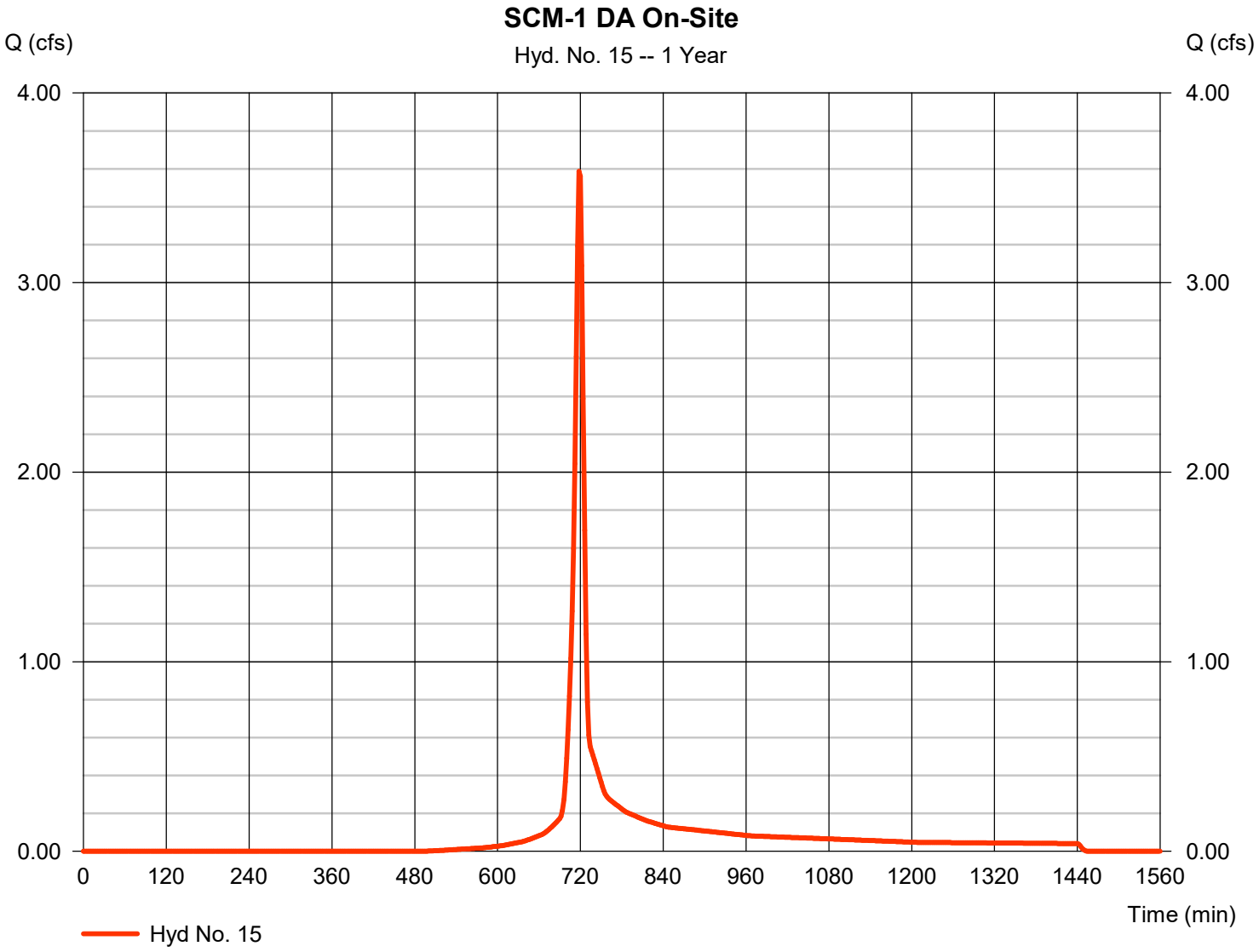


Hydrograph Report

Hyd. No. 15

SCM-1 DA On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.586 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	8,204 cuft
Drainage area	=	1.530 ac	Curve number	=	85.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

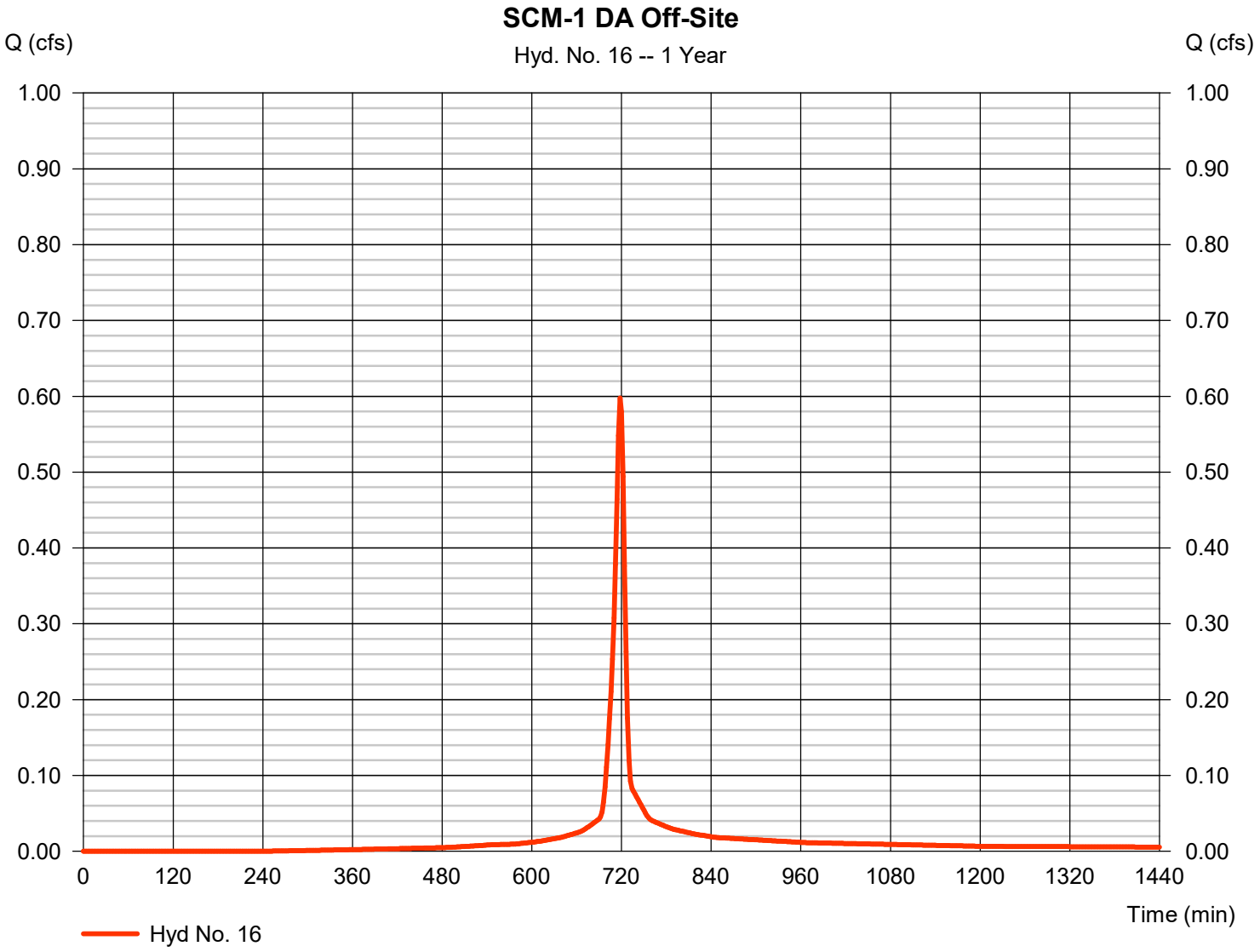


Hydrograph Report

Hyd. No. 16

SCM-1 DA Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.598 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,435 cuft
Drainage area	=	0.180 ac	Curve number	=	93.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

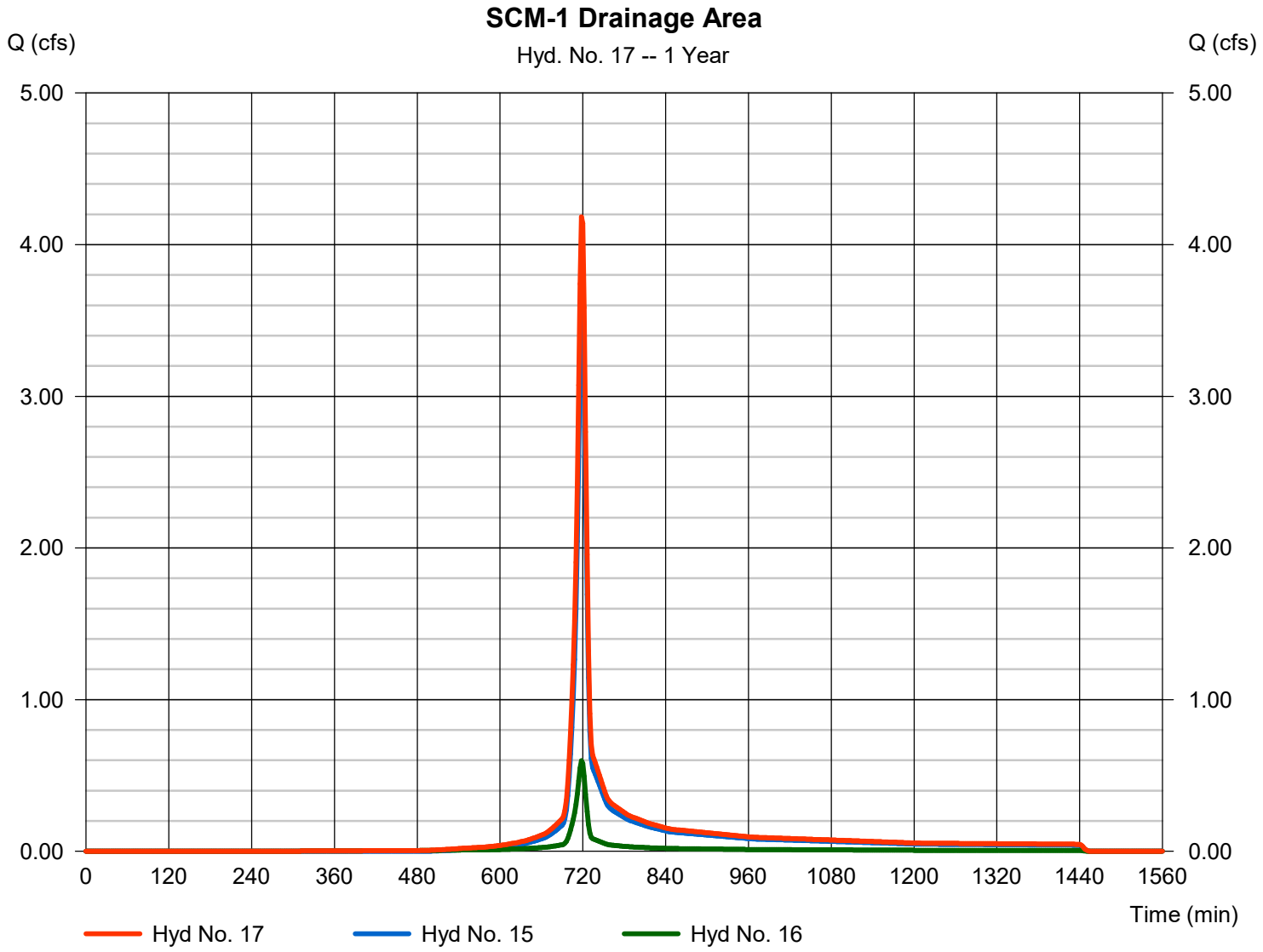


Hydrograph Report

Hyd. No. 17

SCM-1 Drainage Area

Hydrograph type	=	Combine	Peak discharge	=	4.184 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	9,639 cuft
Inflow hyds.	=	15, 16	Contrib. drain. area	=	1.710 ac



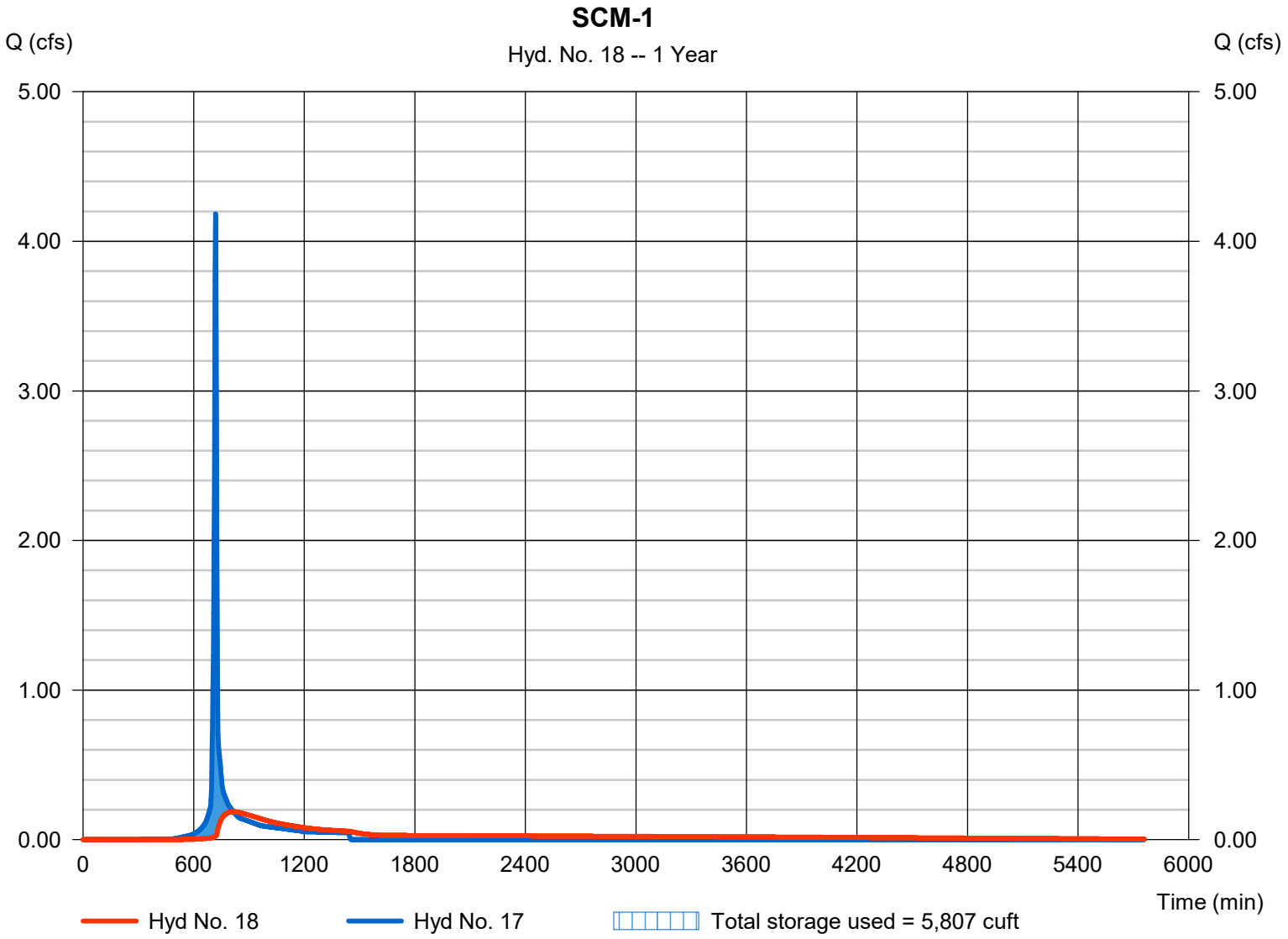
Hydrograph Report

Hyd. No. 18

SCM-1

Hydrograph type	=	Reservoir	Peak discharge	=	0.186 cfs
Storm frequency	=	1 yrs	Time to peak	=	814 min
Time interval	=	2 min	Hyd. volume	=	9,463 cuft
Inflow hyd. No.	=	17 - SCM-1 Drainage Area	Max. Elevation	=	326.07 ft
Reservoir name	=	SCM-1	Max. Storage	=	5,807 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - SCM-1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 324.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	324.50	2,373	0	0
0.50	325.00	3,562	1,474	1,474
1.25	325.75	4,187	2,902	4,376
1.50	326.00	4,402	1,073	5,449
2.50	327.00	5,298	4,843	10,292
3.50	328.00	6,251	5,767	16,059
4.50	329.00	7,261	6,749	22,808
5.00	329.50	7,787	3,761	26,569

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	1.00	0.00	0.00
Span (in)	= 15.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 324.40	324.50	0.00	0.00
Length (ft)	= 39.00	5.00	0.00	0.00
Slope (%)	= 1.03	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

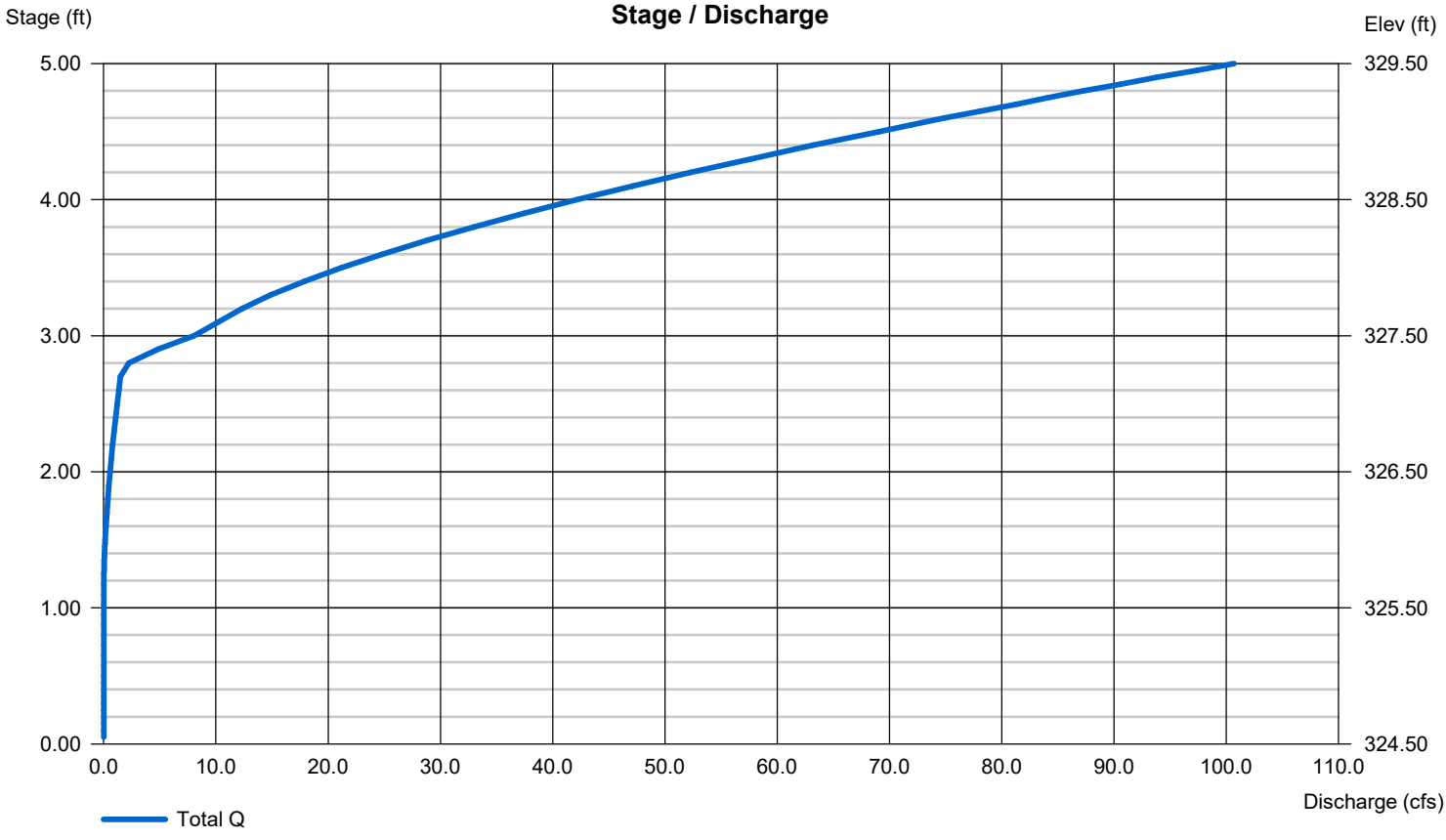
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.75	0.25	0.00	12.00
Crest El. (ft)	= 327.25	325.75	0.00	327.50
Weir Coeff.	= 3.33	3.33	3.33	2.60
Weir Type	= 1	Rect	---	Broad
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

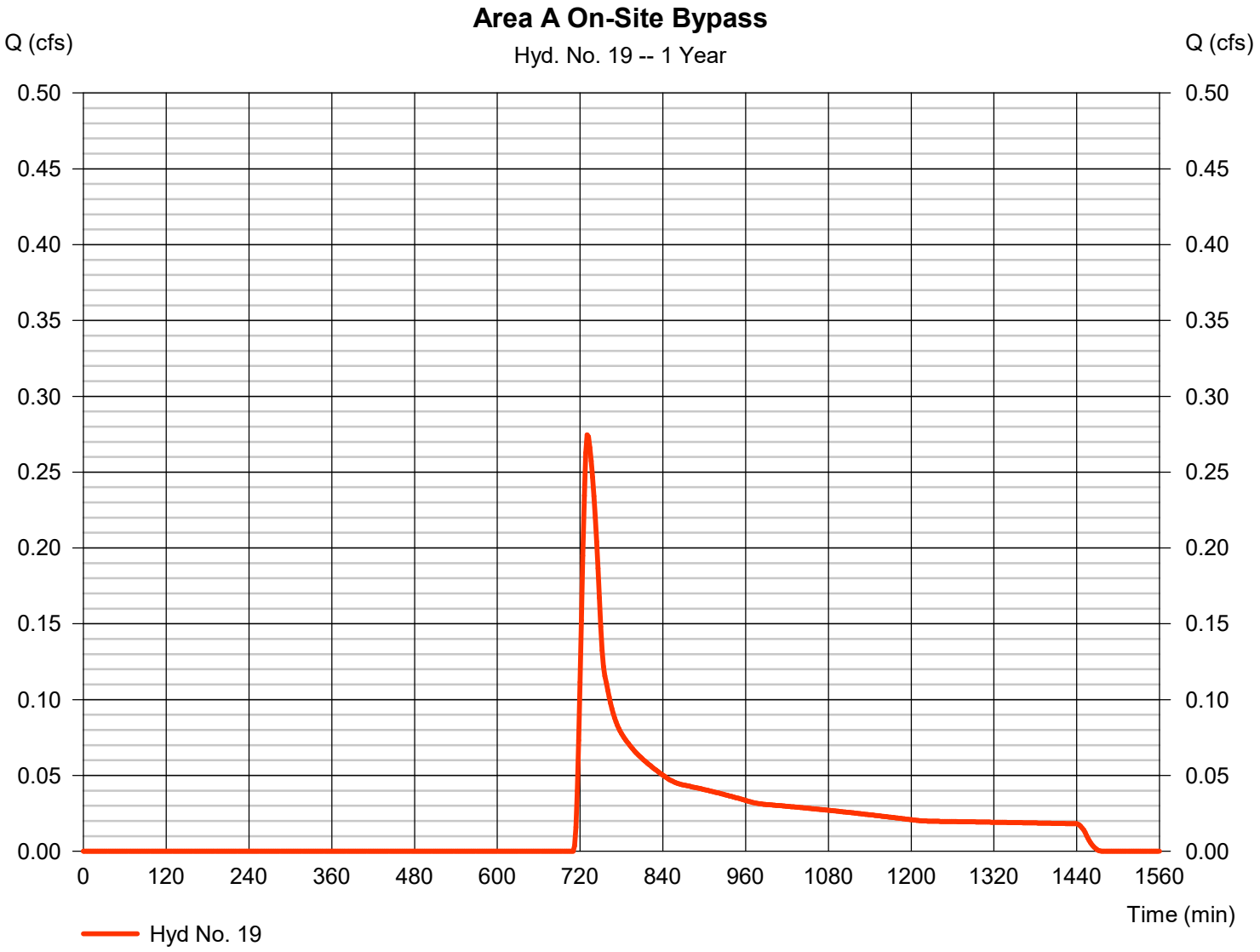


Hydrograph Report

Hyd. No. 19

Area A On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.275 cfs
Storm frequency	=	1 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	1,796 cuft
Drainage area	=	1.570 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

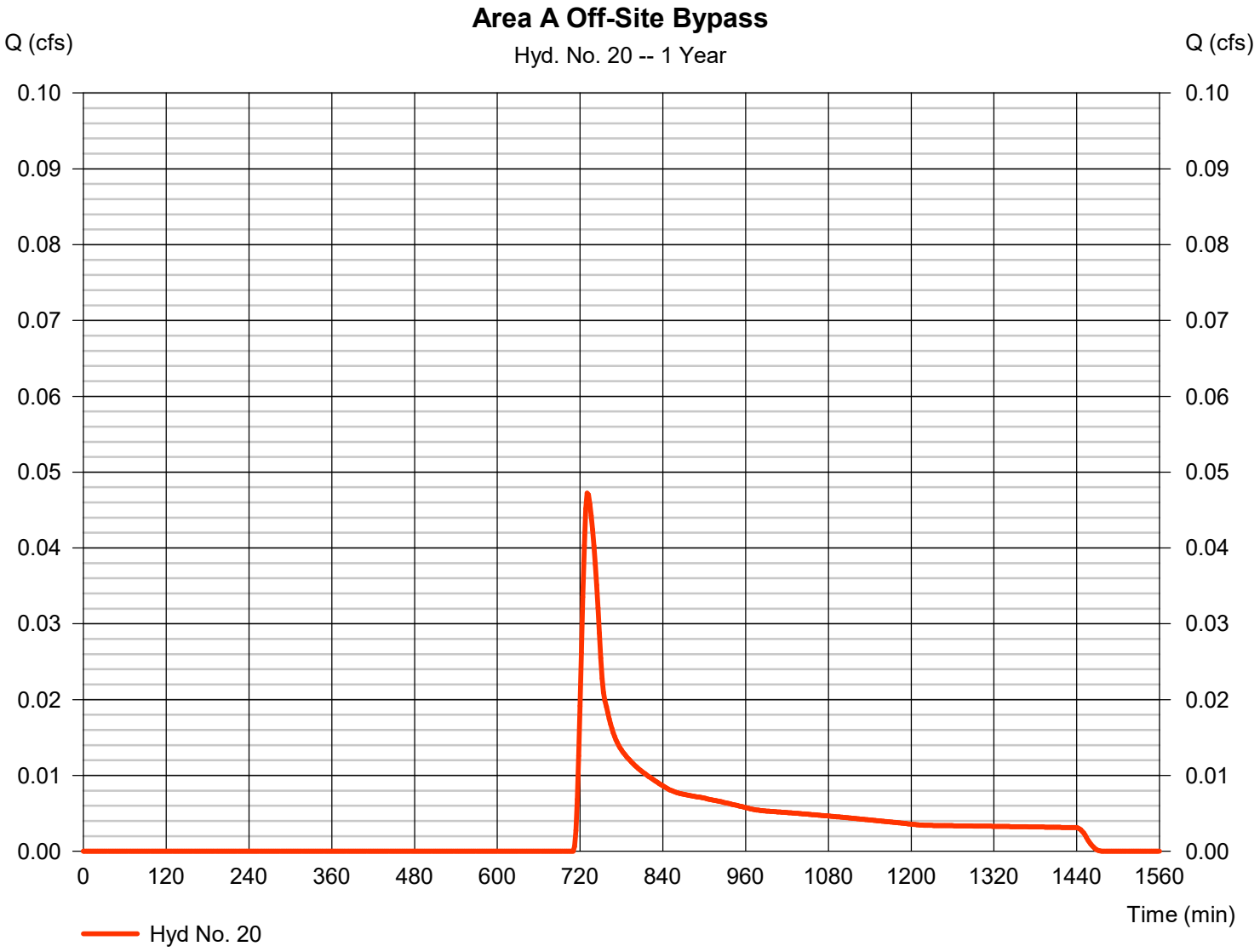


Hydrograph Report

Hyd. No. 20

Area A Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.047 cfs
Storm frequency	=	1 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	309 cuft
Drainage area	=	0.270 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

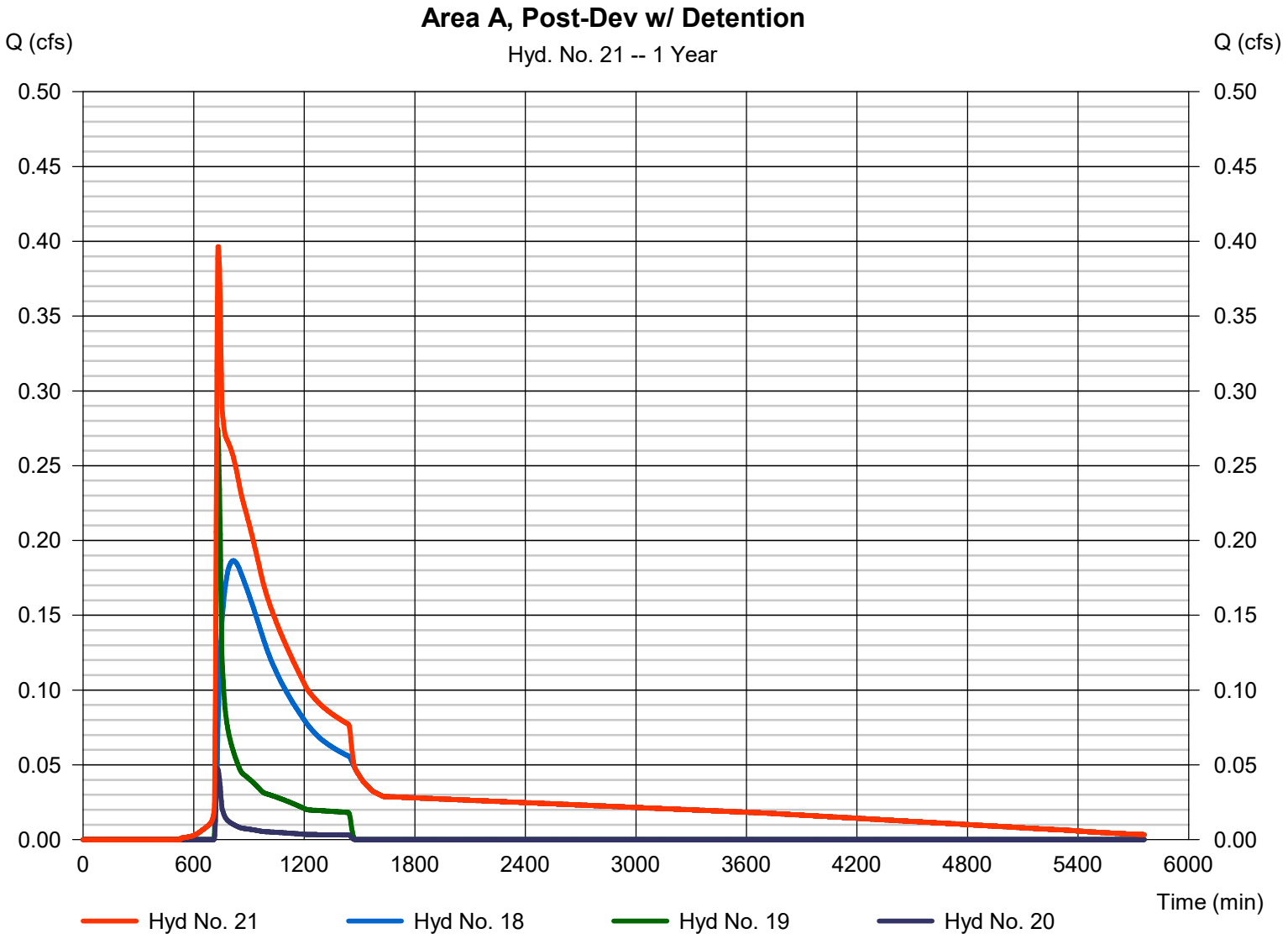


Hydrograph Report

Hyd. No. 21

Area A, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 0.396 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 11,568 cuft
Inflow hyds.	= 18, 19, 20	Contrib. drain. area	= 1.840 ac

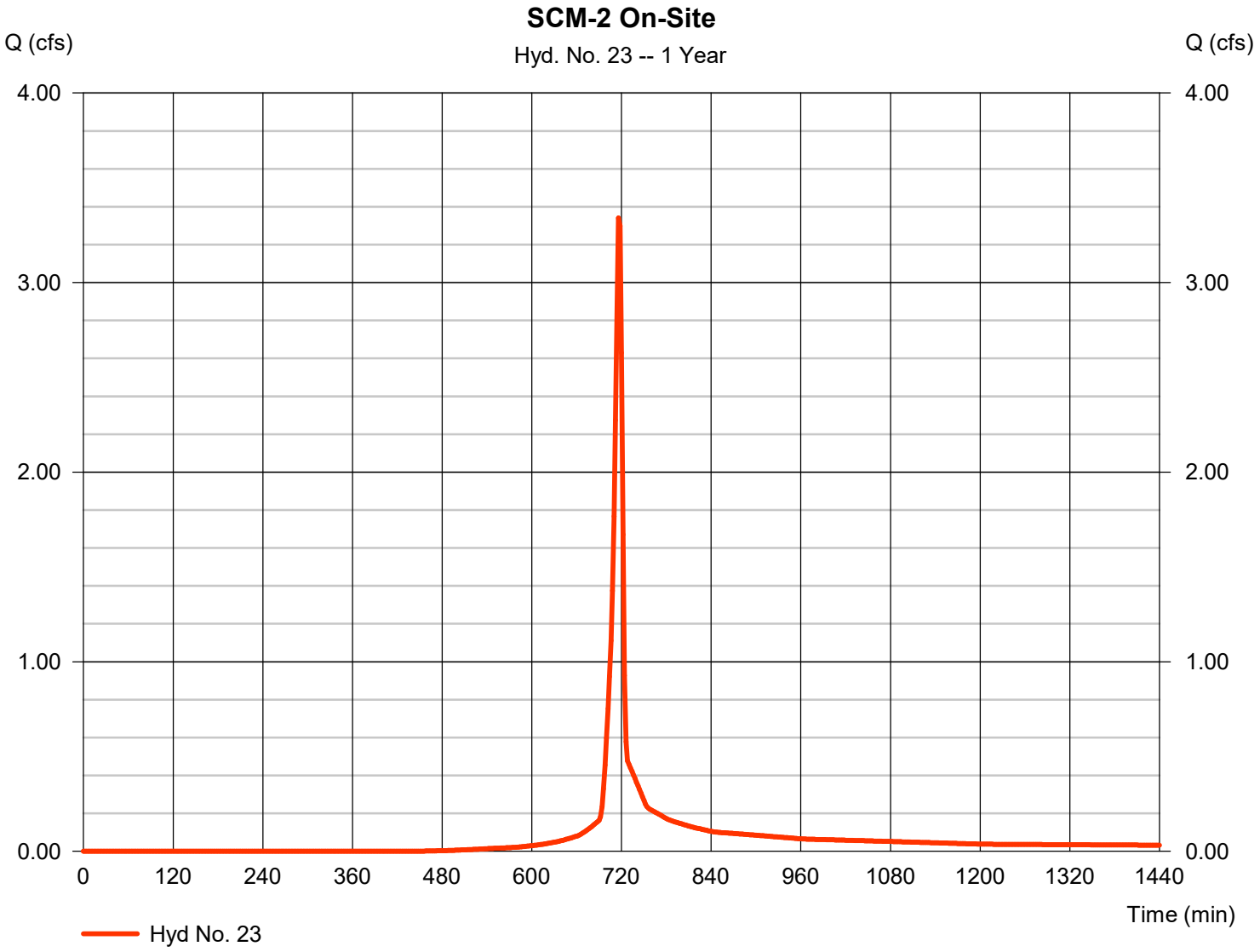


Hydrograph Report

Hyd. No. 23

SCM-2 On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.341 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	6,780 cuft
Drainage area	=	1.250 ac	Curve number	=	86.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

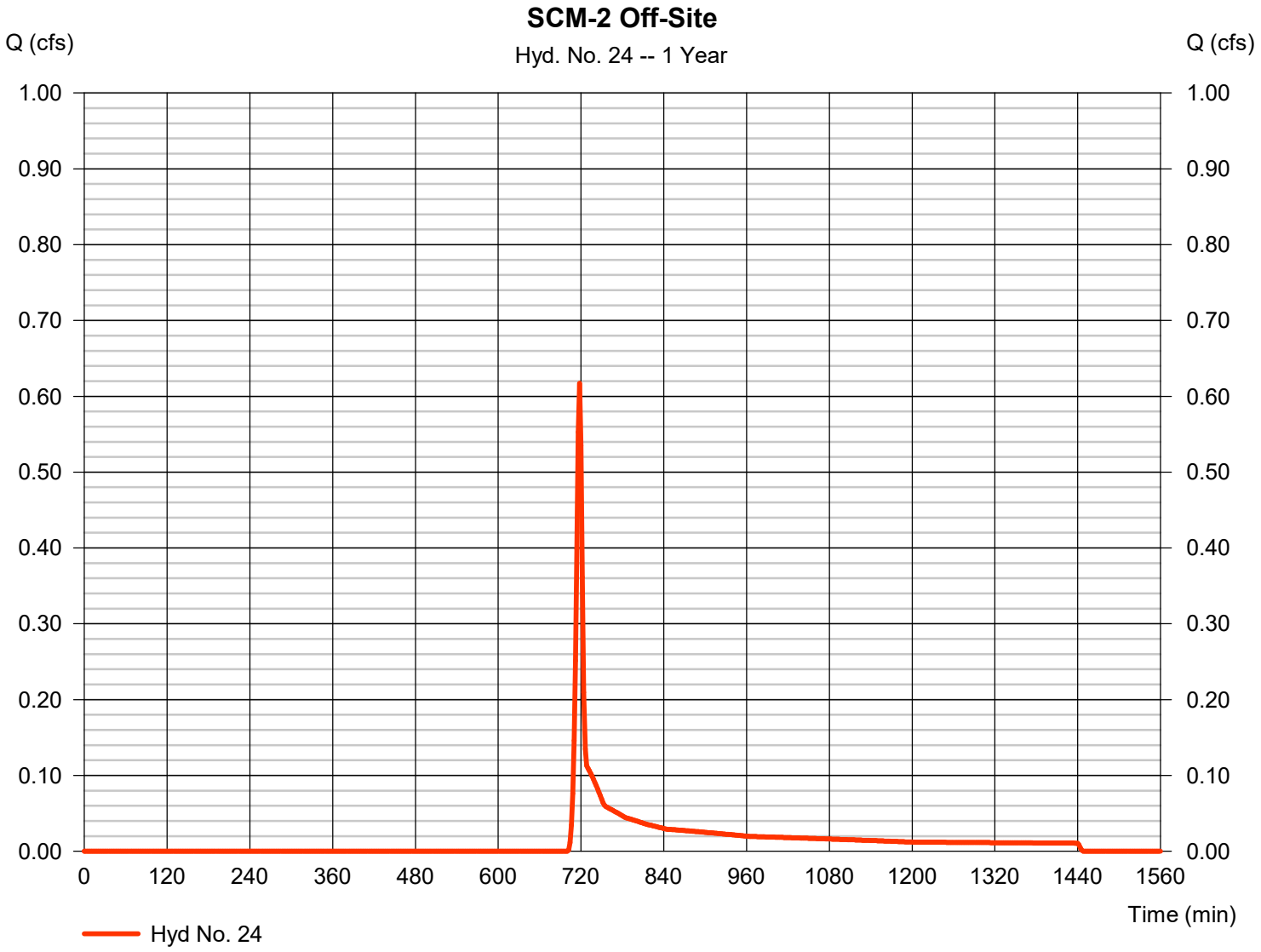


Hydrograph Report

Hyd. No. 24

SCM-2 Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.617 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,338 cuft
Drainage area	=	0.740 ac	Curve number	=	67.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

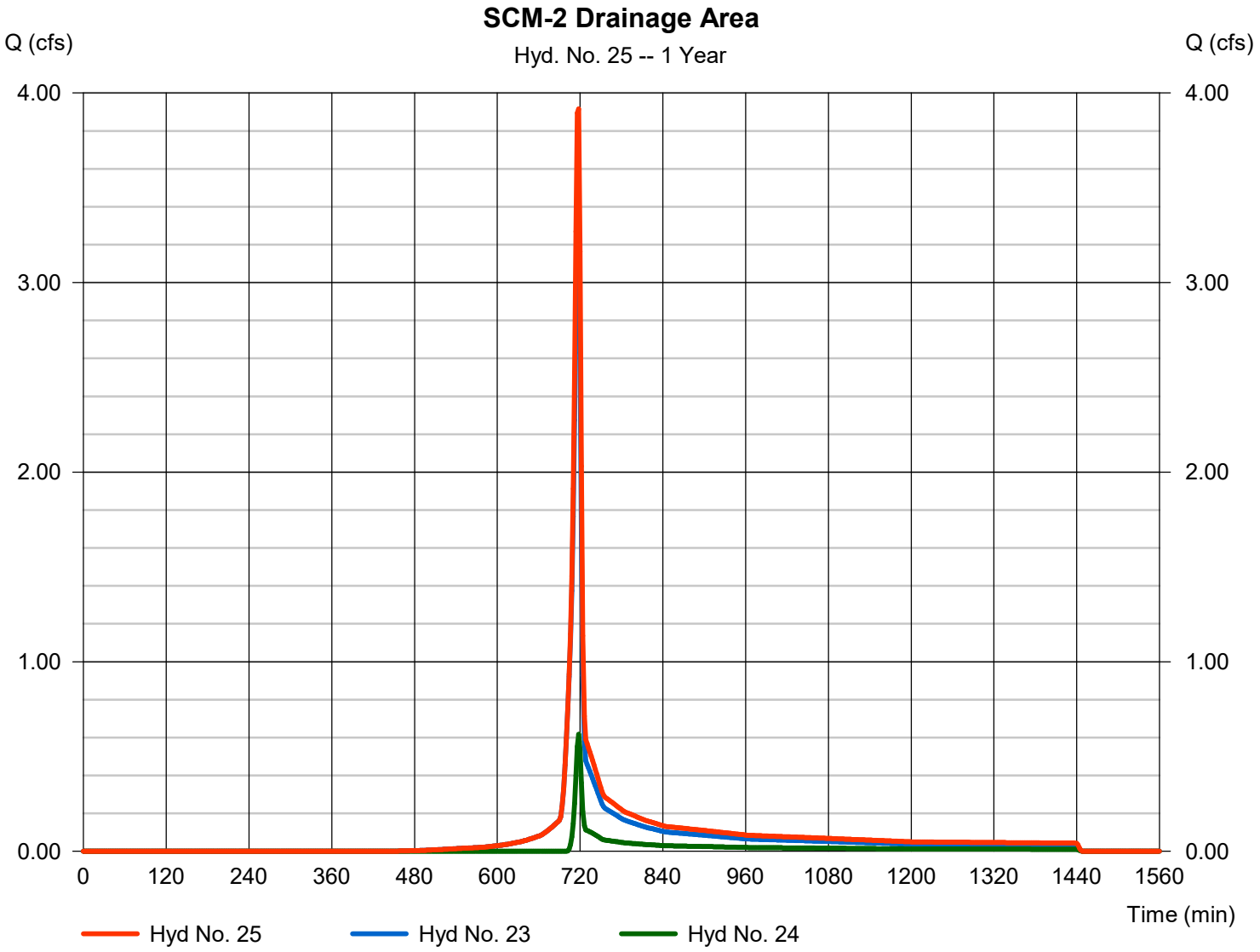


Hydrograph Report

Hyd. No. 25

SCM-2 Drainage Area

Hydrograph type	= Combine	Peak discharge	= 3.916 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 8,118 cuft
Inflow hyds.	= 23, 24	Contrib. drain. area	= 1.990 ac



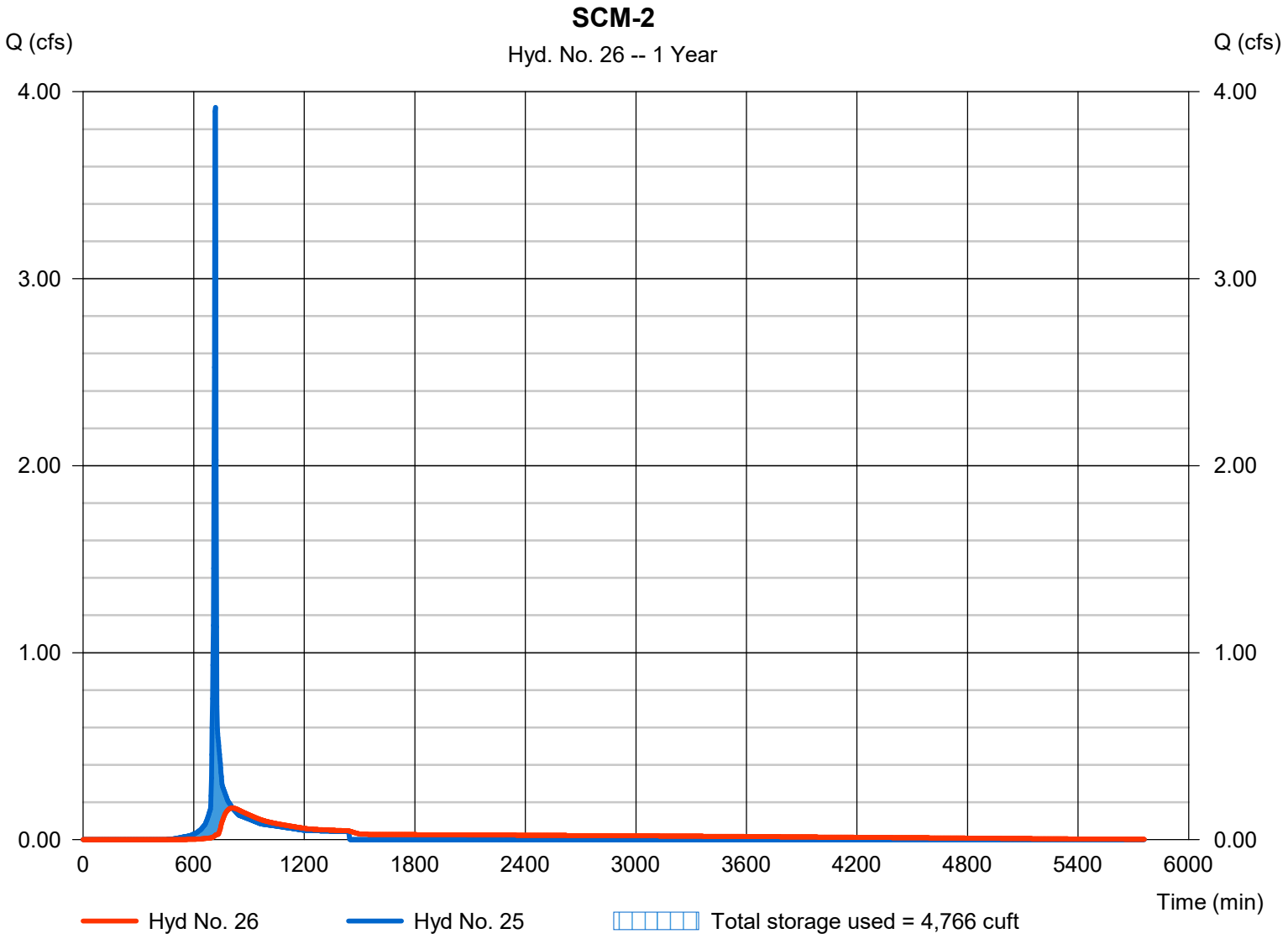
Hydrograph Report

Hyd. No. 26

SCM-2

Hydrograph type	=	Reservoir	Peak discharge	=	0.169 cfs
Storm frequency	=	1 yrs	Time to peak	=	810 min
Time interval	=	2 min	Hyd. volume	=	8,005 cuft
Inflow hyd. No.	=	25 - SCM-2 Drainage Area	Max. Elevation	=	327.65 ft
Reservoir name	=	SCM-2	Max. Storage	=	4,766 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - SCM-2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 326.25 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	326.25	2,259	0	0
0.50	326.75	3,280	1,377	1,377
0.75	327.00	3,542	852	2,229
1.25	327.50	4,074	1,902	4,131
1.75	328.00	4,620	2,172	6,303
2.75	329.00	5,784	5,191	11,494
3.75	330.00	6,663	6,218	17,712
4.25	330.50	7,124	3,446	21,157

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	1.00	0.00	0.00
Span (in)	= 15.00	1.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 326.25	326.25	0.00	0.00
Length (ft)	= 46.00	5.00	0.00	0.00
Slope (%)	= 1.63	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

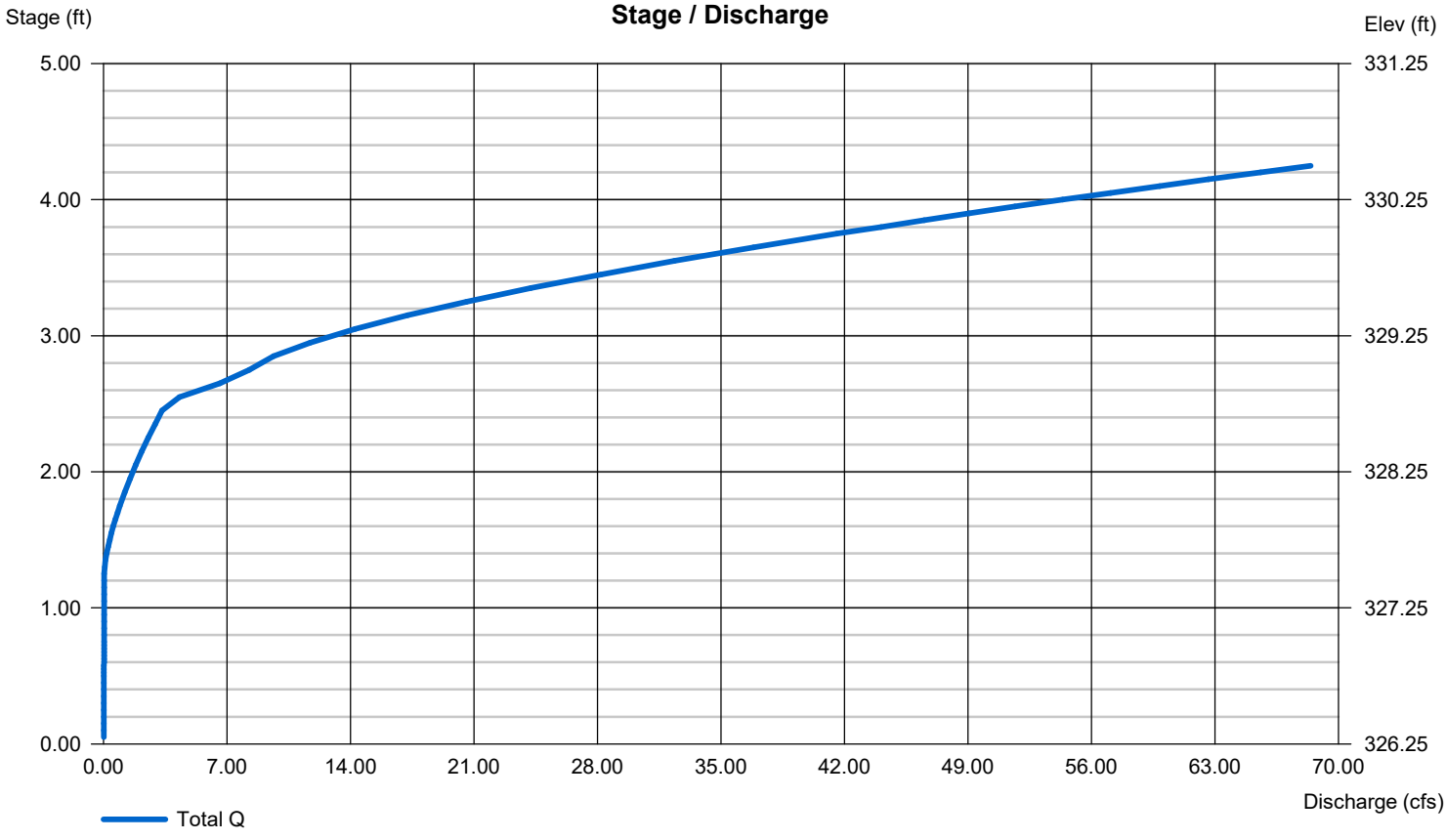
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.25	0.75	0.00	12.00
Crest El. (ft)	= 328.75	327.50	0.00	329.00
Weir Coeff.	= 3.33	3.33	3.33	2.60
Weir Type	= 1	Rect	---	Broad
Multi-Stage	= Yes	Yes	No	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).

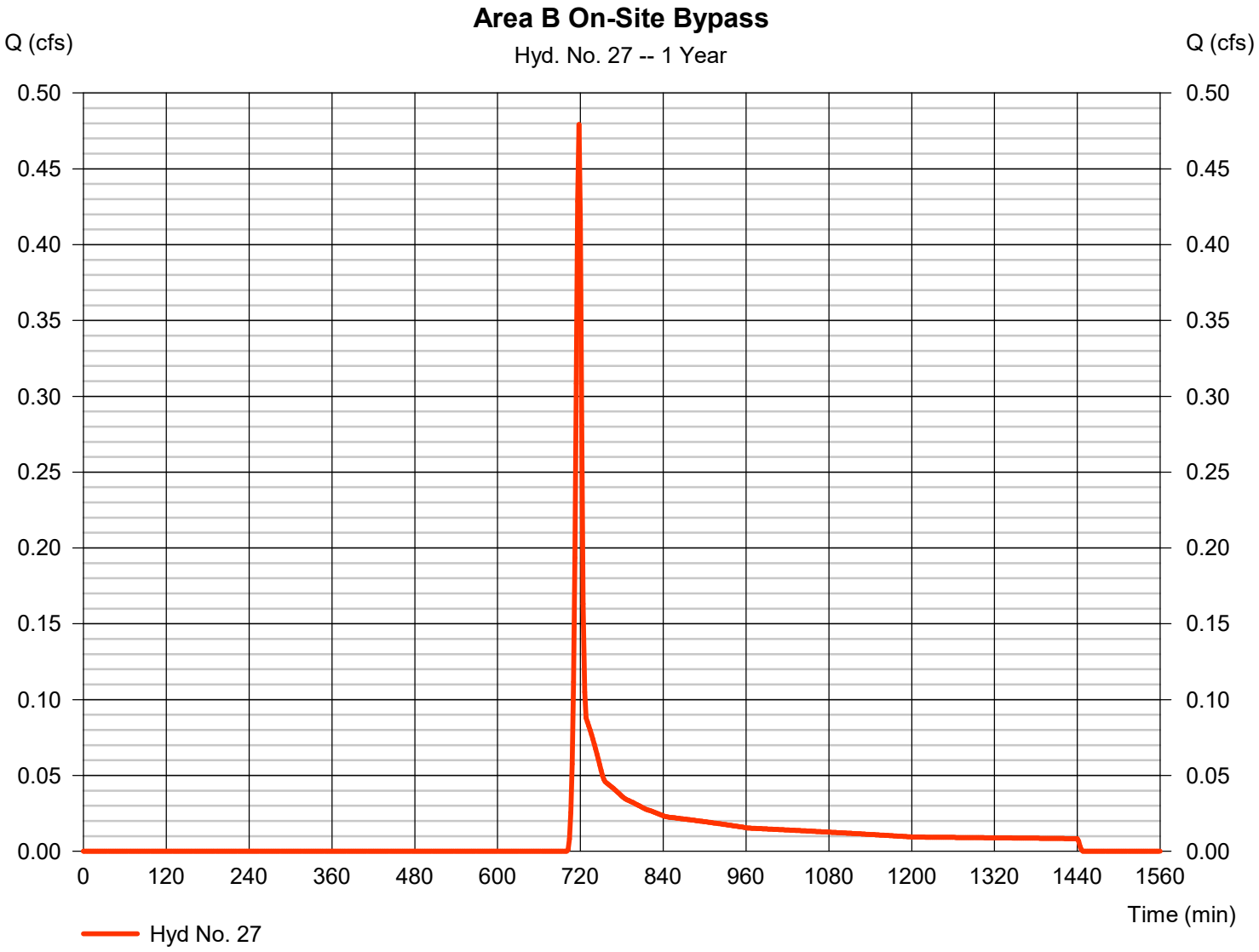


Hydrograph Report

Hyd. No. 27

Area B On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.479 cfs
Storm frequency	=	1 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,041 cuft
Drainage area	=	0.580 ac	Curve number	=	67.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

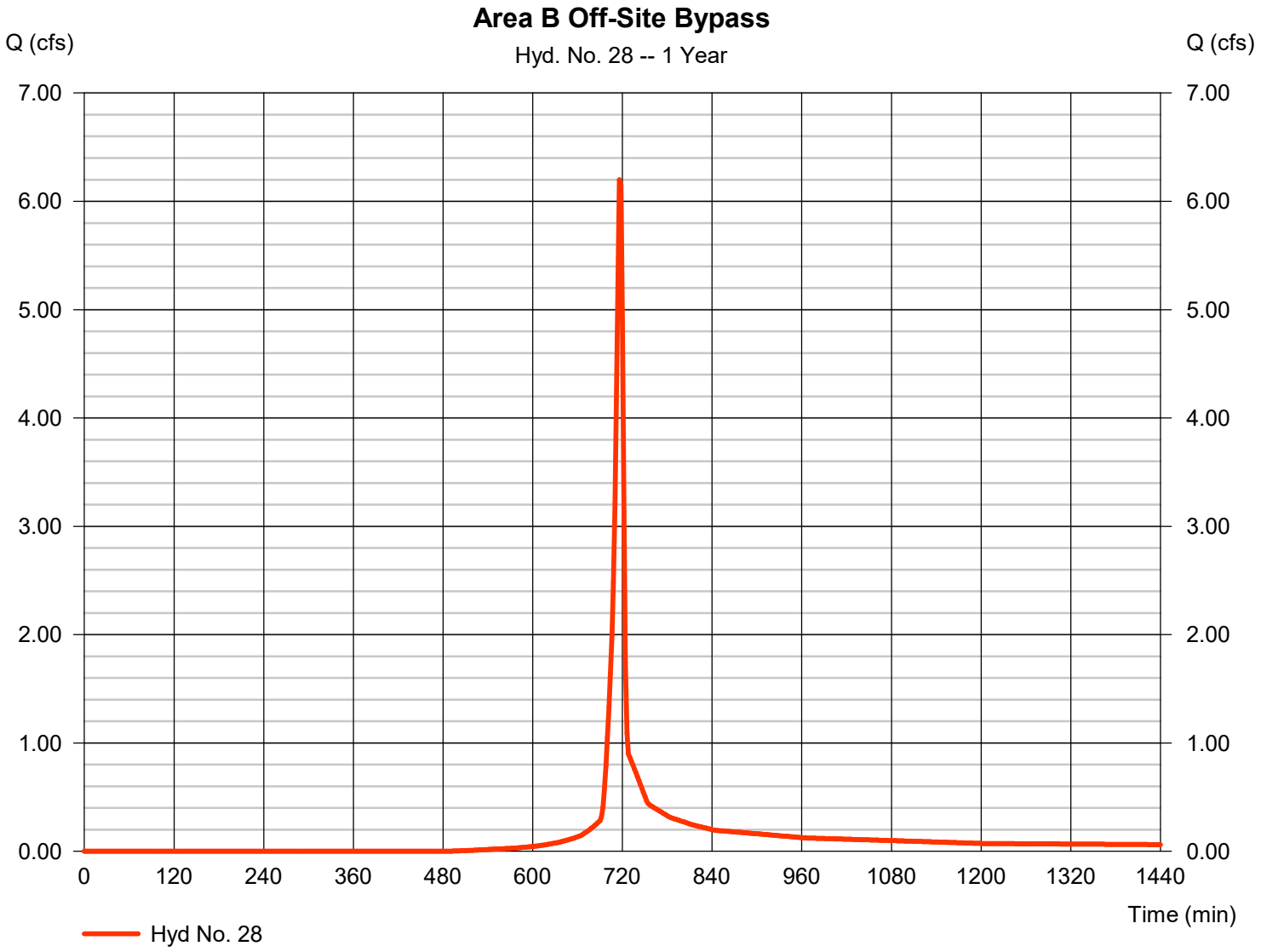


Hydrograph Report

Hyd. No. 28

Area B Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.199 cfs
Storm frequency	=	1 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	12,537 cuft
Drainage area	=	2.470 ac	Curve number	=	85.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	2.85 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

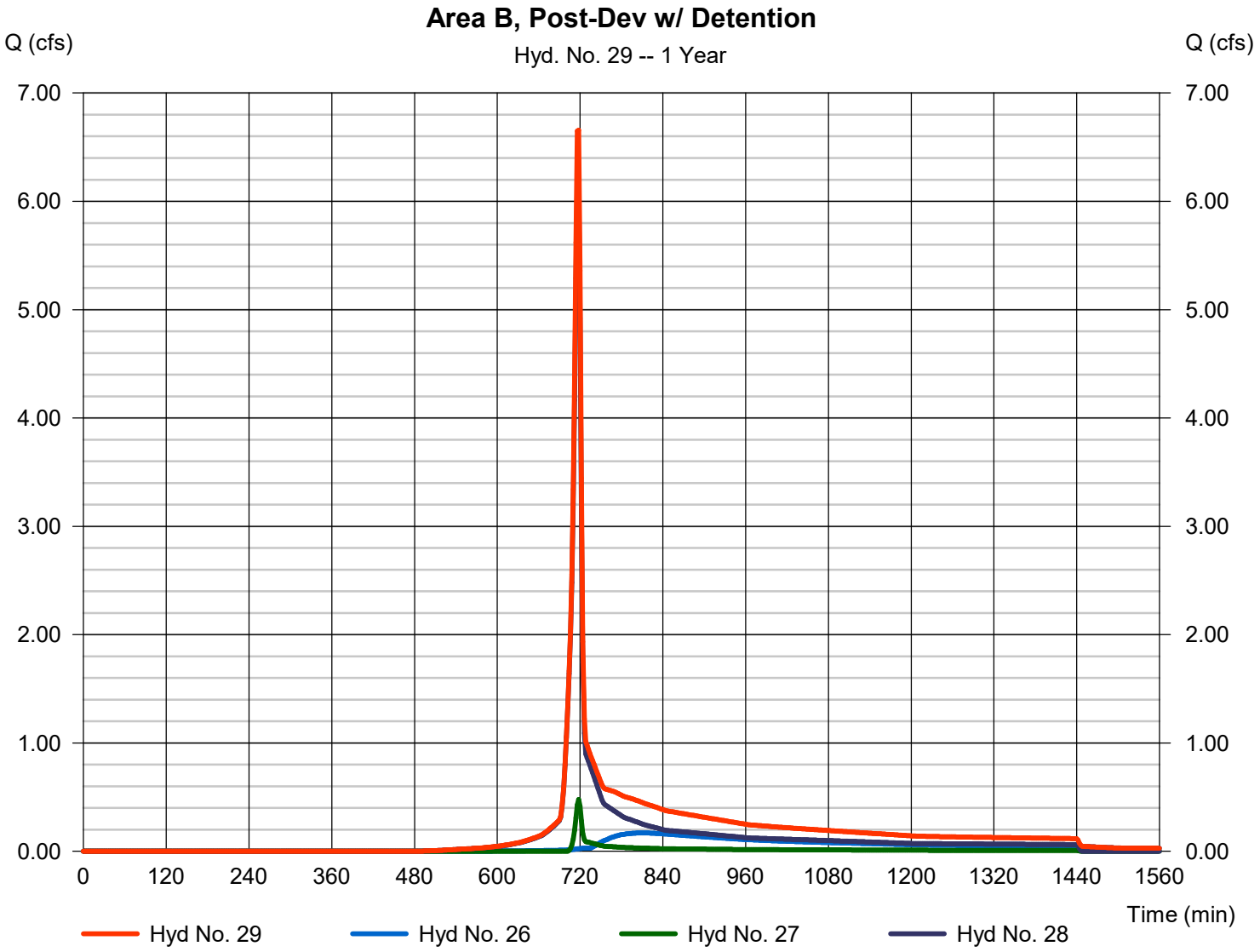


Hydrograph Report

Hyd. No. 29

Area B, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 6.655 cfs
Storm frequency	= 1 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 21,583 cuft
Inflow hyds.	= 26, 27, 28	Contrib. drain. area	= 3.050 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

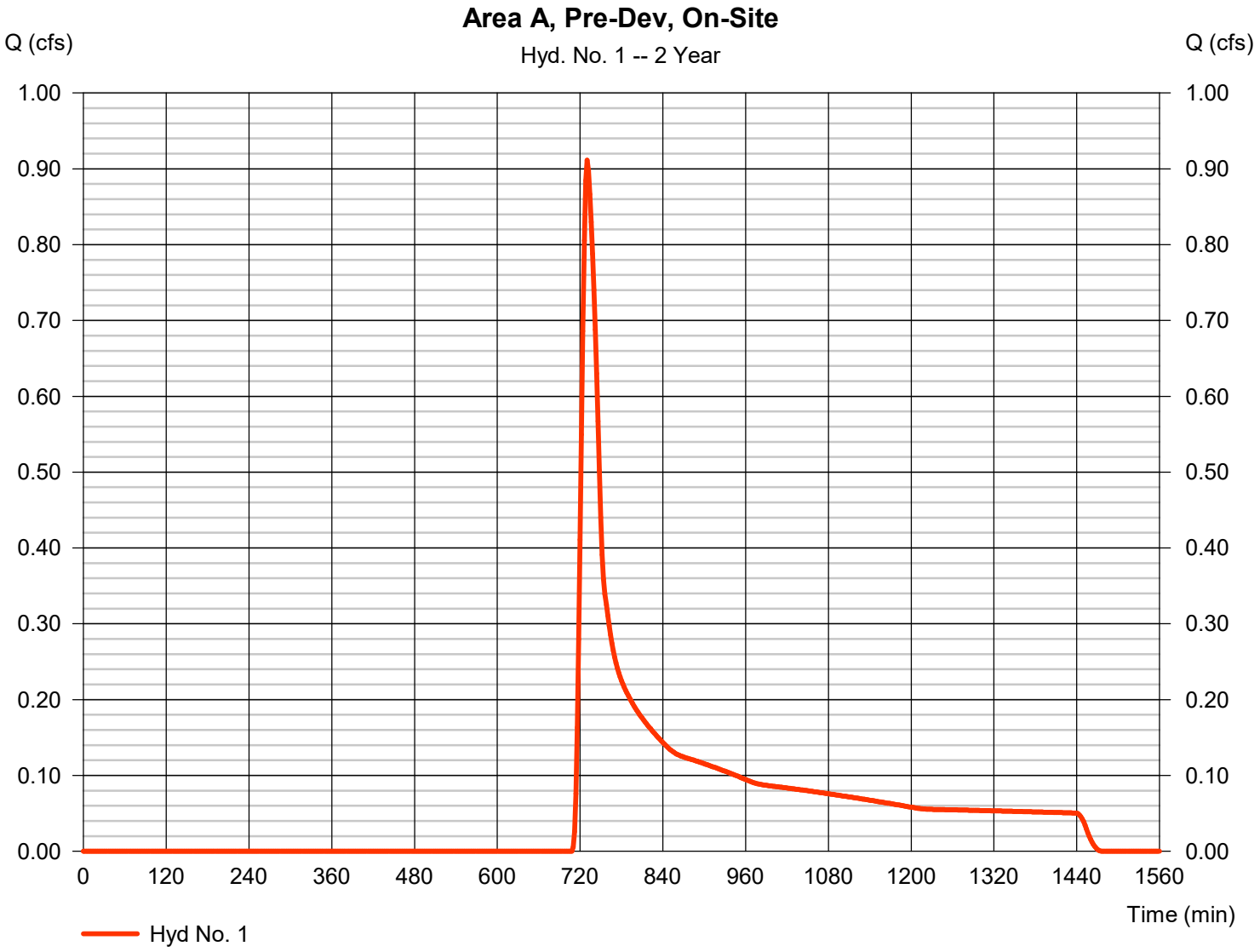
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.911	2	730	5,289	------	------	------	Area A, Pre-Dev, On-Site
2	SCS Runoff	0.296	2	728	1,243	------	------	------	Area A, Pre-Dev, Off-Site
3	Combine	1.205	2	730	6,531	1, 2	------	------	Area A, Pre-Dev
4	SCS Runoff	1.326	2	718	3,021	------	------	------	Area B, Pre-Dev, On-Site
5	SCS Runoff	8.724	2	718	17,584	------	------	------	Area B, Pre-Dev, Off-Site
6	Combine	10.05	2	718	20,605	4, 5	------	------	Area B, Pre-Dev
8	SCS Runoff	3.071	2	728	11,514	------	------	------	Area A, Post-Dev, On-Site
9	SCS Runoff	0.565	2	728	2,036	------	------	------	Area A, Post-Dev, Off-Site
10	Combine	3.637	2	728	13,550	8, 9	------	------	Area A, Post-Dev
11	SCS Runoff	4.958	2	718	9,994	------	------	------	Area B, Post-Dev, On-Site
12	SCS Runoff	9.186	2	716	18,550	------	------	------	Area B, Post-Dev, Off-Site
13	Combine	14.14	2	716	28,543	11, 12	------	------	Area B, Post-Dev
15	SCS Runoff	4.833	2	718	11,095	------	------	------	SCM-1 DA On-Site
16	SCS Runoff	0.748	2	718	1,821	------	------	------	SCM-1 DA Off-Site
17	Combine	5.580	2	718	12,916	15, 16	------	------	SCM-1 Drainage Area
18	Reservoir	0.426	2	758	12,732	17	326.35	7,165	SCM-1
19	SCS Runoff	0.663	2	730	3,219	------	------	------	Area A On-Site Bypass
20	SCS Runoff	0.114	2	730	554	------	------	------	Area A Off-Site Bypass
21	Combine	1.116	2	730	16,504	18, 19, 20	------	------	Area A, Post-Dev w/ Detention
23	SCS Runoff	4.427	2	716	9,059	------	------	------	SCM-2 On-Site
24	SCS Runoff	1.047	2	718	2,147	------	------	------	SCM-2 Off-Site
25	Combine	5.408	2	716	11,207	23, 24	------	------	SCM-2 Drainage Area
26	Reservoir	0.534	2	744	11,091	25	327.84	5,626	SCM-2
27	SCS Runoff	0.815	2	718	1,673	------	------	------	Area B On-Site Bypass
28	SCS Runoff	8.318	2	716	16,928	------	------	------	Area B Off-Site Bypass
29	Combine	9.108	2	716	29,692	26, 27, 28	------	------	Area B, Post-Dev w/ Detention

Hydrograph Report

Hyd. No. 1

Area A, Pre-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.911 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	5,289 cuft
Drainage area	=	3.330 ac	Curve number	=	57.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

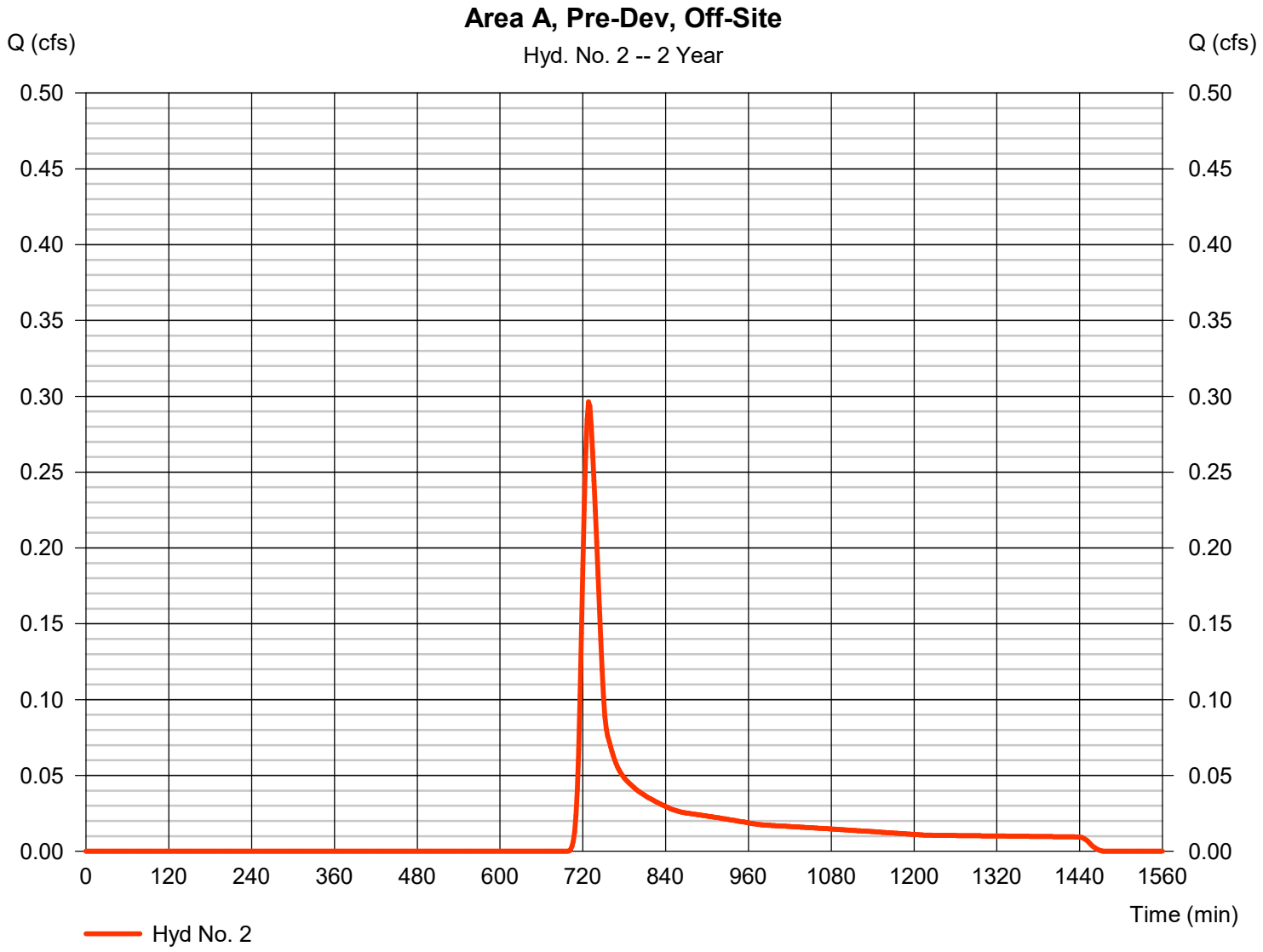


Hydrograph Report

Hyd. No. 2

Area A, Pre-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.296 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 1,243 cuft
Drainage area	= 0.460 ac	Curve number	= 65
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 3.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

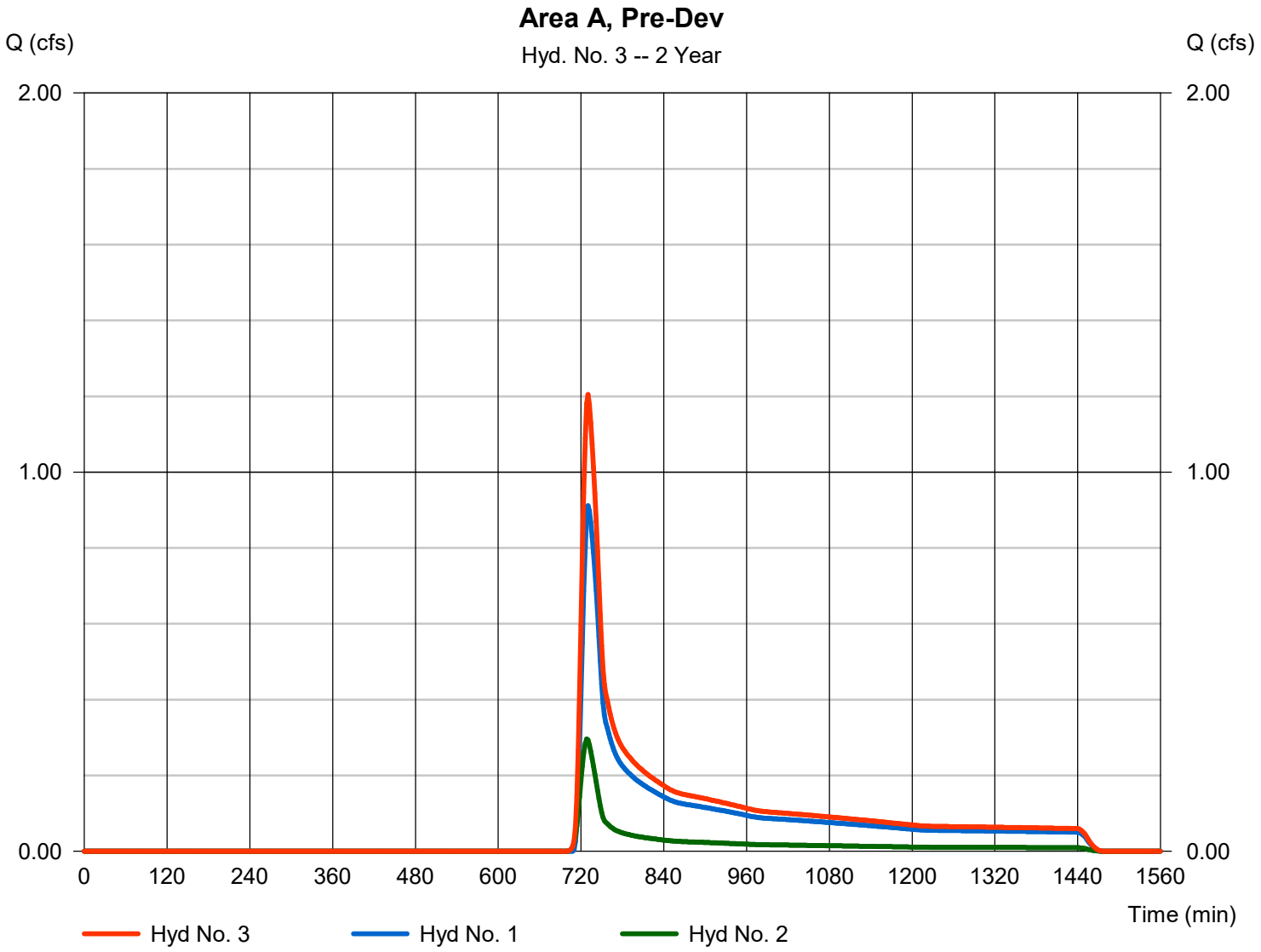


Hydrograph Report

Hyd. No. 3

Area A, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 1.205 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 6,531 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.790 ac

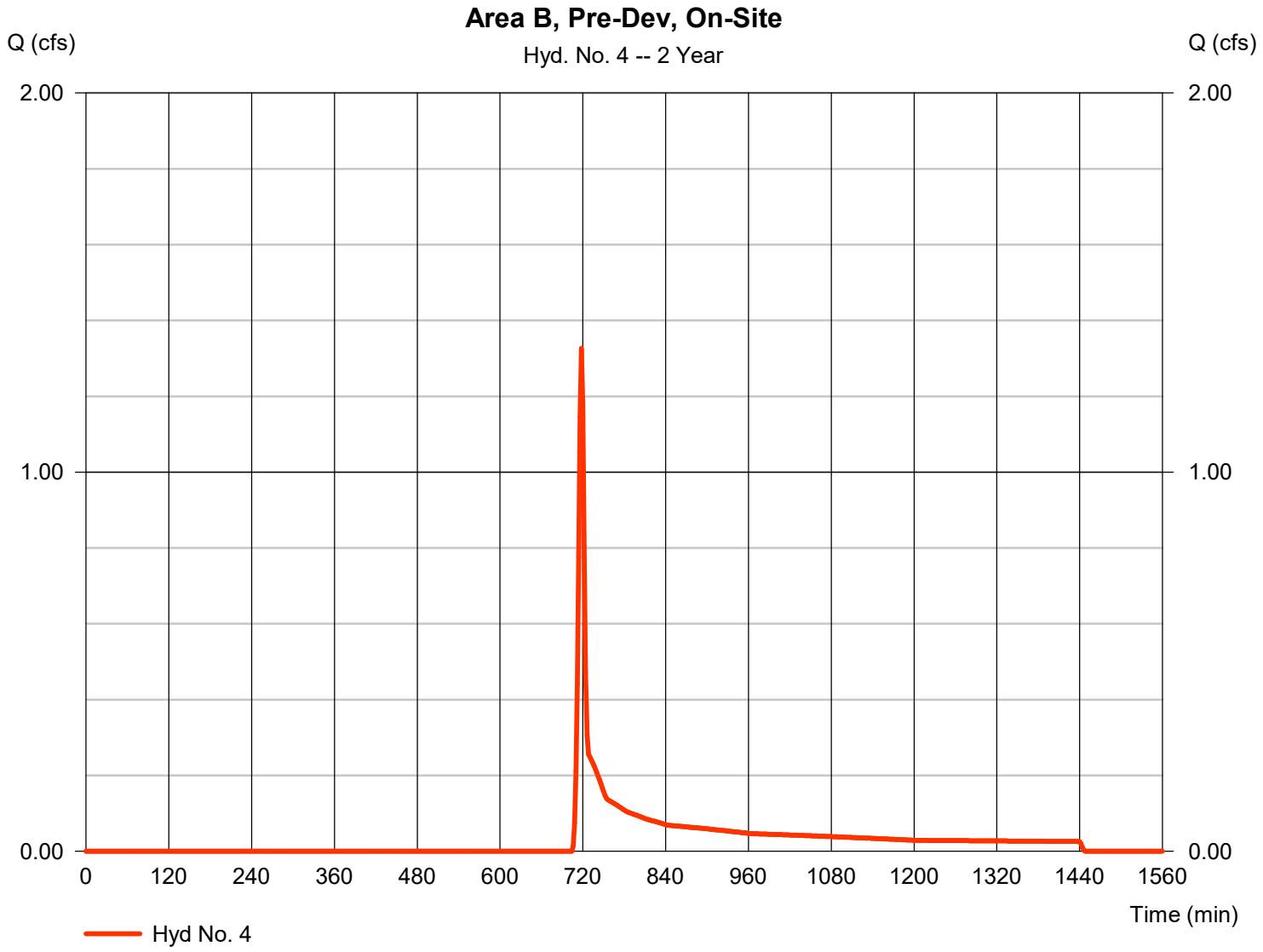


Hydrograph Report

Hyd. No. 4

Area B, Pre-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.326 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	3,021 cuft
Drainage area	=	1.600 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

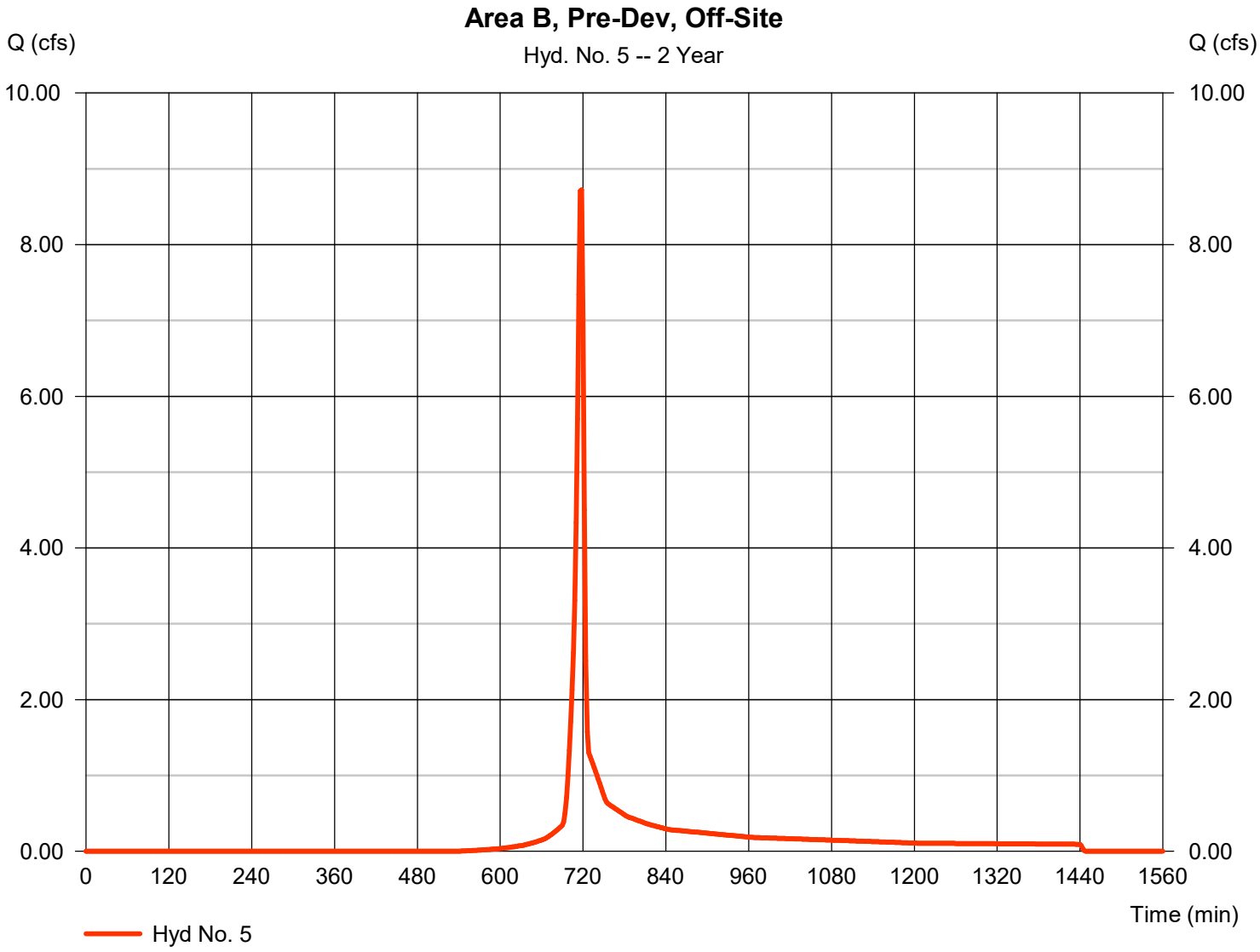


Hydrograph Report

Hyd. No. 5

Area B, Pre-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 8.724 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 17,584 cuft
Drainage area	= 3.220 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

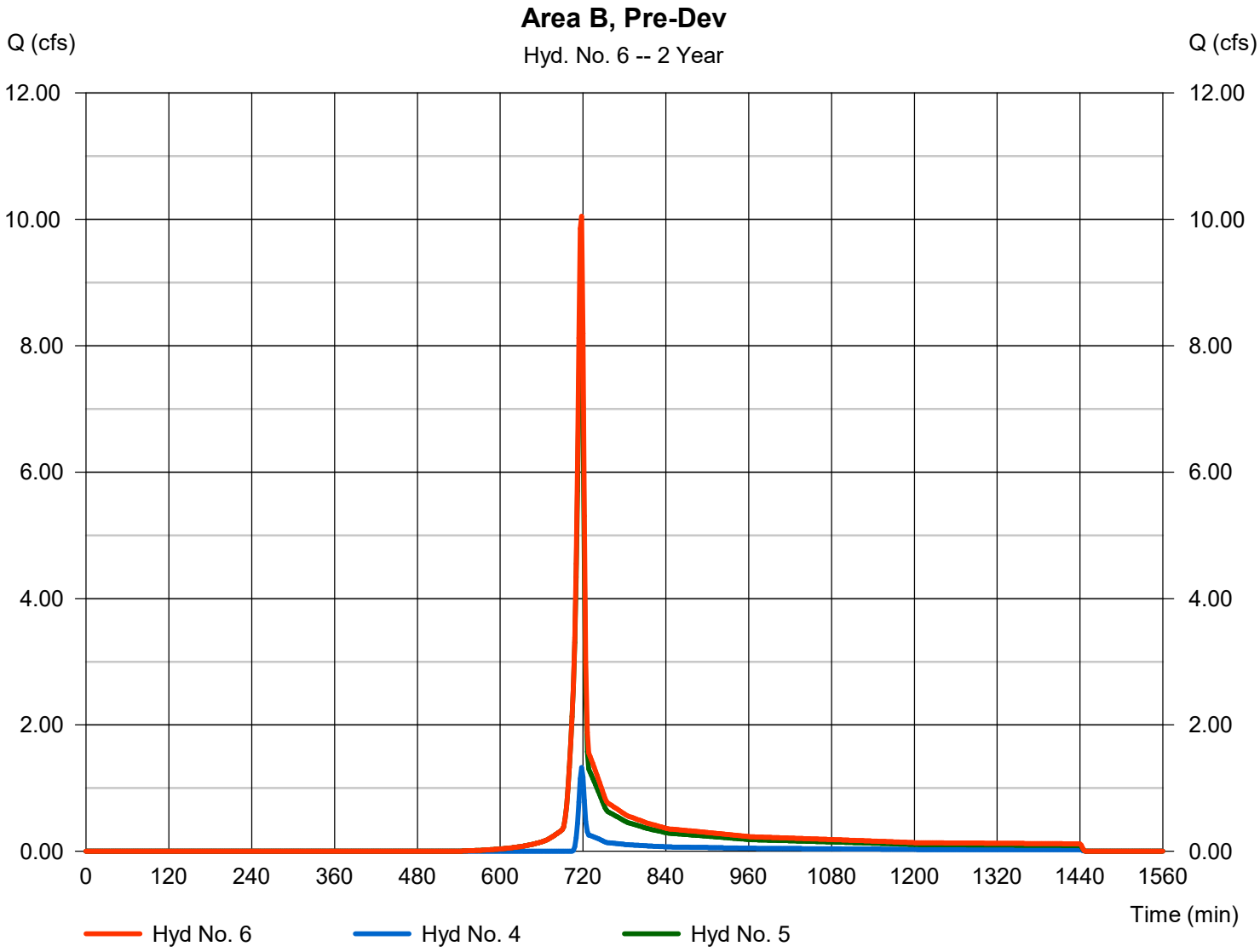


Hydrograph Report

Hyd. No. 6

Area B, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 10.05 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 20,605 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 4.820 ac

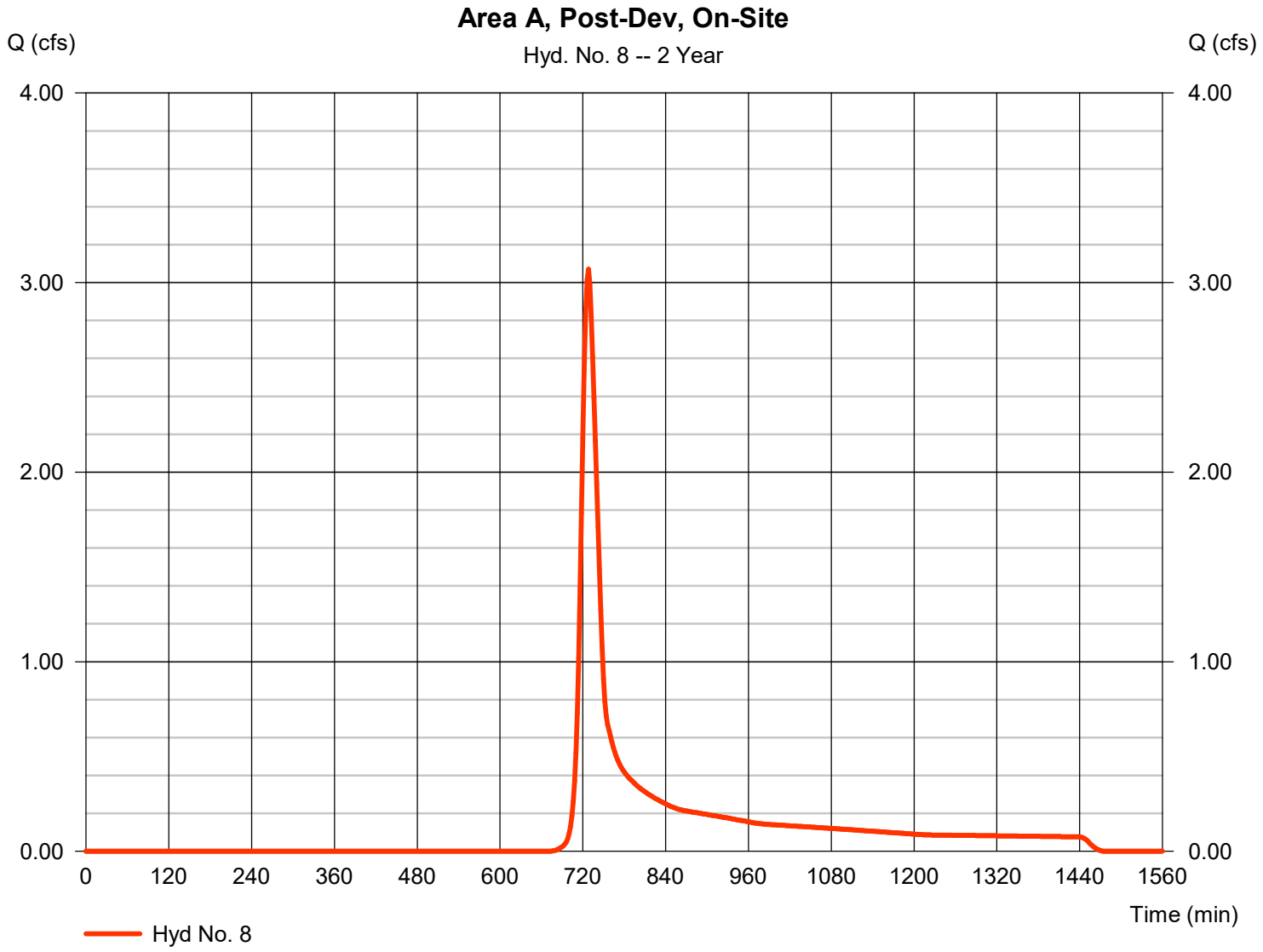


Hydrograph Report

Hyd. No. 8

Area A, Post-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 3.071 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 11,514 cuft
Drainage area	= 3.100 ac	Curve number	= 70.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 3.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

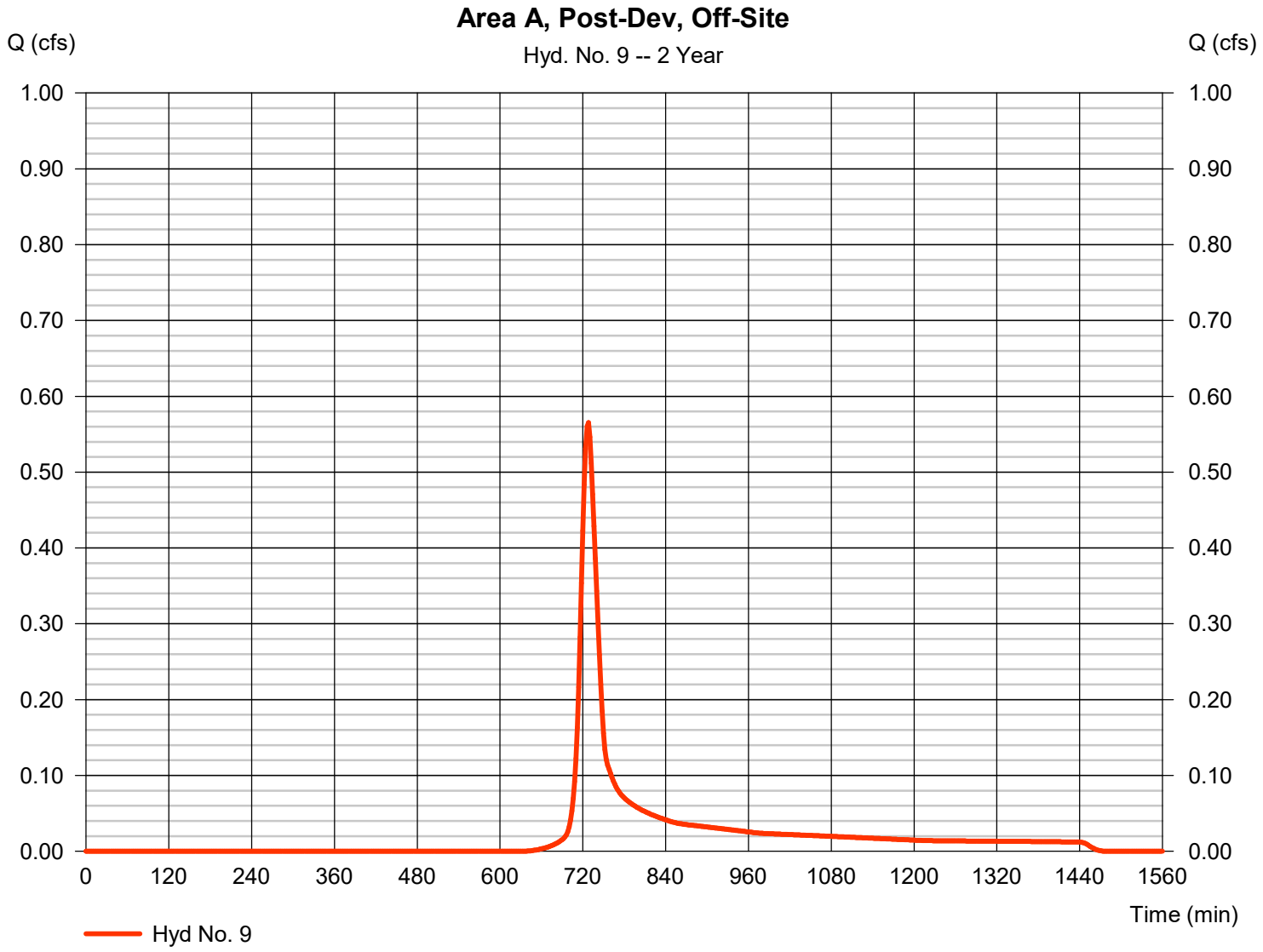


Hydrograph Report

Hyd. No. 9

Area A, Post-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.565 cfs
Storm frequency	= 2 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,036 cuft
Drainage area	= 0.450 ac	Curve number	= 74.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 3.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

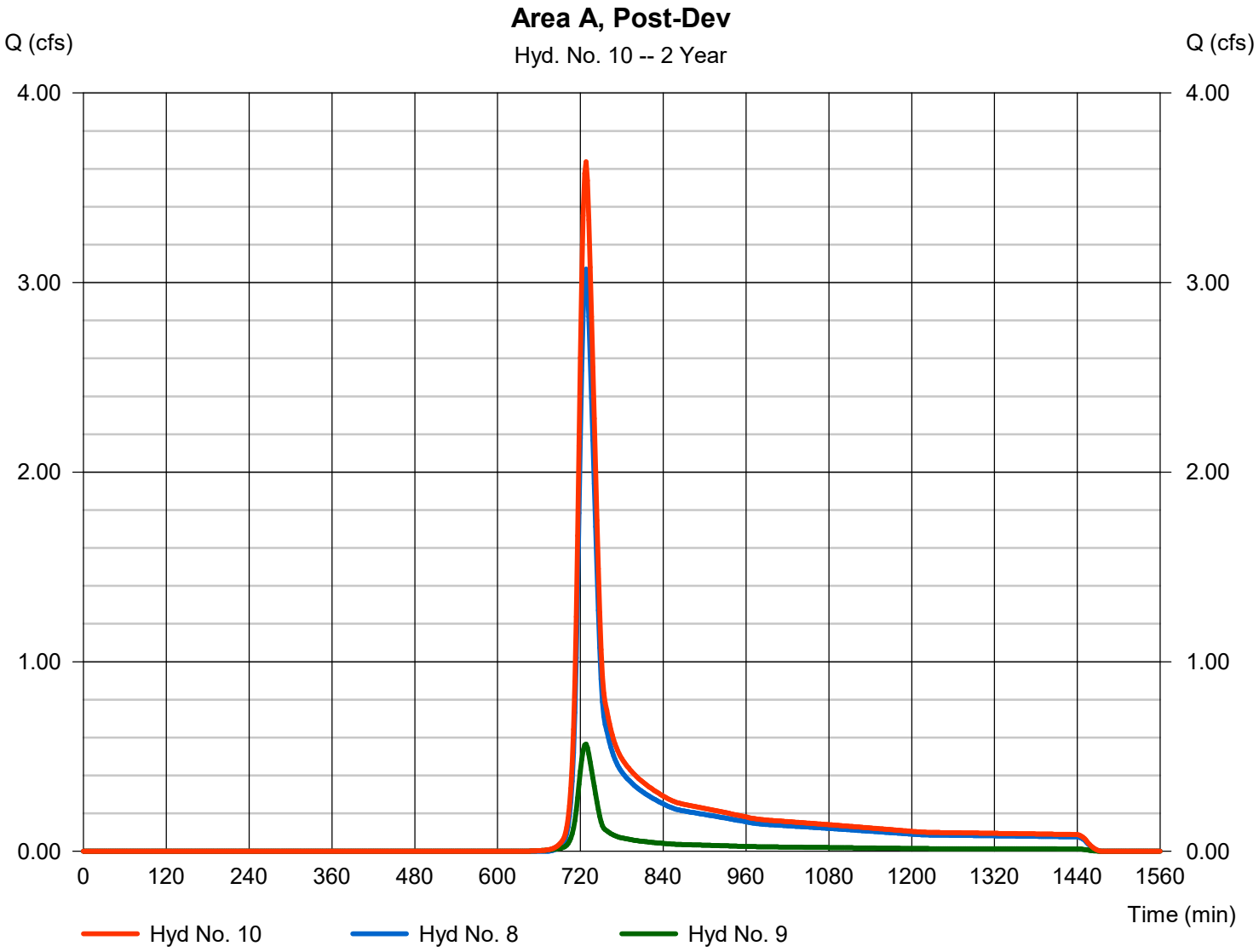


Hydrograph Report

Hyd. No. 10

Area A, Post-Dev

Hydrograph type	=	Combine	Peak discharge	=	3.637 cfs
Storm frequency	=	2 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	13,550 cuft
Inflow hyds.	=	8, 9	Contrib. drain. area	=	3.550 ac

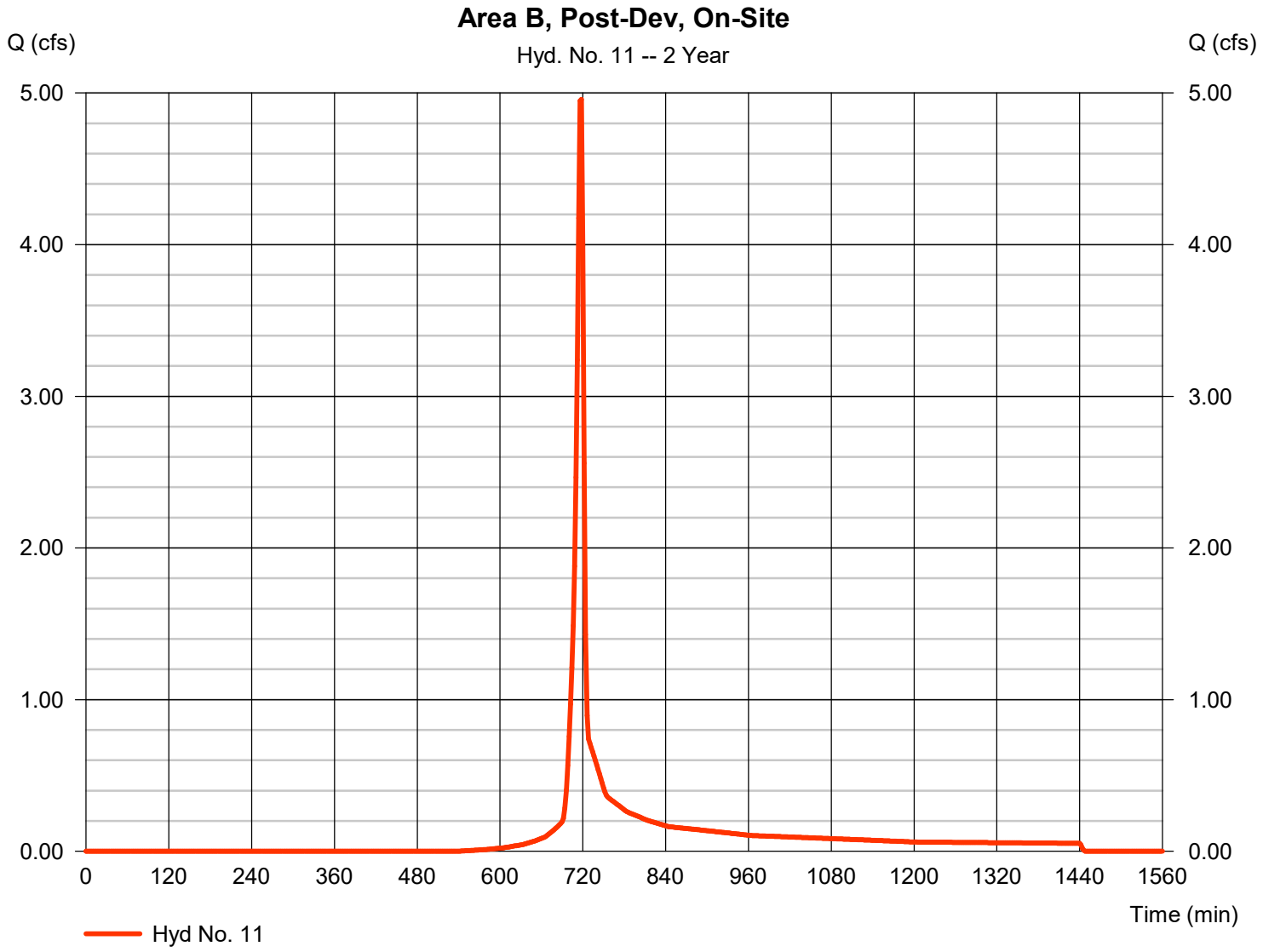


Hydrograph Report

Hyd. No. 11

Area B, Post-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 4.958 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 9,994 cuft
Drainage area	= 1.830 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.46 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

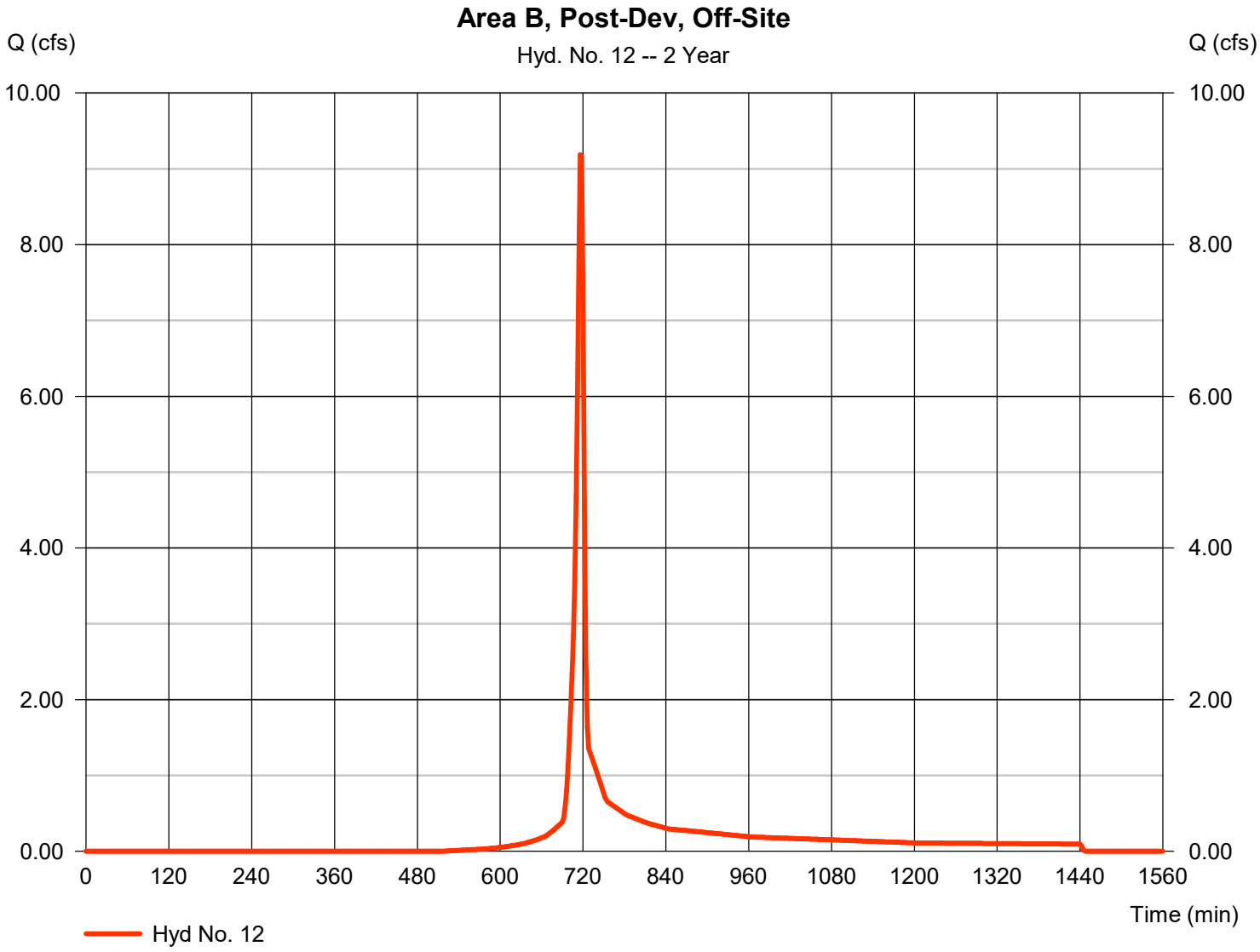


Hydrograph Report

Hyd. No. 12

Area B, Post-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.186 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	18,550 cuft
Drainage area	=	3.210 ac	Curve number	=	81.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

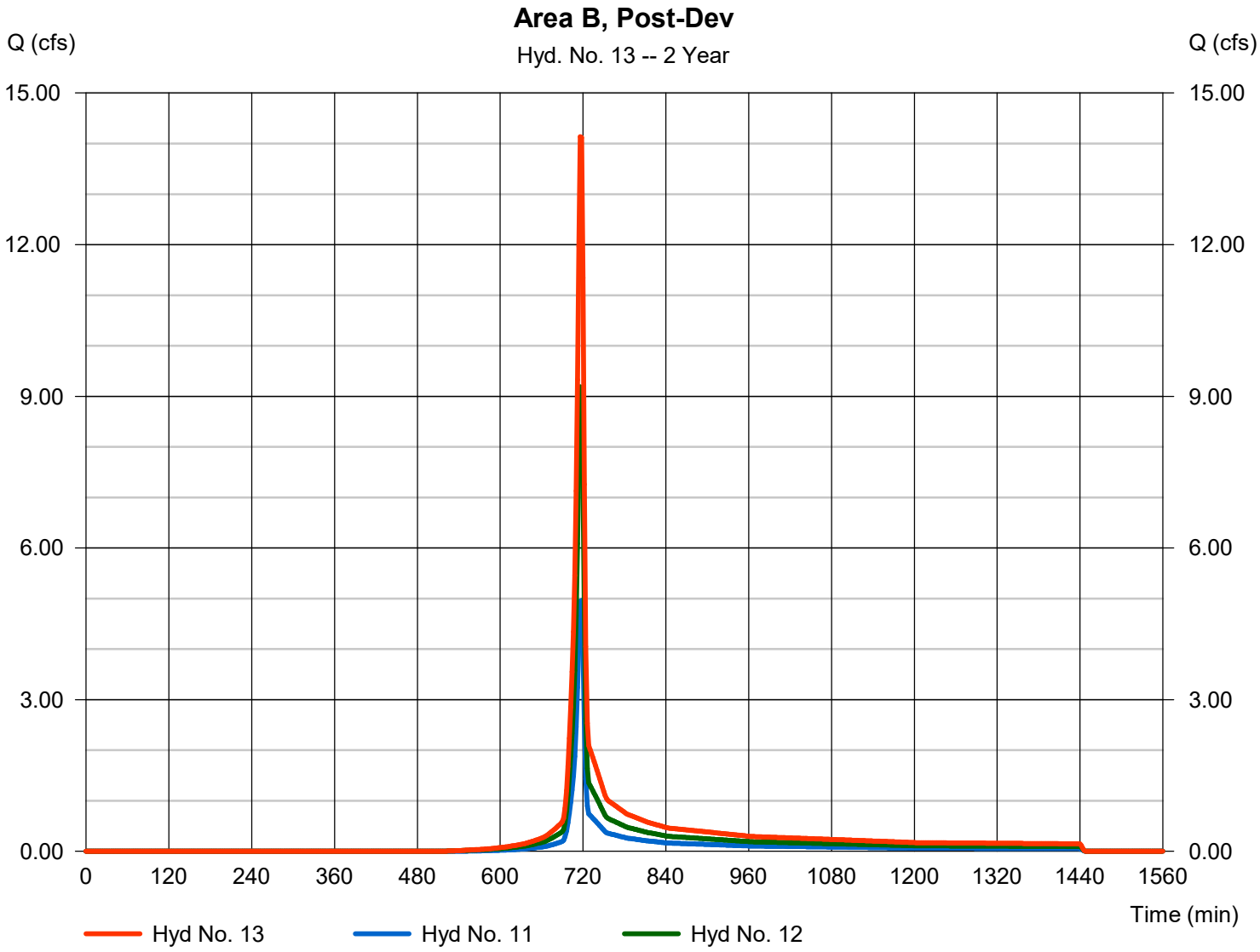


Hydrograph Report

Hyd. No. 13

Area B, Post-Dev

Hydrograph type	= Combine	Peak discharge	= 14.14 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 28,543 cuft
Inflow hyds.	= 11, 12	Contrib. drain. area	= 5.040 ac

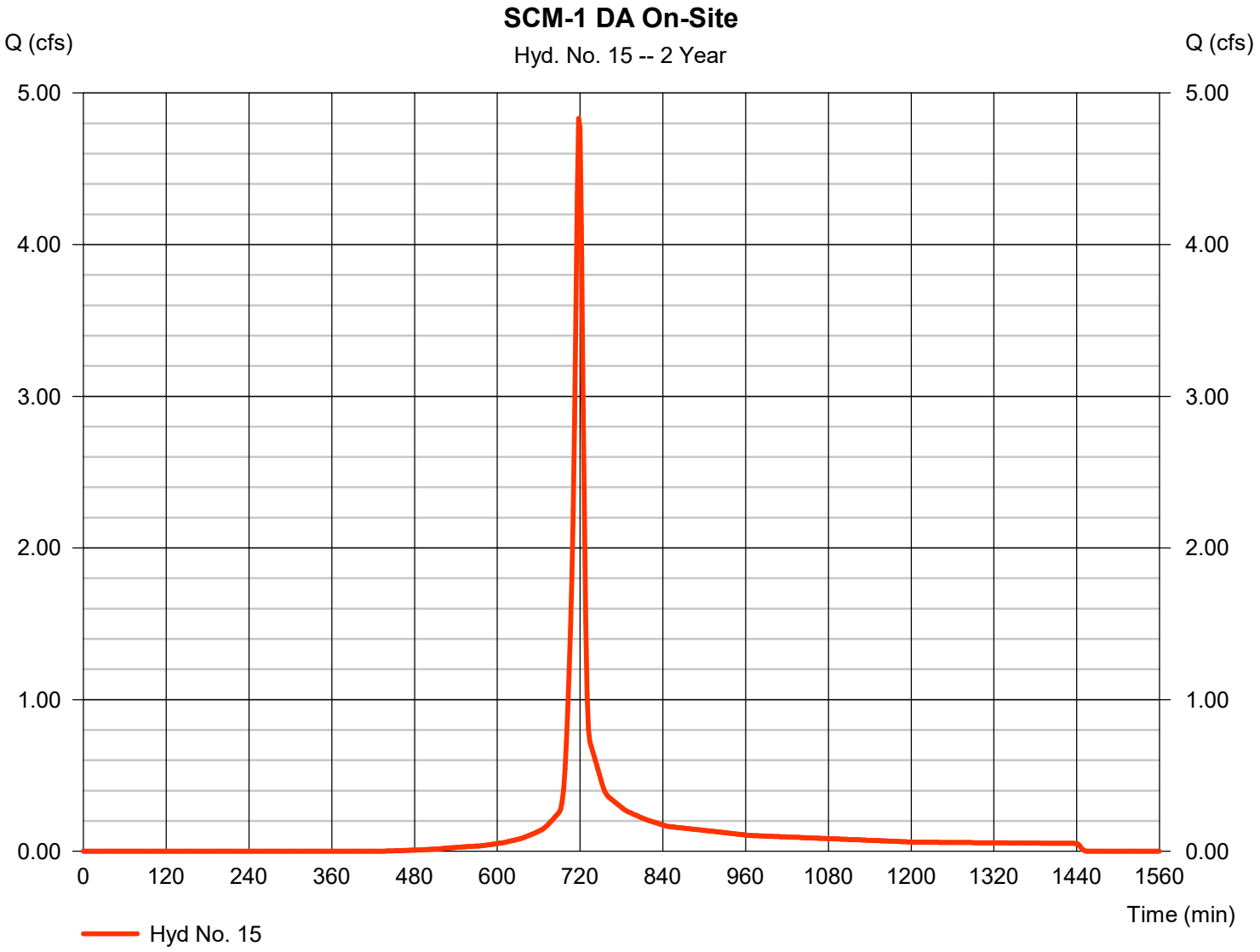


Hydrograph Report

Hyd. No. 15

SCM-1 DA On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.833 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	11,095 cuft
Drainage area	=	1.530 ac	Curve number	=	85.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

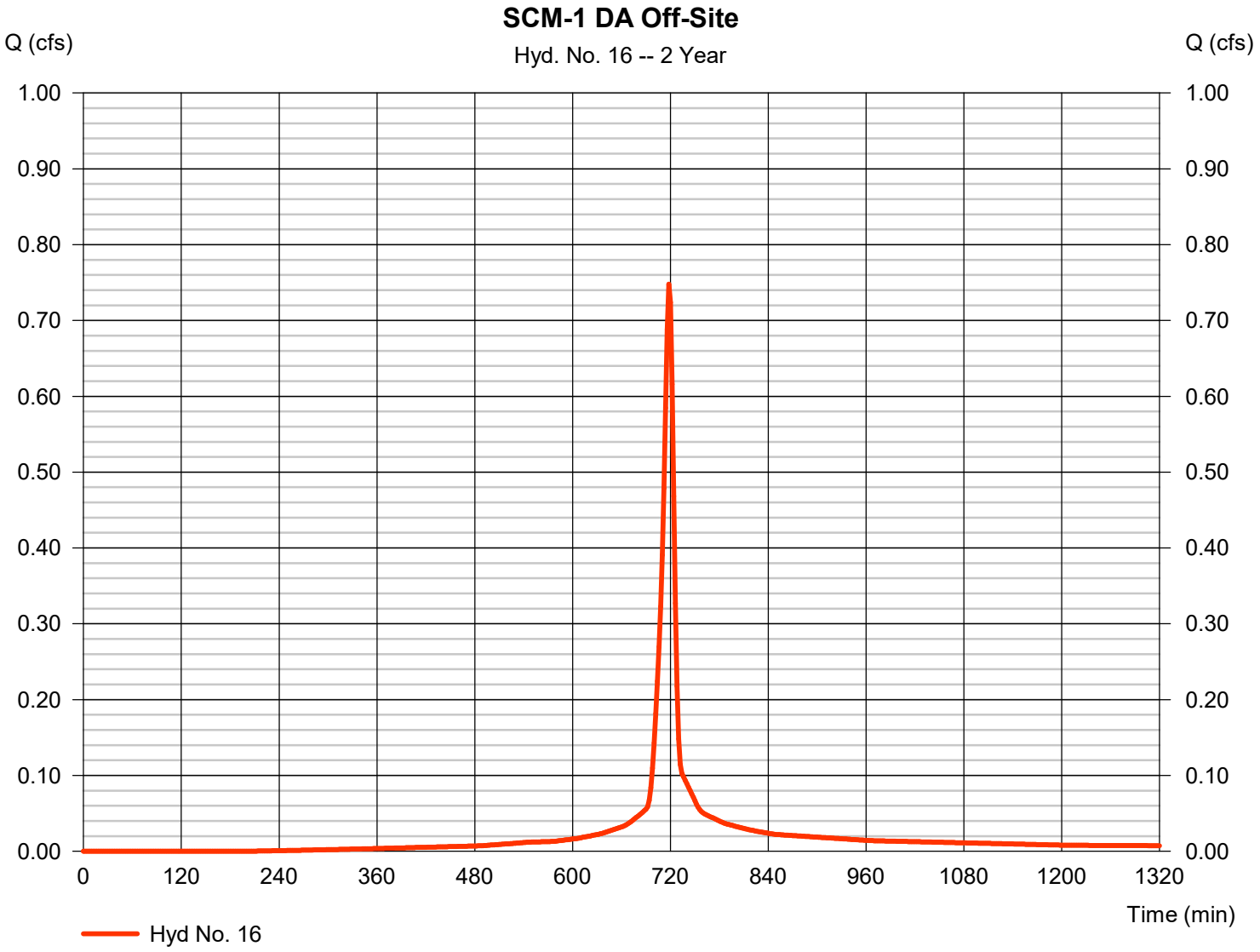


Hydrograph Report

Hyd. No. 16

SCM-1 DA Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.748 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,821 cuft
Drainage area	=	0.180 ac	Curve number	=	93.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

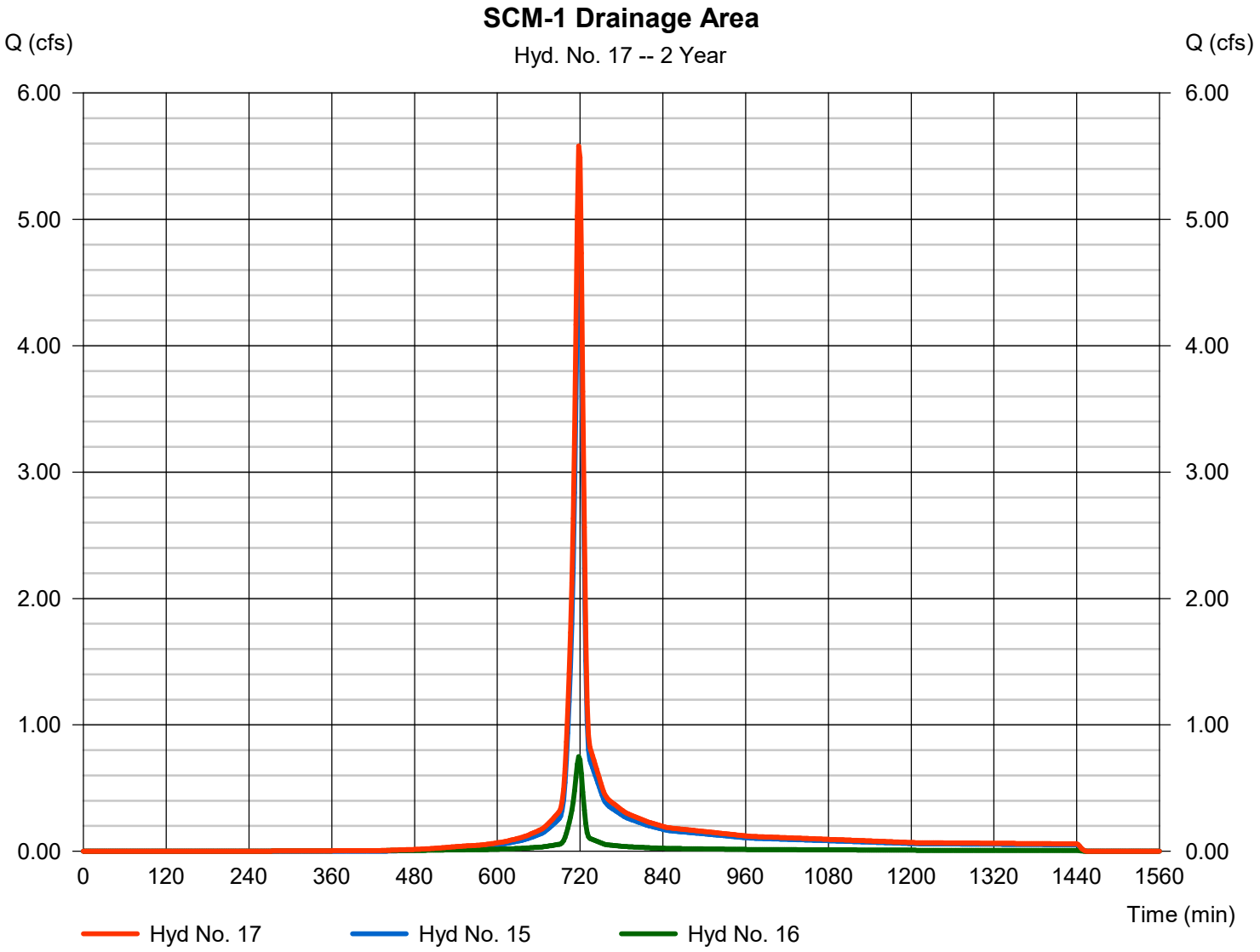


Hydrograph Report

Hyd. No. 17

SCM-1 Drainage Area

Hydrograph type	=	Combine	Peak discharge	=	5.580 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	12,916 cuft
Inflow hyds.	=	15, 16	Contrib. drain. area	=	1.710 ac



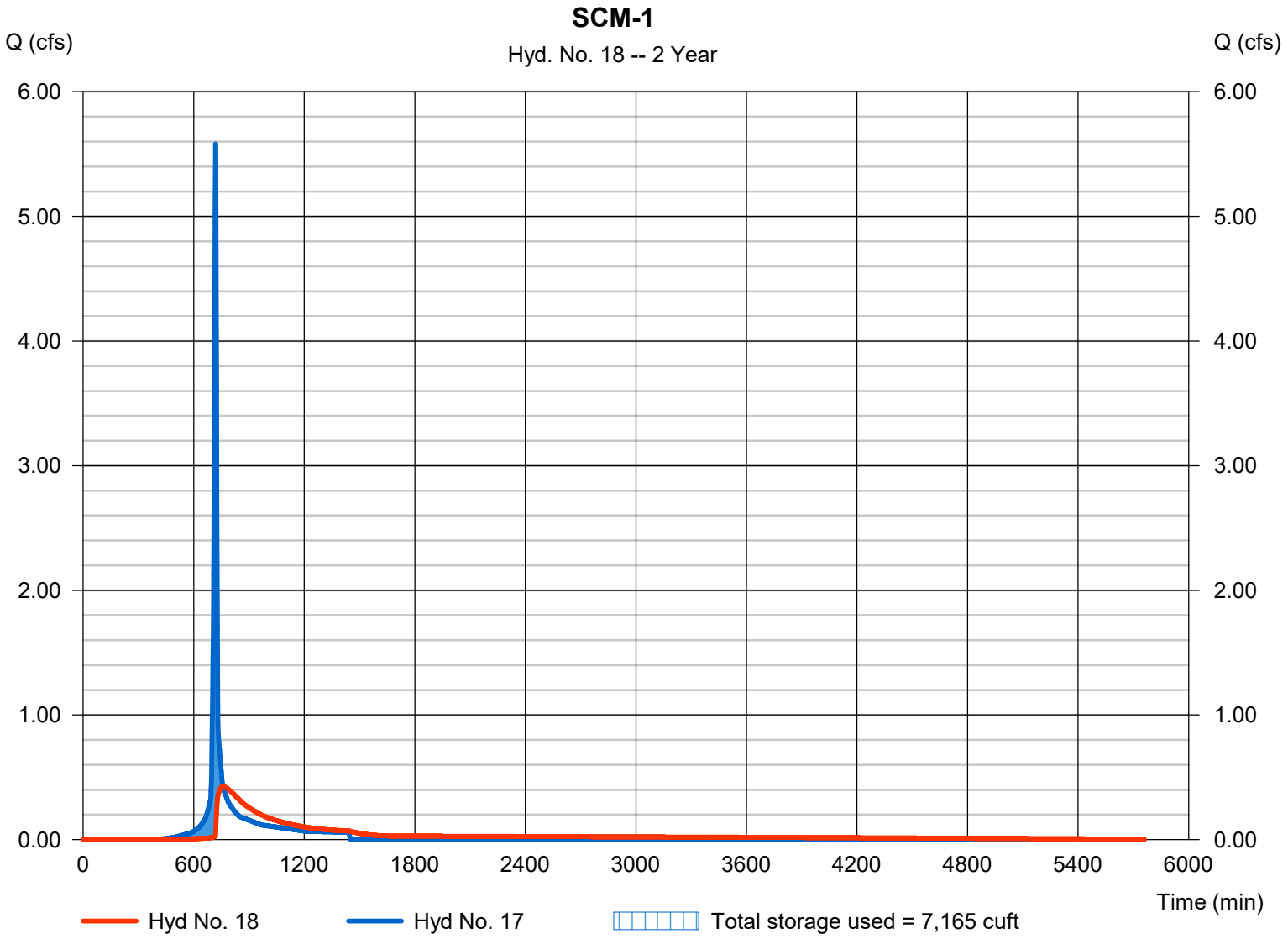
Hydrograph Report

Hyd. No. 18

SCM-1

Hydrograph type	=	Reservoir	Peak discharge	=	0.426 cfs
Storm frequency	=	2 yrs	Time to peak	=	758 min
Time interval	=	2 min	Hyd. volume	=	12,732 cuft
Inflow hyd. No.	=	17 - SCM-1 Drainage Area	Max. Elevation	=	326.35 ft
Reservoir name	=	SCM-1	Max. Storage	=	7,165 cuft

Storage Indication method used.

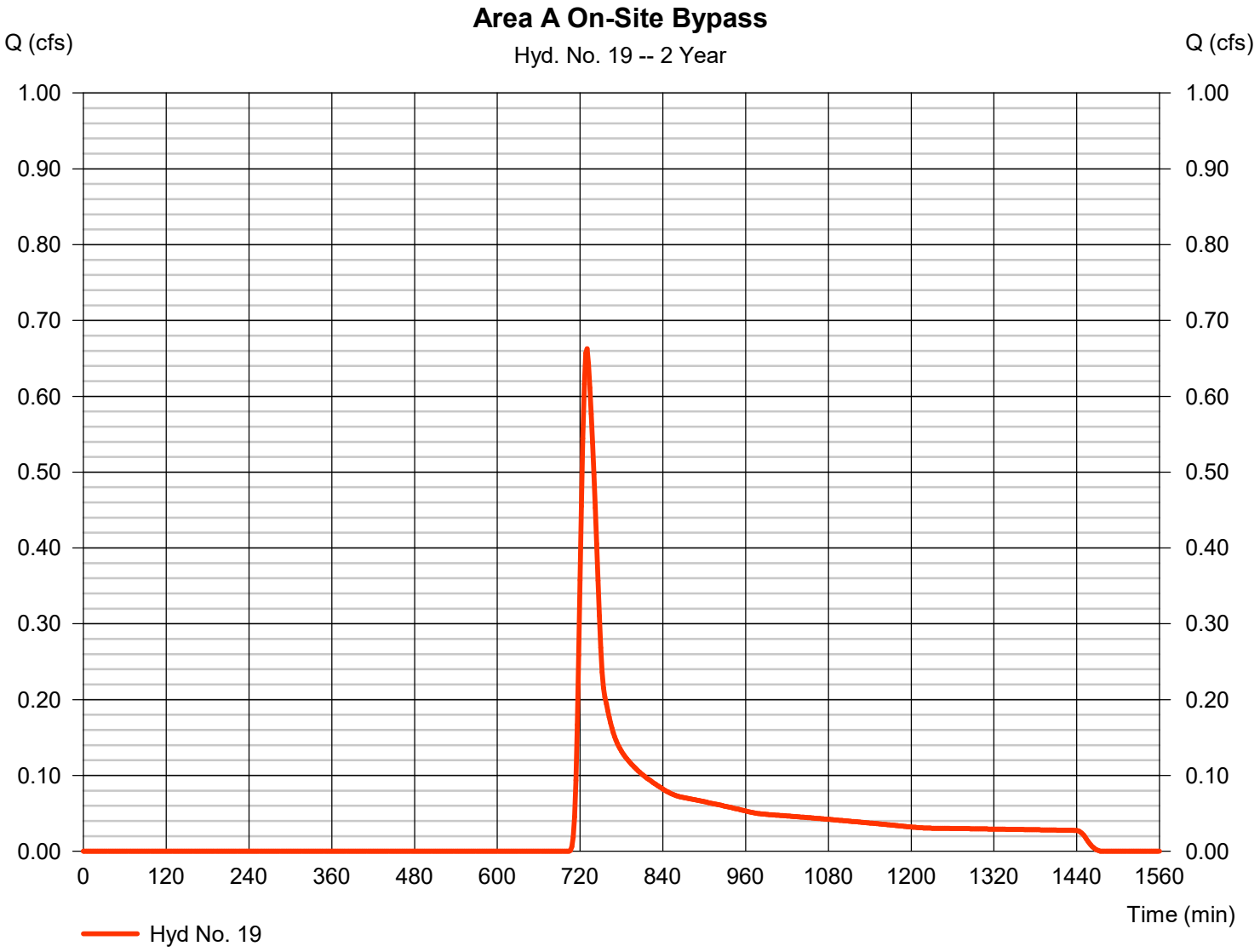


Hydrograph Report

Hyd. No. 19

Area A On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.663 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	3,219 cuft
Drainage area	=	1.570 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

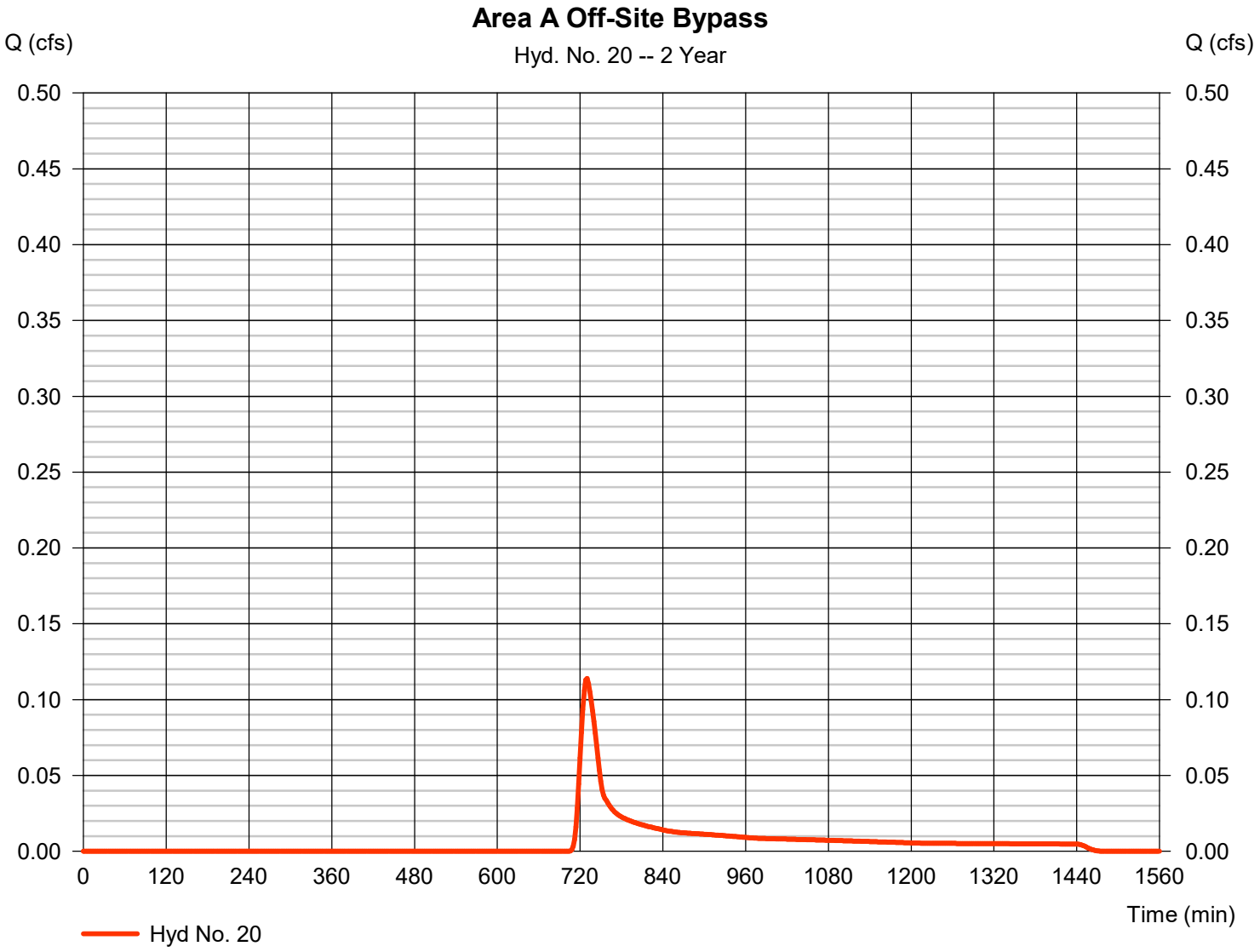


Hydrograph Report

Hyd. No. 20

Area A Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.114 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	554 cuft
Drainage area	=	0.270 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

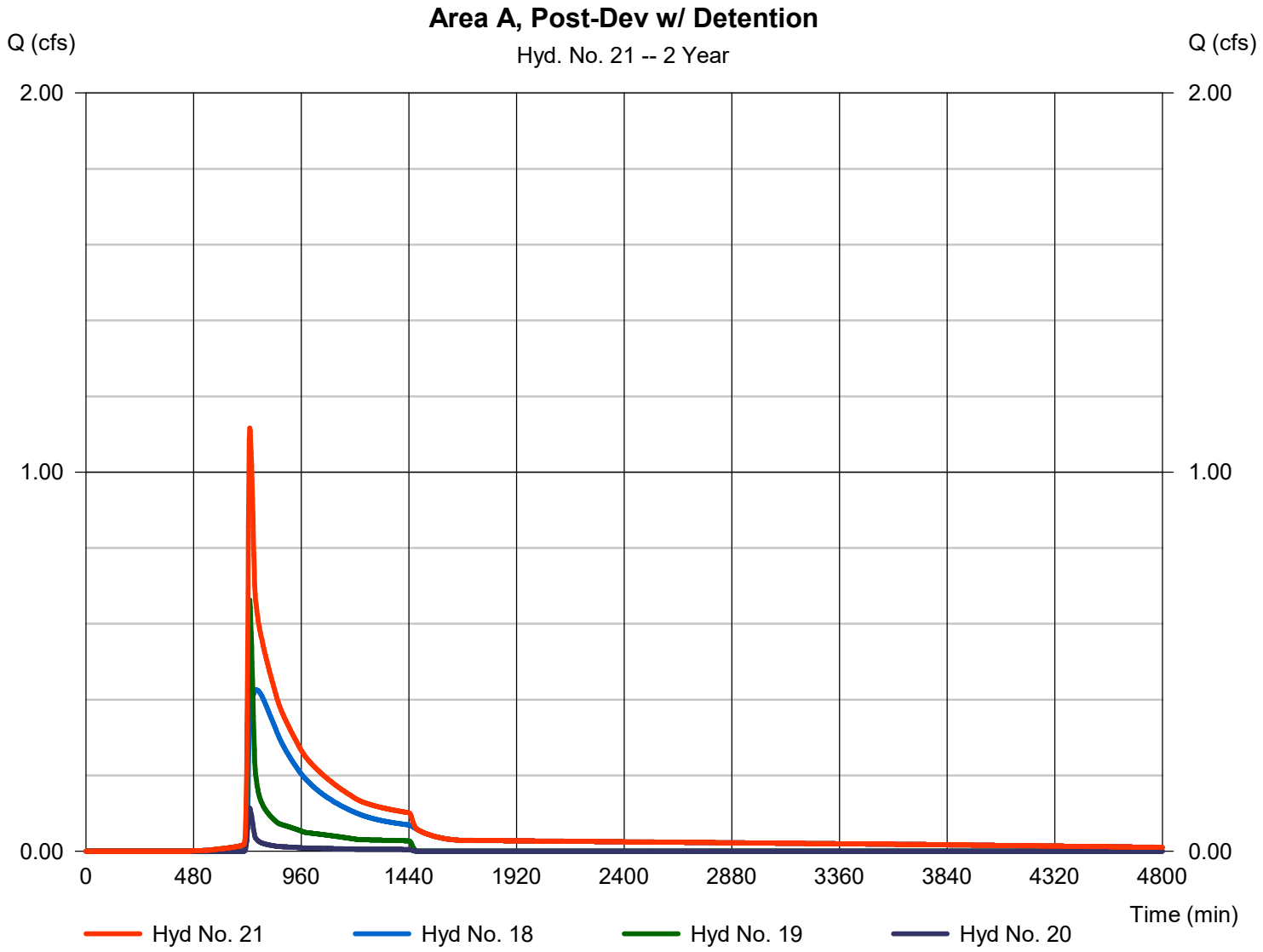


Hydrograph Report

Hyd. No. 21

Area A, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 1.116 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 16,504 cuft
Inflow hyds.	= 18, 19, 20	Contrib. drain. area	= 1.840 ac

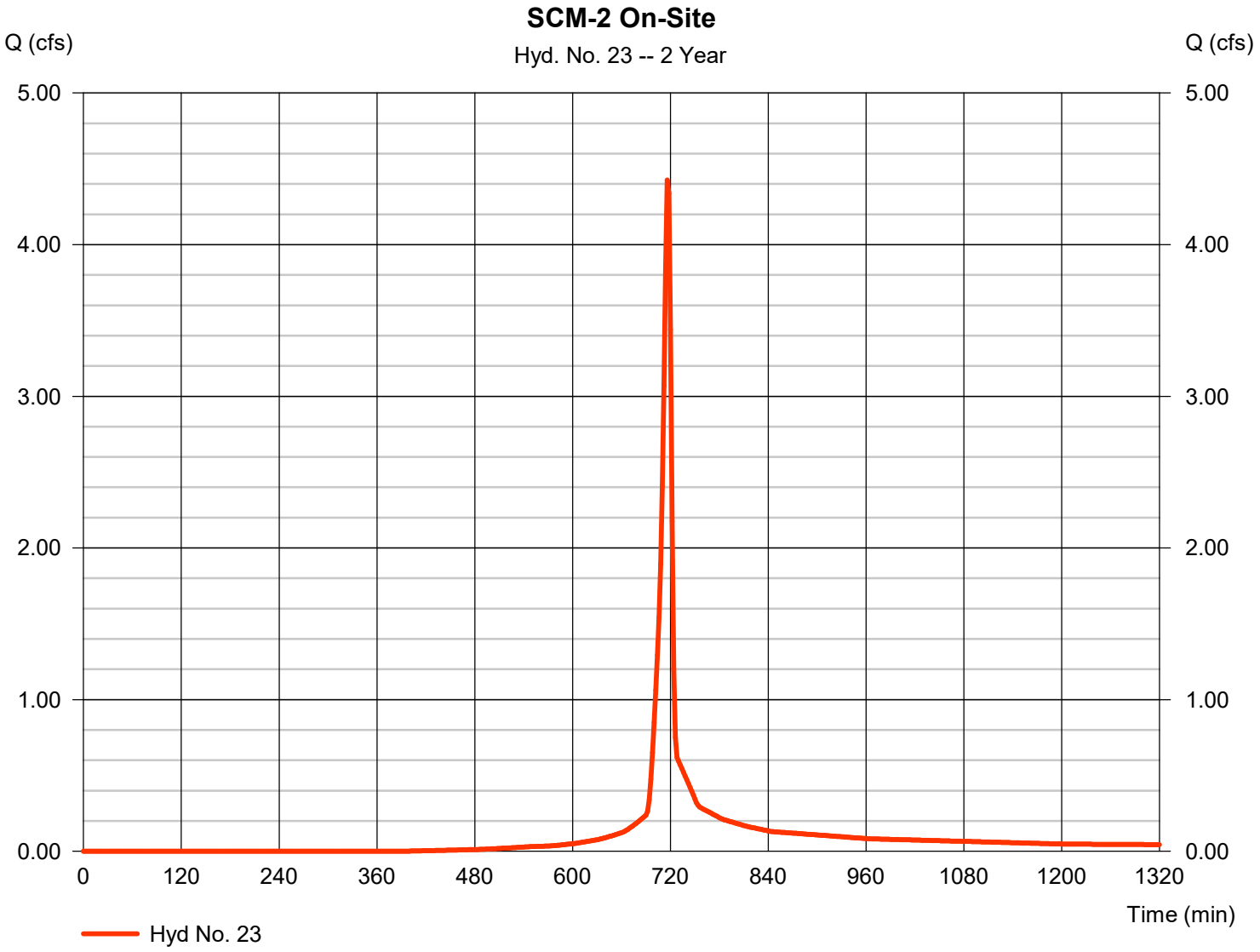


Hydrograph Report

Hyd. No. 23

SCM-2 On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.427 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	9,059 cuft
Drainage area	=	1.250 ac	Curve number	=	86.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

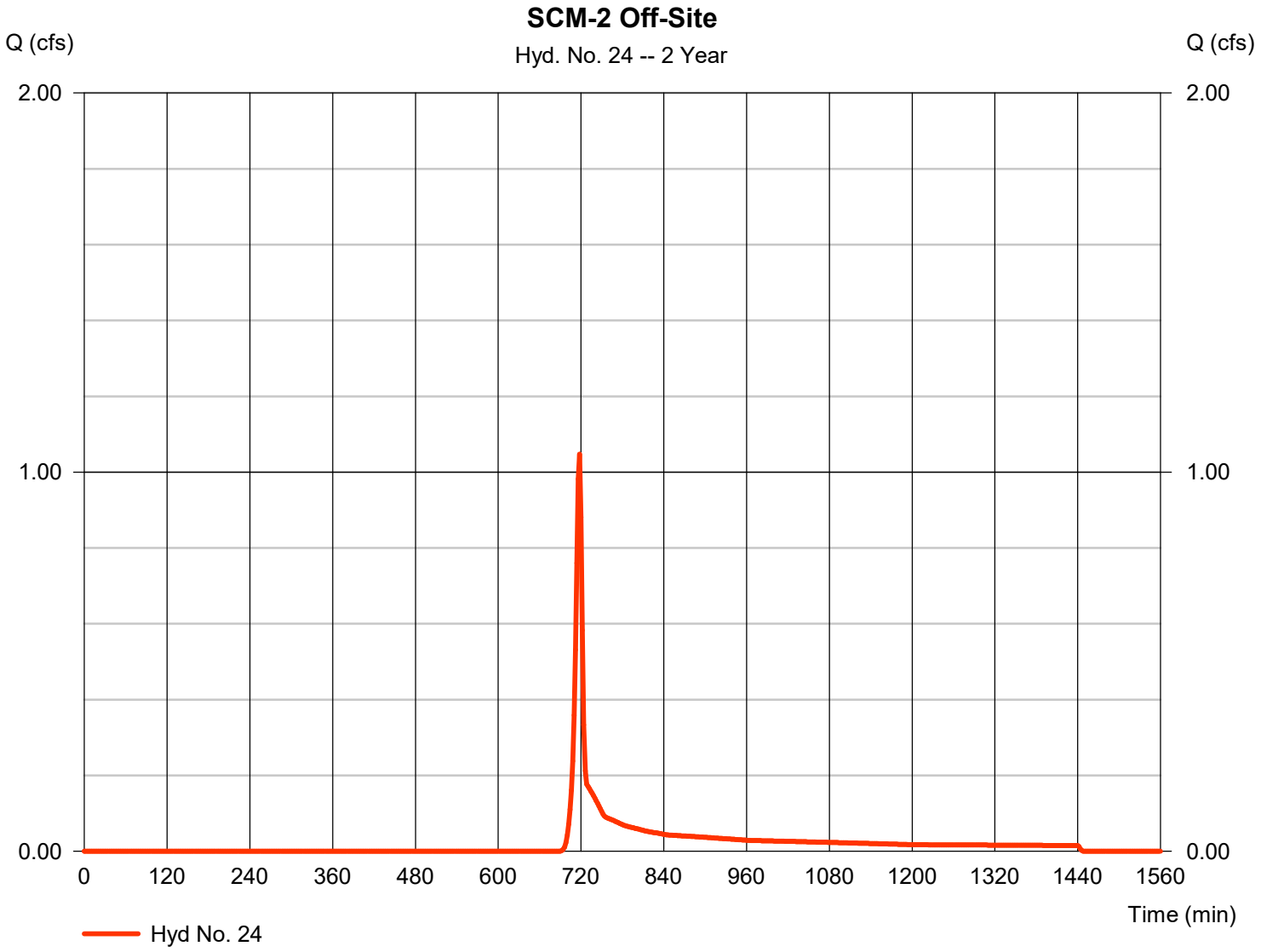


Hydrograph Report

Hyd. No. 24

SCM-2 Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.047 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,147 cuft
Drainage area	=	0.740 ac	Curve number	=	67.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

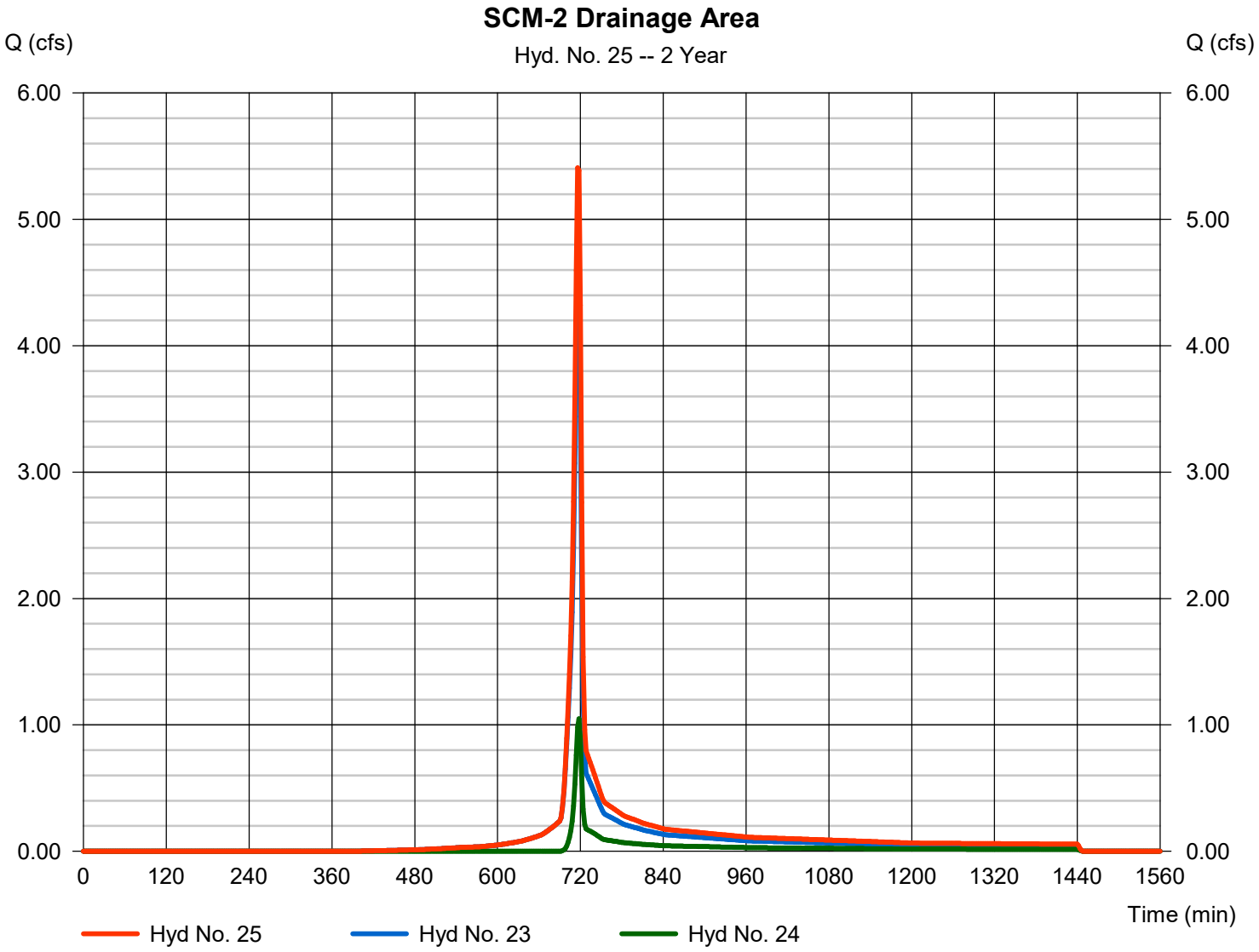


Hydrograph Report

Hyd. No. 25

SCM-2 Drainage Area

Hydrograph type	= Combine	Peak discharge	= 5.408 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 11,207 cuft
Inflow hyds.	= 23, 24	Contrib. drain. area	= 1.990 ac



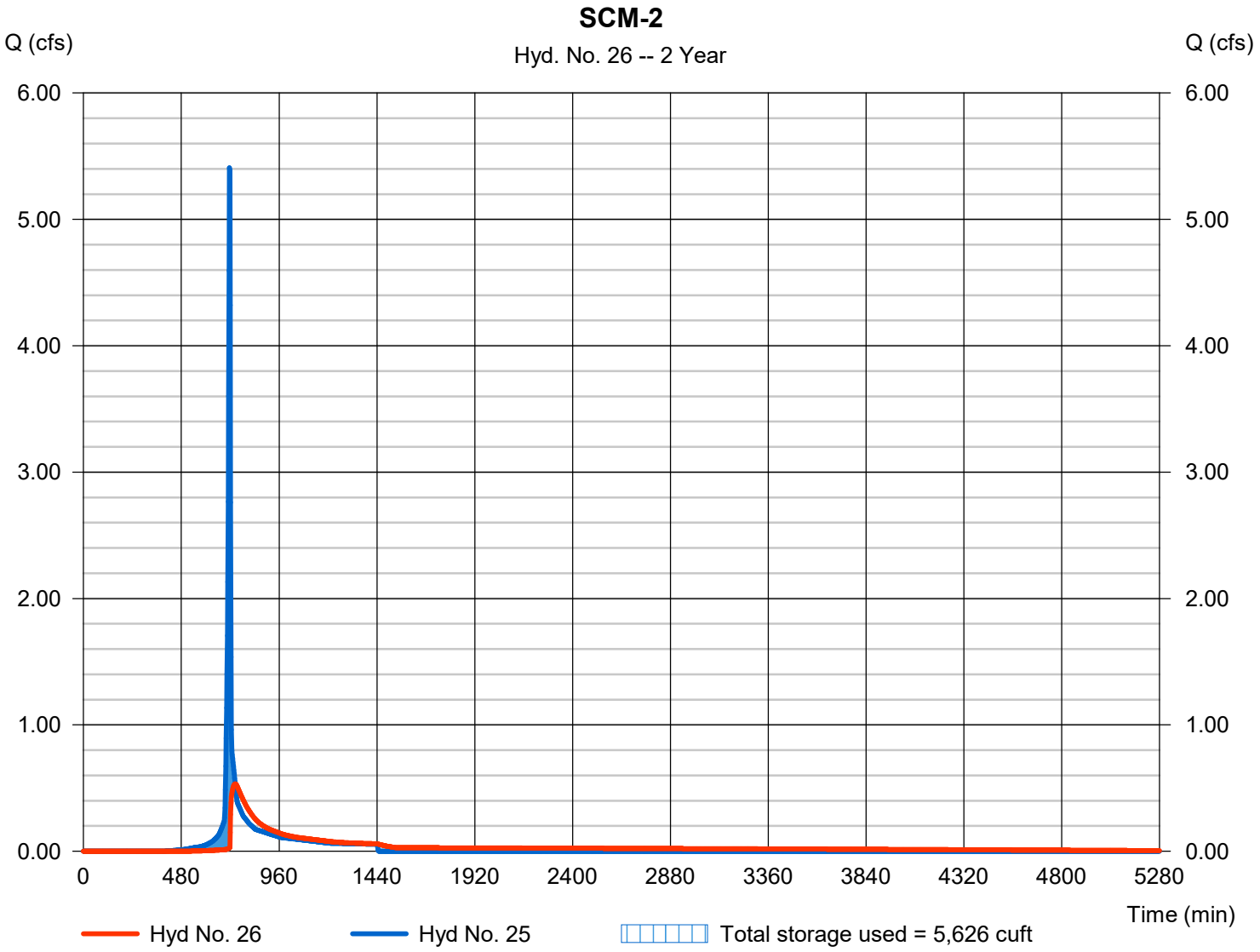
Hydrograph Report

Hyd. No. 26

SCM-2

Hydrograph type	=	Reservoir	Peak discharge	=	0.534 cfs
Storm frequency	=	2 yrs	Time to peak	=	744 min
Time interval	=	2 min	Hyd. volume	=	11,091 cuft
Inflow hyd. No.	=	25 - SCM-2 Drainage Area	Max. Elevation	=	327.84 ft
Reservoir name	=	SCM-2	Max. Storage	=	5,626 cuft

Storage Indication method used.

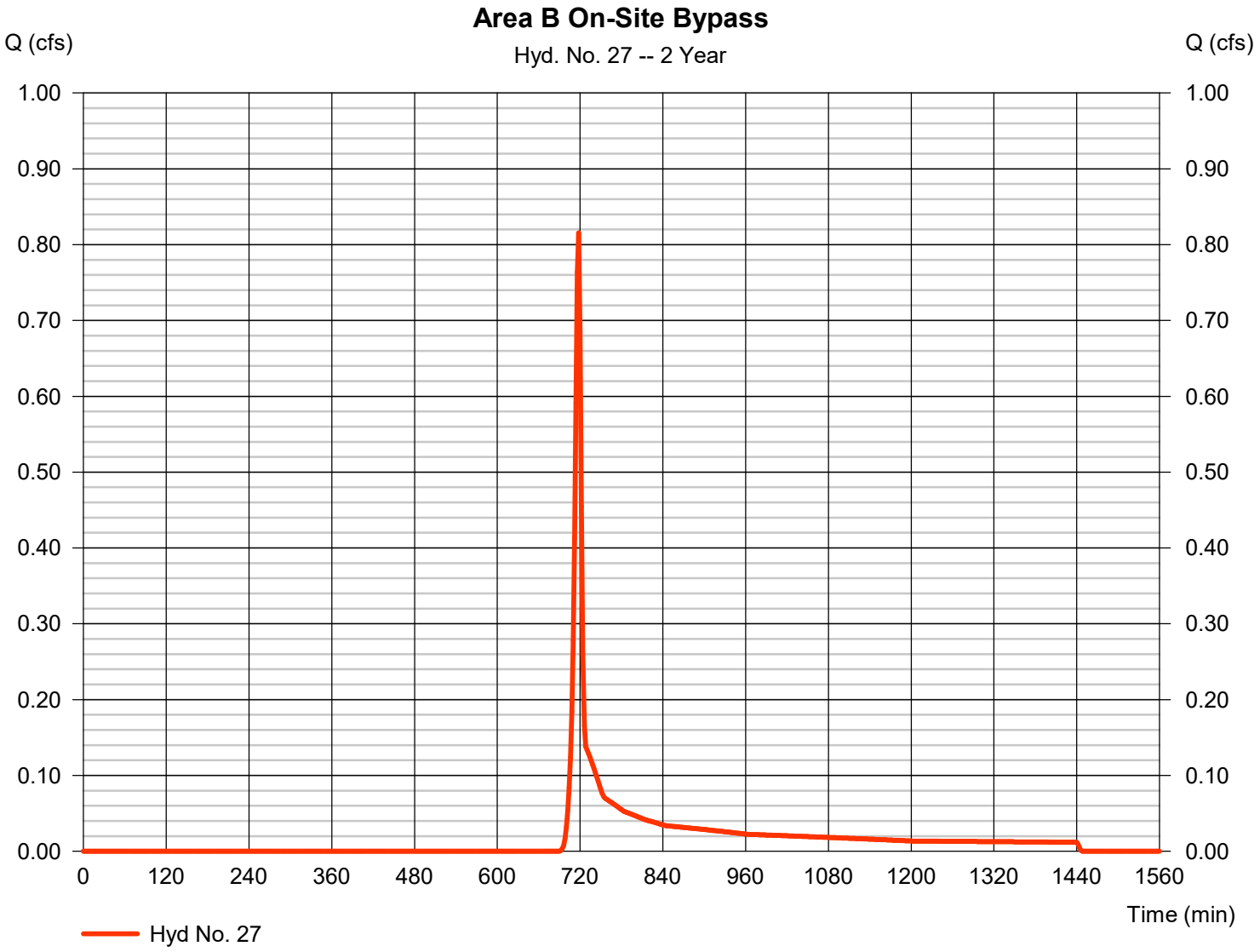


Hydrograph Report

Hyd. No. 27

Area B On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.815 cfs
Storm frequency	=	2 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	1,673 cuft
Drainage area	=	0.580 ac	Curve number	=	67.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

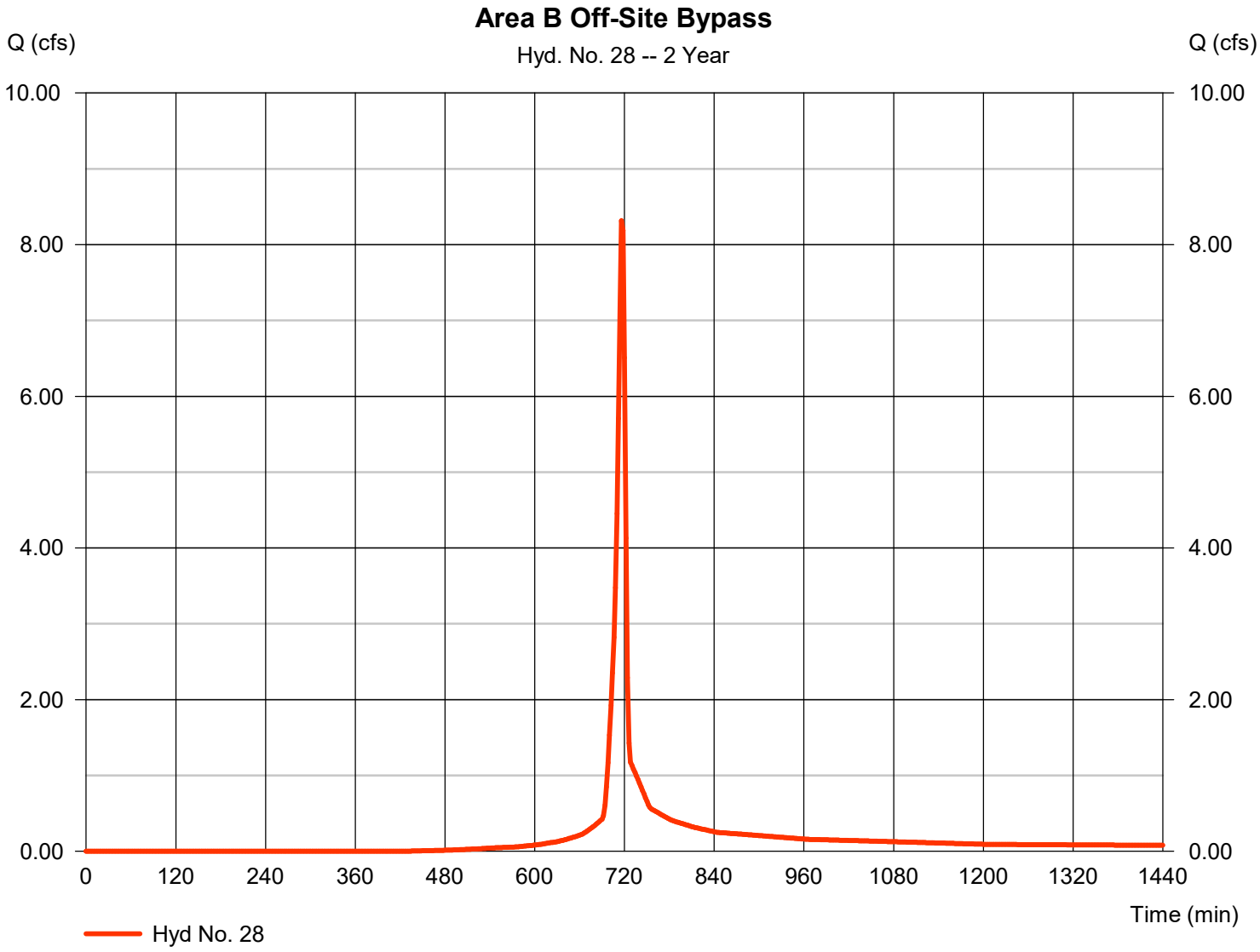


Hydrograph Report

Hyd. No. 28

Area B Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.318 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	16,928 cuft
Drainage area	=	2.470 ac	Curve number	=	85.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.46 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

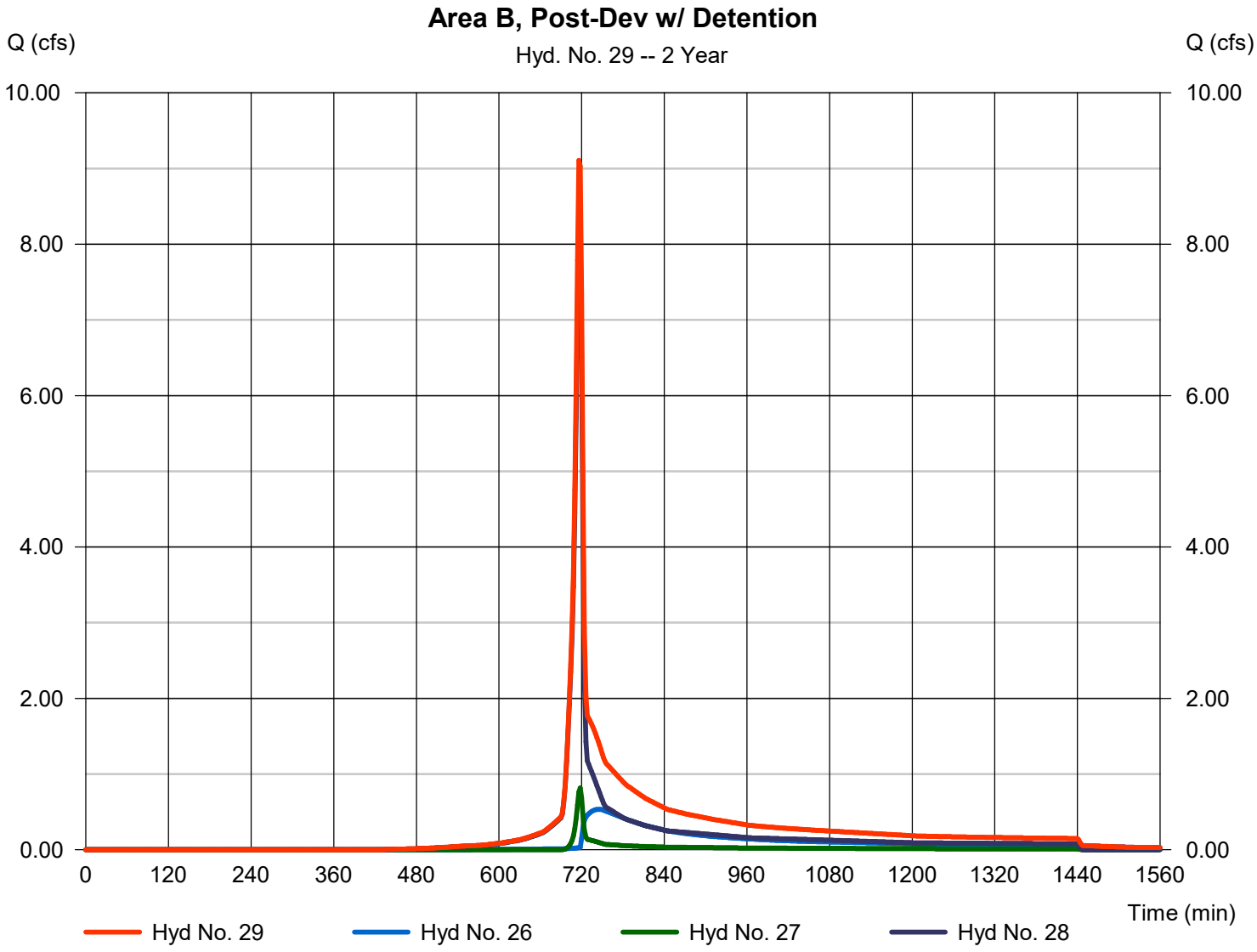


Hydrograph Report

Hyd. No. 29

Area B, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 9.108 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 29,692 cuft
Inflow hyds.	= 26, 27, 28	Contrib. drain. area	= 3.050 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

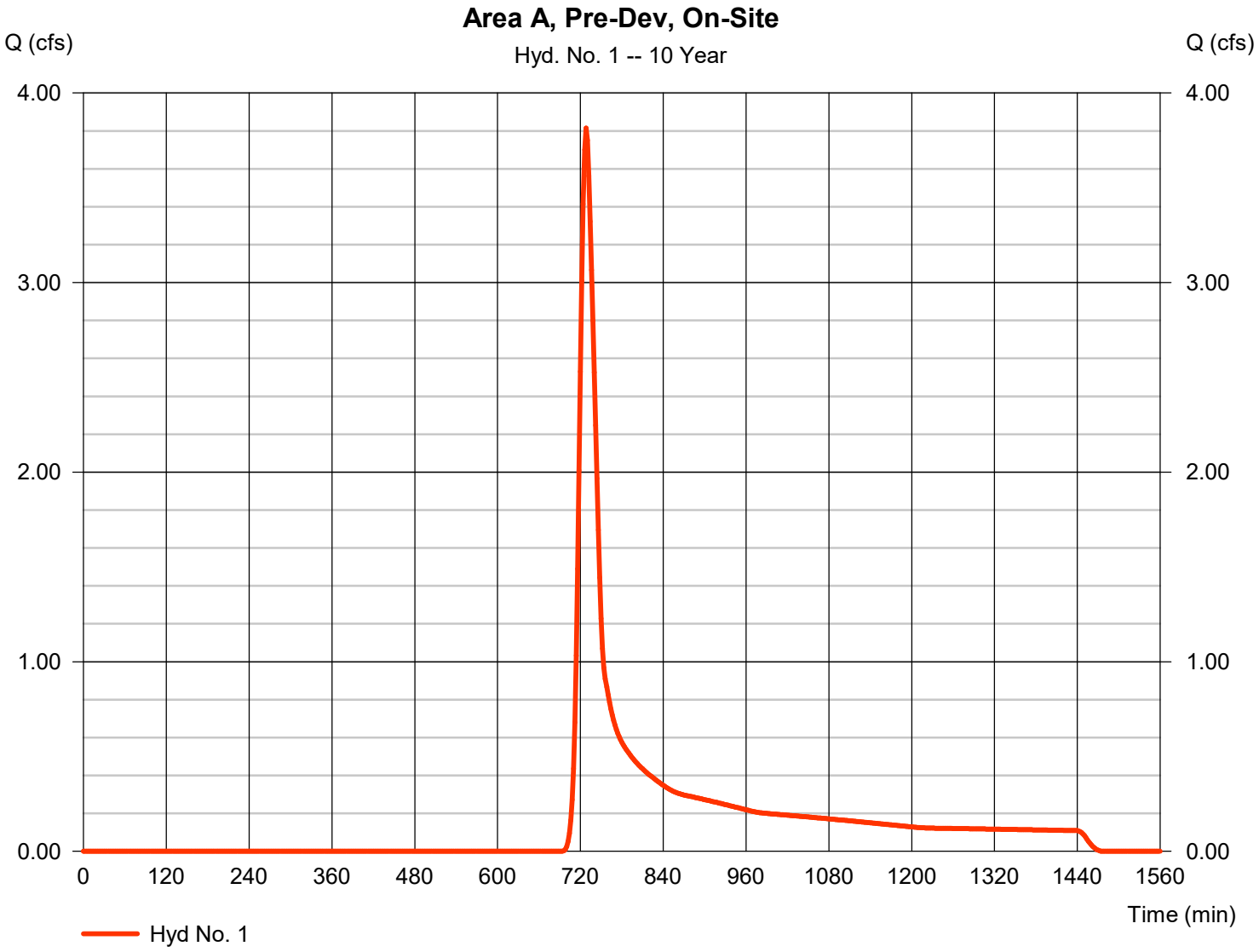
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.815	2	728	15,172	------	------	------	Area A, Pre-Dev, On-Site
2	SCS Runoff	0.819	2	728	2,970	------	------	------	Area A, Pre-Dev, Off-Site
3	Combine	4.634	2	728	18,142	1, 2	------	------	Area A, Pre-Dev
4	SCS Runoff	3.918	2	718	7,917	------	------	------	Area B, Pre-Dev, On-Site
5	SCS Runoff	16.22	2	716	33,042	------	------	------	Area B, Pre-Dev, Off-Site
6	Combine	19.96	2	716	40,959	4, 5	------	------	Area B, Pre-Dev
8	SCS Runoff	7.070	2	728	24,894	------	------	------	Area A, Post-Dev, On-Site
9	SCS Runoff	1.192	2	726	4,146	------	------	------	Area A, Post-Dev, Off-Site
10	Combine	8.259	2	728	29,041	8, 9	------	------	Area A, Post-Dev
11	SCS Runoff	9.221	2	716	18,779	------	------	------	Area B, Post-Dev, On-Site
12	SCS Runoff	16.76	2	716	34,277	------	------	------	Area B, Post-Dev, Off-Site
13	Combine	25.99	2	716	53,056	11, 12	------	------	Area B, Post-Dev
15	SCS Runoff	8.356	2	718	19,536	------	------	------	SCM-1 DA On-Site
16	SCS Runoff	1.157	2	718	2,898	------	------	------	SCM-1 DA Off-Site
17	Combine	9.512	2	718	22,434	15, 16	------	------	SCM-1 Drainage Area
18	Reservoir	1.726	2	730	22,238	17	327.23	11,627	SCM-1
19	SCS Runoff	2.234	2	728	8,434	------	------	------	Area A On-Site Bypass
20	SCS Runoff	0.384	2	728	1,450	------	------	------	Area A Off-Site Bypass
21	Combine	4.279	2	730	32,123	18, 19, 20	------	------	Area A, Post-Dev w/ Detention
23	SCS Runoff	7.455	2	716	15,650	------	------	------	SCM-2 On-Site
24	SCS Runoff	2.443	2	718	4,886	------	------	------	SCM-2 Off-Site
25	Combine	9.853	2	716	20,536	23, 24	------	------	SCM-2 Drainage Area
26	Reservoir	2.860	2	724	20,416	25	328.59	9,345	SCM-2
27	SCS Runoff	1.907	2	718	3,814	------	------	------	Area B On-Site Bypass
28	SCS Runoff	14.28	2	716	29,736	------	------	------	Area B Off-Site Bypass
29	Combine	17.72	2	718	53,966	26, 27, 28	------	------	Area B, Post-Dev w/ Detention

Hydrograph Report

Hyd. No. 1

Area A, Pre-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.815 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	15,172 cuft
Drainage area	=	3.330 ac	Curve number	=	57.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

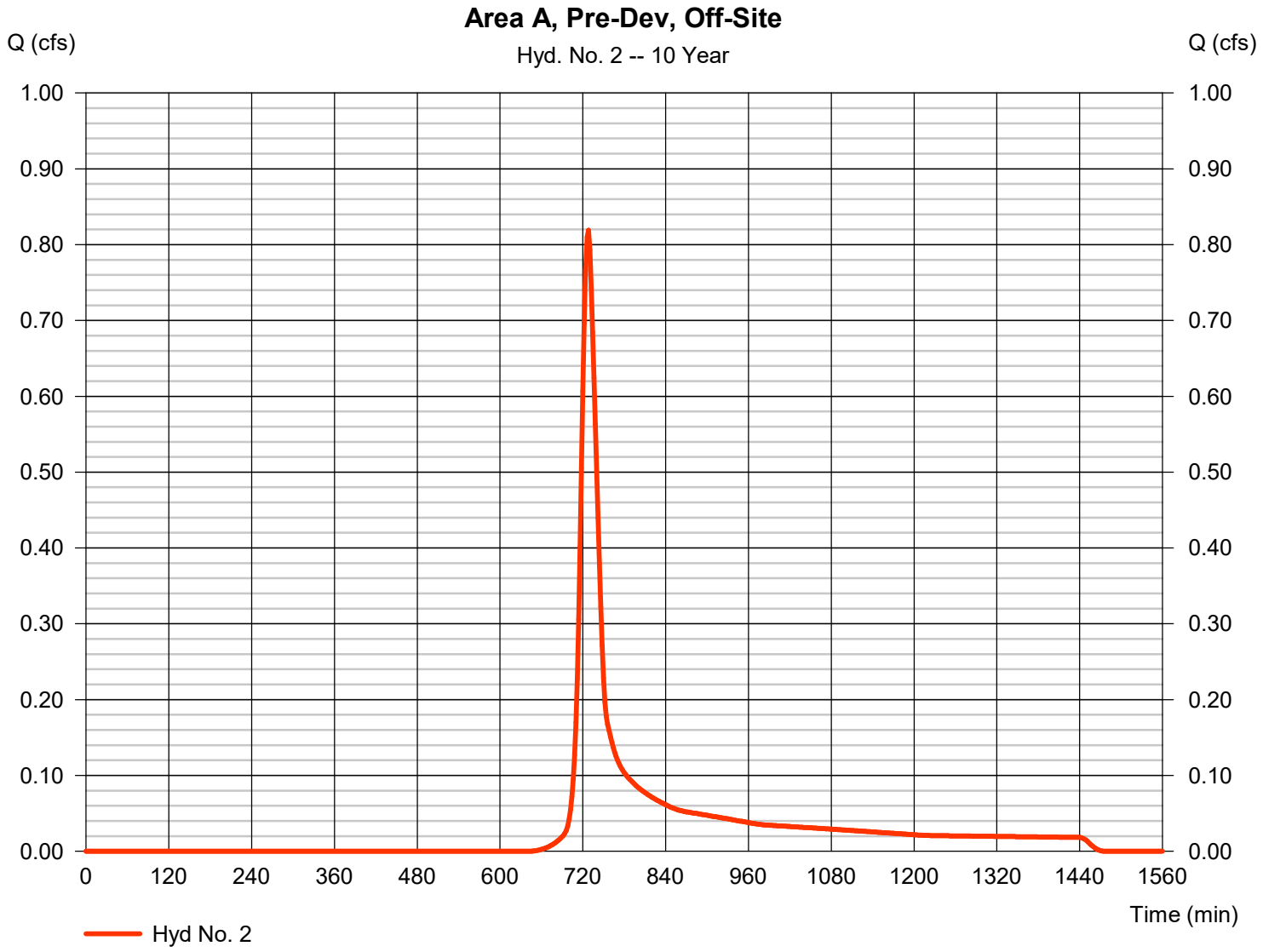


Hydrograph Report

Hyd. No. 2

Area A, Pre-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.819 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 2,970 cuft
Drainage area	= 0.460 ac	Curve number	= 65
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

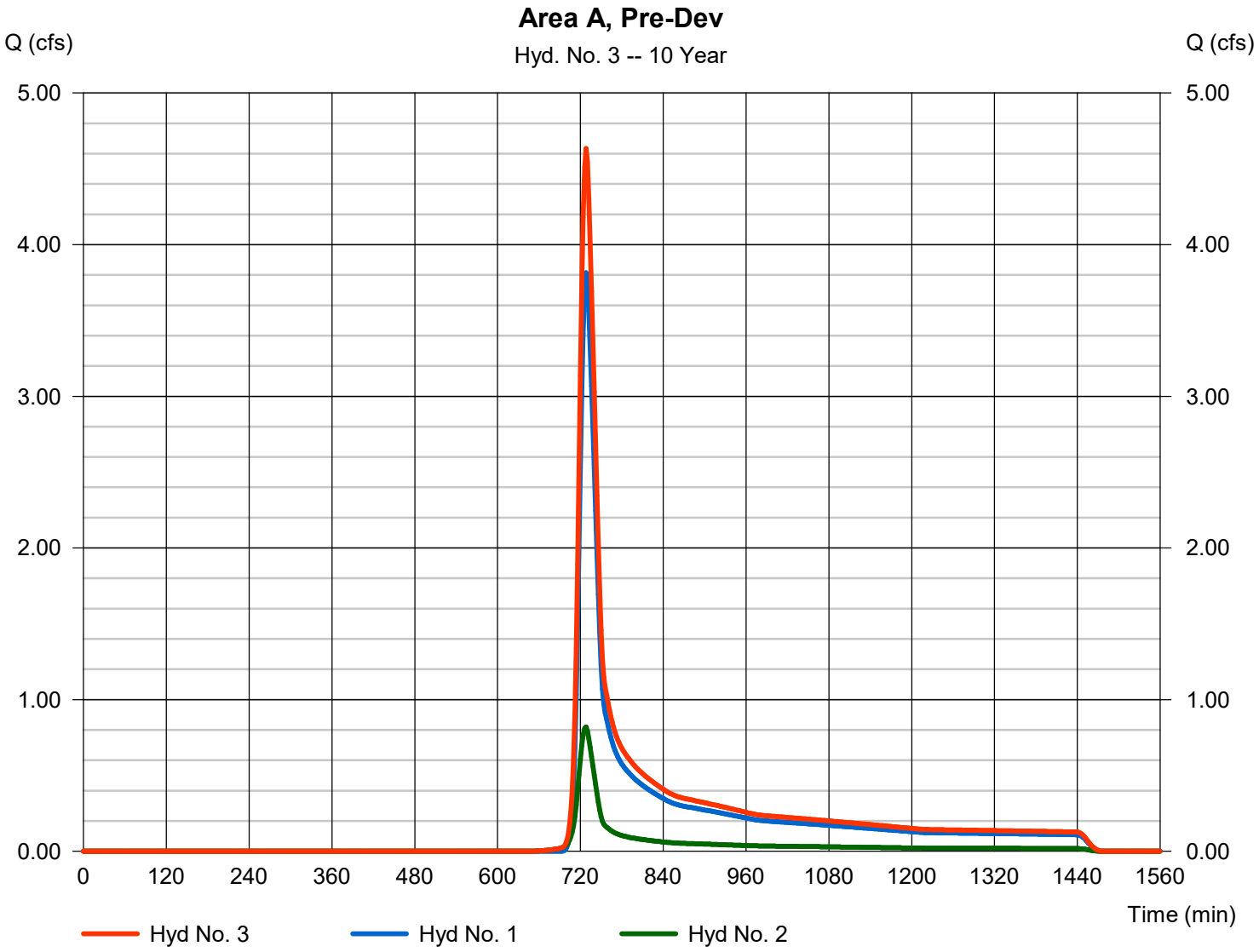


Hydrograph Report

Hyd. No. 3

Area A, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 4.634 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 18,142 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.790 ac

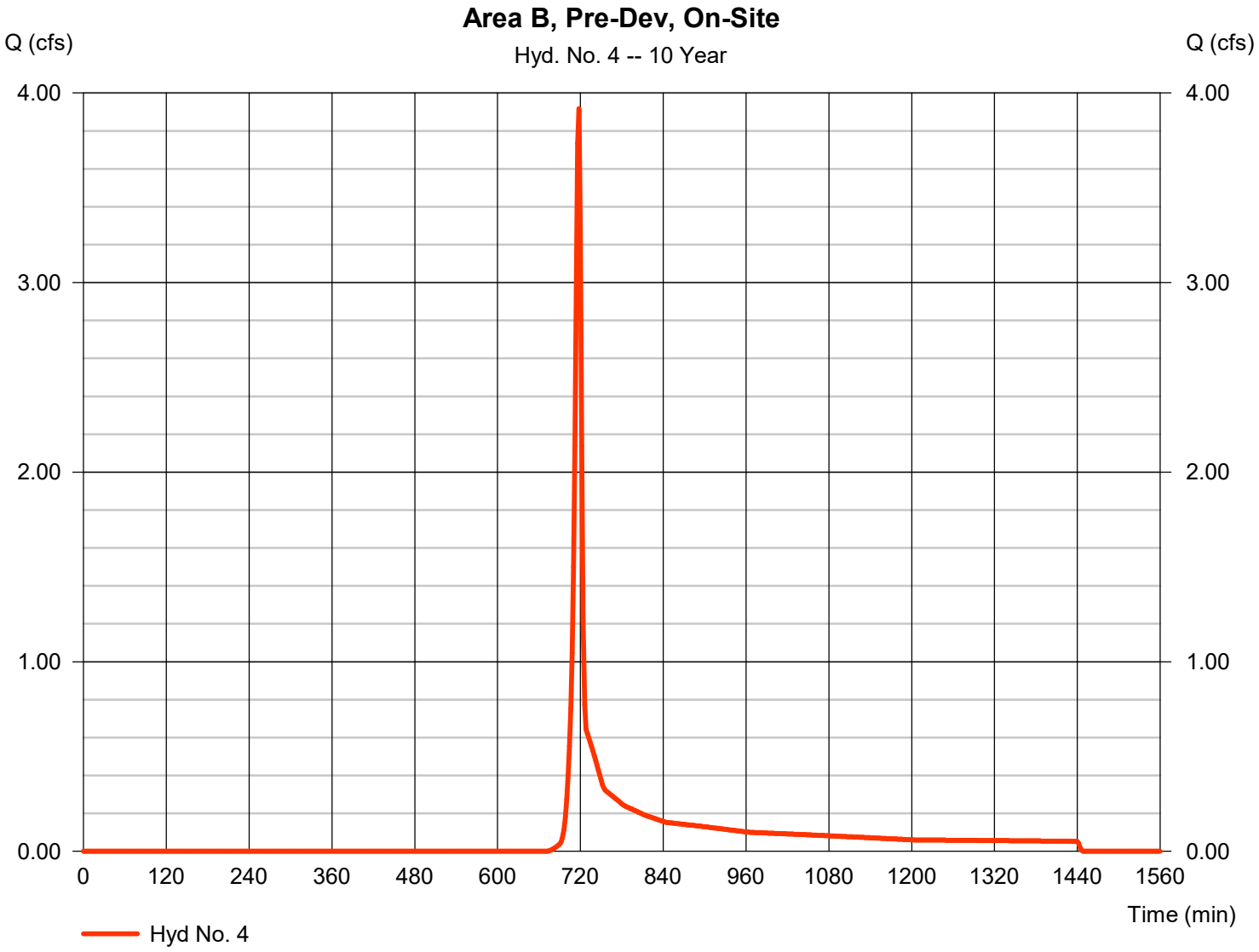


Hydrograph Report

Hyd. No. 4

Area B, Pre-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.918 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	7,917 cuft
Drainage area	=	1.600 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

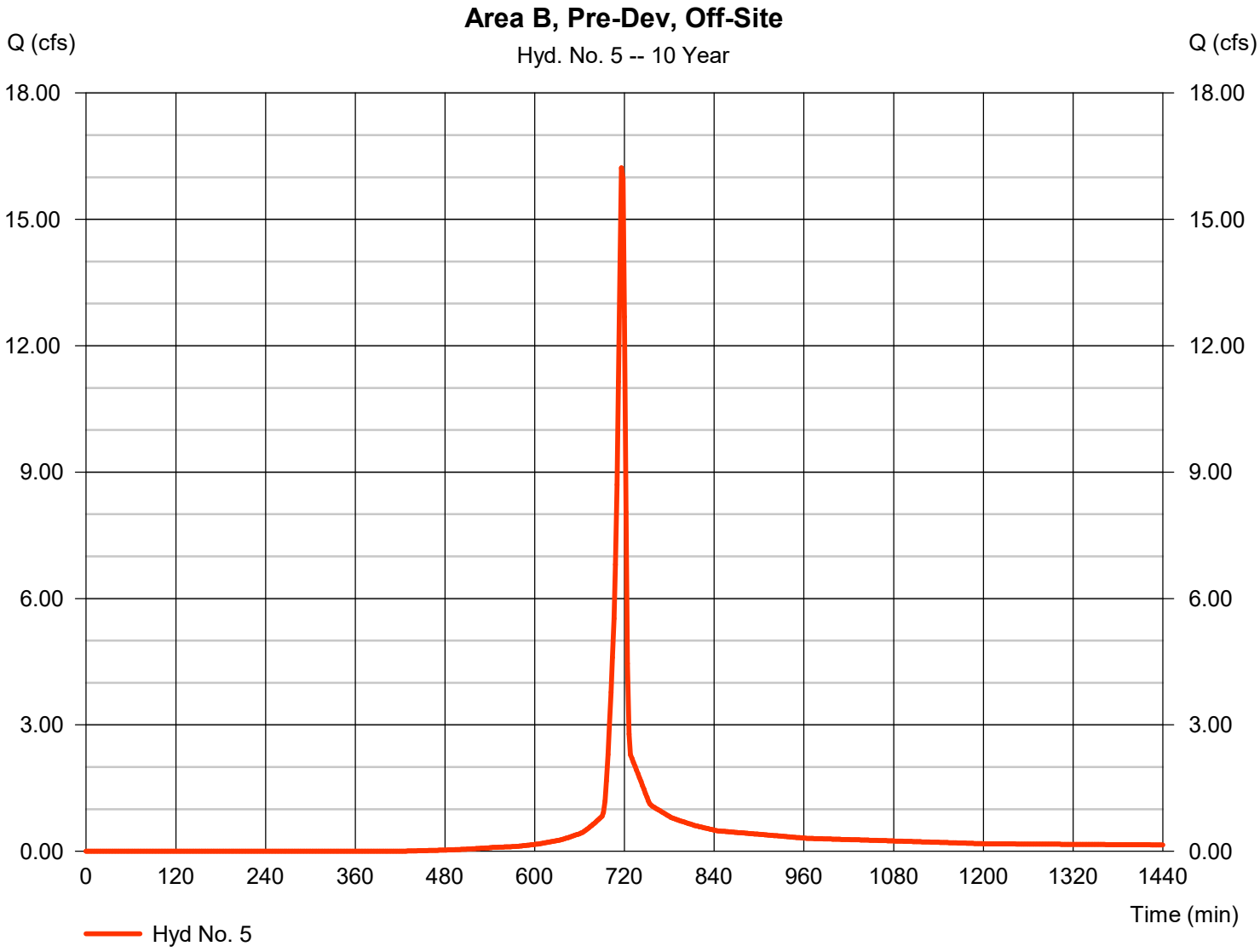


Hydrograph Report

Hyd. No. 5

Area B, Pre-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.22 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	33,042 cuft
Drainage area	=	3.220 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

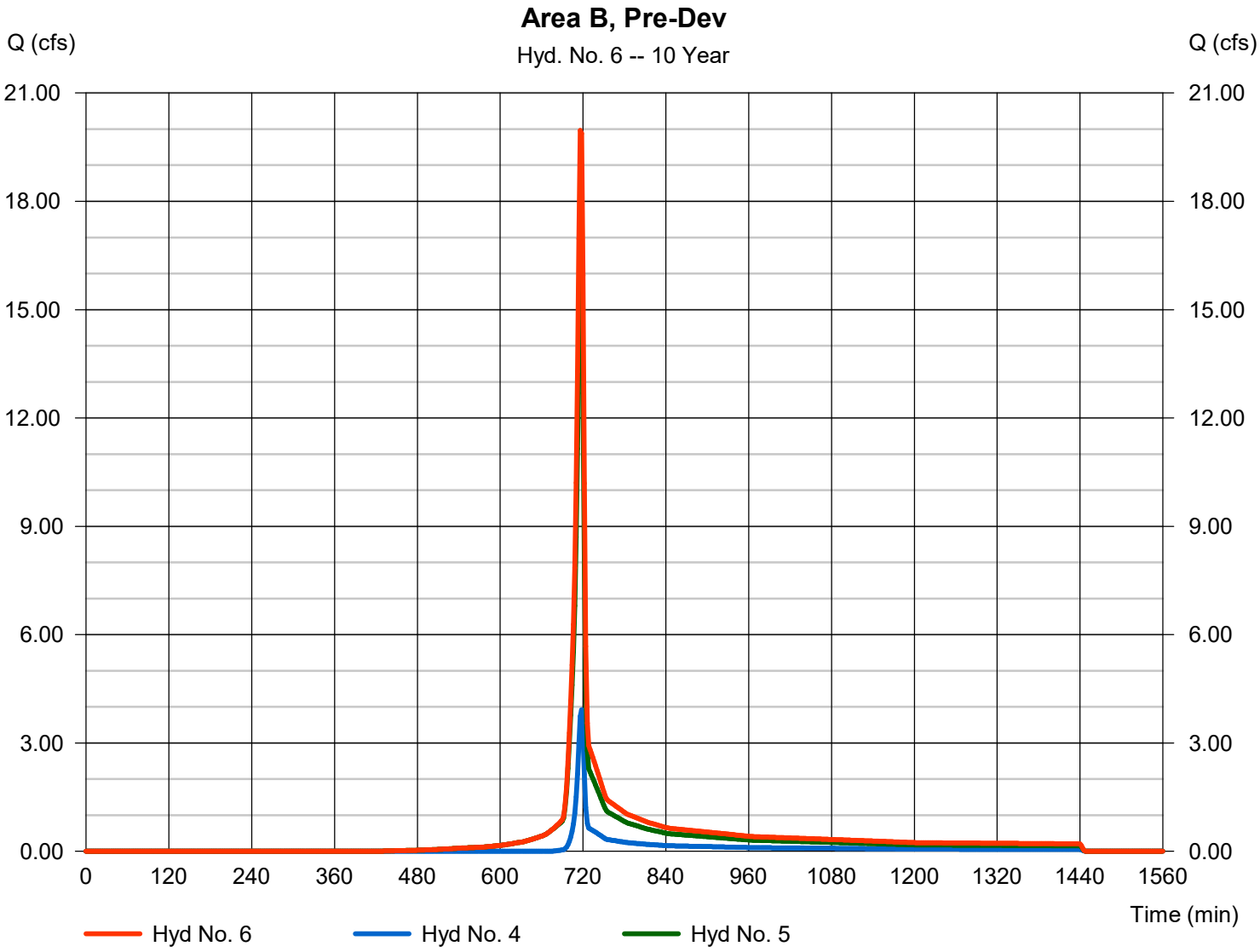


Hydrograph Report

Hyd. No. 6

Area B, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 19.96 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 40,959 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 4.820 ac

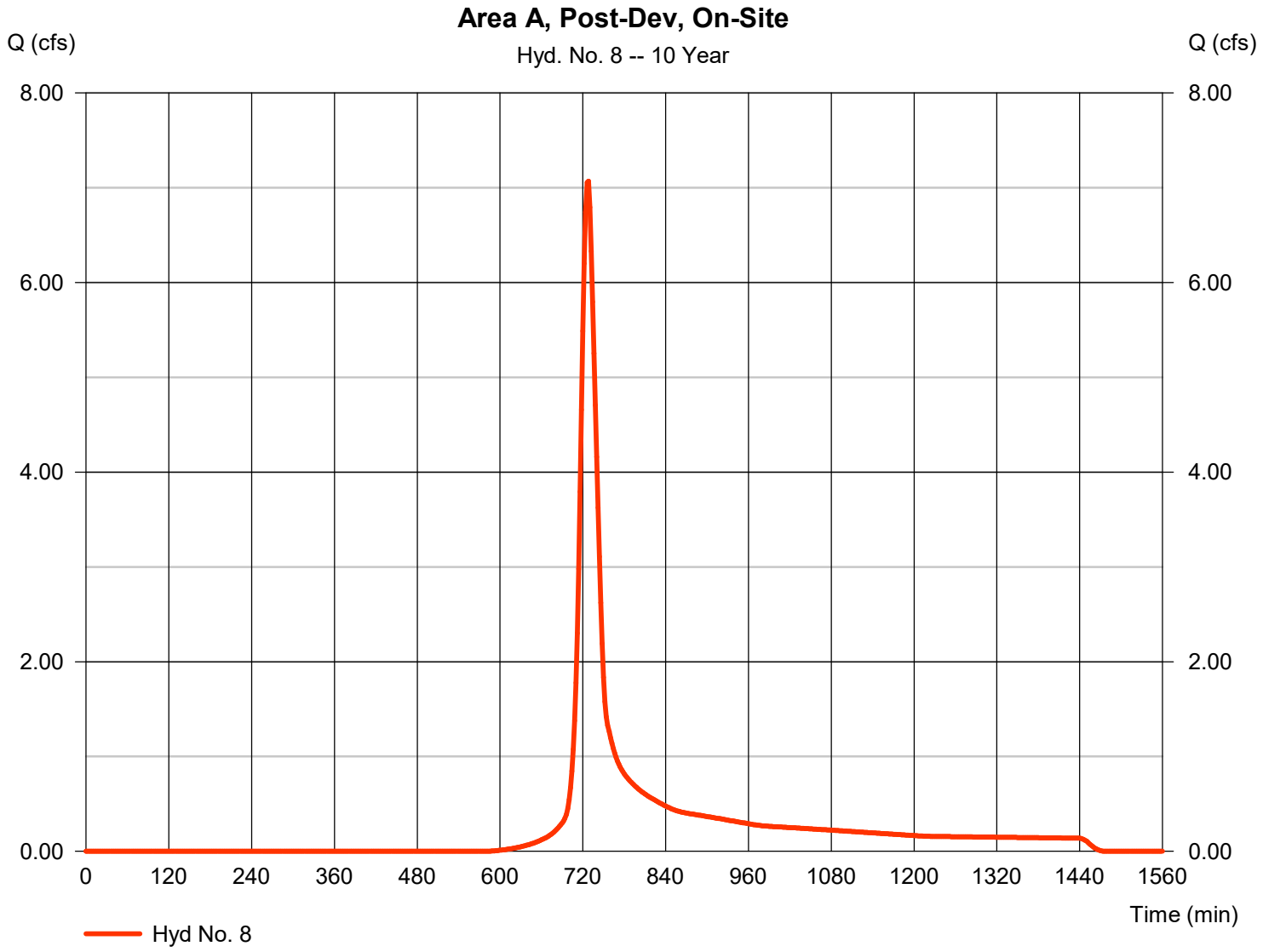


Hydrograph Report

Hyd. No. 8

Area A, Post-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 7.070 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 24,894 cuft
Drainage area	= 3.100 ac	Curve number	= 70.4
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

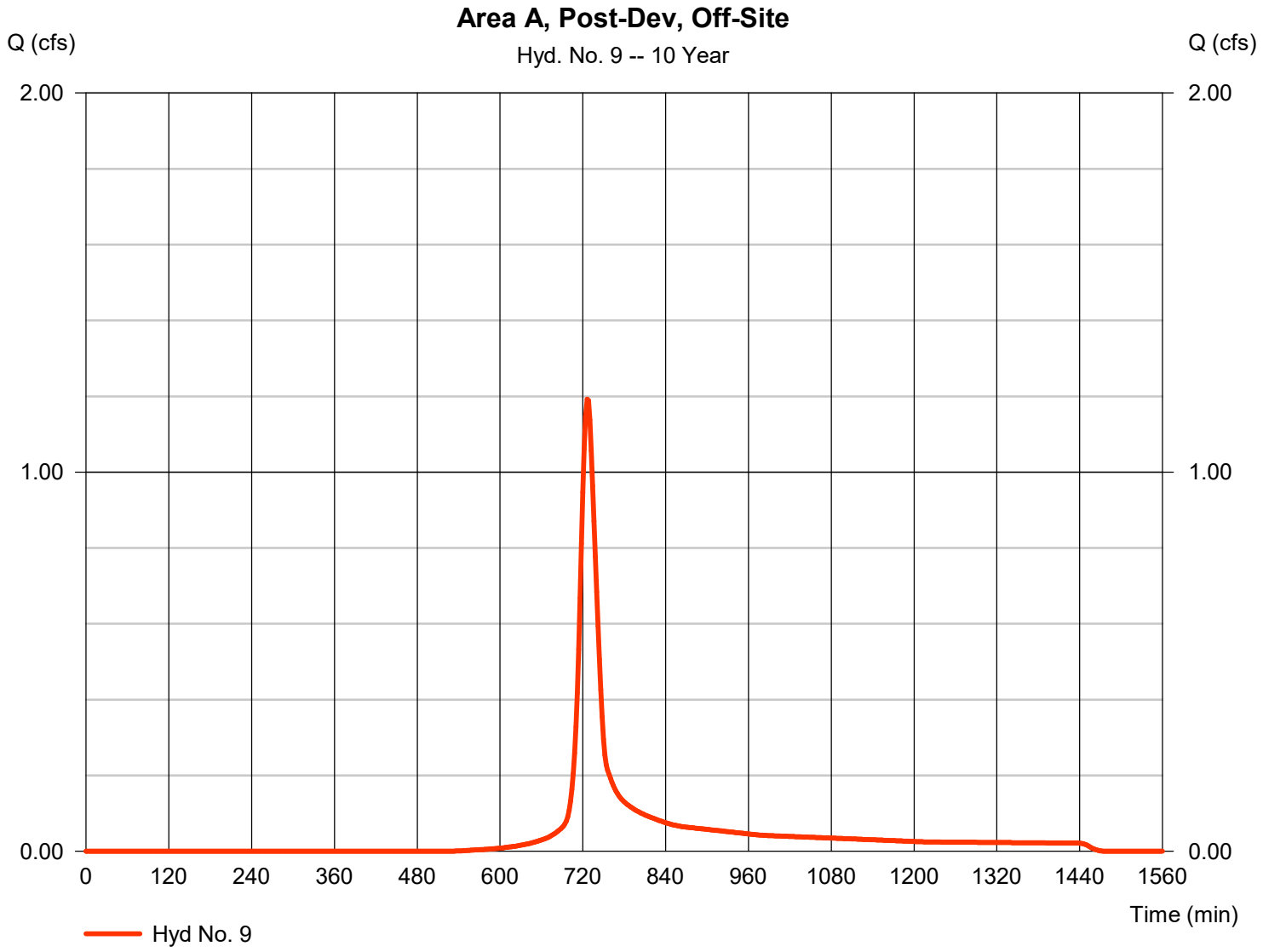


Hydrograph Report

Hyd. No. 9

Area A, Post-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 1.192 cfs
Storm frequency	= 10 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 4,146 cuft
Drainage area	= 0.450 ac	Curve number	= 74.2
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

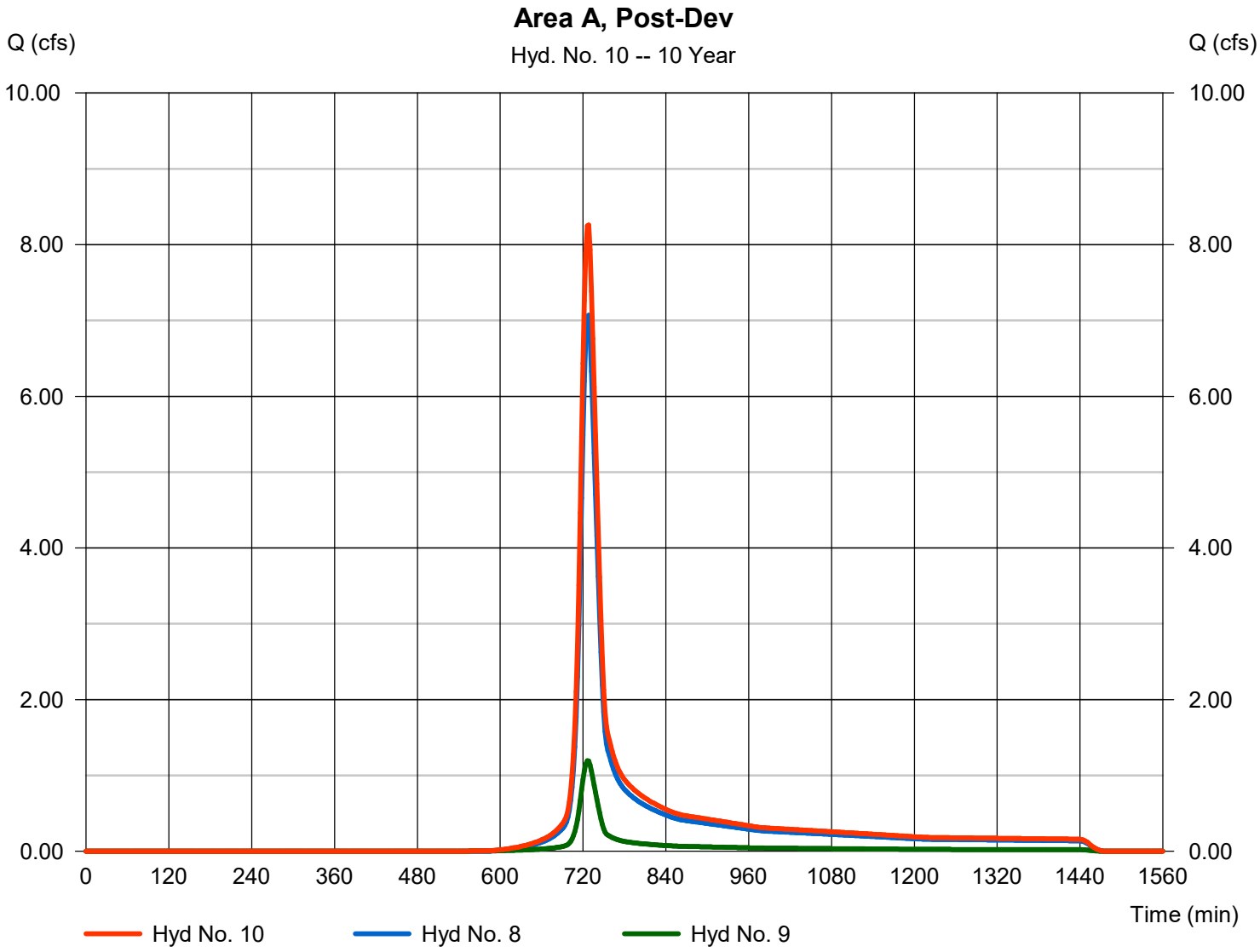


Hydrograph Report

Hyd. No. 10

Area A, Post-Dev

Hydrograph type	=	Combine	Peak discharge	=	8.259 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	29,041 cuft
Inflow hyds.	=	8, 9	Contrib. drain. area	=	3.550 ac

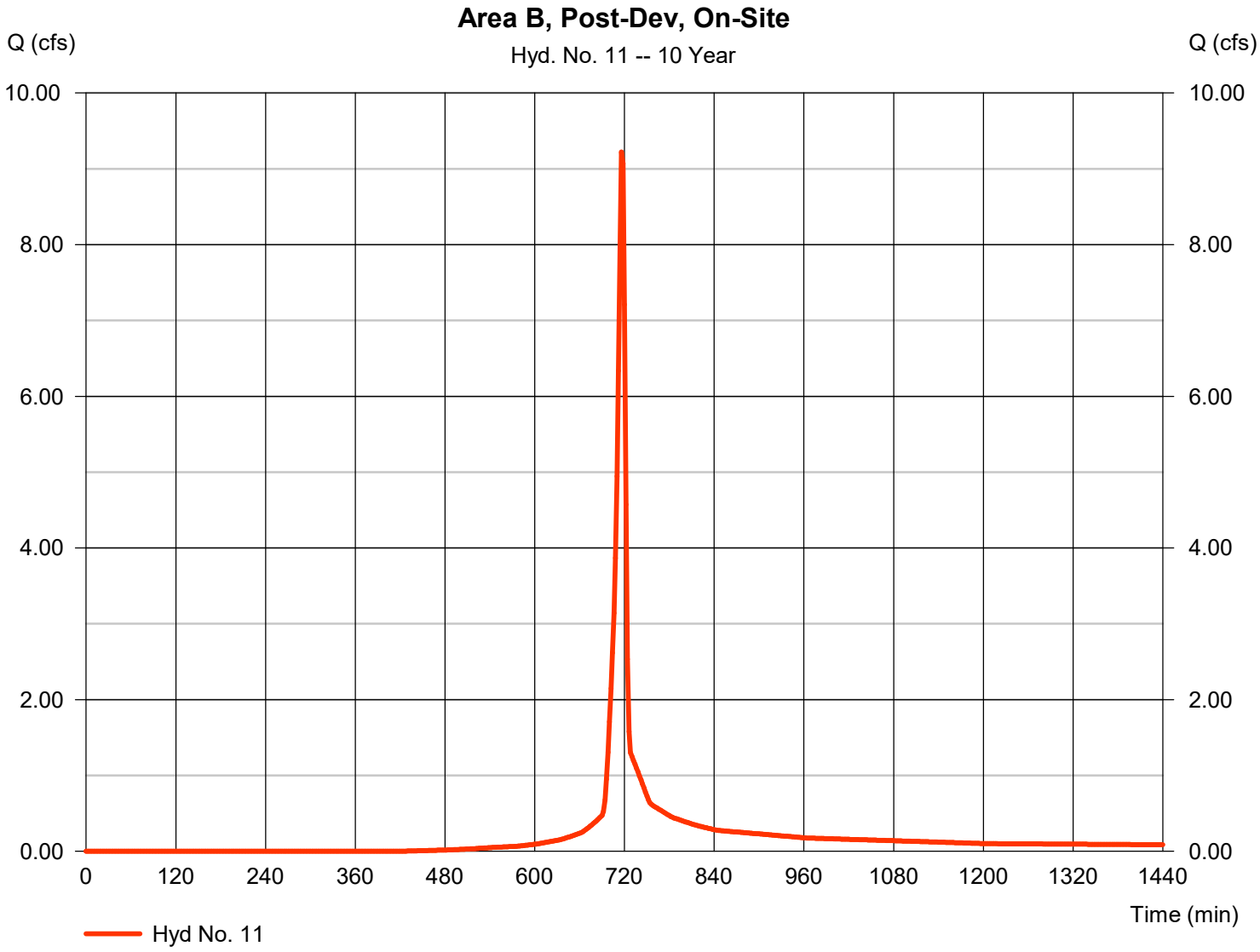


Hydrograph Report

Hyd. No. 11

Area B, Post-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 9.221 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 18,779 cuft
Drainage area	= 1.830 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

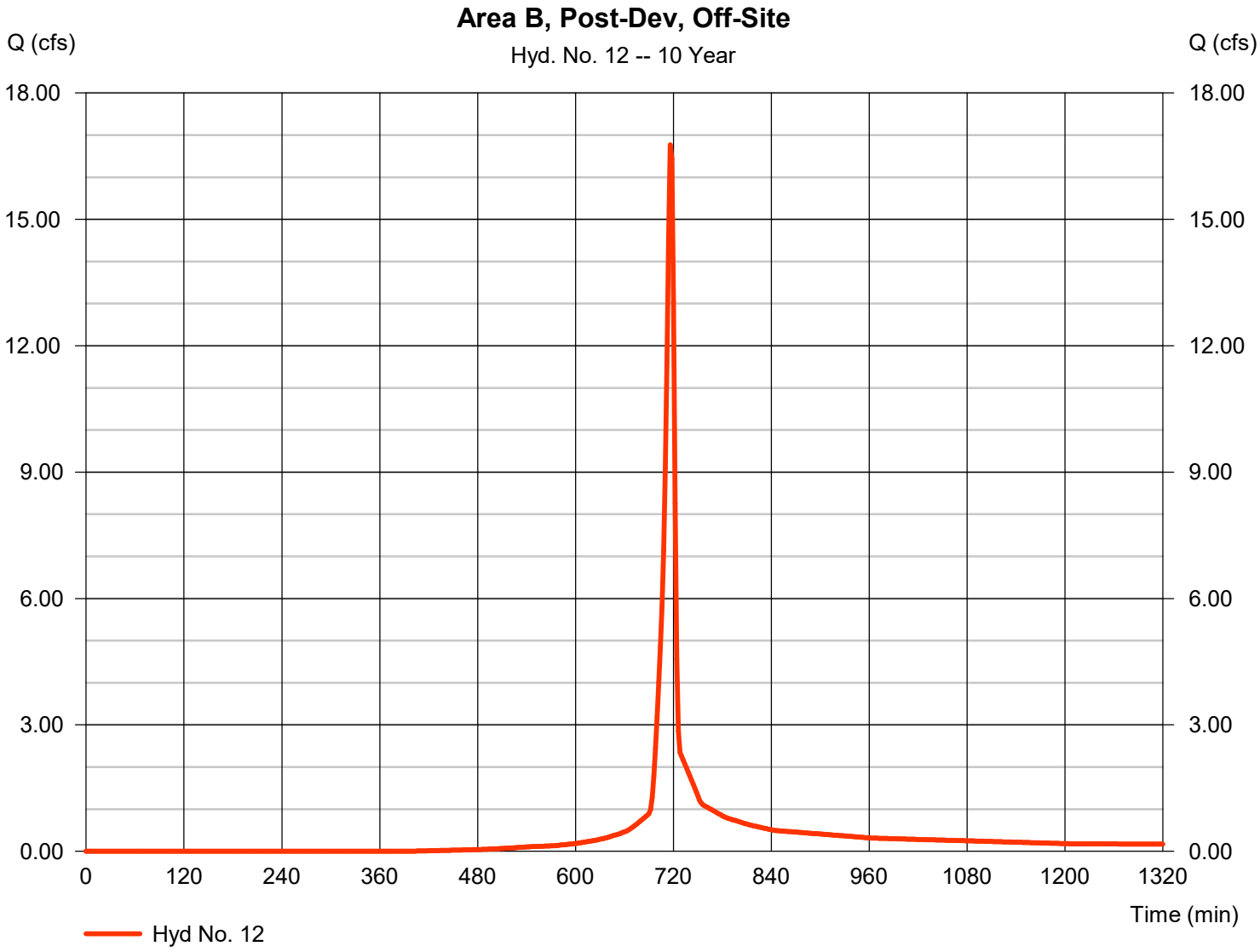


Hydrograph Report

Hyd. No. 12

Area B, Post-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 16.76 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 34,277 cuft
Drainage area	= 3.210 ac	Curve number	= 81.3
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.14 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

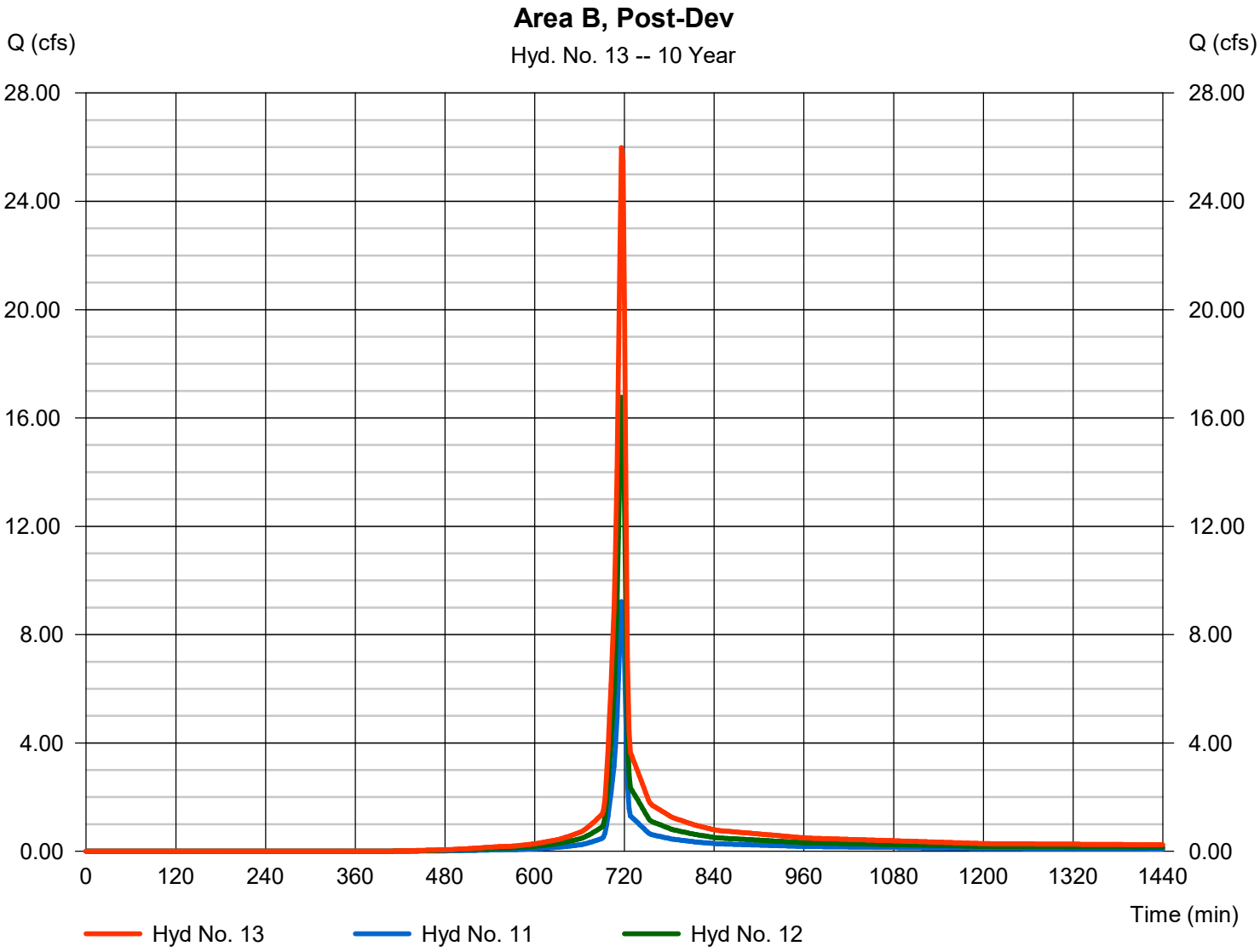


Hydrograph Report

Hyd. No. 13

Area B, Post-Dev

Hydrograph type	=	Combine	Peak discharge	=	25.99 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	53,056 cuft
Inflow hyds.	=	11, 12	Contrib. drain. area	=	5.040 ac

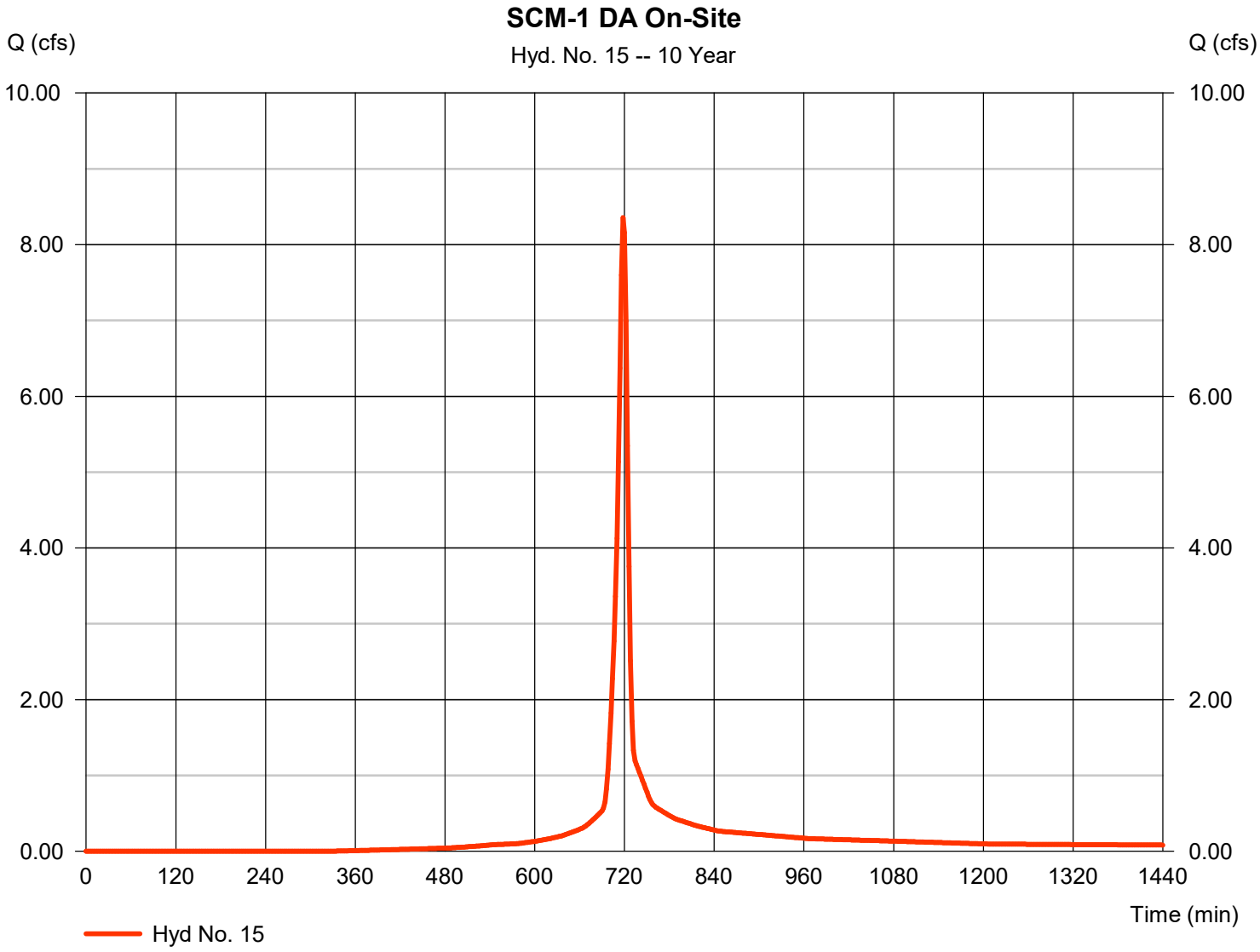


Hydrograph Report

Hyd. No. 15

SCM-1 DA On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.356 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	19,536 cuft
Drainage area	=	1.530 ac	Curve number	=	85.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

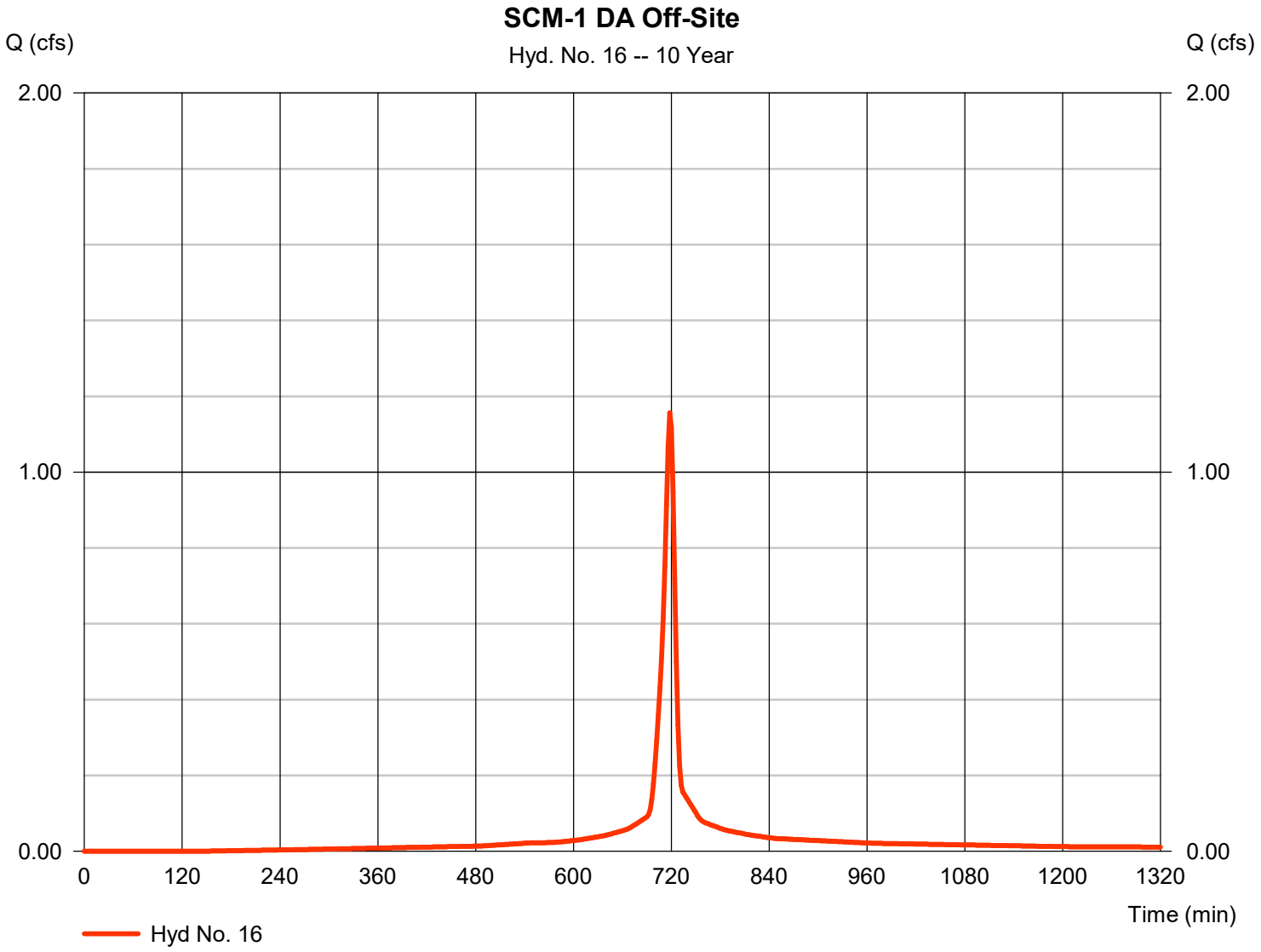


Hydrograph Report

Hyd. No. 16

SCM-1 DA Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.157 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	2,898 cuft
Drainage area	=	0.180 ac	Curve number	=	93.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

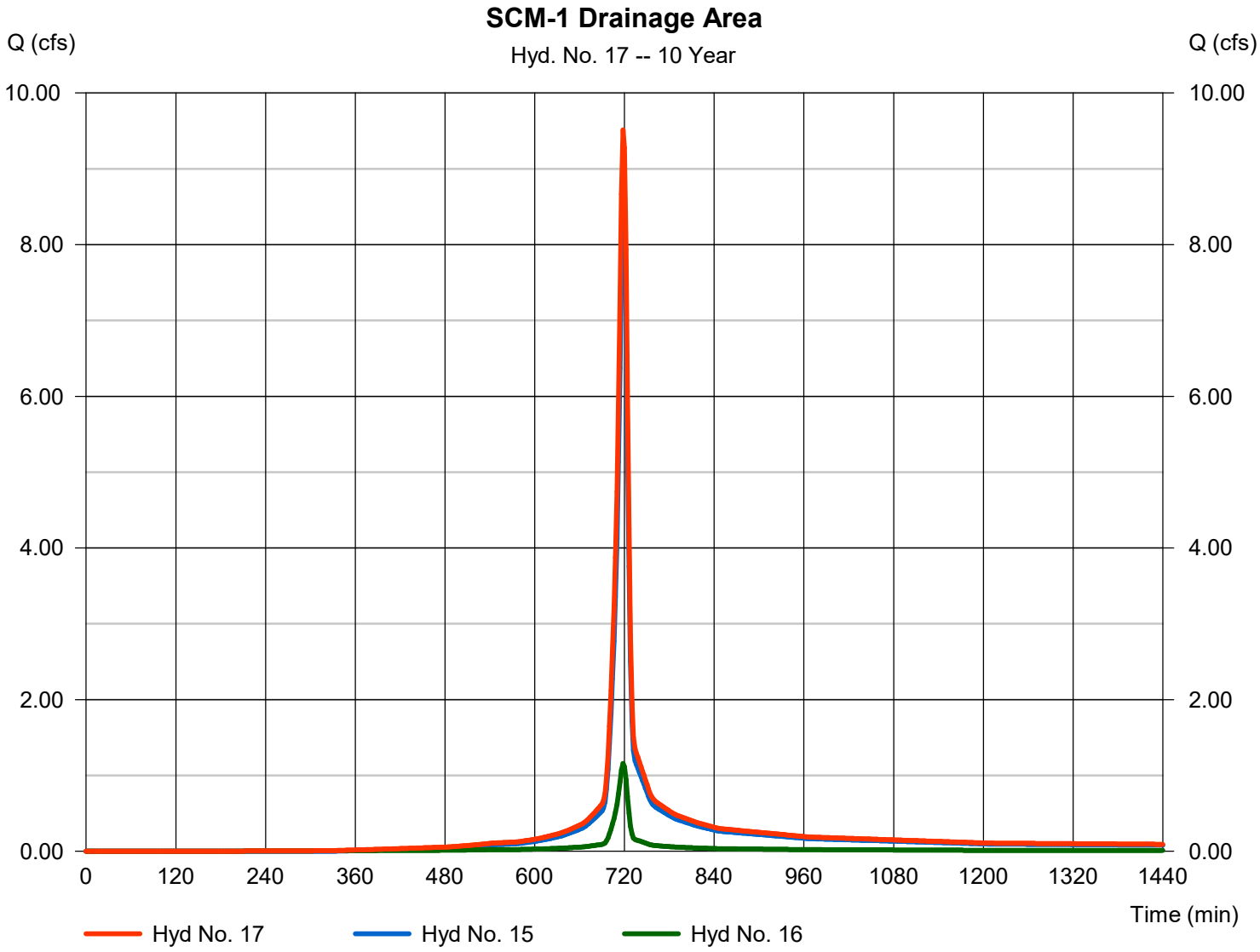


Hydrograph Report

Hyd. No. 17

SCM-1 Drainage Area

Hydrograph type	=	Combine	Peak discharge	=	9.512 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	22,434 cuft
Inflow hyds.	=	15, 16	Contrib. drain. area	=	1.710 ac



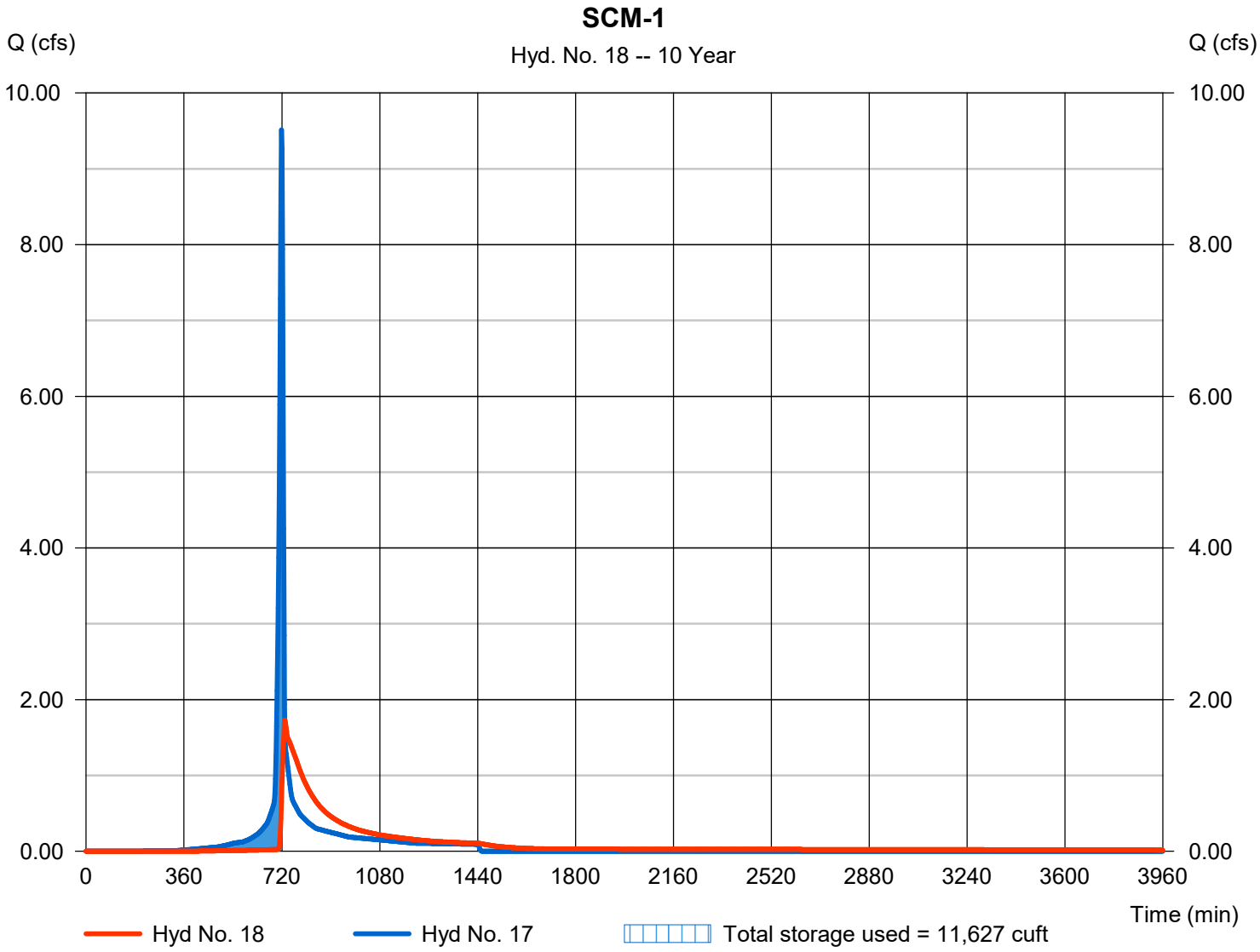
Hydrograph Report

Hyd. No. 18

SCM-1

Hydrograph type	=	Reservoir	Peak discharge	=	1.726 cfs
Storm frequency	=	10 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	22,238 cuft
Inflow hyd. No.	=	17 - SCM-1 Drainage Area	Max. Elevation	=	327.23 ft
Reservoir name	=	SCM-1	Max. Storage	=	11,627 cuft

Storage Indication method used.

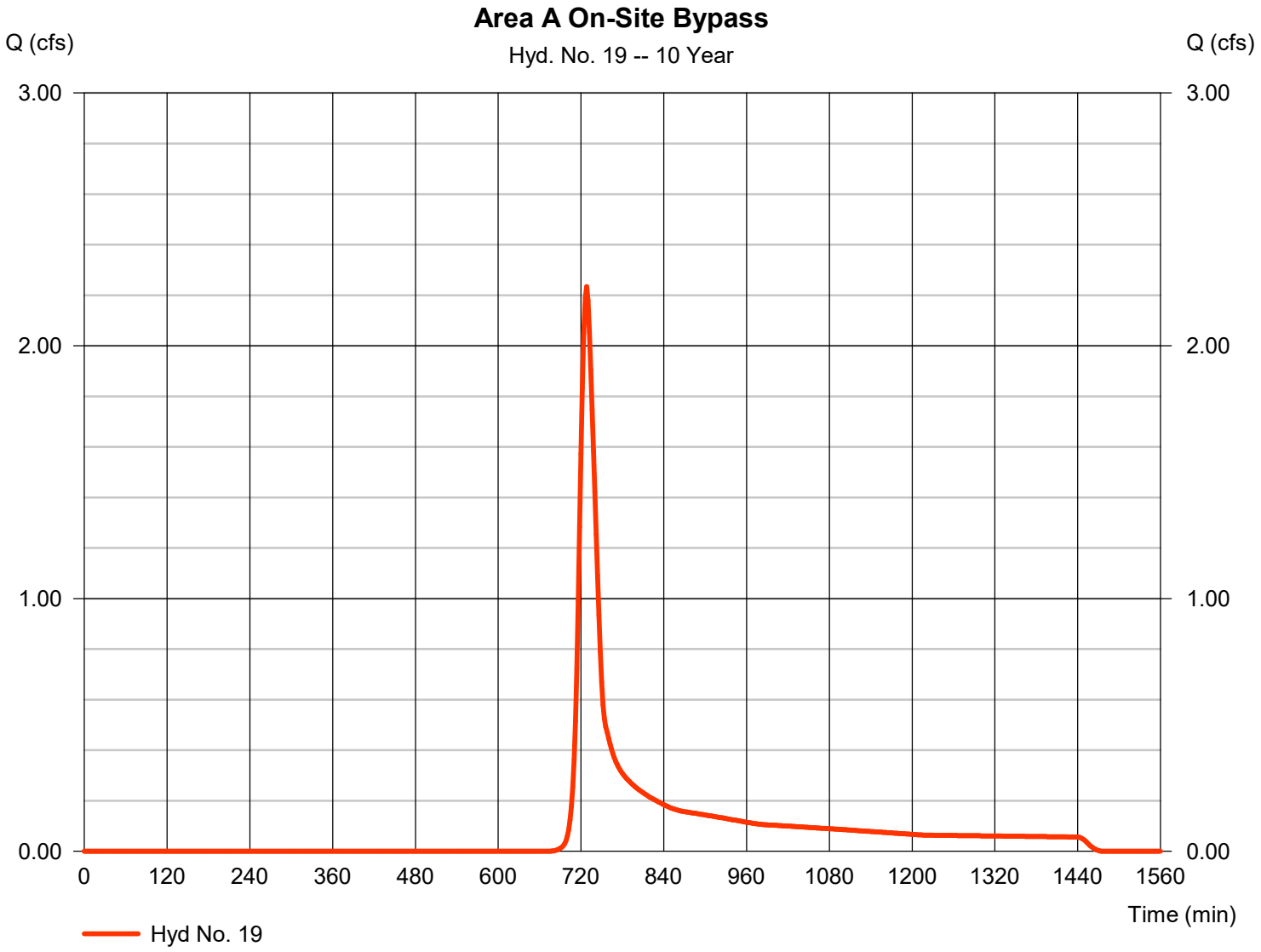


Hydrograph Report

Hyd. No. 19

Area A On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.234 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	8,434 cuft
Drainage area	=	1.570 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

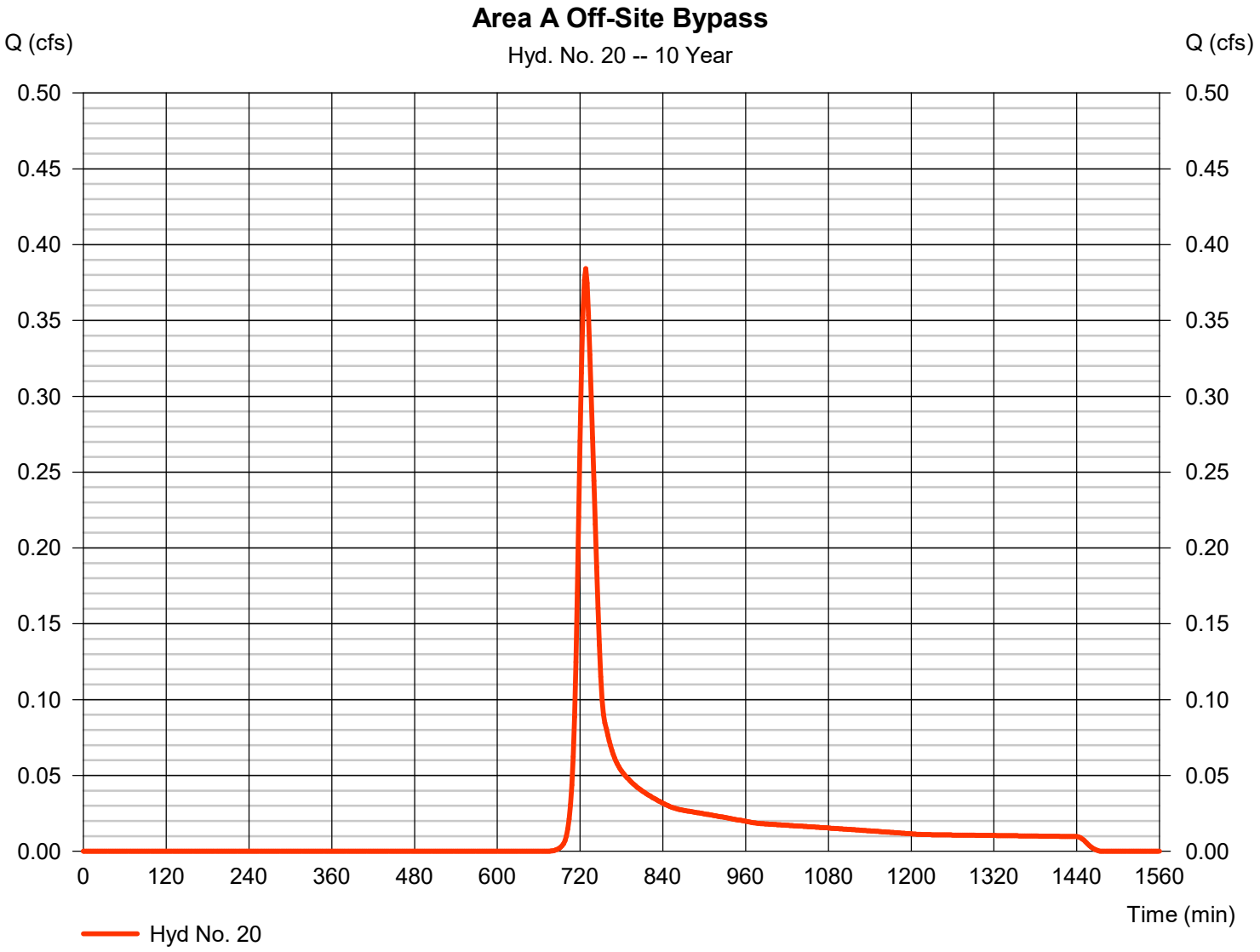


Hydrograph Report

Hyd. No. 20

Area A Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.384 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	1,450 cuft
Drainage area	=	0.270 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

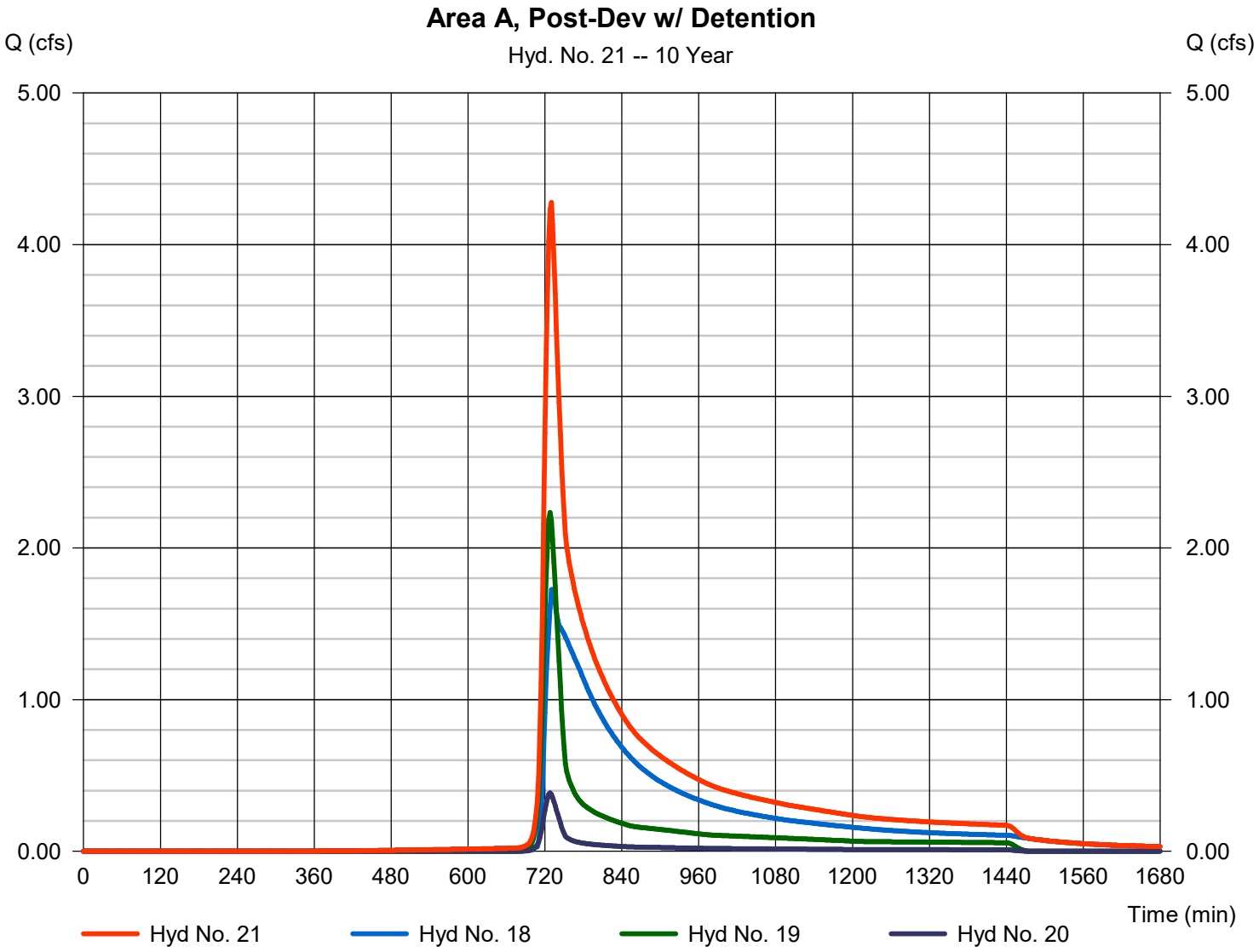


Hydrograph Report

Hyd. No. 21

Area A, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 4.279 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 32,123 cuft
Inflow hyds.	= 18, 19, 20	Contrib. drain. area	= 1.840 ac

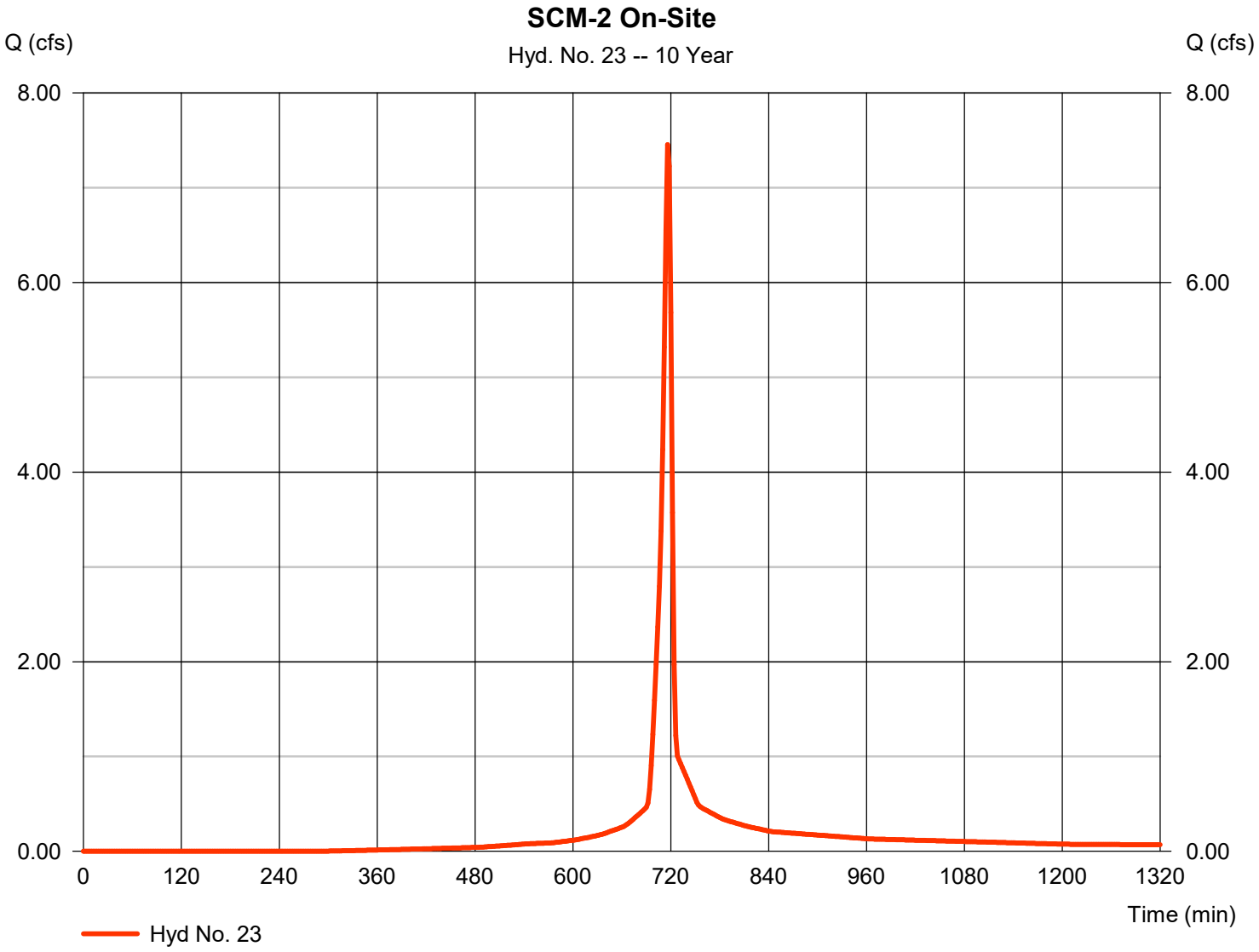


Hydrograph Report

Hyd. No. 23

SCM-2 On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.455 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	15,650 cuft
Drainage area	=	1.250 ac	Curve number	=	86.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

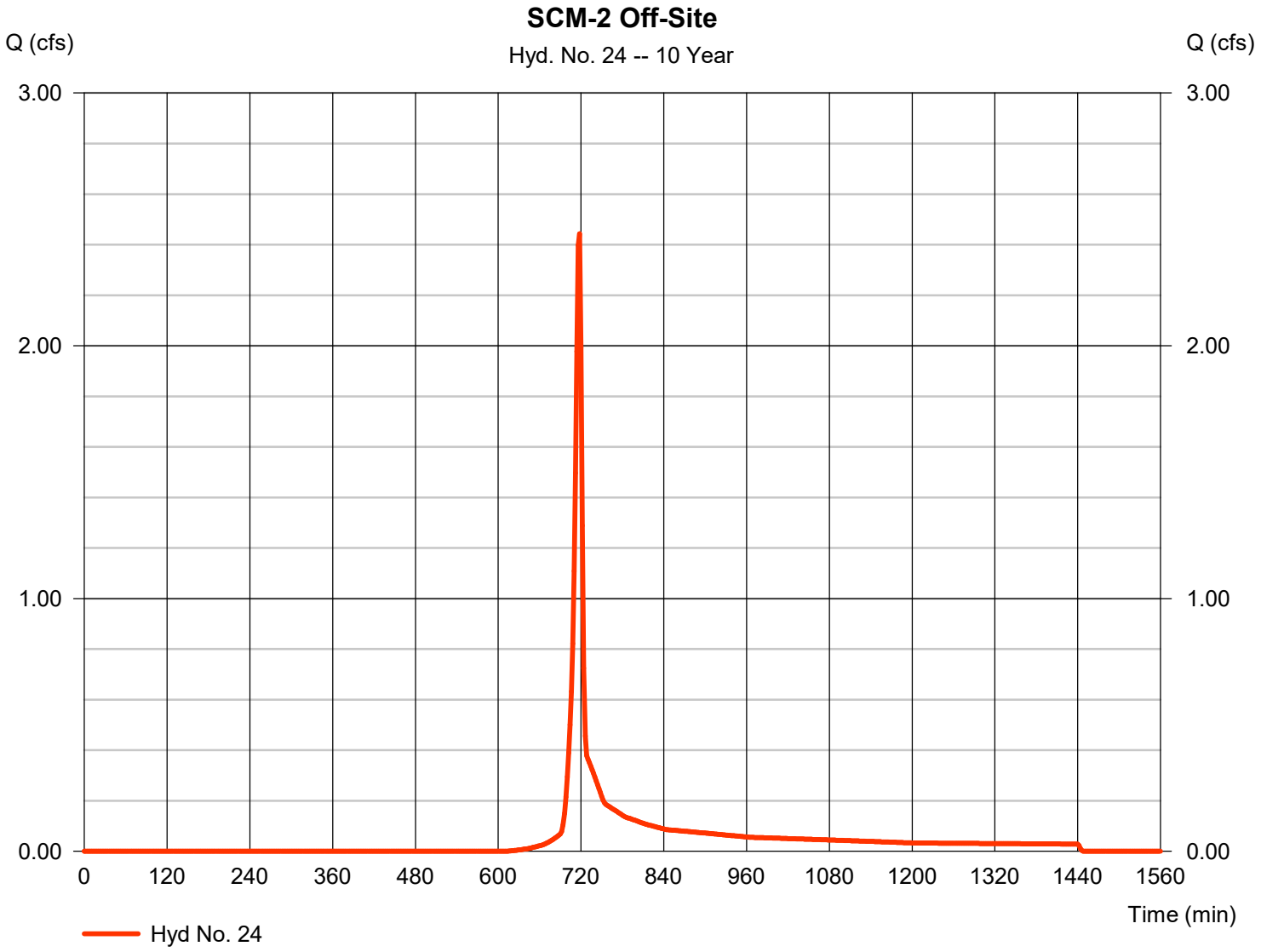


Hydrograph Report

Hyd. No. 24

SCM-2 Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.443 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	4,886 cuft
Drainage area	=	0.740 ac	Curve number	=	67.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

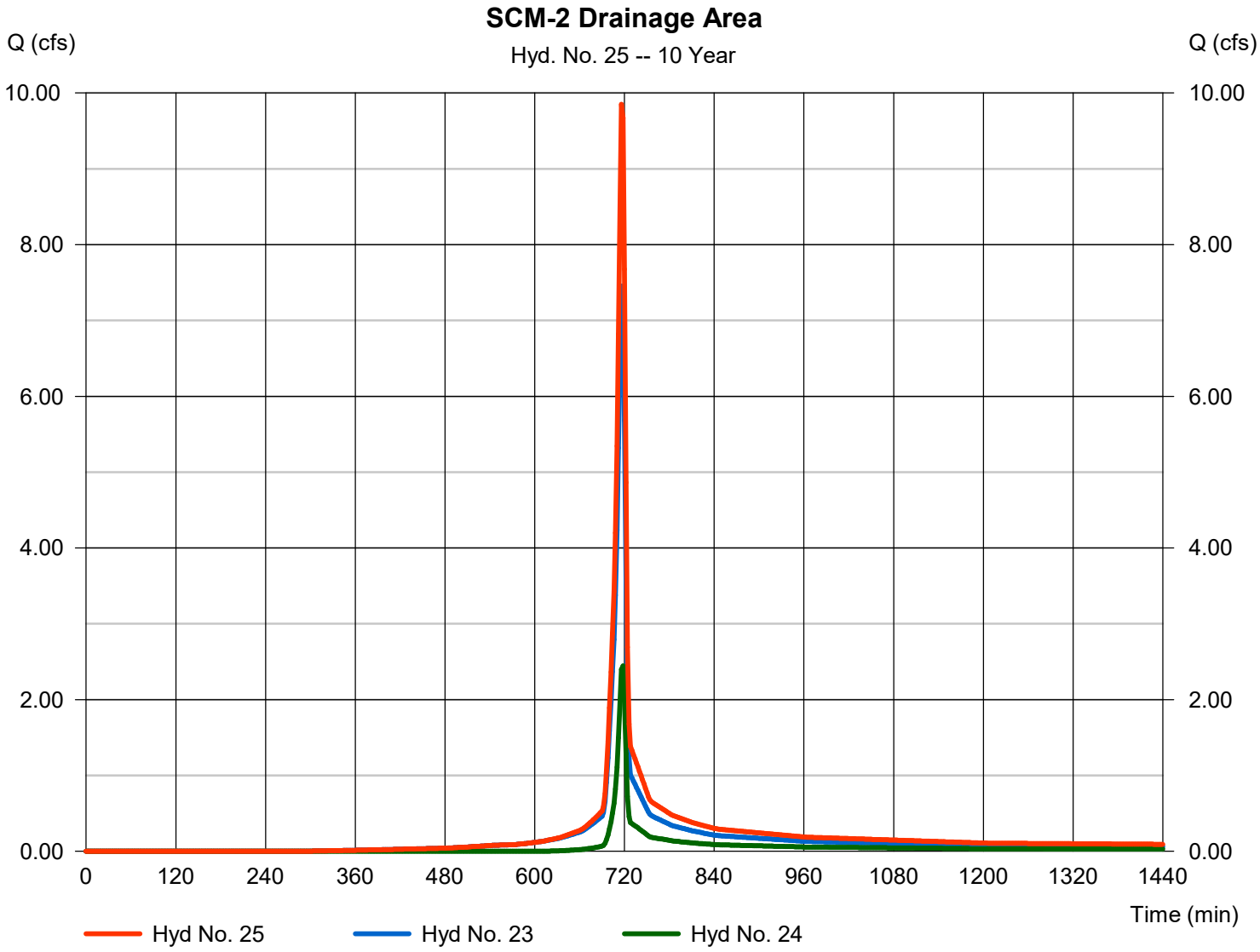


Hydrograph Report

Hyd. No. 25

SCM-2 Drainage Area

Hydrograph type	= Combine	Peak discharge	= 9.853 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 20,536 cuft
Inflow hyds.	= 23, 24	Contrib. drain. area	= 1.990 ac



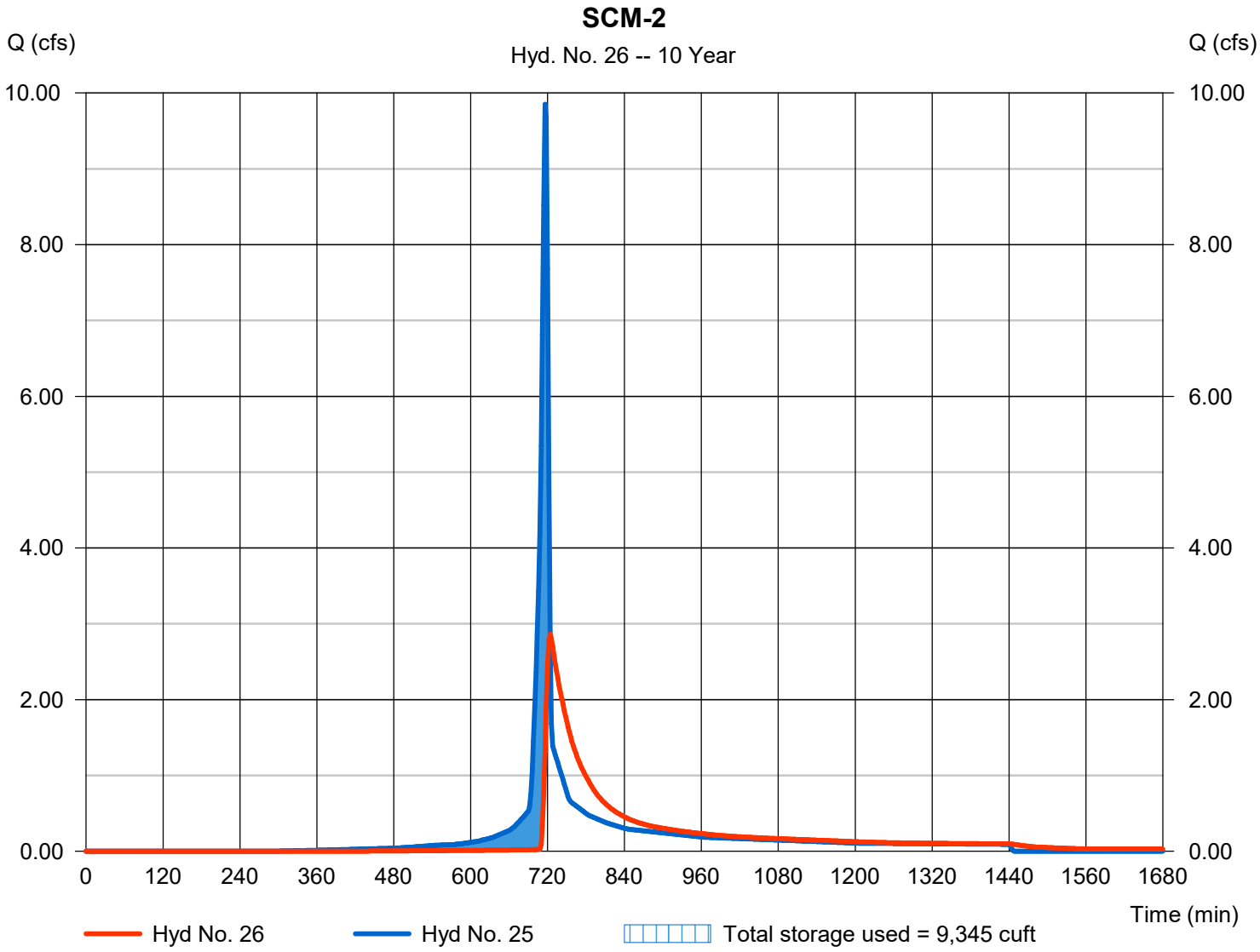
Hydrograph Report

Hyd. No. 26

SCM-2

Hydrograph type	=	Reservoir	Peak discharge	=	2.860 cfs
Storm frequency	=	10 yrs	Time to peak	=	724 min
Time interval	=	2 min	Hyd. volume	=	20,416 cuft
Inflow hyd. No.	=	25 - SCM-2 Drainage Area	Max. Elevation	=	328.59 ft
Reservoir name	=	SCM-2	Max. Storage	=	9,345 cuft

Storage Indication method used.

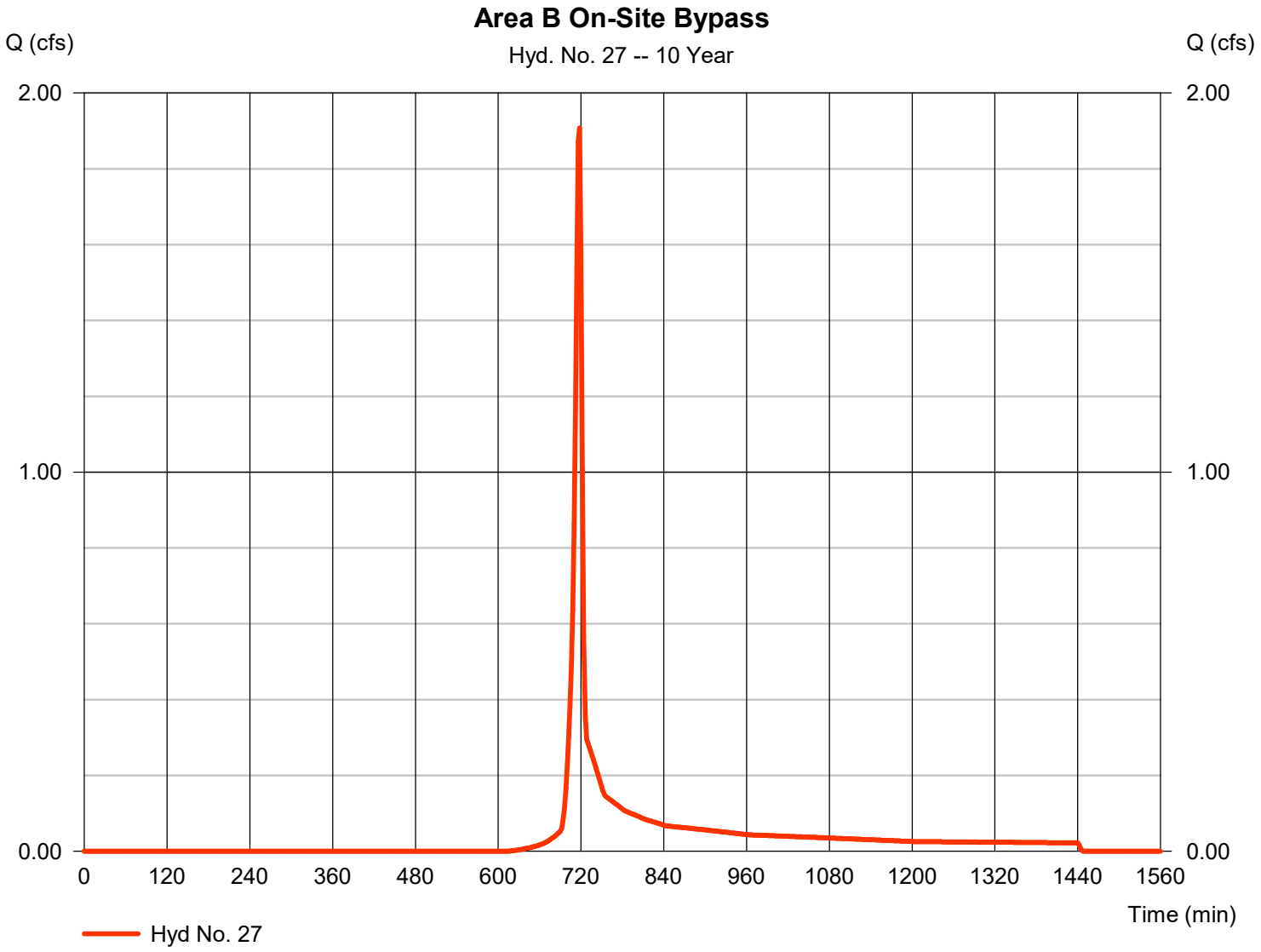


Hydrograph Report

Hyd. No. 27

Area B On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.907 cfs
Storm frequency	=	10 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	3,814 cuft
Drainage area	=	0.580 ac	Curve number	=	67.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

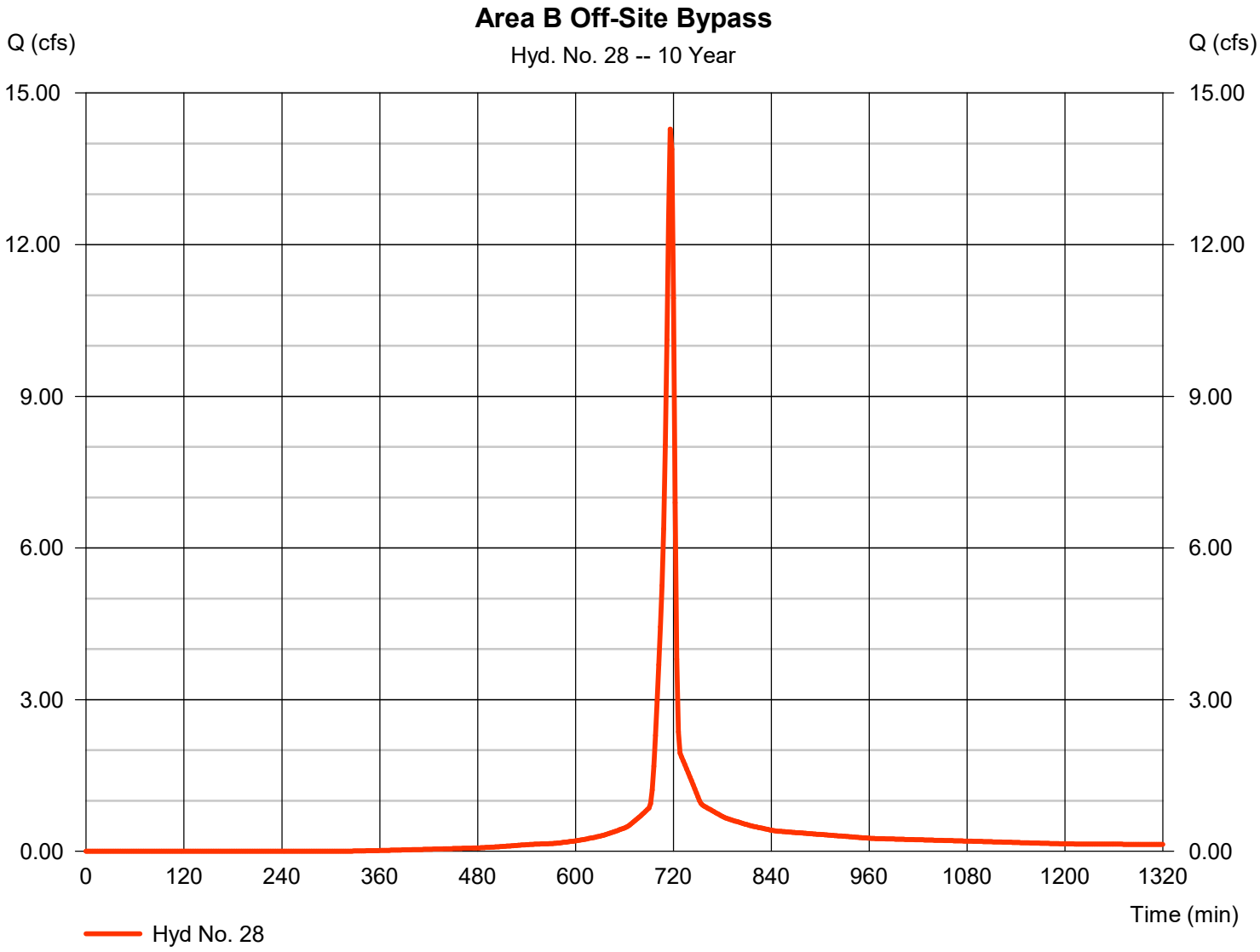


Hydrograph Report

Hyd. No. 28

Area B Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.28 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	29,736 cuft
Drainage area	=	2.470 ac	Curve number	=	85.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.14 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

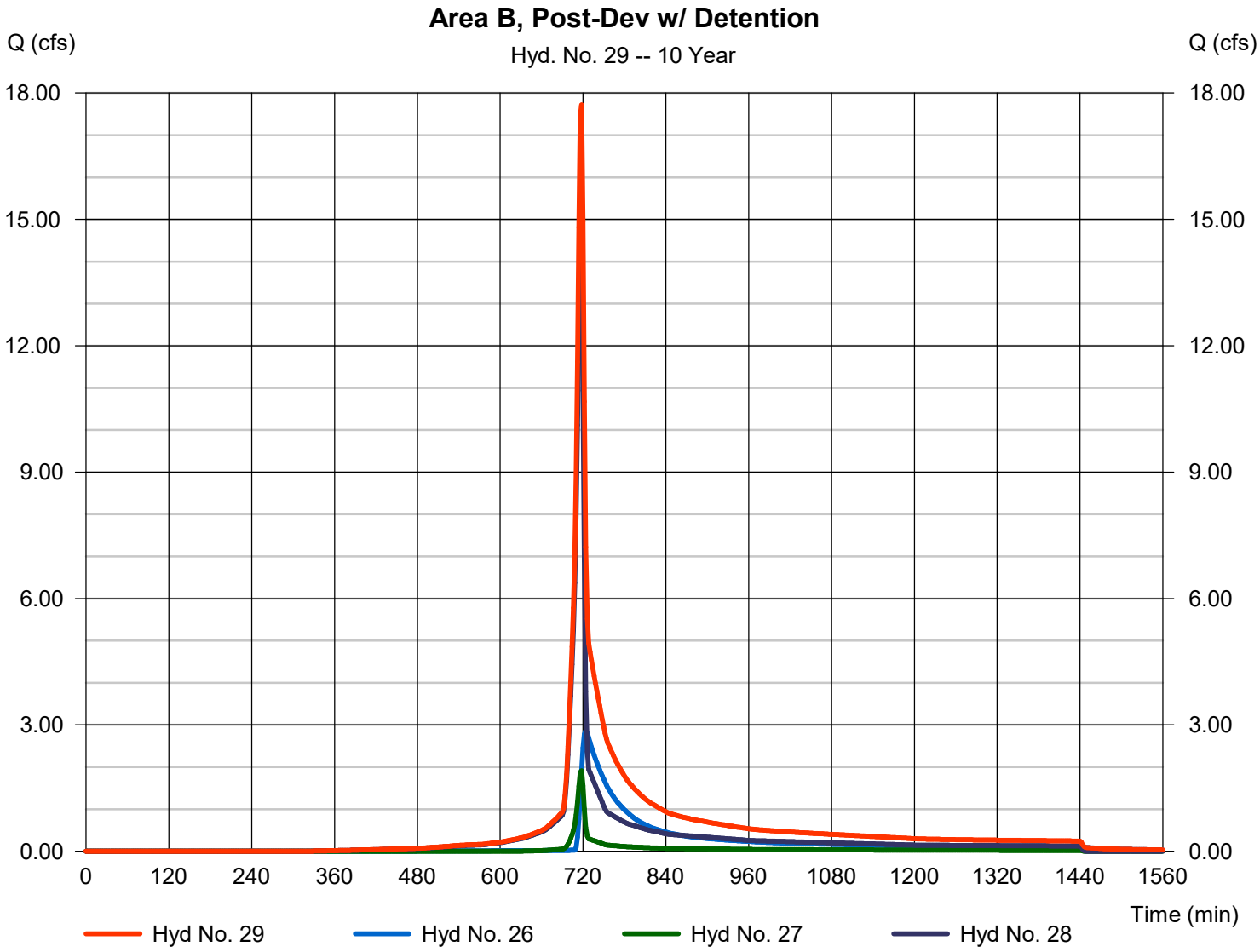


Hydrograph Report

Hyd. No. 29

Area B, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 17.72 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 53,966 cuft
Inflow hyds.	= 26, 27, 28	Contrib. drain. area	= 3.050 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

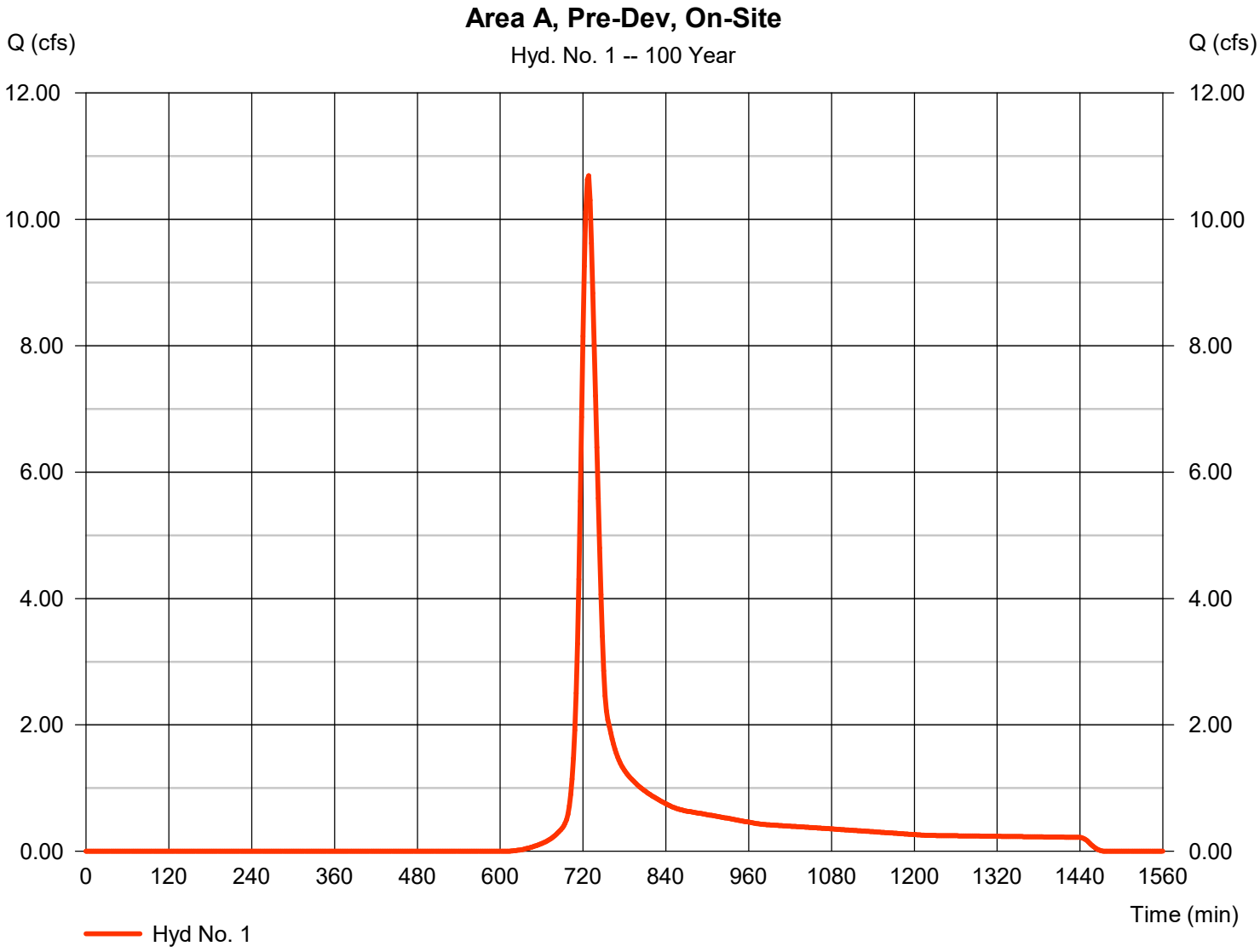
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	10.69	2	728	38,019	------	------	------	Area A, Pre-Dev, On-Site
2	SCS Runoff	1.904	2	726	6,619	------	------	------	Area A, Pre-Dev, Off-Site
3	Combine	12.59	2	728	44,638	1, 2	------	------	Area A, Pre-Dev
4	SCS Runoff	9.346	2	718	18,756	------	------	------	Area B, Pre-Dev, On-Site
5	SCS Runoff	29.48	2	716	61,639	------	------	------	Area B, Pre-Dev, Off-Site
6	Combine	38.75	2	716	80,395	4, 5	------	------	Area B, Pre-Dev
8	SCS Runoff	14.96	2	726	51,660	------	------	------	Area A, Post-Dev, On-Site
9	SCS Runoff	2.381	2	726	8,228	------	------	------	Area A, Post-Dev, Off-Site
10	Combine	17.34	2	726	59,888	8, 9	------	------	Area A, Post-Dev
11	SCS Runoff	16.75	2	716	35,031	------	------	------	Area B, Post-Dev, On-Site
12	SCS Runoff	30.00	2	716	63,114	------	------	------	Area B, Post-Dev, Off-Site
13	Combine	46.76	2	716	98,145	11, 12	------	------	Area B, Post-Dev
15	SCS Runoff	14.38	2	718	34,639	------	------	------	SCM-1 DA On-Site
16	SCS Runoff	1.843	2	718	4,750	------	------	------	SCM-1 DA Off-Site
17	Combine	16.22	2	718	39,389	15, 16	------	------	SCM-1 Drainage Area
18	Reservoir	13.25	2	722	39,180	17	327.74	14,536	SCM-1
19	SCS Runoff	5.684	2	728	19,982	------	------	------	Area A On-Site Bypass
20	SCS Runoff	0.978	2	728	3,436	------	------	------	Area A Off-Site Bypass
21	Combine	19.10	2	722	62,598	18, 19, 20	------	------	Area A, Post-Dev w/ Detention
23	SCS Runoff	12.59	2	716	27,336	------	------	------	SCM-2 On-Site
24	SCS Runoff	5.204	2	716	10,522	------	------	------	SCM-2 Off-Site
25	Combine	17.79	2	716	37,858	23, 24	------	------	SCM-2 Drainage Area
26	Reservoir	13.38	2	720	37,733	25	329.27	13,144	SCM-2
27	SCS Runoff	4.068	2	716	8,225	------	------	------	Area B On-Site Bypass
28	SCS Runoff	24.45	2	716	52,624	------	------	------	Area B Off-Site Bypass
29	Combine	39.64	2	718	98,581	26, 27, 28	------	------	Area B, Post-Dev w/ Detention

Hydrograph Report

Hyd. No. 1

Area A, Pre-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.69 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	38,019 cuft
Drainage area	=	3.330 ac	Curve number	=	57.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

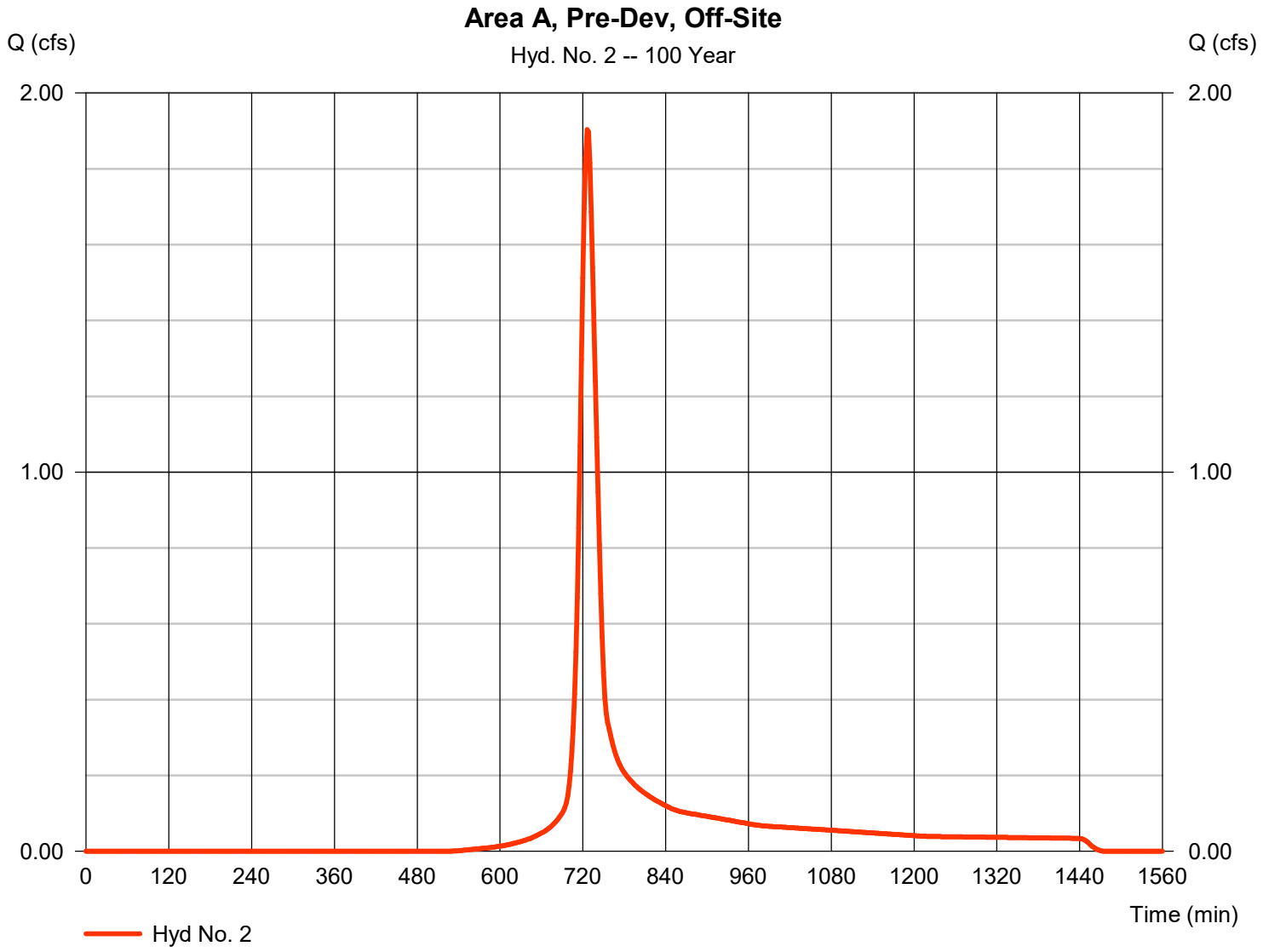


Hydrograph Report

Hyd. No. 2

Area A, Pre-Dev, Off-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 1.904 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 6,619 cuft
Drainage area	= 0.460 ac	Curve number	= 65
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

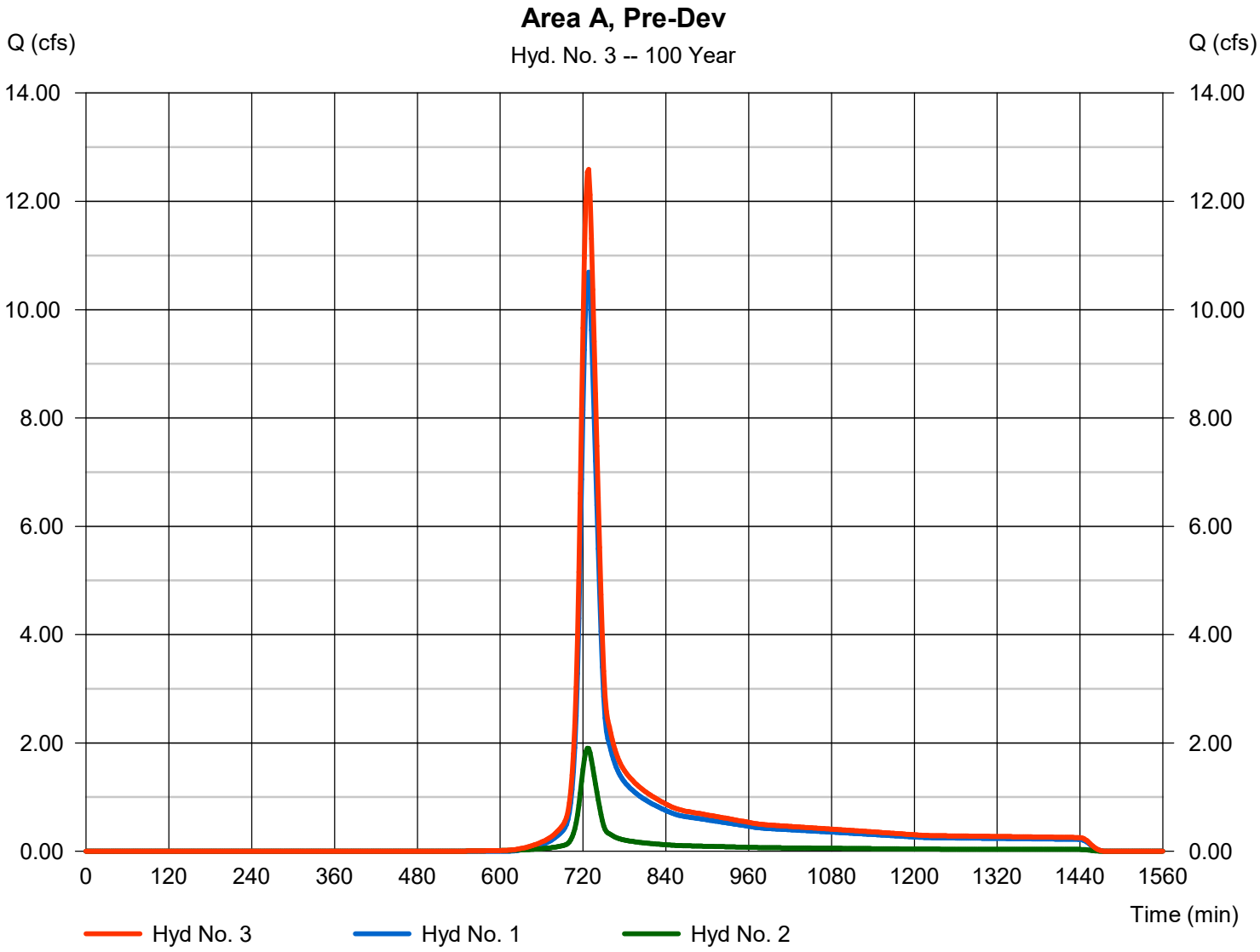


Hydrograph Report

Hyd. No. 3

Area A, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 12.59 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 44,638 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 3.790 ac

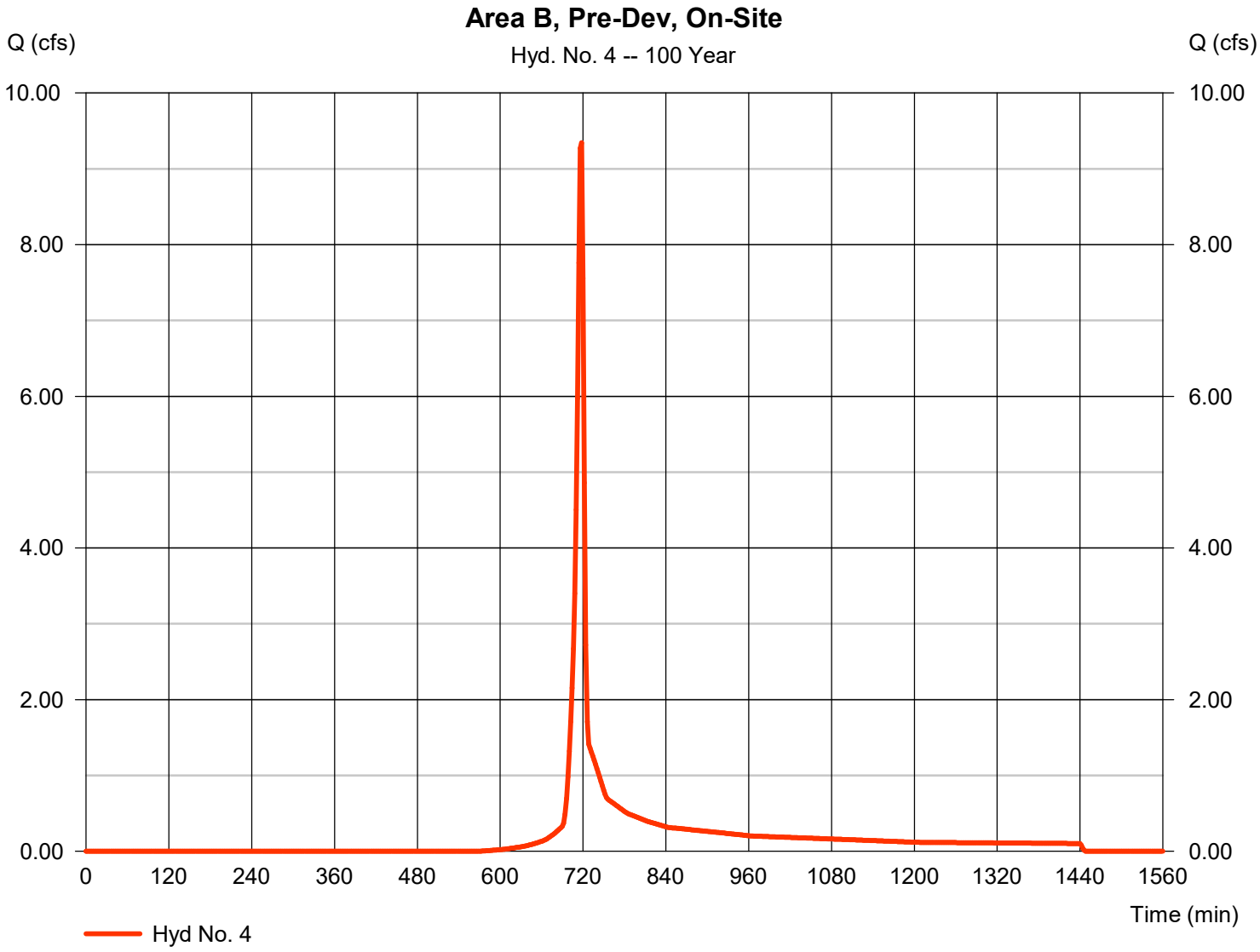


Hydrograph Report

Hyd. No. 4

Area B, Pre-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 9.346 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 18,756 cuft
Drainage area	= 1.600 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

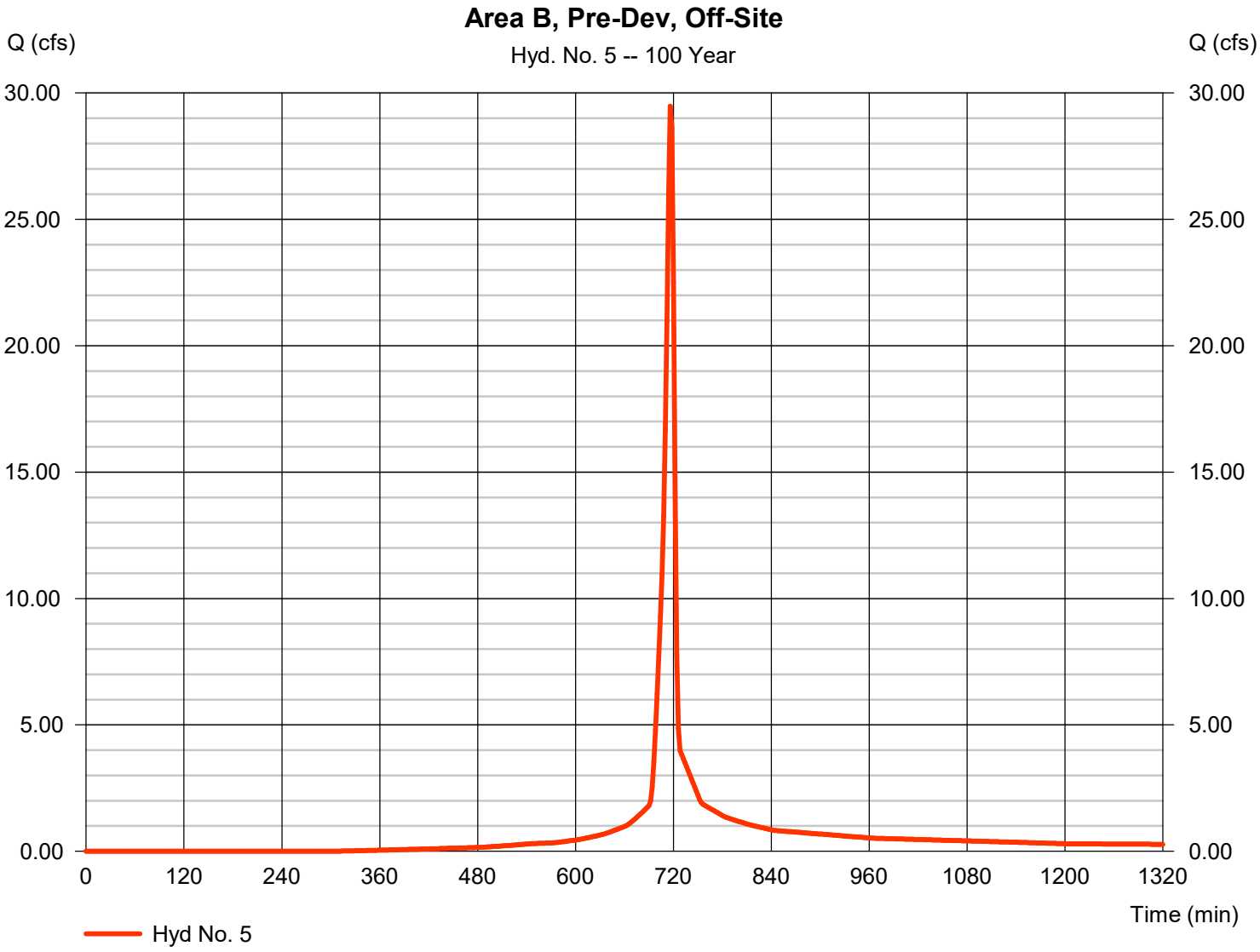


Hydrograph Report

Hyd. No. 5

Area B, Pre-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	29.48 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	61,639 cuft
Drainage area	=	3.220 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

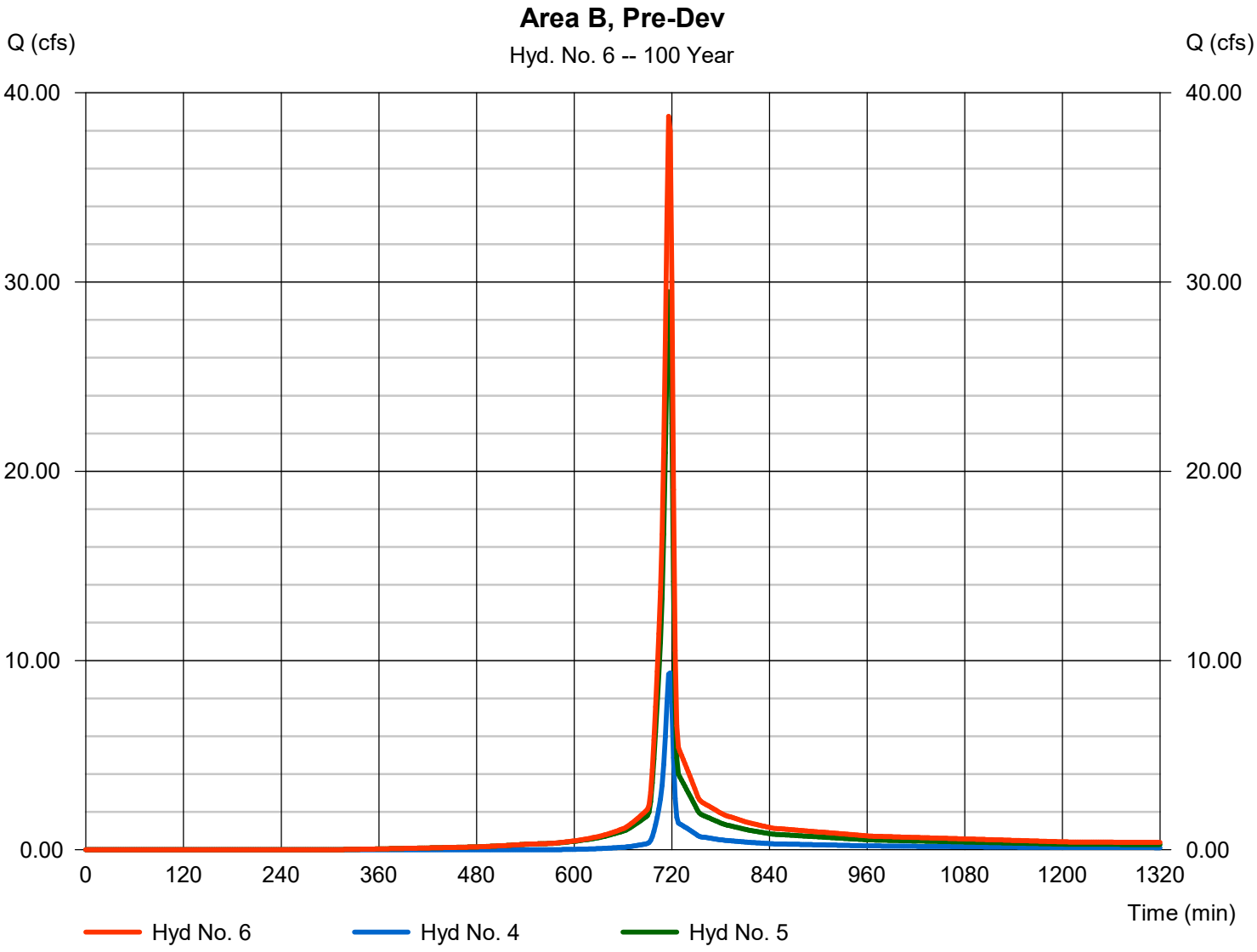


Hydrograph Report

Hyd. No. 6

Area B, Pre-Dev

Hydrograph type	= Combine	Peak discharge	= 38.75 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 80,395 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 4.820 ac

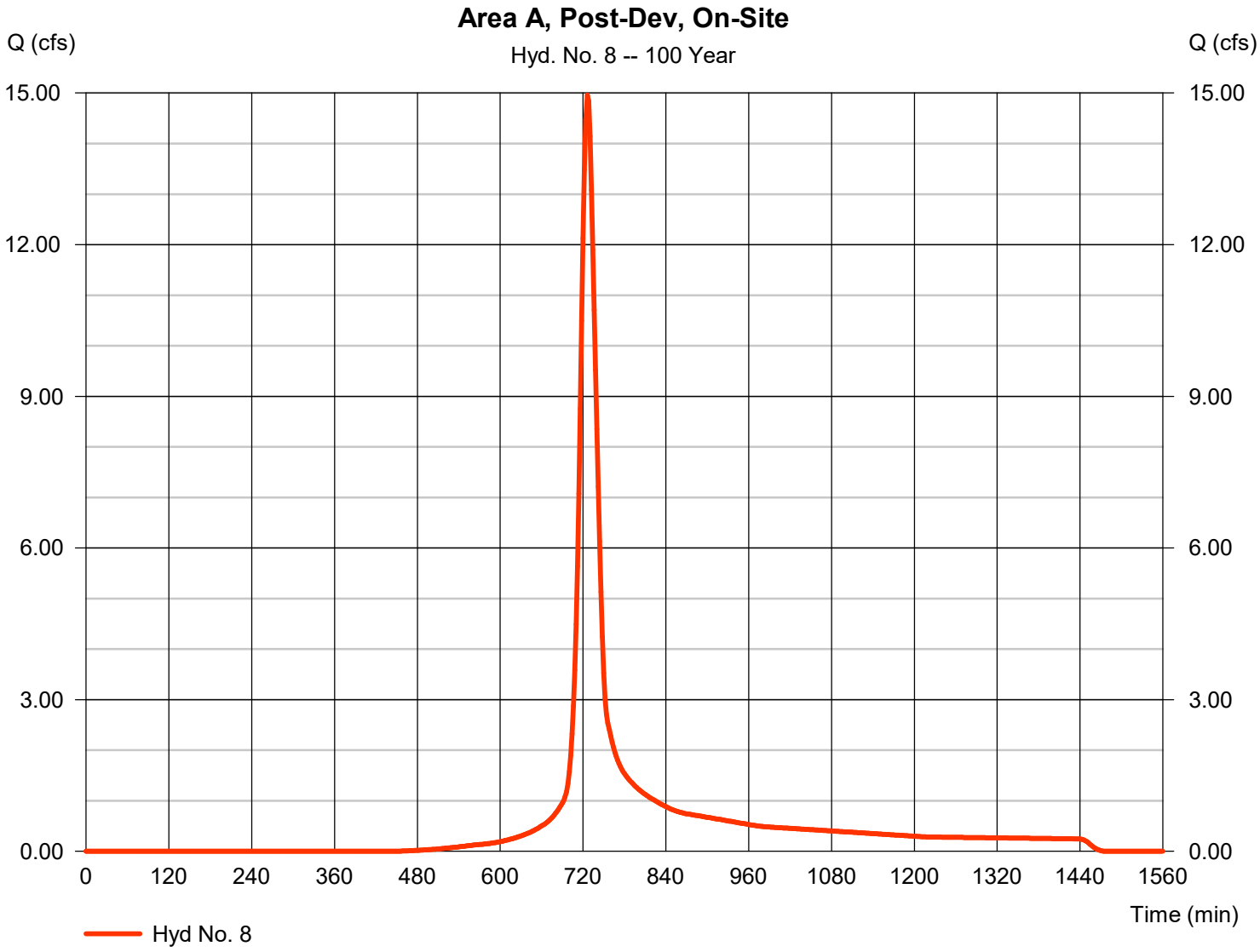


Hydrograph Report

Hyd. No. 8

Area A, Post-Dev, On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.96 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	51,660 cuft
Drainage area	=	3.100 ac	Curve number	=	70.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

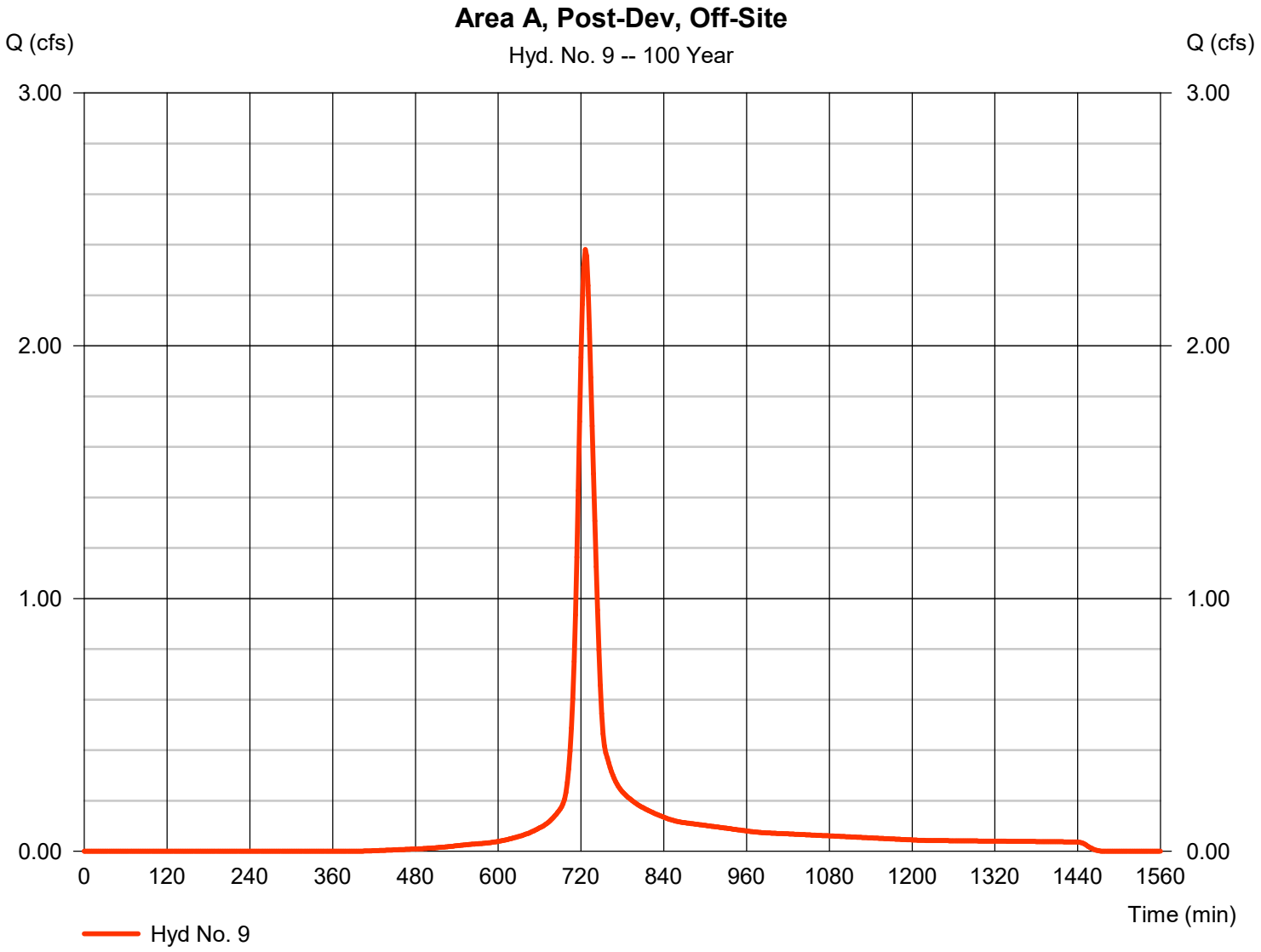


Hydrograph Report

Hyd. No. 9

Area A, Post-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.381 cfs
Storm frequency	=	100 yrs	Time to peak	=	726 min
Time interval	=	2 min	Hyd. volume	=	8,228 cuft
Drainage area	=	0.450 ac	Curve number	=	74.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

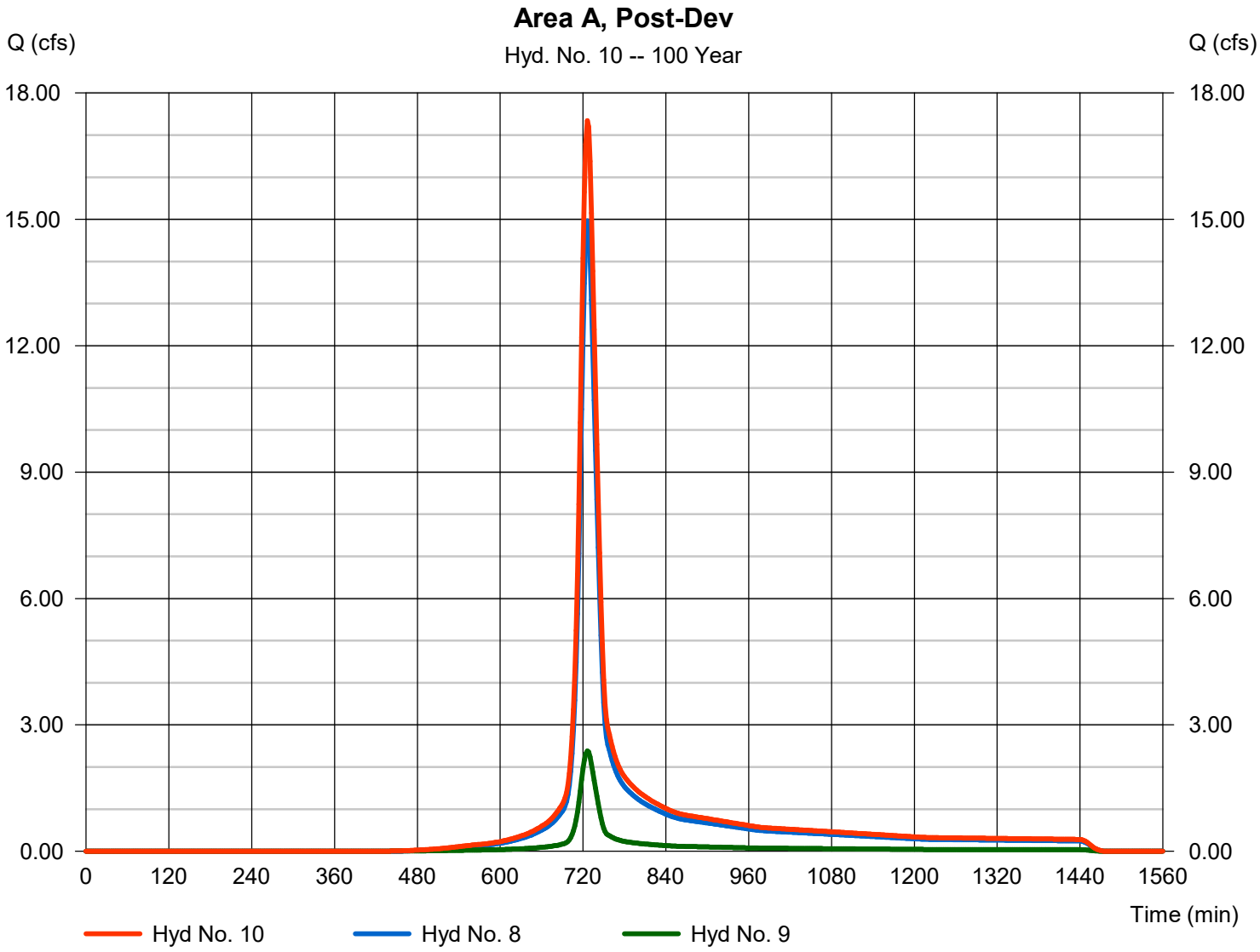


Hydrograph Report

Hyd. No. 10

Area A, Post-Dev

Hydrograph type	= Combine	Peak discharge	= 17.34 cfs
Storm frequency	= 100 yrs	Time to peak	= 726 min
Time interval	= 2 min	Hyd. volume	= 59,888 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 3.550 ac

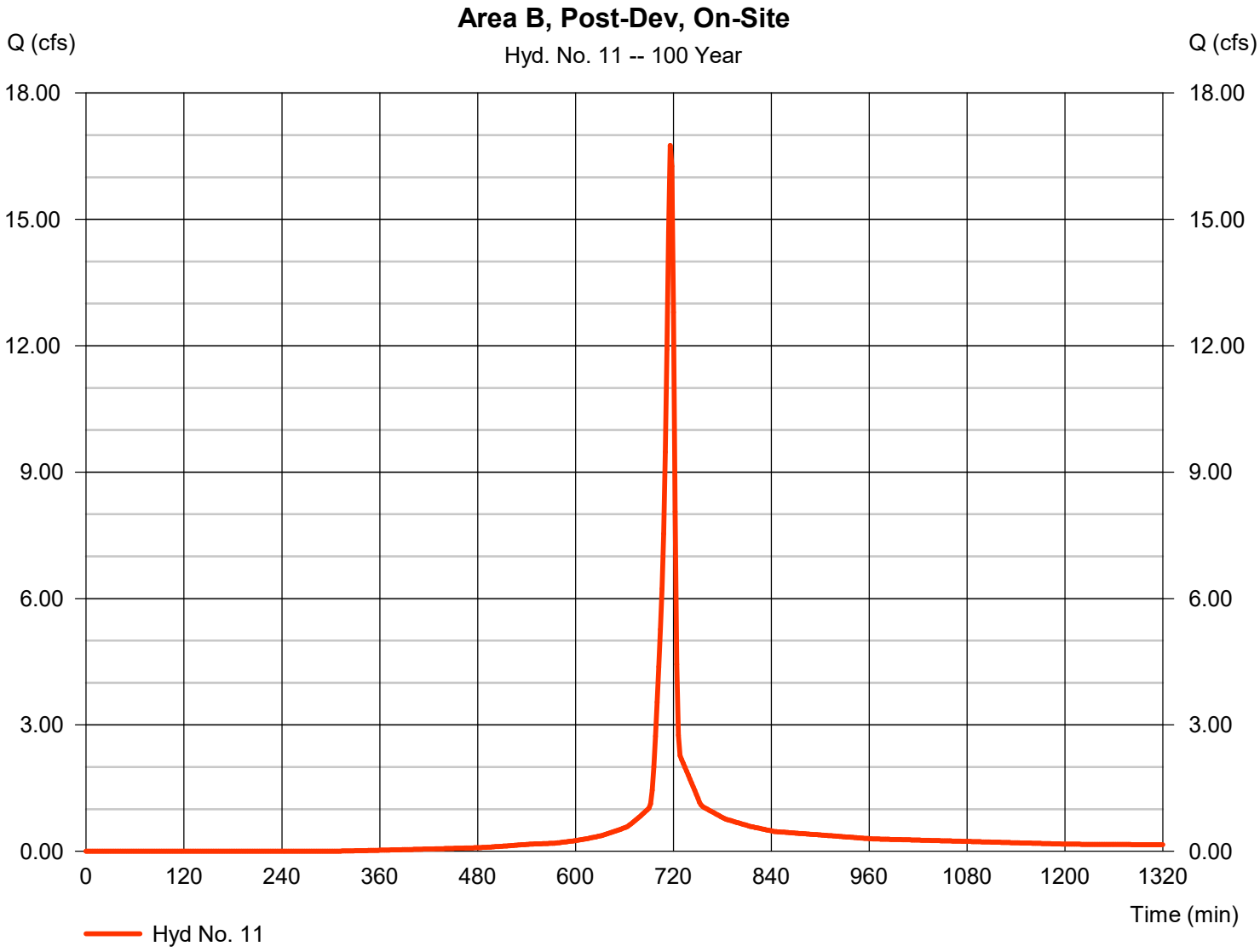


Hydrograph Report

Hyd. No. 11

Area B, Post-Dev, On-Site

Hydrograph type	= SCS Runoff	Peak discharge	= 16.75 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 35,031 cuft
Drainage area	= 1.830 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.00 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

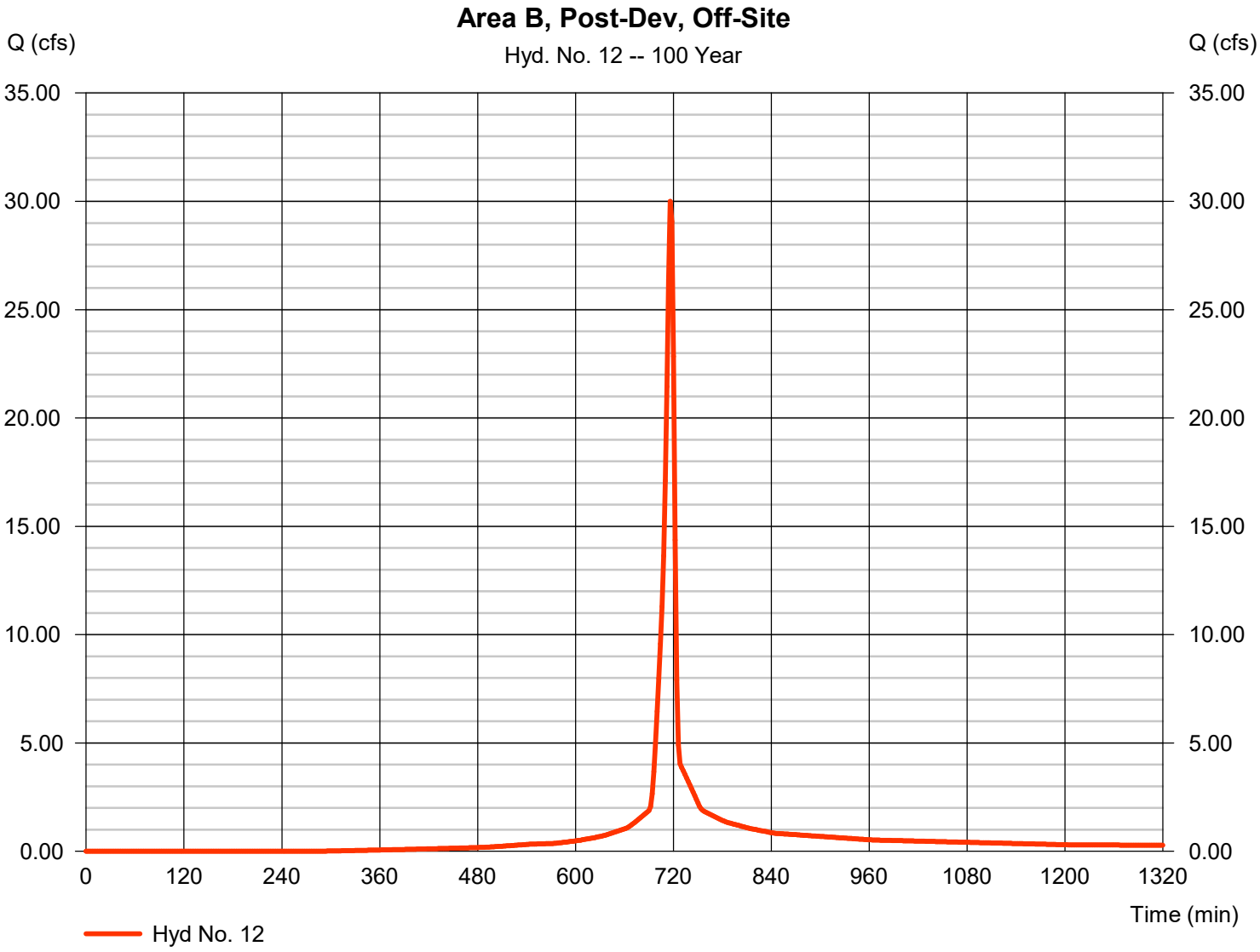


Hydrograph Report

Hyd. No. 12

Area B, Post-Dev, Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	30.00 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	63,114 cuft
Drainage area	=	3.210 ac	Curve number	=	81.3
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

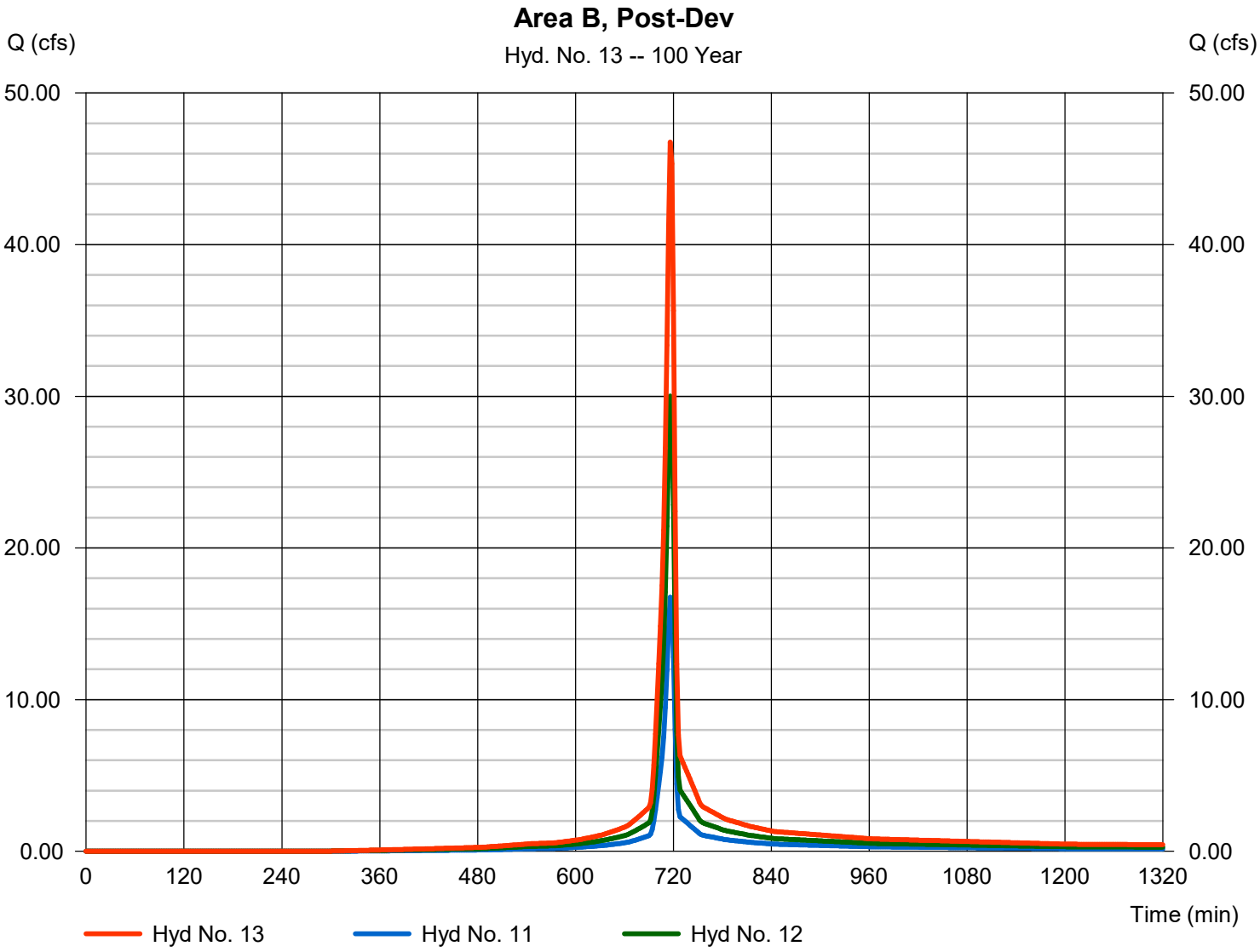


Hydrograph Report

Hyd. No. 13

Area B, Post-Dev

Hydrograph type	= Combine	Peak discharge	= 46.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 98,145 cuft
Inflow hyds.	= 11, 12	Contrib. drain. area	= 5.040 ac

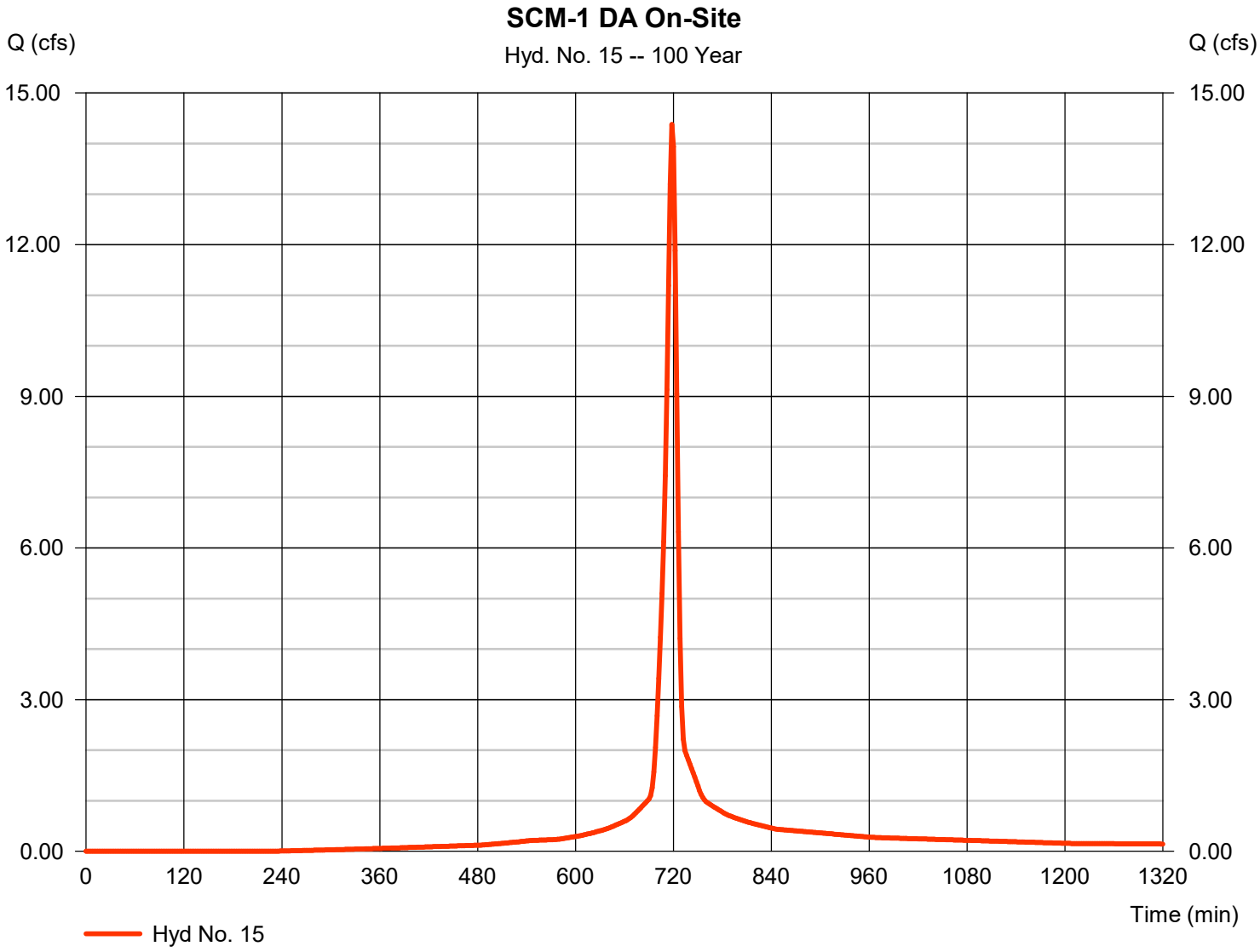


Hydrograph Report

Hyd. No. 15

SCM-1 DA On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.38 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	34,639 cuft
Drainage area	=	1.530 ac	Curve number	=	85.2
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

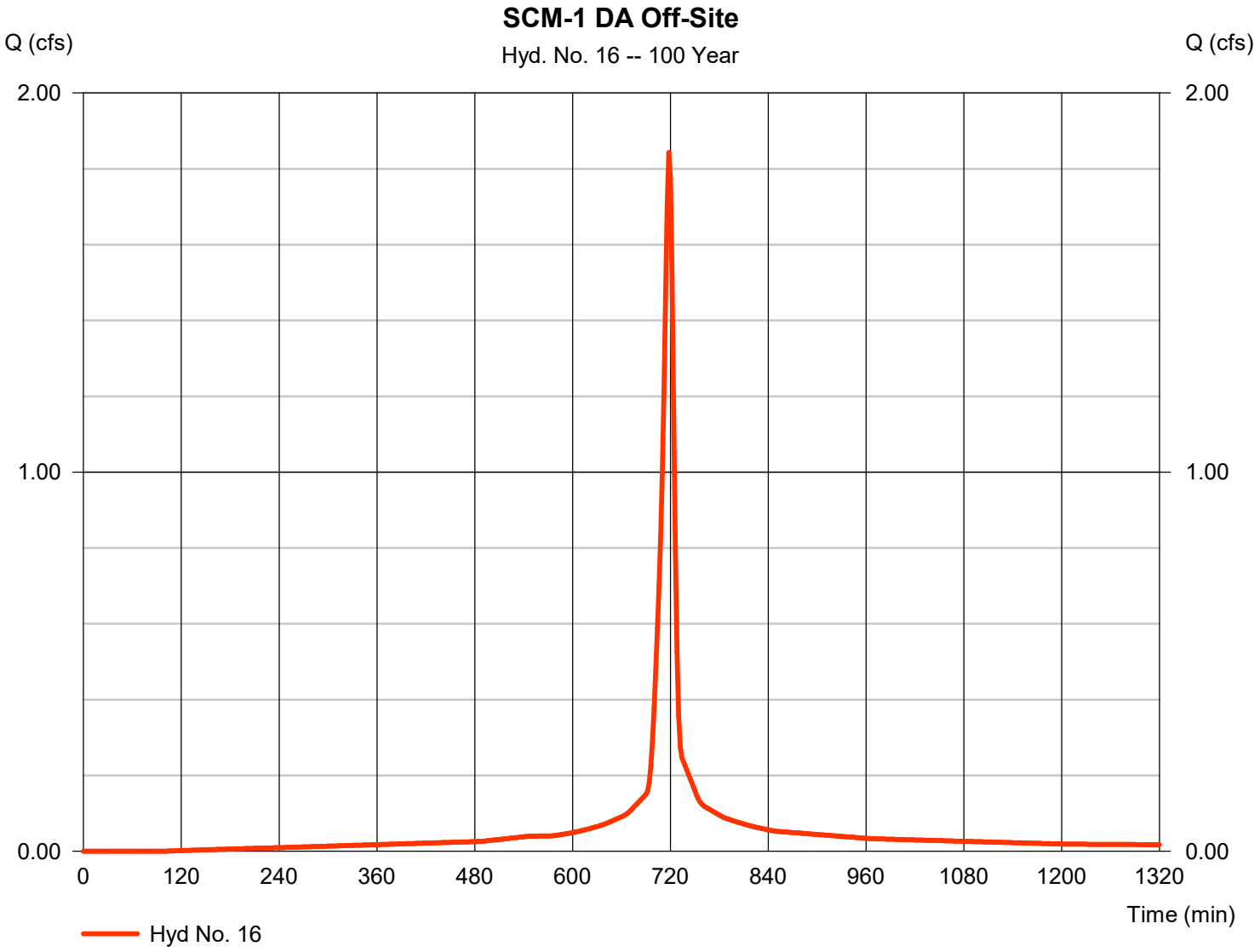


Hydrograph Report

Hyd. No. 16

SCM-1 DA Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.843 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	4,750 cuft
Drainage area	=	0.180 ac	Curve number	=	93.9
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

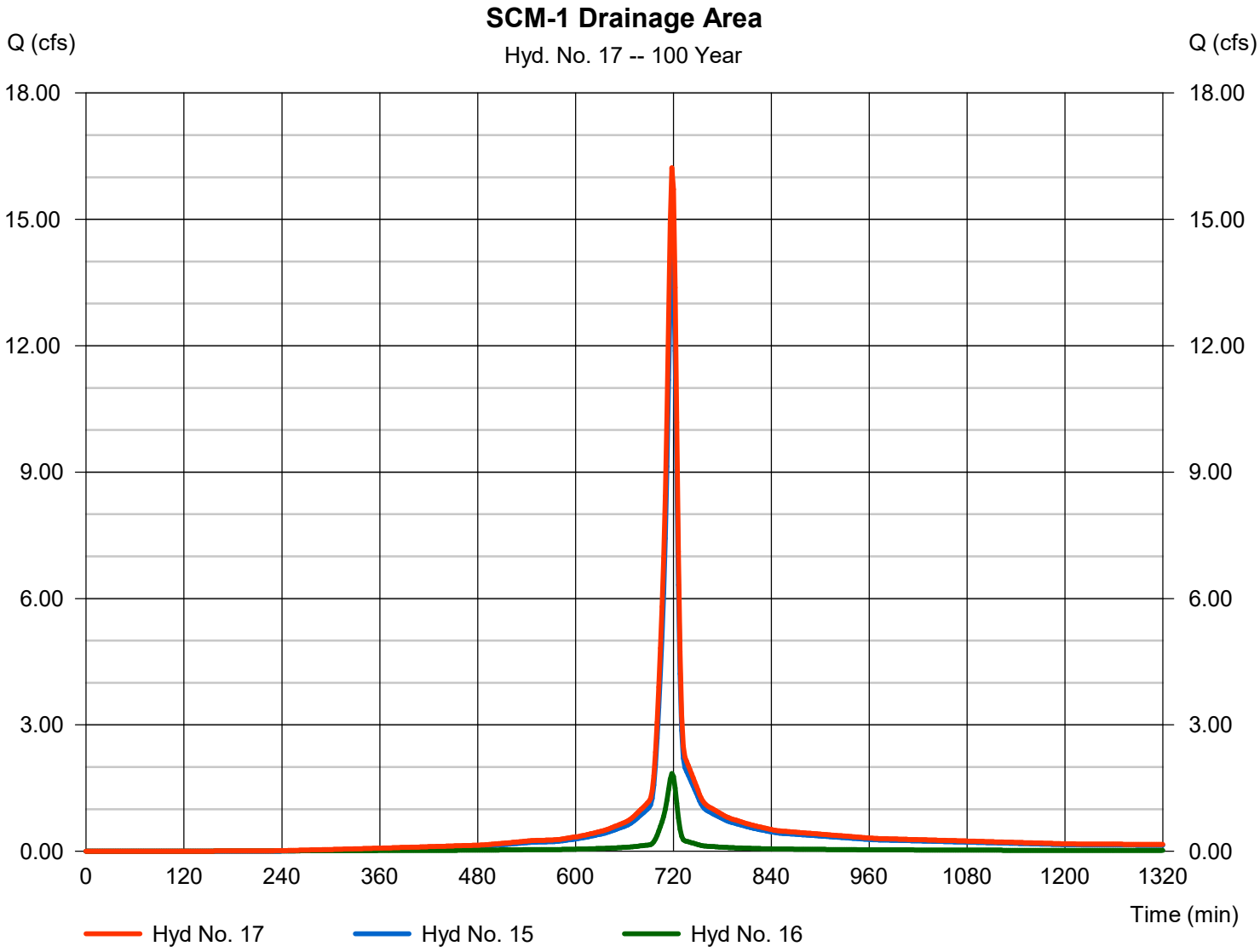


Hydrograph Report

Hyd. No. 17

SCM-1 Drainage Area

Hydrograph type	=	Combine	Peak discharge	=	16.22 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	39,389 cuft
Inflow hyds.	=	15, 16	Contrib. drain. area	=	1.710 ac



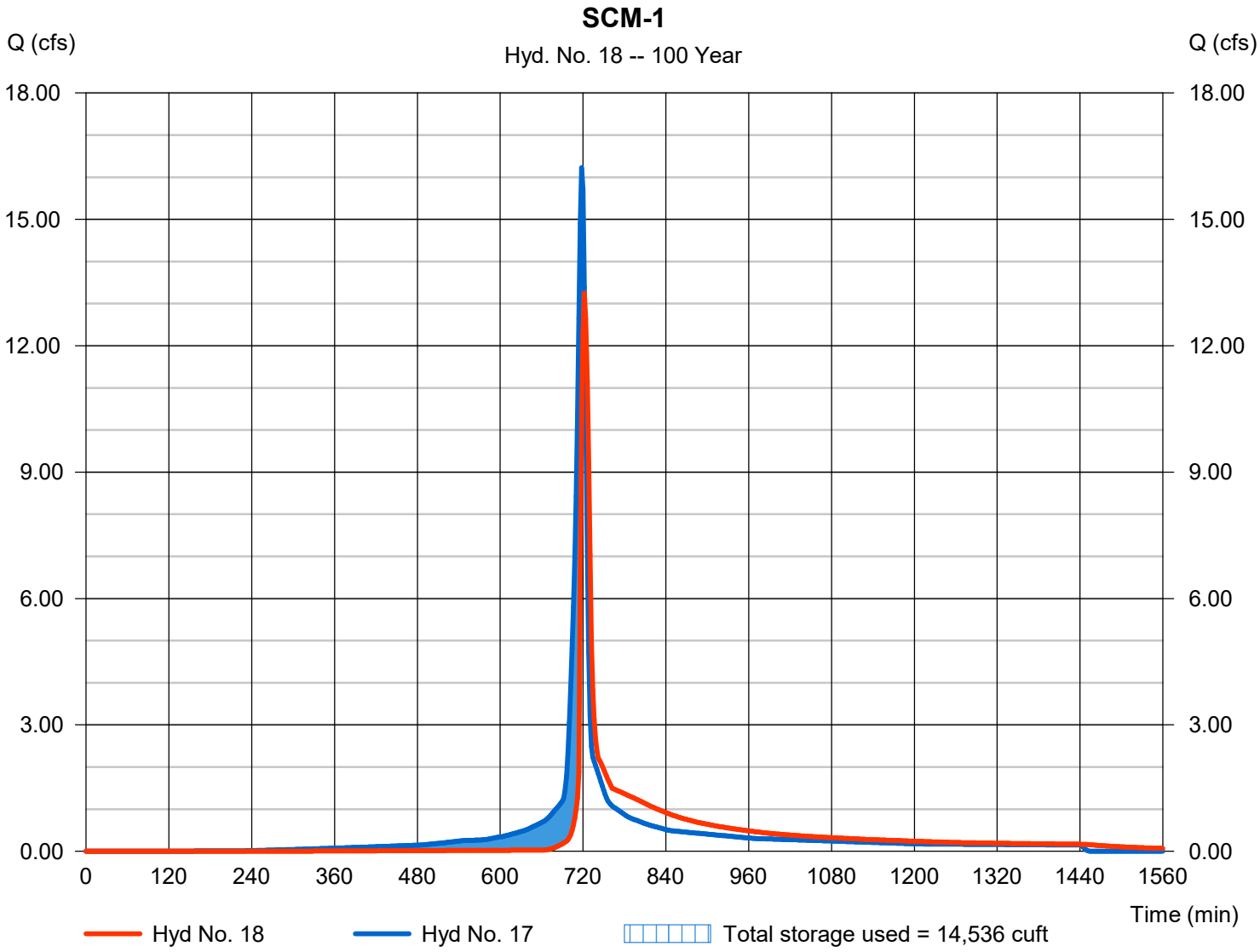
Hydrograph Report

Hyd. No. 18

SCM-1

Hydrograph type	=	Reservoir	Peak discharge	=	13.25 cfs
Storm frequency	=	100 yrs	Time to peak	=	722 min
Time interval	=	2 min	Hyd. volume	=	39,180 cuft
Inflow hyd. No.	=	17 - SCM-1 Drainage Area	Max. Elevation	=	327.74 ft
Reservoir name	=	SCM-1	Max. Storage	=	14,536 cuft

Storage Indication method used.

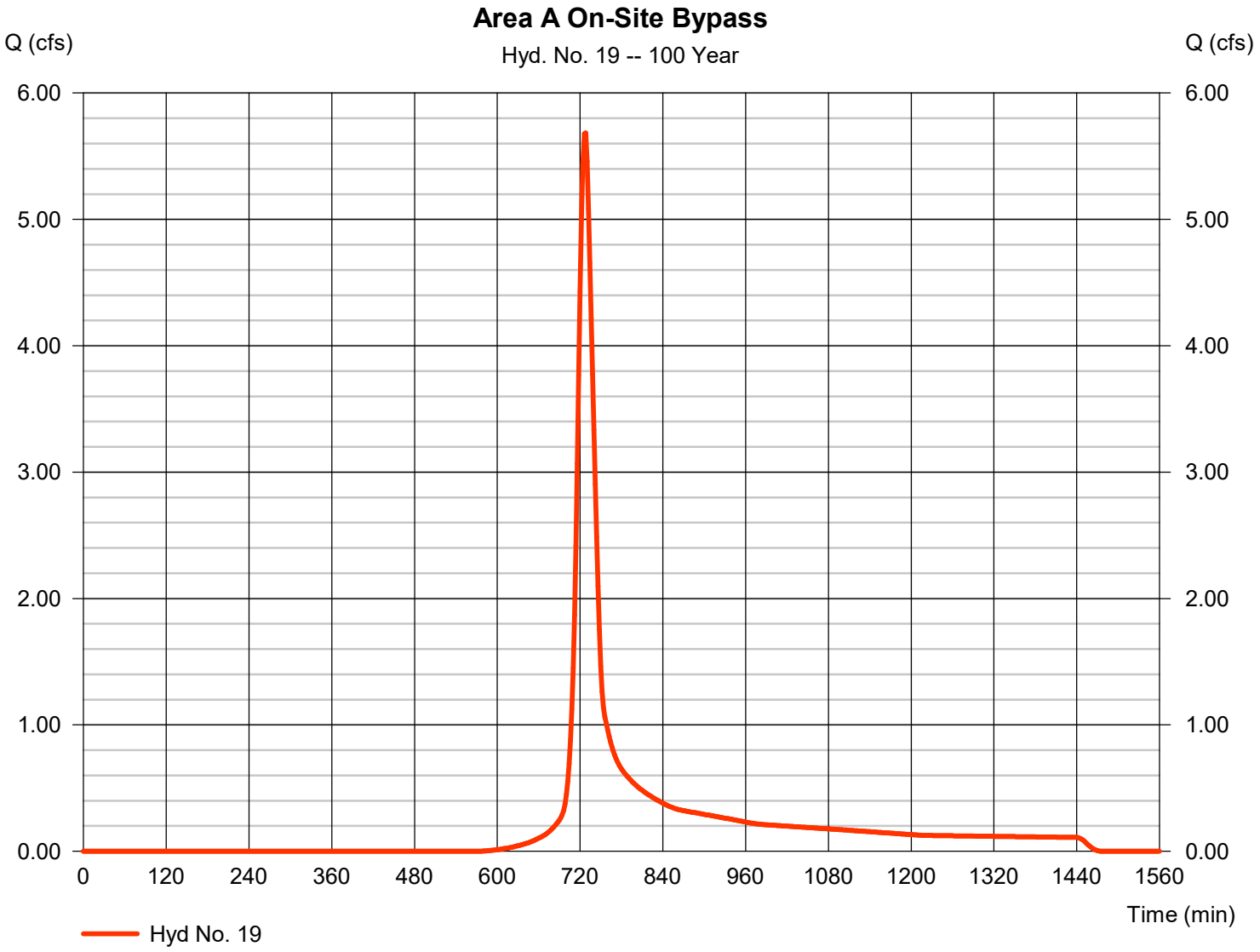


Hydrograph Report

Hyd. No. 19

Area A On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.684 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	19,982 cuft
Drainage area	=	1.570 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

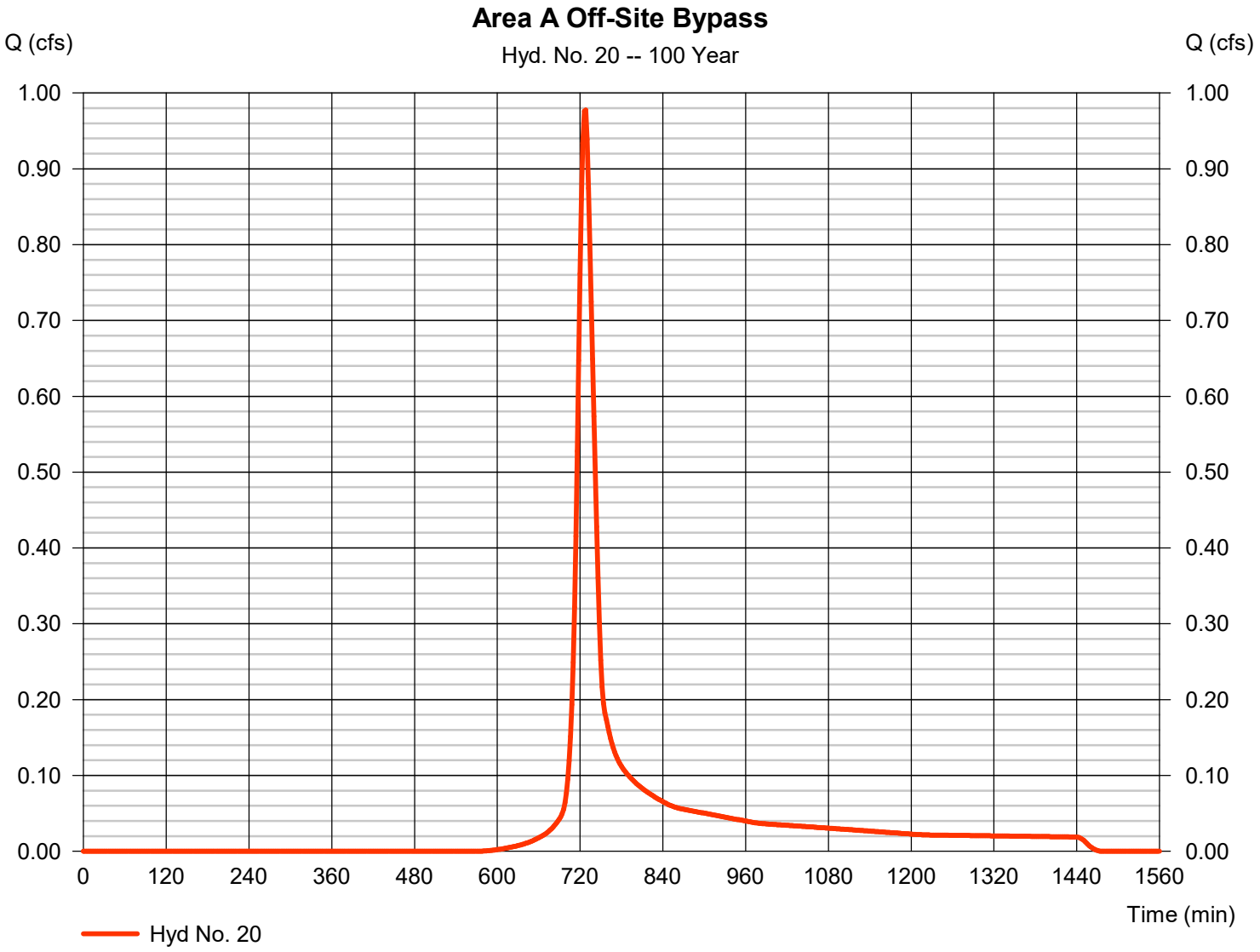


Hydrograph Report

Hyd. No. 20

Area A Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.978 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	3,436 cuft
Drainage area	=	0.270 ac	Curve number	=	61
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	21.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

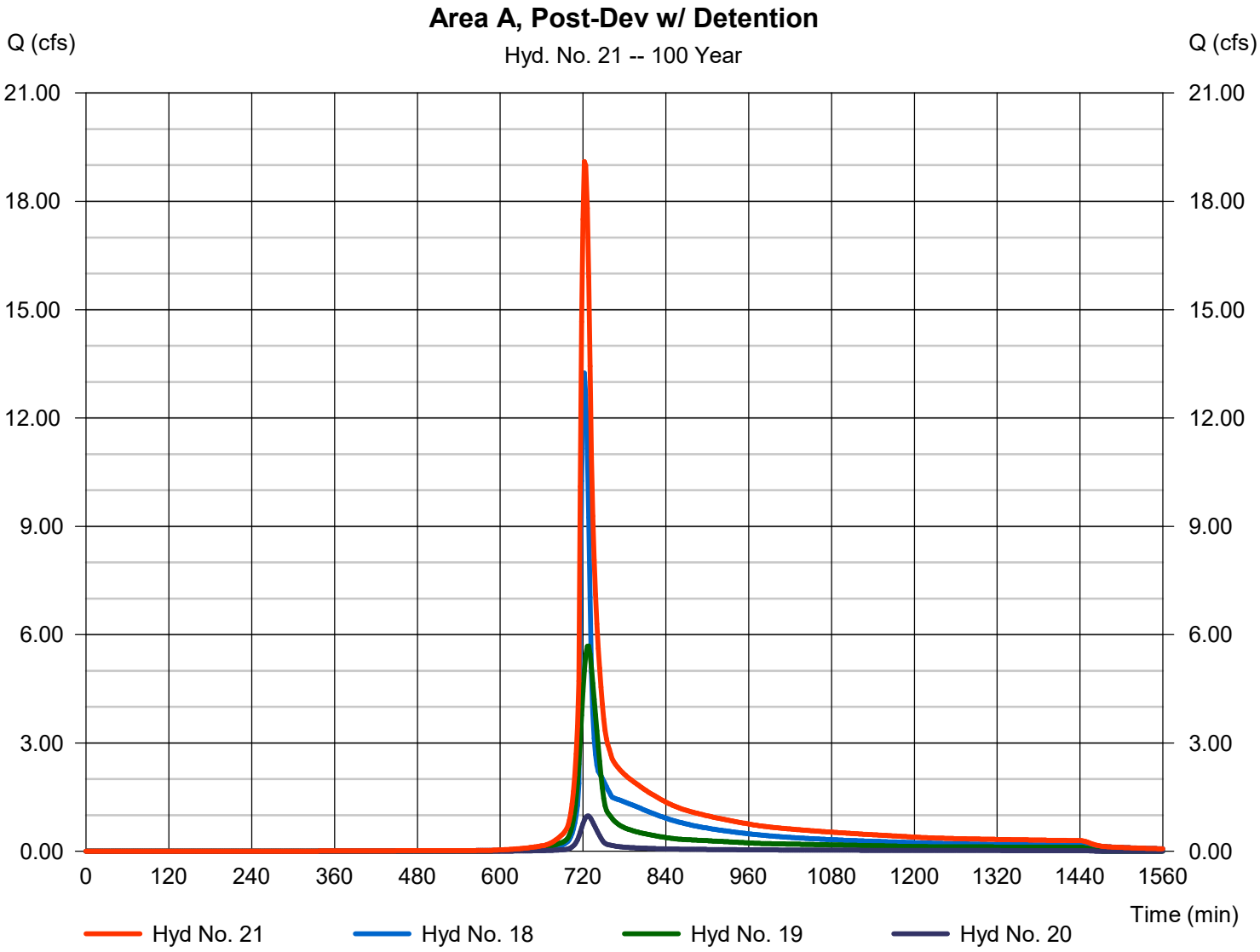


Hydrograph Report

Hyd. No. 21

Area A, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 19.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 2 min	Hyd. volume	= 62,598 cuft
Inflow hyds.	= 18, 19, 20	Contrib. drain. area	= 1.840 ac

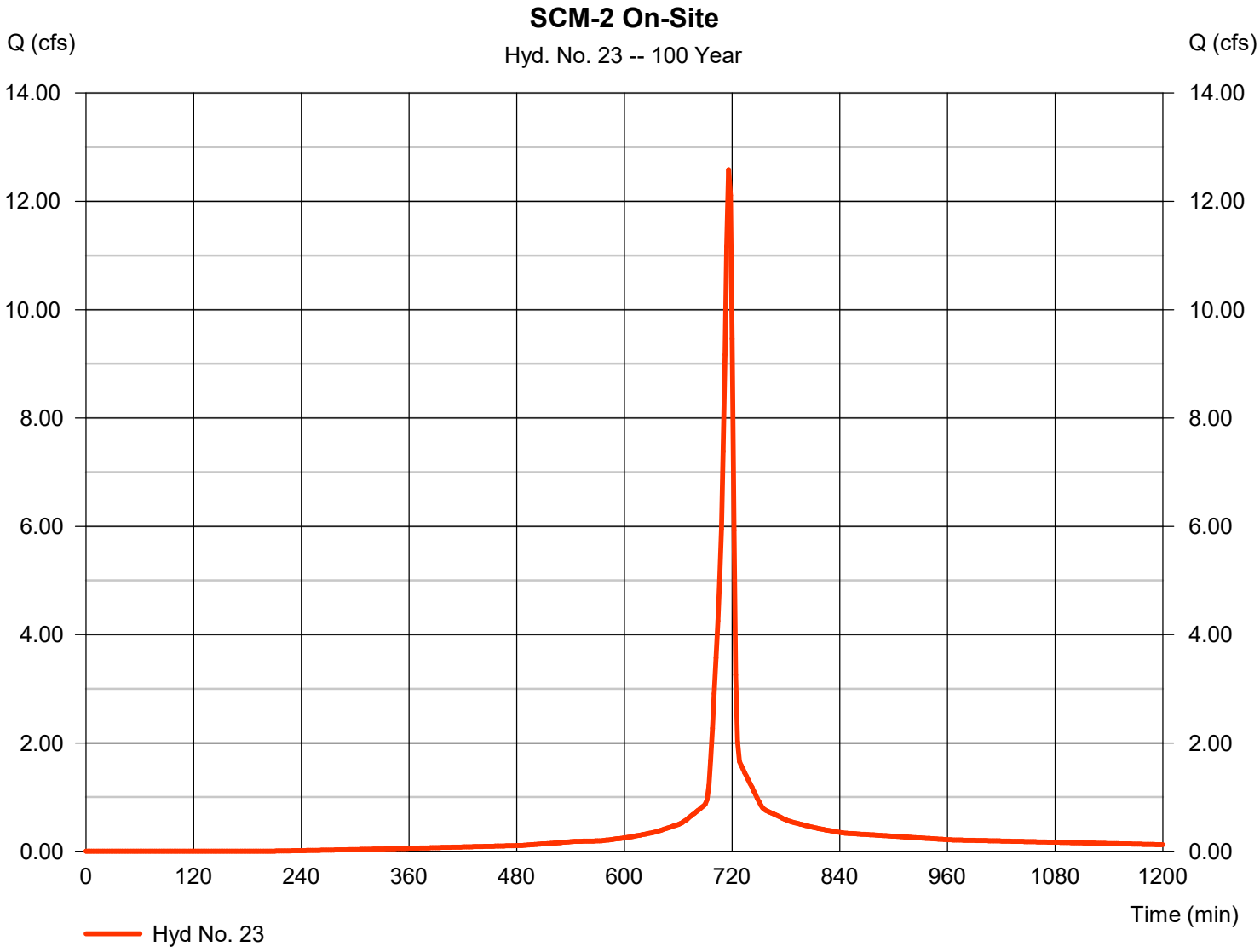


Hydrograph Report

Hyd. No. 23

SCM-2 On-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.59 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	27,336 cuft
Drainage area	=	1.250 ac	Curve number	=	86.8
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

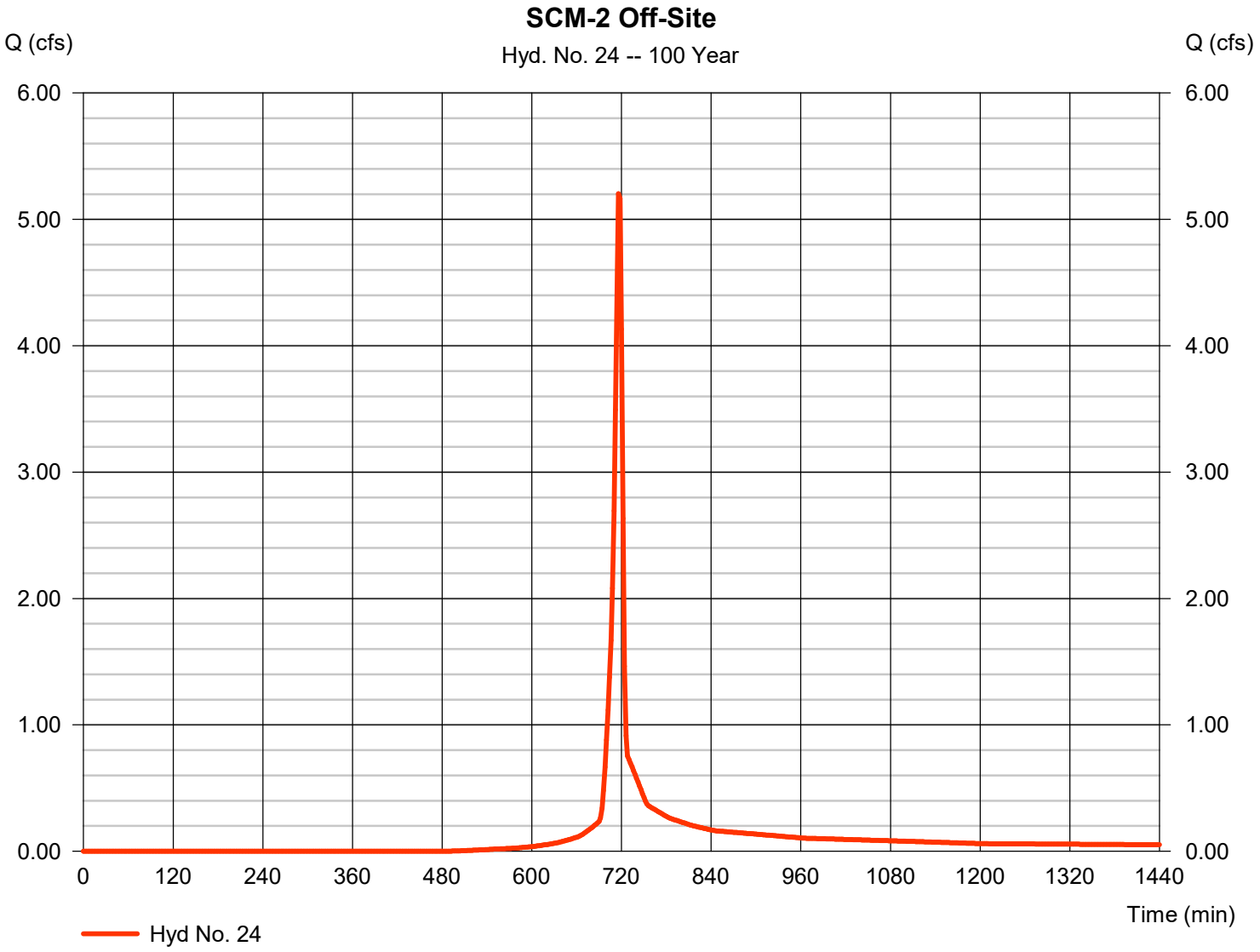


Hydrograph Report

Hyd. No. 24

SCM-2 Off-Site

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.204 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	10,522 cuft
Drainage area	=	0.740 ac	Curve number	=	67.5
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

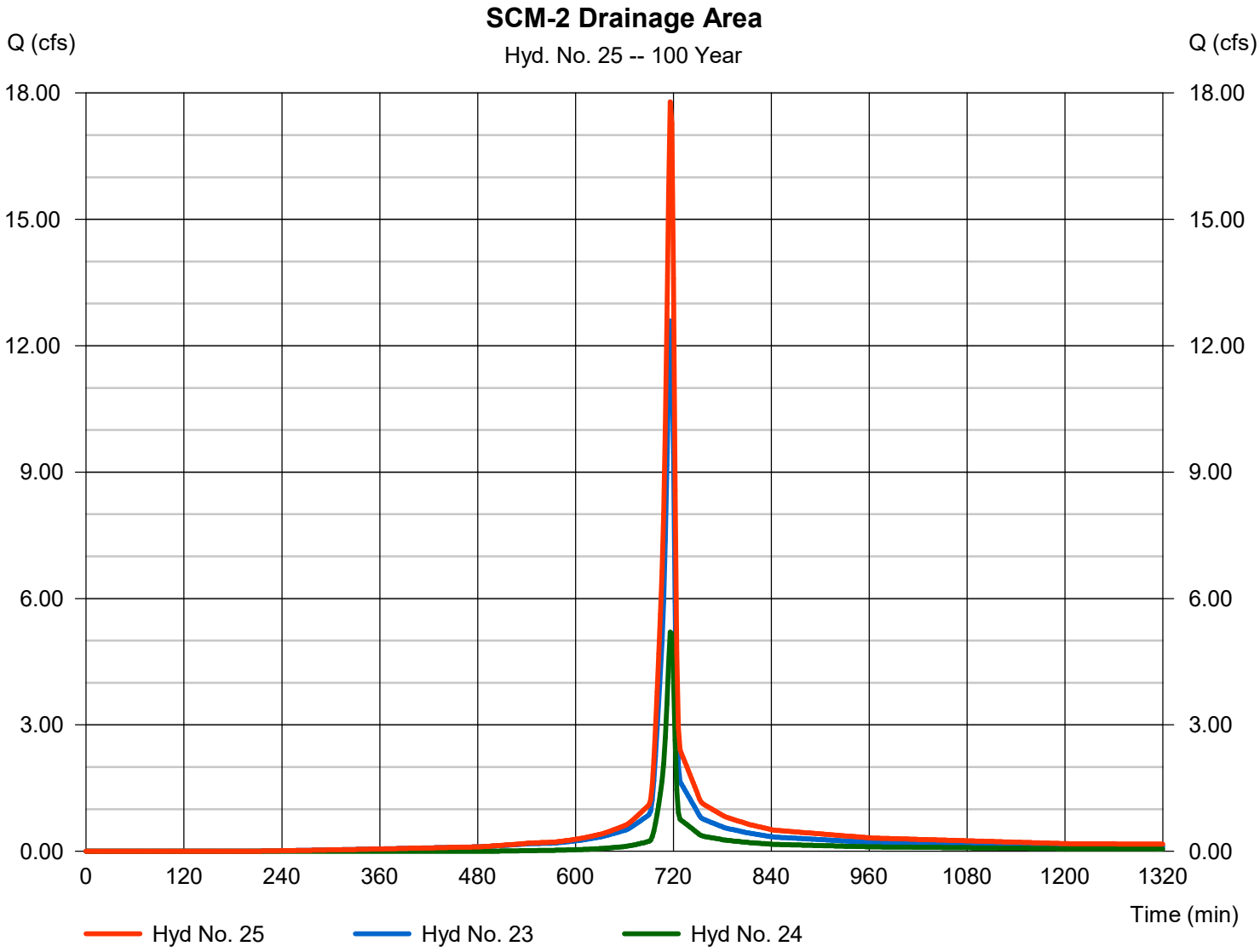


Hydrograph Report

Hyd. No. 25

SCM-2 Drainage Area

Hydrograph type	= Combine	Peak discharge	= 17.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 37,858 cuft
Inflow hyds.	= 23, 24	Contrib. drain. area	= 1.990 ac



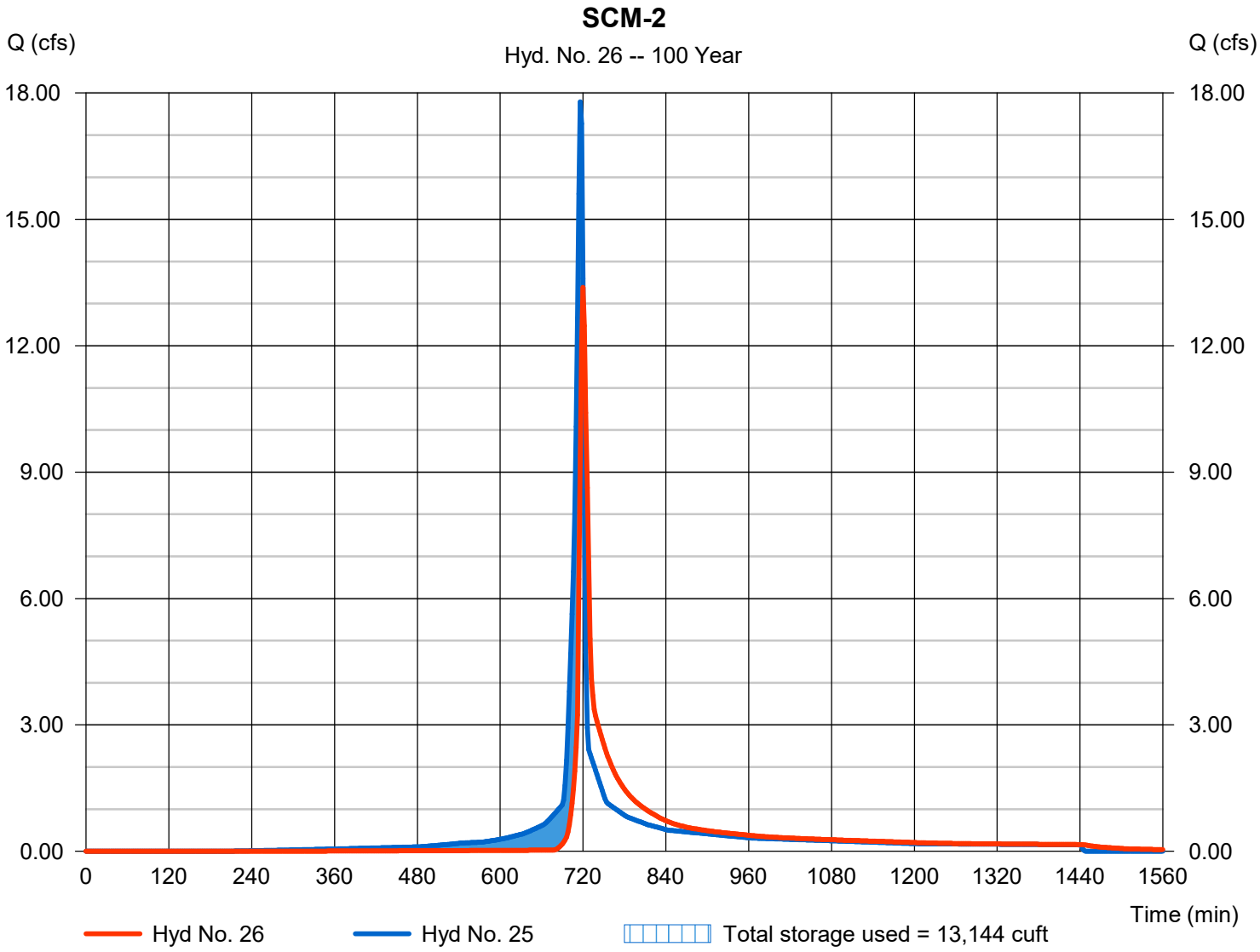
Hydrograph Report

Hyd. No. 26

SCM-2

Hydrograph type	=	Reservoir	Peak discharge	=	13.38 cfs
Storm frequency	=	100 yrs	Time to peak	=	720 min
Time interval	=	2 min	Hyd. volume	=	37,733 cuft
Inflow hyd. No.	=	25 - SCM-2 Drainage Area	Max. Elevation	=	329.27 ft
Reservoir name	=	SCM-2	Max. Storage	=	13,144 cuft

Storage Indication method used.

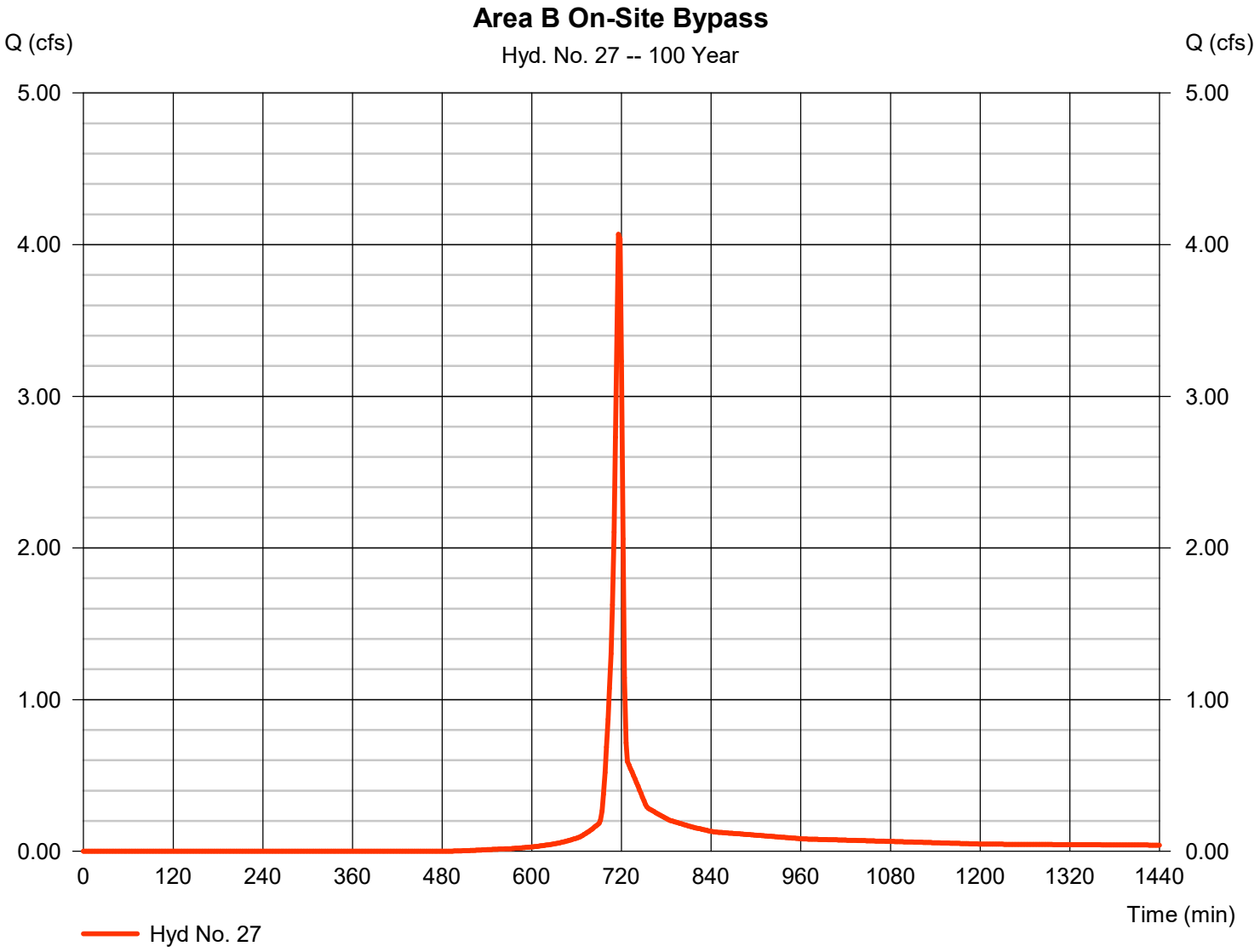


Hydrograph Report

Hyd. No. 27

Area B On-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.068 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	8,225 cuft
Drainage area	=	0.580 ac	Curve number	=	67.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

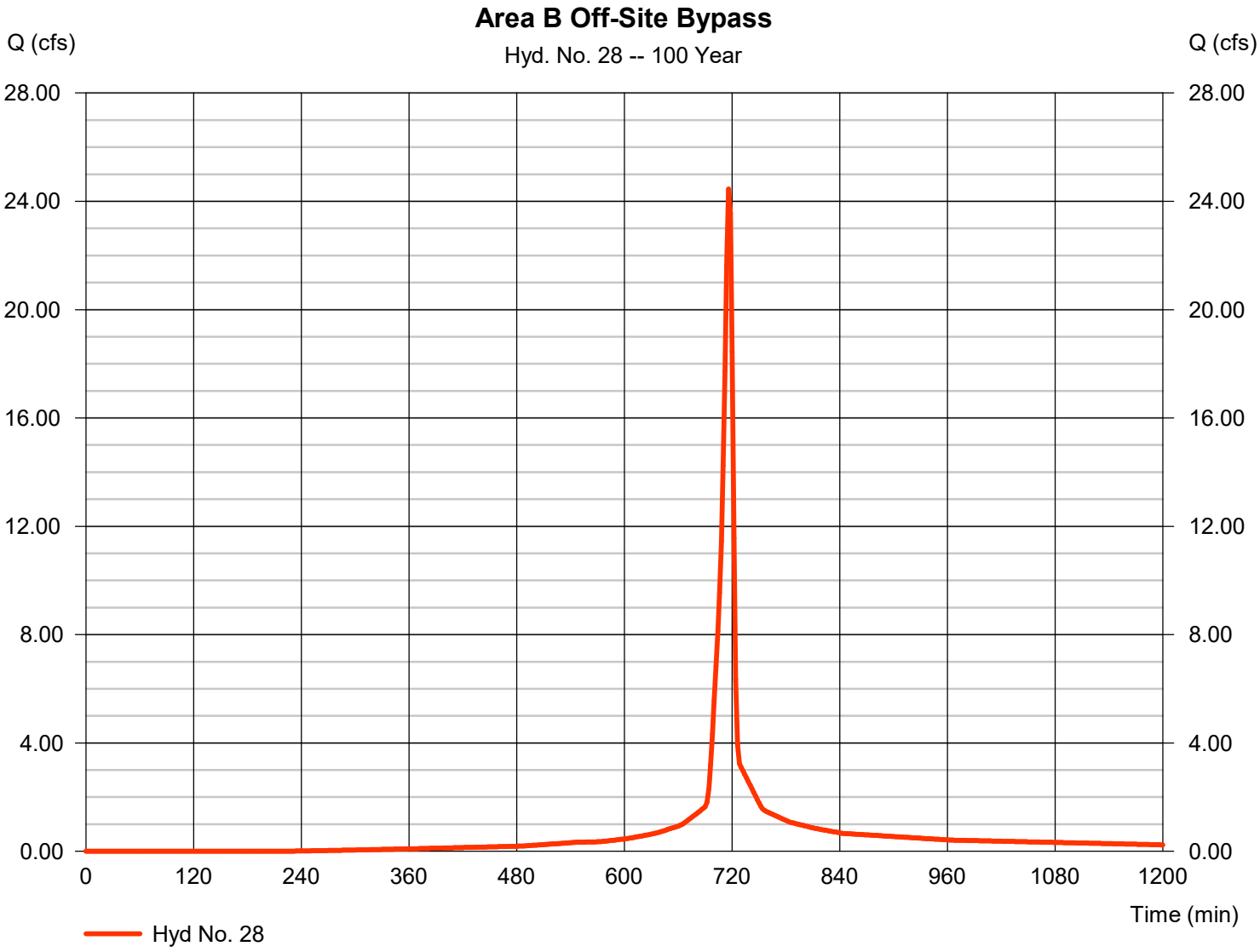


Hydrograph Report

Hyd. No. 28

Area B Off-Site Bypass

Hydrograph type	=	SCS Runoff	Peak discharge	=	24.45 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	52,624 cuft
Drainage area	=	2.470 ac	Curve number	=	85.4
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	8.00 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

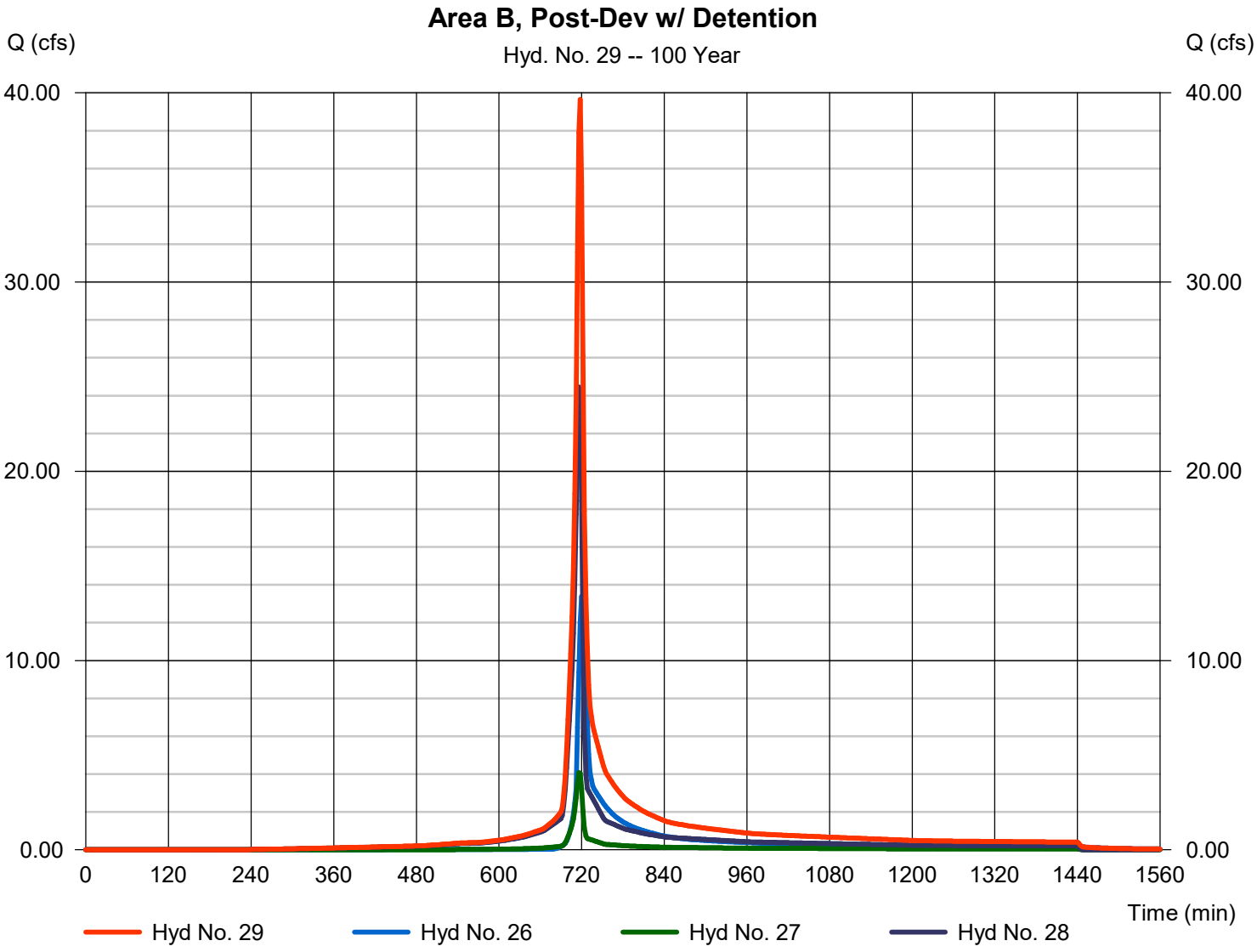


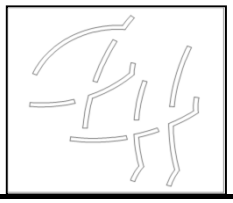
Hydrograph Report

Hyd. No. 29

Area B, Post-Dev w/ Detention

Hydrograph type	= Combine	Peak discharge	= 39.64 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 98,581 cuft
Inflow hyds.	= 26, 27, 28	Contrib. drain. area	= 3.050 ac



WETLAND SIZING	DATE 3-Jun-25	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

	WETLAND	SCM-1
Drainage Area, (DA) =	1.71 ac	
Impervious Area c= 0.95	1.16 ac	
Pervious Area c= 0.30	0.55 ac	
Cc =	0.74	

Wetland Surface Area & Volume

% Impervious =	68 %			
Design Storm Rainfall	1.00 in			
Runoff Coeff. (Rv = 0.05 + 0.009 (% Imperv.)) =	0.66 in/in			
Required Volume (design rainfall)(Rv)(DA) =	4,100 cf			
Depth of Temporary Pool (Dplants) =	15.0 in	(15-in max)		
Approx. Ave. Surface Area for Design =	3,280 sf			
Surface Area at Permanent Pool= (324.50)	2,565 sf	@ 0.0 in. ponding		
Surface Area at 6-in Depth= (325.00)	3,562 sf	@ 6.0 in. ponding		
Surface Area at Secondary Spillway= (325.75)	4,187 sf	@ 15.0 in. ponding		
Temporary Ponding Volume Provided=	**4,438 cf**	> 4,100 cf	**OK**	

Required Design Volume= **4,100 cf**

Stage-Storage Interpolation=

Elevation	Depth	Storage	Depth at Req'd Design Volume (ft) =
325.00 ft	0.50 ft	1532 cf	**1.16**
325.75 ft	1.25 ft	4438 cf	

Surface Area at Design Volume Depth (sf) = 4114 sf

Temp. Storage Depth above Dewatering Hole = 1.16 ft

Diameter of Dewatering Hole = 1.00 in

Detention (Draw-Down) Time = 3.0 days

T days=(Req. Temp. Storage Vol / (0.6 * A * (2*g*(h))^1/2) * 86400

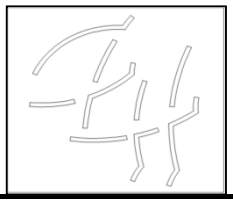
(where h = one third temp. storage depth measured to centroid of orifice)

Wetland Zones Required

Forebay Surface Area (10-15%) =	411 -	617 sf	
Non-Forebay Deep Pools (5-15%) =	206 -	617 sf	
Shallow Water Zone (35-45%) =	1440 -	1851 sf	
Temp. Inundation Zone (30-45%) =	1234 -	1851 sf	

Wetland Zones Provided

Forebay Surface Area =	**501 sf**	12%	OK
Non-Forebay Deep Pools =	**381 sf**	9%	OK
Shallow Water Zone =	**1,683 sf**	41%	OK
Temporary Inundation Zone =	**1,549 sf**	38%	OK

WETLAND SIZING	DATE 3-Jun-25	
PROJECT NAME Zebulon Public Safety Station	PROJECT NO 22-154	
LOCATION Zebulon, NC	BY KAS	

	WETLAND	SCM-2
Drainage Area, (DA) =	1.99 ac	
Impervious Area c= 0.95	1.00 ac	
Pervious Area c= 0.30	0.99 ac	
Cc =	0.63	

Wetland Surface Area & Volume

% Impervious =	50 %			
Design Storm Rainfall	1.00 in			
Runoff Coeff. (Rv = 0.05 + 0.009 (% Imperv.)) =	0.50 in/in			
Required Volume (design rainfall)(Rv)(DA) =	3,628 cf			
Depth of Temporary Pool (Dplants) =	15.0 in	(15-in max)		
Approx. Ave. Surface Area for Design =	2,903 sf			
Surface Area at Permanent Pool= (326.25)	2,259 sf	@ 0.0 in. ponding		
Surface Area at 6-in Depth= (326.75)	3,280 sf	@ 6.0 in. ponding		
Surface Area at Secondary Spillway= (327.50)	4,074 sf	@ 15.0 in. ponding		
Temporary Ponding Volume Provided=	**4,143 cf**	> 3,628 cf	**OK**	

Required Design Volume= **3,628 cf**

Stage-Storage Interpolation=

Elevation	Depth	Storage
326.75 ft	0.50 ft	1385 cf
327.50 ft	1.25 ft	4143 cf

Depth at Req'd Design Volume (ft) = **1.11**

Surface Area at Design Volume Depth (sf) = 3926 sf

Temp. Storage Depth above Dewatering Hole = 1.11 ft

Diameter of Dewatering Hole = 1.00 in

Detention (Draw-Down) Time = 2.7 days

T days=(Req. Temp. Storage Vol / (0.6 * A * (2*g*(h))^1/2) * 86400

(where h = one third temp. storage depth measured to centroid of orifice)

Wetland Zones Required

Forebay Surface Area (10-15%) =	393 -	589 sf	
Non-Forebay Deep Pools (5-15%) =	196 -	589 sf	
Shallow Water Zone (35-45%) =	1374 -	1767 sf	
Temp. Inundation Zone (30-45%) =	1178 -	1767 sf	

Wetland Zones Provided

Forebay Surface Area =	**444 sf**	11%	OK
Non-Forebay Deep Pools =	**353 sf**	9%	OK
Shallow Water Zone =	**1,462 sf**	37%	OK
Temporary Inundation Zone =	**1,667 sf**	42%	OK

STORM DRAINAGE / HYDRAULIC GRADE LINE

ANALYSIS

PROJECT NAME	Zebulon Public Safety Station
LOCATION	Zebulon, NC
DATE	5/13/2025
PROJECT NO	22-154
BY	KAS
CHECKED BY	-

DESIGN PHASE

PRELIM	/ /
CONSTR	/ X /
REVISION	/ /
RECORD	/ /
OTHER	/ /
(SPECIFY)	

Storm Event=	10
n=	0.013
m=	-1.99
b=	10.34
I=	7.14

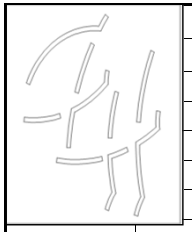
STORM DRAINAGE SCHEDULE

CONTINUED →

FROM	TO	INLET AREA (SF)	INLET AREA (AC)	IMPERVIOUS (%)	INLET Cc RUNOFF COEFF.	INLET DISCHARGE (CFS)	TOTAL AREAS (AC)	INLET TIME (MIN)	PIPE TIME (MIN)	Tc TIME OF CONC. (MIN)	I INTENSITY (IN/HR)	Cc RUNOFF COEFF.
A1	A2	4,350	0.10	63	0.71	0.00	0.10	5.00	0.00	5.00	7.14	0.71
A2	A3	7,210	0.17	56	0.66	0.78	0.27	5.00	0.35	5.35	7.01	0.68
A3	A4	23,350	0.54	95	0.92	3.51	0.80	5.00	1.06	6.06	6.76	0.84
A4	A5	12,010	0.28	99	0.94	1.86	1.08	5.00	1.90	6.90	6.50	0.87
B1	B2	29,340	0.67	53	0.64	0.00	0.67	5.00	0.00	5.00	7.14	0.64
B2	B3	18,270	0.42	35	0.53	1.58	1.09	5.00	0.29	5.29	7.03	0.60
B3	B4	18,170	0.42	66	0.73	2.17	1.51	5.00	0.68	5.68	6.89	0.64
C1	C2	4,710	0.11	92	0.90	0.00	0.11	5.00	0.00	5.00	7.14	0.90
D1	EX1	30,340	0.70	62	0.70	0.00	0.70	5.00	0.00	5.00	7.14	0.70
EX2	E1	22,700	0.52	67	0.74	0.00	0.52	5.00	0.00	5.00	7.14	0.74
E1	EX4	2,260	0.05	76	0.79	0.29	0.57	5.00	0.08	5.08	7.11	0.74
EX4	E2	0	0.00	100	0.95	0.00	0.57	5.00	0.27	5.27	7.04	0.74
E2	E3	0	0.00	100	0.95	0.00	0.57	5.00	0.48	5.48	6.96	0.74
E3	E4	0	0.00	100	0.95	0.00	0.57	5.00	0.76	5.76	6.86	0.74
E4	EX5	84,700	1.94	57	0.67	9.31	2.52	5.00	1.29	6.29	6.69	0.69
EX3	EX4	4,900	0.11	100	0.95	0.00	0.11	5.00	0.00	5.00	7.14	0.95
F1	F2	14,730	0.34	63	0.71	0.00	0.34	5.00	0.00	5.00	7.14	0.71

SCM-1 Outlet Barrel

*Refer to Hydraflow report for discharge calculations



STORM DRAINAGE / HYDRAULIC GRADE LINE ANALYSIS

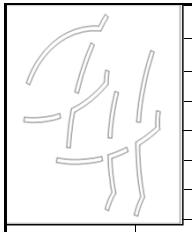
PROJECT NAME: Zebulon Public Safety Station
LOCATION: Zebulon, NC
DATE: 5/13/2025
PROJECT NO: 22-154
BY: KAS
CHECKED BY: -

DESIGN PHASE: PRELIM / / CONSTR / X / REVISION / / RECORD / / OTHER / / (SPECIFY)

Storm Event= 10
n= 0.013
m= -1.99
b= 10.34
I= 7.14

STORM DRAINAGE SCHEDULE - CONTINUED

FROM	TO	Q DISCHARGE (CFS)	Q SIDE-STREAM (CFS)	SLOPE (FT/FT)	DIA. (IN)	CAPACITY (FULL) (CFS)	V FULL (FPS)	LENGTH (FT)	SEGMENT TIME (MIN)	UPPER INV. (FT)	LOWER INV. (FT)	UPSTREAM TOP ELEV. (FT)	PIPE COVER (FT)
A1	A2	0.51	0.00	0.0060	15	5.0	4.1	84	0.35	328.10	327.60	332.00	2.54
A2	A3	1.27	0.00	0.0062	15	5.1	4.1	177	0.71	327.50	326.40	331.90	3.04
A3	A4	4.55	0.00	0.0068	15	5.3	4.4	219	0.84	326.30	324.80	331.15	3.49
A4	A5	6.07	0.00	0.0071	18	8.9	5.0	28	0.09	324.70	324.50	331.82	5.48
B1	B2	3.10	0.00	0.0067	15	5.3	4.3	75	0.29	327.80	327.30	331.25	2.09
B2	B3	4.61	0.00	0.0062	15	5.1	4.1	97	0.39	327.20	326.60	330.75	2.19
B3	B4	6.61	0.00	0.0076	18	9.1	5.2	33	0.11	326.50	326.25	331.05	2.91
C1	C2	0.69	0.00	0.0603	15	15.9	12.9	29	0.04	328.00	326.25	332.00	2.64
D1	EX1	3.50	0.00	0.0091	15	6.2	5.0	11	0.04	325.60	325.50	328.40	1.44
EX2	E1	2.74	0.00	0.0096	15	6.3	5.2	26	0.08	328.24	327.99	331.25	1.65
E1	EX4	3.02	0.00	0.0102	15	6.5	5.3	60	0.19	327.99	327.38	331.25	1.90
EX4	E2	3.75	0.76	0.0109	15	6.7	5.5	67	0.20	327.28	326.55	330.90	2.26
E2	E3	3.72	0.00	0.0053	15	4.7	3.8	66	0.29	326.45	326.10	330.25	2.44
E3	E4	3.67	0.00	0.0051	15	4.6	3.7	118	0.52	326.00	325.40	329.50	2.14
E4	EX5	15.18	2.86	0.0045	24	15.3	4.8	22	0.08	325.30	325.20	328.06	0.58
EX3	EX4	0.76	0.00	0.0208	6	0.8	4.1	106	0.43	330.68	328.48	333.58	2.35
F1	F2	1.71	0.00	0.0255	15	10.3	8.4	110	0.22	327.30	324.50	331.25	2.59
SCM-1 Outlet Barrel		1.73	0.00	0.0103	15	6.5	5.3	39	0.12	324.40	324.00	326.75	0.99



STORM DRAINAGE / HYDRAULIC GRADE LINE ANALYSIS

PROJECT NAME: Zebulon Public Safety Station
LOCATION: Zebulon, NC
DATE: 5/13/2025
PROJECT NO: 22-154
BY: KAS
CHECKED BY: -

DESIGN PHASE: PRELIM / / ; CONSTR / X / ; REVISION / / ; RECORD / / ; OTHER / / ; (SPECIFY)

Storm Event= 10
n= 0.013
m= -1.99
b= 10.34
l= 7.14

HYDRAULIC GRADE LINE

CONTINUED →

BEND LOSS	K's	
90° = 0.70	70° = 0.61	50° = 0.47	30° = 0.28	20° = 0.16
80° = 0.66	60° = 0.55	40° = 0.38	25° = 0.22	15° = 0.10

FROM	TO	PIPE AREA (FT)	HYDRAULIC RADIUS (FT)	SIDESTREAM SUMMATION (CFS)	HEAD LOSS Hf	Hc	He	Hb	Ht	BEND LOSS K	FRICTION SLOPE (FT/FT)	FRICTION VELOCITY (FPS)
A1	A2	1.2272	0.3125	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.0001	0.41
A2	A3	1.2272	0.3125	0.00	0.07	0.00	0.00	0.00	0.07	0.38	0.0004	1.03
A3	A4	1.2272	0.3125	0.00	1.08	0.05	0.01	0.01	1.15	0.45	0.0049	3.69
A4	A5	1.7671	0.3750	0.00	0.09	0.05	0.07	0.15	0.36	0.70	0.0033	3.42
B1	B2	1.2272	0.3125	0.00	0.17	0.02	0.00	0.00	0.20	0.00	0.0023	2.52
B2	B3	1.2272	0.3125	0.00	0.49	0.05	0.03	0.01	0.59	0.10	0.0051	3.74
B3	B4	1.7671	0.3750	0.00	0.13	0.05	0.08	0.15	0.41	0.70	0.0039	3.72
C1	C2	1.2272	0.3125	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0001	0.56
D1	EX1	1.2272	0.3125	0.00	0.03	0.03	0.00	0.00	0.06	0.00	0.0029	2.84
EX2	E1	1.2272	0.3125	0.00	0.05	0.02	0.00	0.00	0.07	0.00	0.0018	2.22
E1	EX4	1.2272	0.3125	0.00	0.13	0.02	0.03	0.00	0.18	0.00	0.0022	2.45
EX4	E2	1.2272	0.3125	0.76	0.22	0.04	0.03	0.01	0.30	0.10	0.0034	3.04
E2	E3	1.2272	0.3125	0.76	0.22	0.04	0.05	0.03	0.34	0.22	0.0033	3.02
E3	E4	1.2272	0.3125	0.76	0.38	0.03	0.05	0.09	0.56	0.66	0.0032	2.98
E4	EX5	3.1416	0.5000	3.62	0.10	0.09	0.05	0.10	0.33	0.70	0.0045	4.81
EX3	EX4	0.1963	0.1250	0.00	1.96	0.06	0.00	0.00	2.02	0.00	0.0185	3.88
F1	F2	1.2272	0.3125	0.00	0.08	0.01	0.00	0.00	0.08	0.00	0.0007	1.39
SCM-1 Outlet Barrel		1.2272	0.3125	0.00	0.03	0.01	0.00	0.00	0.04	0.00	0.0007	1.40

STORM DRAINAGE / HYDRAULIC GRADE LINE ANALYSIS

PROJECT NAME: Zebulon Public Safety Station
LOCATION: Zebulon, NC

DATE: 5/13/2025
PROJECT NO: 22-154
BY: KAS
CHECKED BY: -

DESIGN PHASE: PRELIM / / CONSTR / X / REVISION / / RECORD / / OTHER / / (SPECIFY)

Storm Event= 10
n= 0.013
m= -1.99
b= 10.34
I= 7.14

HYDRAULIC GRADE LINE - CONTINUED

DESIGN CRITERIA:
1. DESIGN FOR THE 10 YR STORM
2. ASSUME TIME OF CONCENTRATION TO AN INDIVIDUAL INLET = 5 MIN.
3. INTENSITY = g/(h+T), FOR 10 YR STORM
4. MANNINGS "n" FACTOR= .013
5. RATIONAL METHOD: C= .30 GRASS, C= .95 PAVEMENT

FROM	TO	OUTLET W.S. ELEV (FT)	INLET W.S. ELEV. OUTLET CONTOL (FT)	INLET CONTROL (FT)	USE (FT)	FLOW CONDITION CONTROL	HGL INSIDE PIPE DOWN (HW/D<1)	HGL INSIDE PIPE UP (HW/D<1)	UPSTREAM INLET TYPE	INSIDE PIPE?	INSIDE STRUCTURE?
A1	A2	328.81	328.82	328.73	328.82	OUTLET	0.97	0.57	CB	OK	OK
A2	A3	328.74	328.81	328.17	328.81	OUTLET	1.87	1.05	CB	USE O-RING	OK
A3	A4	327.59	328.74	327.52	328.74	OUTLET	2.23	1.95	CB	USE O-RING	OK
A4	A5	327.23	327.59	325.96	327.59	OUTLET	1.82	1.93	CB	USE O-RING	OK
				Tailwater Elev=	327.23						
B1	B2	329.51	329.71	328.70	329.71	OUTLET	1.77	1.53	CB	USE O-RING	OK
B2	B3	328.92	329.51	328.43	329.51	OUTLET	1.86	1.85	DI	USE O-RING	OK
B3	B4	328.51	328.92	327.85	328.92	OUTLET	1.51	1.61	CB	USE O-RING	OK
				Tailwater Elev=	328.51						
C1	C2	328.51	328.51	328.64	328.64	INLET	1.81	0.51	CB	USE O-RING	OK
				Tailwater Elev=	328.51						
D1	EX1	326.50	326.56	326.58	326.58	INLET	0.80	0.78	CI	OK	OK
				Tailwater Elev=	326.50						
EX2	E1	328.99	329.06	329.08	329.08	INLET	0.80	0.67	DI	OK	OK
E1	EX4	328.50	328.68	328.88	328.88	INLET	0.90	0.71	DI	OK	OK
EX4	E2	328.20	328.50	328.31	328.50	OUTLET	1.32	0.98	MH	USE O-RING	OK
E2	E3	327.86	328.20	327.47	328.20	OUTLET	1.41	1.40	MH	USE O-RING	OK
E3	E4	327.31	327.86	327.01	327.86	OUTLET	1.53	1.49	MH	USE O-RING	OK
E4	EX5	326.80	327.13	327.31	327.31	INLET	0.80	1.00	DBL CB	USE O-RING	OK
				Tailwater Elev=	326.80						
EX3	EX4	328.88	330.90	331.58	331.58	INLET	0.80	1.80	JB	USE O-RING	OK
				Tailwater Elev=	328.50						
F1	F2	327.23	327.31	328.01	328.01	INLET	2.18	0.57	CB	USE O-RING	OK
				Tailwater Elev=	327.23						
SCM-1 Outlet Barrel		325.00	325.04	325.11	325.11	INLET	0.80	0.57	RISER	OK	OK
				Tailwater Elev=	325.00						

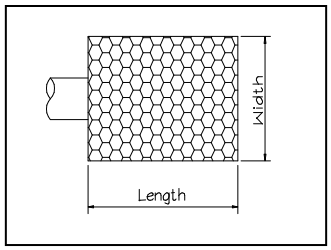
OUTLET PROTECTION DESIGN	DATE	DESIGN PHASE
	5/13/2025	PRELIM / /
PROJECT NAME	PROJECT NO	CONSTR / X /
Zebulon Public Safety Station	22-154	REVISION / /
LOCATION	BY	RECORD / /
Zebulon, NC	KAS	OTHER / /
	CHECKED BY	(SPECIFY)
	-	

Riprap Apron Outlet Protection

FES No.=	A5		Q_{10}/Q_{full} =	0.68	
Pipe Dia=	18	in	V/Vfull =	1.07	
Q_{10} =	6.07	cfs	V =	5.4	fps
Qfull =	8.88	cfs			
Vfull =	5.02	fps			

From Fig. 8.06.b.1: Zone = 2

From Fig. 8.06.b.2:



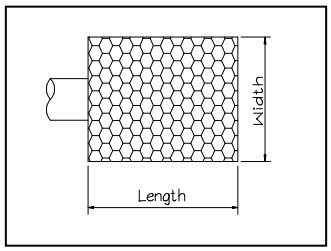
D_{50}	=	8	in
D_{MAX}	=	12	in
Riprap Class	=	B	
Apron Thickness	=	18	in
Apron Length	=	9	ft
Apron Width = 3xDia	=	5	ft

Riprap Apron Outlet Protection

FES No.=	B4		Q_{10}/Q_{full} =	0.72	
Pipe Dia=	18	in	V/Vfull =	1.08	
Q_{10} =	6.61	cfs	V =	5.6	fps
Qfull =	9.14	cfs			
Vfull =	5.17	fps			

From Fig. 8.06.b.1: Zone = 2

From Fig. 8.06.b.2:



D_{50}	=	8	in
D_{MAX}	=	12	in
Riprap Class	=	B	
Apron Thickness	=	18	in
Apron Length	=	9	ft
Apron Width = 3xDia	=	5	ft

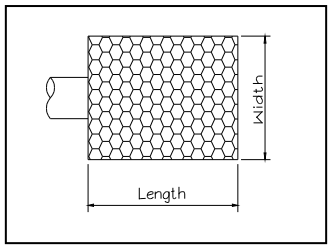
OUTLET PROTECTION DESIGN	DATE	DESIGN PHASE
	5/13/2025	PRELIM / /
PROJECT NAME	PROJECT NO	CONSTR / X /
Zebulon Public Safety Station	22-154	REVISION / /
LOCATION	BY	RECORD / /
Zebulon, NC	KAS	OTHER / /
	CHECKED BY	(SPECIFY)
	-	

Riprap Apron Outlet Protection

FES No.=	C2		Q_{10}/Qfull =	0.04	
Pipe Dia=	15	in	V/Vfull =	0.42	
Q_{10} =	0.69	cfs	V =	5.5	fps
Qfull =	15.87	cfs			
Vfull =	12.91	fps			

From Fig. 8.06.b.1: Zone = 2

From Fig. 8.06.b.2:



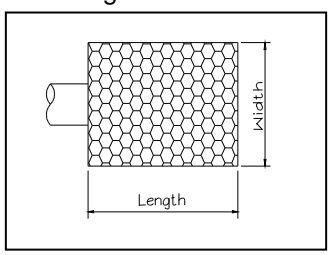
D_{50}	=	8	in
D_{MAX}	=	12	in
Riprap Class	=	B	
Apron Thickness	=	18	in
Apron Length	=	7.5	ft
Apron Width = 3xDia	=	4	ft

Riprap Apron Outlet Protection

FES No.=	SCM-1 Outlet Barrel		Q_{10}/Qfull =	0.26	
Pipe Dia=	15	in	V/Vfull =	0.83	
Q_{10} =	1.73	cfs	V =	4.4	fps
Qfull =	6.54	cfs			
Vfull =	5.32	fps			

From Fig. 8.06.b.1: Zone = 2

From Fig. 8.06.b.2:



D_{50}	=	8	in
D_{MAX}	=	12	in
Riprap Class	=	B	
Apron Thickness	=	18	in
Apron Length	=	7.5	ft
Apron Width = 3xDia	=	4	ft

OUTLET RISER ANTI-FLOAT DESIGN	DATE 5/13/2025	DESIGN PHASE
		SD / /
PROJECT NAME	PROJECT NO	DD / /
Zebulon Public Safety Station	22-154	CD / x /
LOCATION	BY	REV / /
Zebulon, NC	KAS	OTHER / /
	CHECKED BY	(SPECIFY)

Structure: **SCM-1 Riser**

Top of Rim=	327.25 ft			
Floor of Structure =	323.40 ft			
Thickness of Base =	6 in	=	0.50 ft	
Thickness of Wall =	6 in	=	0.50 ft	
Extended Base =	24 in	=	2.00 ft	
I.D. of structure =	4 ft	by	4 ft	
O.D. of structure =	5 ft	by	5 ft	

Depth of water displaced =	6.4	ft
Vol of water displaced =	159	cf
Density of water =	62.4	pcf
Wt of water displaced =	9,906	lbs

Wt of structure concrete = Wt of riser sections + Wt of base slab

Density of concrete =	150	pcf
Vol. of riser sections =	35	cf
Wt of riser sections =	5,198	lbs
Vol of base =	63	cf
Wt of base =	9,375	lbs
Total wt of structure =	14,573	lbs

Resulting Safety Factor =	1.47	**O.K.**
Req. S.F.=	1.15	

OUTLET RISER ANTI-FLOAT DESIGN	DATE 5/13/2025	DESIGN PHASE
		SD / /
PROJECT NAME	PROJECT NO	DD / /
Zebulon Public Safety Station	22-154	CD / x /
LOCATION	BY	REV / /
Zebulon, NC	KAS	OTHER / /
	CHECKED BY	(SPECIFY)

Structure: **SCM-2 Riser**

Top of Rim=	328.75 ft			
Floor of Structure =	325.25 ft			
Thickness of Base =	6 in	=	0.50 ft	
Thickness of Wall =	6 in	=	0.50 ft	
Extended Base =	24 in	=	2.00 ft	
I.D. of structure =	4 ft	by	4 ft	
O.D. of structure =	5 ft	by	5 ft	

Depth of water displaced =	6.0	ft
Vol of water displaced =	150	cf
Density of water =	62.4	pcf
Wt of water displaced =	9,360	lbs

Wt of structure concrete = Wt of riser sections + Wt of base slab

Density of concrete =	150	pcf
Vol. of riser sections =	32	cf
Wt of riser sections =	4,725	lbs
Vol of base =	63	cf
Wt of base =	9,375	lbs
Total wt of structure =	14,100	lbs

Resulting Safety Factor =	1.51	**O.K.**
Req. S.F.=	1.15	